GOVERNMENT E-SERVICES EVALUATION GUIDELINE

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POLIITIKAUURINGUTE KESKUS
PRAXIS
CENTER FOR POLICY STUDIES

ESTONIAN DEVELOPMENT COOPERATION

Guidline is co-financed by the Estonian Ministry of Foreign Affairs from the finances of Estonian Development Cooperation and Humanitarian Aid.

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ISBN 978-9949-507-57-3 (pdf)

TABLE OF CONTENTS

INTRODUCTION

Governments around the world are extensively implementing information and communication technology (ICT) in order to provide services and fulfil government functions. The adoption of ICT has exceeded the evaluation of such systems. There are four types of government e-services: government to government, government to citizen, government to business and government to employee. ICT can change the performance of all the counterparts, but the actual impact depends much on several factors regarding the implementation and use of the system. A systematic approach is needed to understand, describe and quantify the impact of government e-services in order to make better decisions about these.

This guideline offers an introduction to the concept of evaluation, guides you through the process of evaluation and provides an overview of a range of methods. Theoretical material is supported by examples of conducted e-service evaluations in Estonia. The guideline is aimed for analysts, public servants and other specialists planning to undertake an evaluation as well as people developing e services.

1. THE CONCEPT OF EVALUATION

1.1. DEFINITION OF EVALUATION

Evaluation is often defined as a systematic and objective assessment of the design, implementation and results of a program/project/policy/service (henceforth the term service is used in the document) **compared to a set of explicit or implicit objectives, targets or standards**. Evaluation usually determines the fulfilment of objectives, service efficiency, effectiveness, impact, sustainability and relevance.[1]

Evaluations are frequently used to establish the impact of service. Impact refers to the difference between the situation with service and the situation without service. And this is the reason for the fundamental evaluation problem - these two situations at the same time are mostly not possible and there is the need to construct one or the other using different methods. However, **the most important contribution of evaluations is not the precision of the calculations used to derive the impact, but the action of analysing** – questioning, describing, comparing actual impact and exploring assumptions for achieving desired impact in a systematic way.

Evaluation provides value in different phases of service provision:

- During **service development** evaluation can be used to monitor progress, and re-define activities and expectations. It can identify potential gaps or problems early, so steps can be taken to resolve them.
- For a **functioning service** evaluation findings can be used to monitor service provision and provide feedback to managers. Evaluation can help to demonstrate successes as well as areas for improvement. Outcomes can also be assessed for mature services when enough time has passed since implementation to allow results to appear.
- After a longer period **of service provision** evaluation helps to assess the total impact of the service as well as document lessons learned for the future. In this phase evaluation can assess whether unexpected outcomes appeared and the desired results were sustained. Also, the possibility that an intervention could be replicated in another setting and factors to encourage this can be analysed.

In professional literature the term "evaluation" is mainly used for post-implementation (ex-post) assessment. And pre-implementation or ex-ante assessment is referred to as "impact assessment". Monitoring, however, is a continuing action during the provision of service that provides indication of the extent of progress and achievement of objectives using systematic collection of data on specified indicators.[2] Throughout this guideline term "evaluation" is used for all assessments, the distinction between pre- and post-implementation is made if needed.

[1] Based on Queensland (2014) and OECD DAC Glossary
[2] OECD DAC Glossary

1.2. EVALUATION ABC

In the subsections below main aspects about evaluation are outlined in order to provide a theoretical input for understanding the evaluation of e-services.

Why?

In general, evaluations enable to:

- Understand what works and why
- Make better/more informed decisions
- Increase the openness and transparency of the decision making
- Keep the costs under control
- Avoid unnecessary intervention
- Assess the results

In case of e-service already in use, the aim of the evaluation can be to find improvement possibilities and provide knowledge to other implementers. However, when the e-service is still in the planning phase, it can provide valuable information on whether and how to implement the service. And evaluation is especially important ex-post for learning from past experiences to identify more effective interventions.[3] Evaluation objectives can also be based on the overall goal of implementing the service and estimating the success of implementation (the latter is the case of DeLone and McLean IS Success model introduced in subsection 2.1).

Thus, the specific reason for evaluation can be:

- To decide whether to implement an e-service
- To give input for improving the e-service in development
- To assess if the implementation of e-service has produced desired outcomes
- To evaluate the overall impact of e-service

Who?

This question defines which perspective (e.g. societal, end-user, government) is taken in the evaluation process as most e-services affect several stakeholders. The number of stakeholders can make the implementation complicated, possible outcomes more diverse and, thus, the evaluation more difficult. It is important to make the distinction between the context and the subjects under evaluation.

[3] Yusof et al 2008

Consider who is:

- Using the service
- Affected by the service
- Involved in service provision
- Intended users of evaluation findings

When?

The e-service can be in different phases of development during the evaluation. Evaluation can be done in four main phases of the classical system development life cycle (SDLC)[4]:

- Pre-implementation (development)
- During implementation
- Post-implementation
- During routine operation

What?

There are innumerable aspects of an e-service that can be measured and evaluated. Evaluation can include technical, professional, organisational, economic, ethical and legal domains. Also, in many cases it is not easy to draw the line, for example, between the overall information management platform of a state institution and a specific e-service. Ideally the evaluation framework should seek to address such a difficulty.

Types of evaluations:

- Impact evaluations focus on questions of causality and the overall results of the service provision.
- Performance monitoring provides information on how a service is operating and the extent to which specified objectives are being attained. Performance monitoring informs on whether the set indicators can be reached.
- Process evaluations answer questions about how the service operates, documents the procedures and activities undertaken in service delivery. The focus is on how the service is provided to the user.
- Cost evaluations address how much the service provision costs in relation to alternative uses of the same resources.

[4] See more at http://en.wikipedia.org/wiki/Systems_development_life_cycle

Sometimes different types of evaluations are combined to achieve the goals of service provider, or other parties who commission the evaluation. Therefore, in order to select the appropriate type of evaluation it is vital to define the objective of the evaluation clearly.

How?

Evaluation could be supported by a broader framework and entail objectivist or subjectivist approaches. The former relies on the assumption that there is a possible common understanding, what constitutes a good service: for example, randomized controlled trials (RCTs) are important in the objectivist approach (this is especially the case in health care settings). The latter on the other hand assumes that there are many stakeholders involved in a complex system, thus there is no one and only way to say, what is right for them. In subjectivist studies, research is conducted based on the judgements of expert evaluators or stakeholders in the natural environment of the subjects. The subjectivist studies can be more efficient and holistic, while objectivist approach could be more costly and sometimes difficult to produce.

Hence a right balance between subjectivist and objectivist approaches and qualitative and quantitative methods should be seeked. Although integrating qualitative and quantitative research can be difficult[5], it could also be challenging to provide a comprehensive evaluation with just a few methods (whether qualitative or quantitative) in case of services with many users, dimensions, functions and development phases. Thus, several research approaches should be considered beforehand, whereas taking into account the cost and suitability of different methods.

1.3. EVALUATION PROCESS

The evaluation process involves (Figure 1):

- First stage with the aim of getting a good understanding of the service - preparing for the evaluation and working out the intervention logic
- Evaluation planning stage where the objectives and design (evaluation questions, indicators) of evaluation is focused on
- Implementation stage includes data collection and analyses, and reporting results

[5] Bryman 2007

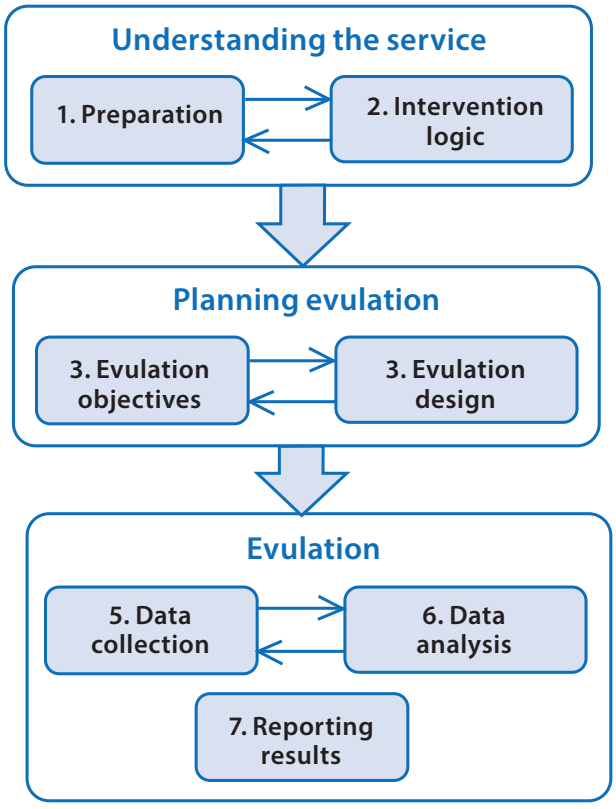

Figure 1. Phases of evaluation[6]

Preparation stage

In preparation stage the following aspects should be considered:

1) Firstly, it is important to take into account the duration and timing of the assessment. In this regard there are two important issues to keep in mind: data collection is generally the most time-consuming phase of the process, and depending on the topic being studied, certain temporal distance must be allowed between the activities and their assessment in order for the results to manifest properly. The time spent on evaluation depends on the level of scrutiny, methodology, availability of data, variety and complexity of service etc.

2) Secondly, the cost of evaluation and the type of funding should be considered. The cost and duration of the assessment generally depend on the same factors (e.g. data collection is generally the most expensive and time-consuming phase of the assessment process). It is advisable to plan the evaluation and data collection in conjunction with planning of the service.

3) Thirdly, the organisational capacity for carrying out the evaluation is important to understand. If the organisation has plenty of people with analytical experience, and enough

[6] http://meera.snre.umich.edu/planning-and-implementing-ee-evaluation

time to take on the evaluation, then the organisation may conduct the evaluation in-house. If the organisation lacks the relevant expertise, but could provide support staff, then an external evaluator should be hired.

The time, cost and needed analytical expertise depend on the complexity of the evaluation. Short-term evaluations of individual services are simpler, whereas long-term comprehensive evaluations of systems require more time, money and highly professional expertise.

Time and financial resources, as well as capacity, may set serious limitations on the evaluation. In case of serious limitations it should be considered whether it is reasonable to undertake the evaluation at all. **High quality evaluation with sound methodology provides the needed value, so rather perform fewer but better evaluations**.

Intervention logic

Intervention logic is considered a precondition for evaluation - in order to carry out an evaluation, understanding of the subject of evaluation (how the service enables to achieve desired impact) is needed. **Constructing and analysing the intervention logic is the most valuable result of an (ex-ante) evaluation**. Poorly designed intervention is not worth complicated evaluation effort.

Intervention logic ties problems, objectives and actions in order to describe how the expected results will be achieved. In short, the following issues have to be clearly stated:

- Problem - what and why need to be changed?
- Objective - what would be an outcome of the change?
- Action - what will be done for the change to take place?

There are numerous methods to construct the intervention logic (methods are described in Annex 1):

- Result chain
- Logical framework
- Theory of change
- Problem tree/objective tree

Without understanding the intervention logic the strategic perspective remains unclear, poor understanding the underlying problems, planning is focused on activities, difficult to define results, financial resources divided not directed towards the most effective way to achieve the objective, short term view, and there is a lack of common understanding of the issues.

2. PLANNING AN EVALUATION

2.1. EVALUATION FRAMEWORK

Choosing the questions to be asked and indicators to be measured in an evaluation can be difficult without a systematic framework. The evaluation framework should support setting a focus on evaluation and using different methods, measures and study designs (both quantitative and qualitative), but also address different dimensions, aspects and problems of the service under examination. A framework can be seen as a plan or a structure with relevant dimensions that an evaluation will focus on. A comprehensive framework can support different study designs, indicators and methods.

Different frameworks address different evaluation needs – some focus on specific development stages, some look at different process steps or distinguish dimensions, some take the cost and investment perspective of evaluation.

For example, the Total Cost of Ownership (TCO) method aims to quantify the short and long term (direct and indirect) costs of an ICT solution during the life-cycle of the solution. But the TCO model does not usually assess how the intervention meets the needs of the user or fits with the organisation's strategic aims.

With regards to e-government, the DeLone and McLean (2003) framework has been used in order to capture the citizen's perspective of e-governance benefits, showing the interconnections of different dimensions of information system evaluation (Figure 2).

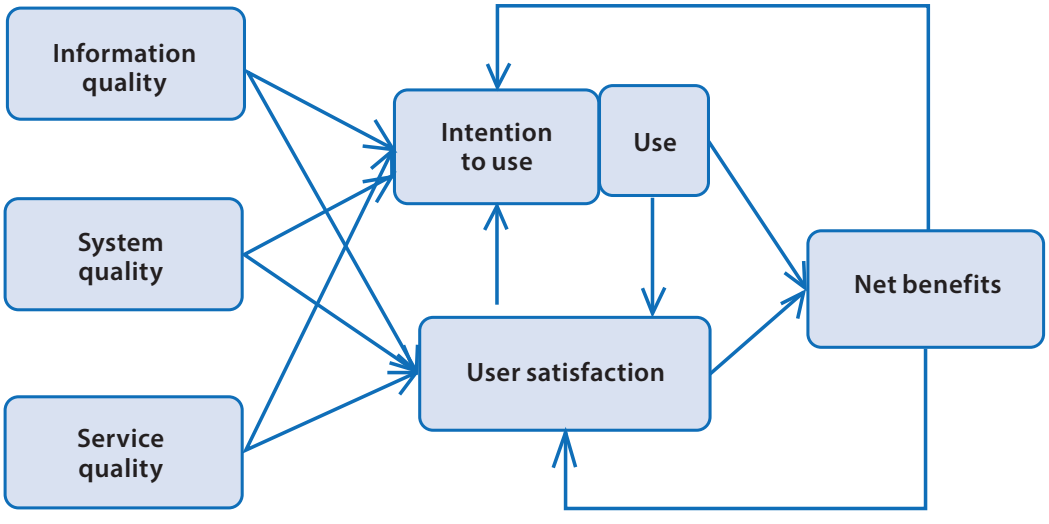

Figure 2. DeLone and McLean's updated IS success model

Esteves and Joseph (2008) focused on ex-post evaluation of government e-services using a three-dimensional framework for evaluation (Figure 3). The three dimensions were government e-services' maturity level, stakeholders, and assessment levels.

As the e-services mature, successive assessments may be necessary to determine if the goals are being met. The assessment framework contributes both to the improved accountability and the definition of government e-service strategies prior to, during, and post-implementation. Evaluation of government e-services is a continuous process. However, evaluation will be valuable if accompanied by clear guidelines for improvement and better achievement of outcomes.

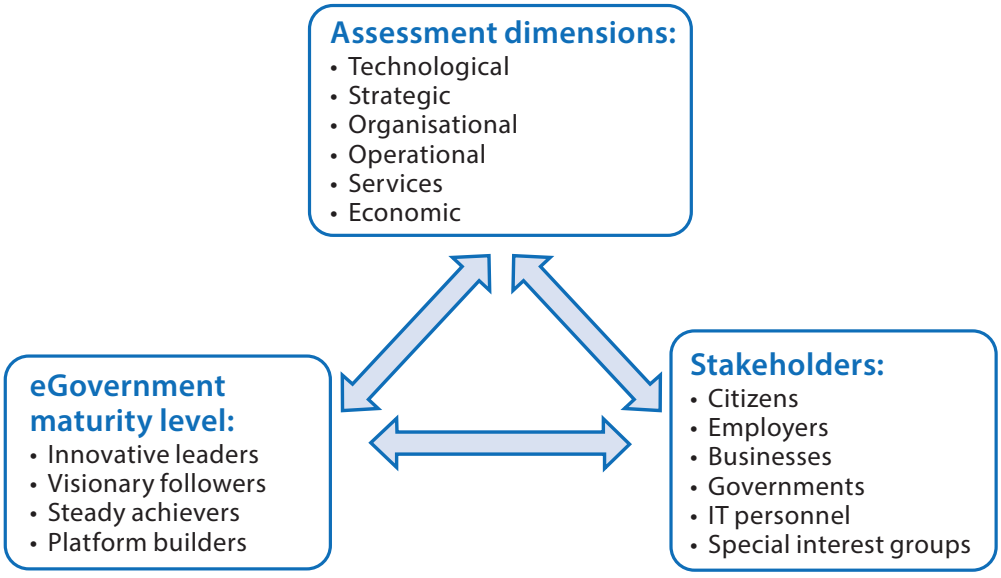

Figure 3. Esteves and Joseph eGovernment evaluation framework

2.2. DETERMINING EVALUATION CRITERIA AND QUESTIONS

Evaluation criteria determine what are the aspects of an e-service that are evaluated. Usually the criteria of relevance, effectiveness, efficiency and sustainability are used (EVALSED 2012):

- Relevance refers to the appropriateness of the explicit objectives of the evaluation object in relation to the problems it aims to address. Usually, the questions of relevance are used in ex-ante evaluation because the focus is on choosing the best strategy.
- Effectiveness concerns with the objectives formulated being achieved, what the successes and difficulties have been, how appropriate the chosen solutions have turned out to be and what is the influence of external factors. Important in intermediate and ex-post evaluations.

- Efficiency is assessed by comparing the results obtained and the resources mobilised. Often the terms economy and cost minimisation are used instead of efficiency. Effectiveness and efficiency of services are the questions of intermediate and ex-post evaluations.
- Sustainability refers to the extent to which the results of the intervention are durable. Often evaluations consider the sustainability of institutional changes as well as socio-economic impacts.
- Utility is very particular evaluation criterion and judges the impacts obtained in relation to broader societal and economic needs.
- Equity as looking at winners and losers for example in case of changes to services or reducing inequality, whether income inequality, gender inequality or some other aspect has been getting more important over the past years and is a requirement of some sources of funding of evaluations or services.

These criteria are not exclusive. Flexibility, institutional constraints, acceptance etc can also be used in evaluations if relevant. Table 1 below provides an overview about the typical evaluation questions related to the main criteria.

Defining evaluation questions is an essential part of planning any evaluation. There are different types of evaluation questions:

- Descriptive questions intended to describe and measure changes (answering the question what happened?)
- Causal questions strive to understand and assess relations of cause and effect (how and to what extent is something that occurred attributable to the intervention?)
- Normative questions which apply agreed targets (are the results and impacts satisfactory in relation to targets, goals, etc?)
- Predictive questions attempt to anticipate what will happen as a result of planned interventions (will the intervention create negative effects?)
- Critical questions often support change from value perspective (how can e-services be better accepted by user groups?)

When determining the evaluation questions, the following aspects must be taken into consideration:

- Question should correspond to a real need for information, i.e. be an input into decision-making or public debate. It should not be only of interest in terms of new knowledge as in scientific research.
- Question concerns an impact, a result or a need i.e. elements outside the service (beneficiaries, economic environment etc.). Questions of internal management of resources and outputs, can be treated more efficiently in the course of monitoring or audit.

- Question concerns only one judgement criterion (e.g. efficiency). Without judgement criteria clearly stated from the outset, it is difficult to provide meaningful conclusions. Evaluation questions that include judgement criteria fall primarily into one of the following four categories: relevance, effectiveness, efficiency, and sustainability (Figure 4).

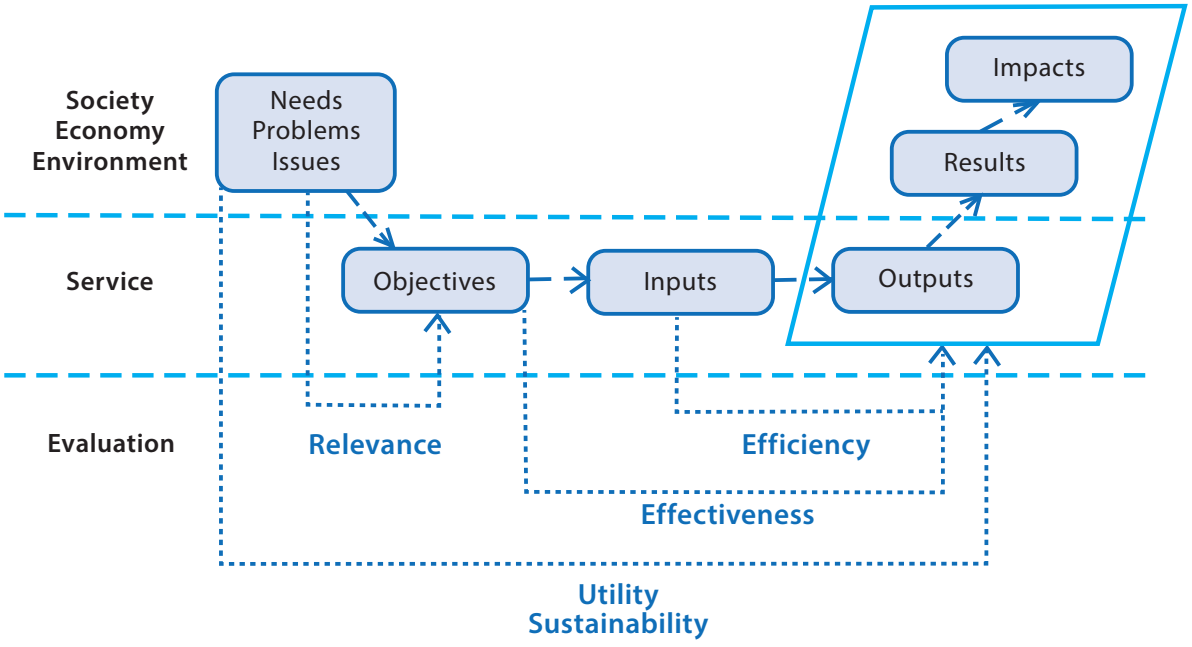

Figure 4. Selecting priority evaluation questions (EVALSED 2012)

Table 1. Example evaluation questions related to the main evaluation criteria

EVALUATION CRITERIA	EXAMPLE QUESTIONS
Relevance	Are service objectives related to the needs? How much does the intervention help to solve the problem? Are there any other interventions that would be more relevant?
Effectiveness	To what extent have the objectives been achieved? Has the intervention produced the expected effects in short term and long term? What helped/ hindered reaching the desired impact?
Efficiency	Is the intervention cost-effective? Could better effects be obtained at the same cost?
Sustainability	To what extent are the results persistent? Can the results be maintained without public funding?
Utility	What kind of unintended effects appeared? Are the expected or unexpected effects satisfactory from the point of view of direct or indirect beneficiaries?
Equity	Who are the winners and losers of the policy? Does the intervention decrease inequality?
Flexibility	How easy is the adjustment to the changed policy environment? Can the intervention produce results in changed environment?
Institutional constraints	Does the policy option fit the current law? Is there administrative support? Who is coordinating and monitoring the implementation?
Community acceptance	Does the community (people, entrepreneurs, government) accept the policy? Do they understand the policy and its effect?

Source: EVALSED 2012

Categorization is a helpful tool in the process of formulating questions. For example depending on the objective of the evaluation one can formulate questions from three different aspects. Those aspects are monitoring, process and impact. Moreover, it is also important to take into consideration the three different levels, i.e. individual, subject area or society. Additionally, two more levels might be included – the funding/supporting body and the organisation itself. Based on these aspects and levels one could devise a matrix presenting the content of the evaluation, i.e. the objects of the evaluation.

Other questions can be implementation or process related: What activities or characteristics of the intervention created the impact? Who were affected and which way by the intervention? Did the intervention affect all planned target groups? If not, then why? How did the impact emerge? What where the channels of the effects? Did the implementation of the policy vary between the target groups?

2.3. SELECTING EVALUATION INDICATORS

When the evaluation questions are determined, the process of elaborating the indicators can be started. **Indicator is a targeted metric that measures the course of a process or phenomenon**. Indicator indicates but does not explain. Impact can be calculated only in relation to something – baseline is needed. Indicators can be quantitative (not more objective than qualitative indicators). Choice of indicators can affect performance as well - you'll get what you measure!

An indicator consists of indicator base level, target level and time period that is needed to reach the target level. If the information about the base level is lacking then change can still be assessed – by asking service users for example (has the service quality improved during the past x years?).

Types of indicators (EC Impact Assessment Guidelines 2009):

- **Resource indicators**: provide information on the financial, human, material, organisational or regulatory means needed for the implementation of the intervention. (What was used?)
- **Output indicators:** relate to the deliverables that the intervention is expected to produce. It is generally quite easy to distinguish, because output is by definition easily measurable - whether the planned activities were carried out in targeted volume? (What was done?)
- **Result indicators:** represent the immediate effects of the intervention on the direct recipients. Result indicators are somewhat harder to determine, because they must reflect things that are frequently of qualitative nature. (What has changed?)
- **Impact indicators:** represent the consequences of the intervention beyond its direct and immediate interaction with the recipients (including unintended effects). Impact indicators are the most complex, because they must also take into account the causality between the objective and results.

When choosing indicators, it is important to identify them all along the results chain, and not just at the level of outcomes, so that it would be possible to track the causal logic of any results that are observed. Even in case of impact evaluation, it is still important to track implementation indicators, so it would be possible to determine whether interventions have been carried out as planned and on time, and whether they have reached their intended beneficiaries. When evaluating government e-services, it is useful to engage service providers in selecting evaluation indicators, to ensure that the ones selected are good measures of service performance.

It is difficult to find good indicators. A good indicator:

- Is measureable
- Measures what is relevant not what is easy to measure
- Is specific in terms of:
  - quality (what?)
  - quantity (how much?)
  - target group (who?)
  - time (when?)
- Is valid and reliable
- Measures only changes due to the service

For setting up good indicators, the following questions should be answered:

- What do I want to change?
- What data sources will provide a good representation of this change?
- What are the baseline values?
- What direction and how much movement from the baseline do I want to achieve? (What is the target?)

Examples of indicators: 100% of population to have free access to internet in local library by 2015; 65% of population have used internet at home or work to visit public service websites by 2015; 15% of staff have agreements to work from home when appropriate by 2015; 40% staff time released by use of internet service delivery by 2016; 5 MEUR overall staff costs saved by move to e-service delivery by 2008.

If due to data limitation (no data, too expensive to collect etc) a good indicator cannot be constructed, than proxy can be used.

3. CONDUCTING AN EVALUATION

3.1. SELECTION OF EVALUATION METHODS

Once it is clear what will be assessed and which evaluation question answered, one can start to consider how to evaluate. The methodology selected for evaluation will dictate the reliability of the results, necessary data, duration of evaluation, etc. Methods are divided into quantitative and qualitative.

Quantitative methods:

- Use statistical and econometrical methods to (1) establish the size of impact and its financial value by constructing the alternative situation (e.g. without implementation of the e-service) in ex-post evaluations, or (2) forecast expected impact (constructing the situation when e-service is implemented) in ex-ante evaluations
- Employ previous research, models and additional data collection, large samples
- Unable to explain why and how the impact occurs
- Do not take into account detailed background information, standardises

Qualitative methods:

- Use information from interviews, focus groups, expert opinions, observations, case studies etc., small samples, not generalisable
- Describe results, processes and explain the way intervention achieves impact, able to use detailed and unstandardised information and take the context into account
- Unable to estimate the numerical value of impact
- Reliability of conclusions depends on the strength and consistency of arguments

Due to the limitations of both types of methods, often a combination of qualitative and quantitative methods is used. For example, qualitative analysis is employed next to quantitative in following situations:

- Performing scenario analysis before the quantitative assessment of scenarios
- Quality of survey data depends largely on the questionnaire, to avoid missing valuable aspects and sift out ambiguous questions context is examined using interviews or focus groups
- Qualitative methods are used for small societal groups that are hard to include with quantitative methods
- Qualitative data helps to interpret the results of quantitative analysis

In addition to combining methods as mentioned above, triangulation (answering the same questions with different methods/data/analysts) can be used to increase the reliability of conclusions. Types of triangulation[7]:

- Data triangulation uses different samples (e.g. samples from different time periods or areas) for answering the same questions
- Investigator triangulation means two analysts using the same data
- Multiple triangulation uses different methods, theories, data and analysts
- Methodological triangulation: (a) using quantitative and qualitative methods in parallel, or (b) using different data collection methods, but data are analysed with the same method

Things to consider when determining the evaluation methodology:

a) Evaluation objective and questions. Are projections needed? Or thorough analysis of the cost and benefits of the service? Is the focus on the size of impact or the way of achieving it? Is the focus on population or a small group of subjects?

b) Time elapsed from the intervention. Depending on the subject field there must be some time left between the time the activities took place and their evaluation in order to allow for the results to manifest. However, after some time has passed, people might not remember everything clearly, thus it should be born in mind when designing questionnaires or deciding whether to use interviews for data collection, quantitative methods might be preferable.

c) Available data. If for example extensive databases exist in the subject field (e.g. health care), then you should seriously consider using quantitative methods.

d) Evaluation time-table. Collecting data is usually the most time-consuming phase of evaluation, depending on the methods used. In addition, other aspects also affect the duration of the evaluation, e.g. detail level, availability of existing data, variety of activities, complexity etc.

e) Financial resources. Data collection is usually the most expensive phase, especially in case of certain qualitative methods.

f) Analytical capacity. Complex methodologies require specific knowledge base and long-term experience.

Example evaluation questions and methods (assuming the data exists or time and financial resources allow the collection of it, there is econometric modelling expertise etc.):

- What is the nature and extent of the problem? *Quantitative and qualitative studies, monitoring indicators*

[7] Gray 2009

- Why is the intervention needed? *Logical models, economic theory, political criteria*
- What are the possible actions? Which is the best option? *Ex-ante evaluation: previous studies, experiences, expert opinions, additional studies*
- How is the policy implemented? Does it reach target groups? Are planned services offered? *Monitoring and indicators*
- Has the intervention reached planned objectives? *Ex-post evaluation: statistical methods, qualitative methods*
- Was the intervention cost-effective? *Ex-post evaluation: financial methods*

Figures 5 and 6 illustrate the methods for ex-ante and ex-post evaluations. More information about the methods in Annex 2.

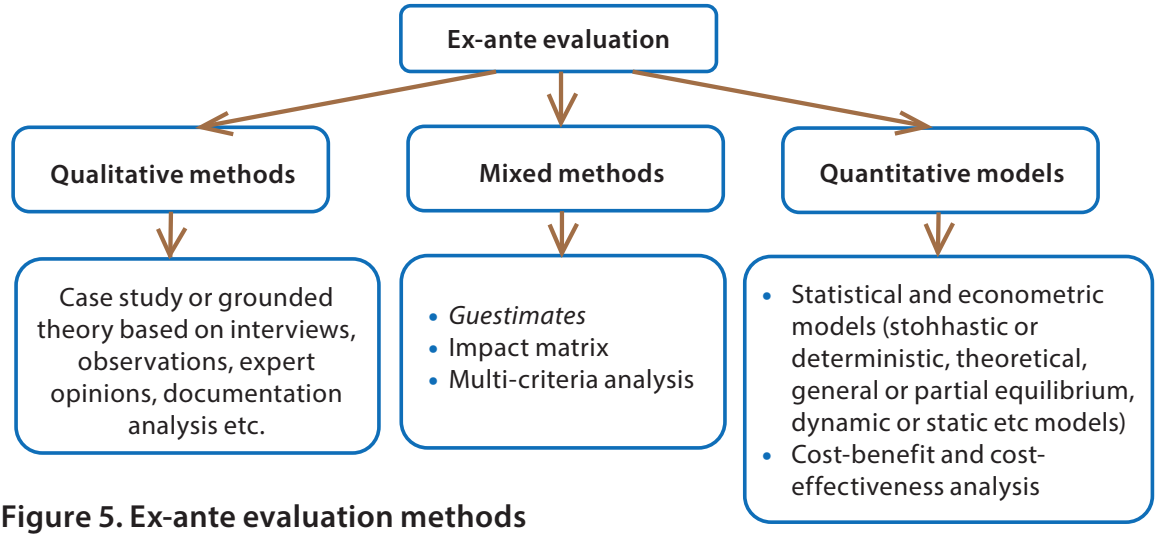

Figure 5. Ex-ante evaluation methods

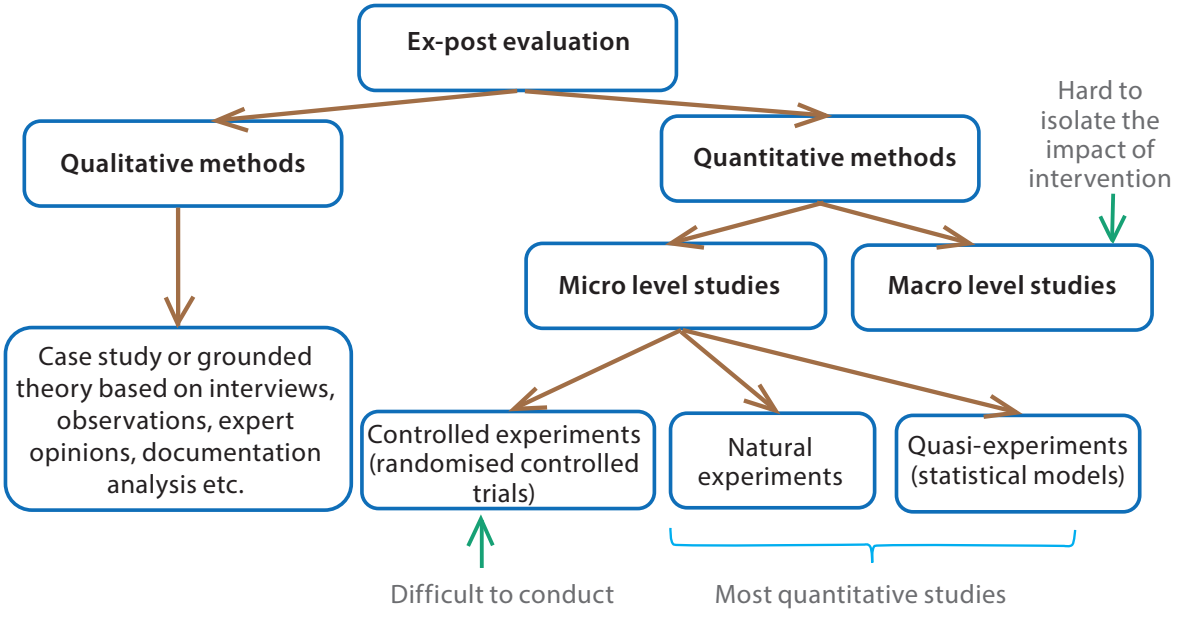

Figure 6. Ex-post evaluation methods

3.2. DATA COLLECTION

What kind of data is needed?

Once the evaluation objective, focus and questions have been established together with the indicators, then it will be clear what type of data is needed. Indicators form the basis of subsequent actions and it is important to collect all available data which will help determine base values and attainment levels of the various indicators. It should be considered whether it is needed, for example, to quantify assessments, explain causes, describe process or collect user feedback.

What kind of data already exists?

A lot of data already exists and can be used for evaluations. The data corresponding to output indicators (e.g. number of service users, number of transactions in the process of service delivery of service etc.) is probably collected by the service provider itself in the course of monitoring its activities. If indicators reflect the data that is collected by research companies or the state in the course of regular surveys or can be found in various registries, then that type of data is also available. And finally, research, previous evaluations and the work of other evaluators might be worth making use of.

The data itself can be divided into primary and secondary data. **Primary data** is collected directly from the data sources for a specific reason, tailored to the collectors' interest (e.g. interview with e-service user to get feedback on the user interface). **Secondary data** is the kind that is readily available and, therefore, less expensive to obtain. Secondary data can be information from census, company's records or other statistical information, and can usually be examined over a longer period of time. When using existing data for an evaluation, then data will inevitably be secondary, because it has been collected and to some extent processed by others and for other purposes. Therefore, good understanding of how, when, why and exactly what kind of data has been collected is needed.

What kind of data need to be collected?

After the existing data have been mapped out, it will be clear what kind of information is still missing and what must be collected additionally in order to provide answers to evaluation questions. If additional data are needed then it is important:

- To investigate synergies with other projects to combine data collection efforts
- To develop a data strategy for the evaluation:

  - The timing for data collection (to estimate change or impact data from at least two different time periods is necessary)
  - The variables needed
  - The sample (including sample size)
- To understand how to integrate with the data from other sources (e.g service monitoring data)

Data can be quantitative or qualitative. **Quantitative data helps to determine whether there is an impact as well as estimate the size of the impact**. It enables to answer questions - how big? how much? The advantages of using quantitative data: it can be generalised, help to find causality, and is objective and precise. But many important aspects cannot be quantified - quantitative data do not explain why a change has taken place and expert opinions or judgements are a valuable addition to quantitative data.

Quantitative data can be collected through:

- Censuses – collecting data from the whole population. Usually conducted by government and used in an evaluation as existing data and not a method for collecting additional data.
- Registers – database of population data that is regularly updated. Registers are established by the government, large organisations etc and data from them is used in an evaluation as existing data and not a method for collecting additional data.
- Surveys – using a sample to make conclusions about the population. Often used to collect data for evaluations.

Qualitative data helps to understand how and why the change has occurred - opens the "black box" between inputs, results and impact. But qualitative data collection is more subjective and the data needs interpretation. Therefore, the quality and reliability of the data depends on researcher's skills.

Most widespread qualitative data collection methods are:

- Interviews
- Focus groups
- Observations
- Documentation analyses
- Case studies
- Less common are Delphi method and foresight (sometimes categorised as mixed methods)

The Table 2 provides an overview about the advantages and shortages of different data collection methods.

Table 2. The advantages and shortages of data collection methods used in the evaluation process

METHOD	ADVANTAGES	SHORTAGES
Interviews: An interviewer questions one or more people. Interviews can be structured, semi-structured or unstructured, i.e. the questions are either set in stone or allow adapting to actual circumstances. Interviews can be conducted face-to-face or by phone, comprise of open-ended or closed questions.	■ People being interviewed explain their own or their institution´s experiences „in their own words" ■ The interviewer may ask additional questions and gain an in depth understanding on the topic ■ Useful in situations where there might be language problems (eg. filling out a form in order to avoid mistakes) ■ More suitable for getting input and insight form people in management positions ■ Suitable for studying behaviour and processes, helps explain why things happen in a certain way	■ Time-consuming (especially when factoring in transcribing) and expensive ■ If different perspectives are presented with regard to one topic or process, then the analyst has a hard time deciding, what actually occurred or if these differences are mutually exclusive or complementary (this risk can be mitigated with focus groups) ■ Difficult to make generalisations
Focus groups: Before asking structured questions, focused discussions are carried out with parties that have had frequent experiences with the issue under observation.	■ Same strengths as for interviews ■ Knowledge is formed via group interaction, i.e. participants may change their opinions to some extent in the course of the group discussion, and together the group may reach shared conclusions or recommendations. ■ As a result the assessment is grounded in a strong social context	■ May prove expensive and time-consuming ■ Assembling the focus group may prove difficult, because it´s hard to find a time and a place that is suitable for all busy participants. ■ Results do not allow for generalisations ■ Entails an experienced moderator ■ Suitable for combining with other methods, e.g. provides input for devising questionnaires
Observation: Observing and recording situations. Includes the person under observation, what happens, when, where and how the event takes place. Observations may be direct (the observer just watches what happens) or participatory (i.e. the observer takes part in the scene).	■ Provides descriptive information about the context and observed changes that occurred.	■ The quality and usefulness of the data depends largely on the writing and observations skills of the observer ■ The results are prone to multiple interpretations

Documentation analysis: Systematic sifting of various documents.	■ May provide a context for the evaluation. ■ May point out topics needing further study. ■ Cost effective, however depends on the volume of the material and how familiar the analyst is with the topic at hand.	■ May prove to be time-consuming ■ The result depends on the quality of the documents (e.g. previous studies may have methodological problems etc).
Case studies[8]: Pooling information into a comprehensive narrative that can be either descriptive or explanatory and describing the how and why.	■ Comprises a large amount of evidence from documents, interviews, and surveys. ■ Provides an overview and understanding of broader and more complex cases. ■ Samples of several cases allows for comparative analysis.	■ Difficulty of delivering good quality case studies ■ Entails research and writing skills ■ Results do not allow for generalisations ■ Time-consuming and expensive ■ Difficult to verify results ■ This type of in-depth analysis usually leads to decrease in the number of objects under review
Surveys: Surveys can be conducted online (results can be instantly saved) or on paper.	■ Simultaneous study of a multitude of subjects ■ Allows respondents time to think before answering ■ May be conducted anonymously ■ Guarantees uniform answers ■ Data formation and comparison is easier ■ Allows for generalisations (provided that the sample is representative)	■ The quality of the answers depends largely on the clarity of the questions ■ Sometimes it is difficult to persuade the respondents to take the survey ■ In case of multiple choice answers the respondents may be forced to choose from pre-determined answers that may not reflect their true opinion

Which data collection method to choose depends on:

- Type and purpose of the evaluation (Is it necessary to quantify the impact? Or are detailed user experiences needed to improve the service?)
- Users of the evaluation (Will the method allow you to gather information that can be analysed and presented in a way that will be seen as credible and beneficial by your intended users?)
- Respondents from whom you need to collect the data (What is appropriate for the age, literacy level, and socio-economic back-ground of the respondents? Are they likely to respond to a mail survey or prefer to answer questions face-to-face?)

[8] Case studies can also be regarded as a research method for which data is collected via various methods e.g. interviews, observations, focus groups, content analysis etc.

- Resources available for collecting data, e.g. time and money that can be used for carrying out polls, working with datasets etc)
- Type of necessary information (Standardized or diverse? Are generalisations about population needed?)

Quality criteria for data:

- Validity refers to the extent to which a measure actually represents what we intend to measure
- Reliability: data should reflect stable and consistent data collection processes and analysis methods over time
- Precision: relative size of the measurement error may have important impact on measurement
- Integrity focuses on whether there is improper manipulation of data
- Timeliness: data should be available and up to date enough to meet evaluation needs

3.3. PRESENTING THE RESULTS

Evaluation results are usually presented as a report with an executive summary or section of conclusions to bring out the main results. Report is usually a long, often technical and theoretical text. In order to ensure that the evaluation results are understood, taken into account in decision making and put into practise, then:

- Use graphs, figures and tables to illustrate and present the most important data and conclusions. Also animation, info graphs and video can be used to visualise important relations, give meaning to a large amount of data and present evaluation results.
- Ensure target audiences know about and can easily access the evaluation report (e-mail notification, press release, article, blog post, report available online, etc.)
- Produce separate short forms in addition to the evaluation report (summary, memo, policy brief, info graph, video interview) keeping your reader in mind (incl. terminology, language)
- Adapt the form of presenting results to the target audience to effectively transmit the message. When multiple groups of users, present the results in ways that are usable for each of them (incl. oral presentation).

4. A CASE STUDY: EVALUATION FRAMEWORK FOR ESTONIAN E-SERVICES

In evaluating e-services in Estonia the concept developed by the OECD and World Bank was used. According to this concept, e-services are a part of national e-governance solutions. **The aim of Praxis' evaluation was to determine the efficiency and impact of the e-services, i.e. to carry out the ex-post evaluation of e-services**.

The underlying question in grouping the e-services was: who is the target of impact? Consequently, the impact evaluation of the e-services was carried out by three target groups:

1. Users of e-services (Government to Business; Government to Citizens)
2. Providers of e-services
3. Developers of e-services (private professionals involved in developing the e-services through public procurements)

In evaluating the effectiveness of e-services, the position of the state as a service provider from one side, and citizens and businesses as service users from the other side, was taken into account. The impact of e-services was measured using three criteria: efficiency, effectiveness and democracy (Table 3). The efficiency was measured as the time it takes different stakeholders to complete a task and the cost of migrating to an e-service. The effectiveness of the e-services was measured through the improvements in the quality of the e-service that come from this transition. The time, cost and quality were evaluated from an e-service users' and providers' perspective. The wider impact of the e-services, including on democracy and engagement, were measured indirectly. In evaluating the impact of e-services on the developers, the export possibilities of IT solutions were measured. The evaluation focused on the comparison of e-service and traditional paper-based, non-digital service.

Table 3. Framework used in the evaluation of Estonian e-services

CATEGORY OF IMPACT / TARGET OF IMPACT		EFFICIENCY	EFFECTIVENESS	DEMOCRACY AND ENGAGEMENT*
User benefits	**Citizen**	Cost reduction Saving in time	Customer-focus of service Customer satisfaction	Accountability: control over service process Relevancy of information More channels for participation Access to service Awareness Trust
	Business	Cost reduction in using state services	Enhanced productivity Better profit margins Flexibility Innovation, creating new products and services Motivation to interact with government	
Provider benefits	**Government/ institution**	Cost reduction Reduction of administrative burden	Staff motivation Expanding the user scale Saving in time	New user groups

Notes: *indirect impact. *Source:* Kalvet et al. 2013

For evaluating the impact of the e-services 13 indicators were defined. The main starting point for evaluating the **impact of an e-service to the users** was the time and the cost saving aspects from the use of the e-services. For example, the users were asked to compare how much time they spent on using the service as an e-service and paper-based service. However, often when the e-service has been in use for a long period of time such a comparison cannot be made. In this case, there is the possibility to compare the latest, most mature and earlier version of an e-service.

The financial impact of the use of the e-services consists of reduced costs, e.g. transport costs. When multiplying the average time saved from the use of the e-services with the average wage, the financial savings (achieved through the time saved) for the all users can be calculated.

In addition to time and cost saving, the improvement of the quality of public goods is important. The impact of e-services on the improvement of the quality of public goods was measured by four indicators: public goods availability; public goods simplicity and comfort; transparency and reduction of errors in procedural processes; and improvement in the image of the country. For all the indicators mentioned above **the data were collected through a user survey. The wording of questions was modified to achieve better relevance for each service**.

The evaluation of financial benefit (or loss) arising from the development and adoption of e-services was based on the total cost of ownership method (TCO). TCO, when incorporated into any financial benefit analysis, provides a cost basis for determining the total economic value of an investment. In evaluating the **impact of e-services on the provider** the data for the planning, developing, adoption and annual operating costs of e-services were collected. The costs related to the developed and adopted e-solutions were distinguished from the costs related to the general IT-infrastructure. In the same way, the time spent on and operating cost of an e-action was compared to the similar activities in case of paper-based solution. Based on the time and financial cost per each action and the change in the number of transactions over the years, it is possible to calculate the total revenue from adoption of an e-service for each year. In principle, **the cost-benefit analysis was carried out for evaluating the financial impact** of e-services for the service provider.

In addition to the financial impact, the impact of e-services on the work processes of public service was evaluated. Two indicators were used: **the acceleration of the work, and the improvement in the work process and service quality**. For example, the smoother the exchange of information or more modern and accurate working arrangements are, the less time is spent on preparations, prolonged periods of inactivity or transport, etc. The improvement of the service quality was measured by the transparency of service process and decreased number of errors. For both indicators, the **data were collected through a service provider survey**.

The last two indicators used for evaluating the impact of e-services on service provider were the **better management of organisation, and feedback to policy planning and assess-**

ment. For this, a survey among the senior employees in the organisation which provided the e-service was carried out. Accordingly, the study analysed the impact of current e-services, but also what is preventing the achievement of greater impact. For the latter, the data were gathered through interviews with service providers, and a survey carried out among the officials and senior employees.

For evaluating the **impact of e-services on the service developer**, the impact on the export possibilities of the e-service was measured. The experience of different countries indicates that it is possible through public procurements (including outsourced IT development) to shape the business environment, including the promotion of introduction of new products, services or processes at the enterprise level. Table 4 provides an overview of the indicators used in the evaluation of e-services in Estonia.

Table 4. Indicators used in the impact evaluation of Estonian e-services

	SUBFIELD	TARGET GROUP	INDICATOR
1.	Financial impact	Provider	E-service cost and benefit analysis (Δ€)
2.	Time saving	User	Time saving from the use of an e-service (Δ)
3.	Time saving	User	Total time saving from the use of an e-service (Δ)
4.	Financial impact	User	Financial impact of the use of an e-service (e.g. transport costs) (Δ€)
5.	Public service quality	Provider	Acceleration of the work
6.	Public service quality	Provider	Improvement in the work processes and service quality
7.	Public service quality	Provider	Better management of organisation
8.	Better administrative policy	Provider	Feedback to policy planning and assessment
9.	Public service quality	User	Availability of public service
10.	Public service quality	User	Simplicity and comfort of public service
11.	Public service quality	User	Decreased number of errors in proceedings
12.	Public service quality	User	Improvement of country image
13.	Impact on export	Developer	Public procurement impact on e-service IT-solutions export

Source: Kalvet et al 2013

4.1. DATA COLLECTION METHODS

In measuring and interpreting the results of the introduction of e-services the following data collection methods were used in Praxis' survey:

- **Desk research and statistical analysis of the available data**. In this case, the information was gathered from the service providers, e.g. statistics on e-service, previous evaluations and surveys, etc.
- **Structured interviews** with the persons responsible for developing the e-service. In an interview, there were questions about the size of the funds used for the development, administrative costs of the development, the changes in the number of employees and organisational structure. During the interview the information gathered about the e-service through other sources was specified and controlled. Based on these data, the estimation of administrative costs and revenue from the e-service was drawn up.
- **E-service user survey**. The users of e-services were asked to fill in a questionnaire before or after the use of the e-service. If it was not possible (because the e-service was not used actively during the survey), the invitation to fill in the questionnaire was sent through the service provider's website.
- **E-service provider survey** was carried out for measuring the impact of the e-service on the organisation.
- **Interviews with the e-service provider**. The aim of the interviews was to check the data collected through other sources and to identify the effects of the e-services.

The applied approach enabled to find out the technological, legal and organisational prerequisites of successful implementation of an e-service and main obstacles that have not allowed benefiting from the use of an e-service.

4.2. PRECONDITIONS FOR THE EVALUATION

The starting point was to carry out an evaluation of effectiveness and efficiency on the following condition (Terms of reference by the procuring agency - Ministry of Economic Affairs and Communications):

- From the position of a neutral bystander, independent from either owner's perspective or technical developer's interests. For the evaluation, it meant that we analysed the bene-

fits from the perspective of the provider and the user groups. NB! There may be various user profiles for one service, and they have different user behaviours which should be identified.

Example: *in the case of school information system, parents (not students!) were identified as users of the system for the purposes of keeping in contact with school. There are no central providers of the service (it is an environment created by a digitalisation agency), but administrative users were identified in two groups – school management and teachers.*

- Ex-post evaluation or looking back to evaluate the e-services in their present stage of life cycle. Some services were in their maturity, some had just been reorganised (redesigned and upgraded); some were at the ending stage, i.e. decision had been made to discontinue the current format for e-service.
- To establish main dimensions from economic and social aspect and choose relevant indicators to measure the „success" of providing digital access to public services
- To create and use methodology that would be universally applicable to e-services, no matter what is the intensity level of digitalisation; what is the policy area, and what user groups are targeted (individuals and corporate users alike)

4.3. PROCESS OF EVALUATION

General preparation phase for evaluation includes:

- Researching internationally used evaluation practices and methods
- Creating a framework for measuring efficiency and effectiveness, selecting dimensions for measuring the impact (saving time, avoiding errors, increasing quality, providing access, etc.)
- Making a list of evaluation criteria and indicators, based on selected evaluation dimensions
- Creating a format/case description as a base for collecting information on an e-service, according to evaluation dimensions and indicators
- Applying evaluation methodology

4.4. EVALUATION OF EACH SERVICE

An example of a service evaluation is presented in Annex 3.

Adapting the case description format to the nature of the specific service. What were the aims for developing this e-service?

Lesson learned: try to find what objectives were identified at the design phase when the digital development was started or commissioned (suitable documents to give this information may be e.g. Terms of Reference for the technical development, or funding application). If there are no clear objectives, define and discuss them with the owner of the service.

NB! If the aim was stated just as "making the service digital", an evaluator cannot accept that. In order to define objective more concretely, look at the aims in this policy area, e.g. what are the aims of granting public health services by the government?

Example: *in the case of e-voting, the main aim was not time savings or even cost savings, but creating better access for democracy and engaging new voter groups.*

Adapting the list of indicators: are they relevant for this service? The evaluator has to understand, what are the relevant dimensions and indicators to be measured? E.g. are better administrative procedures an aim for the service provider? Or is the main aim to create transparency (regardless of the high costs for complicated procedure)? The evaluation must focus on the relevant dimensions!

Lesson learned: Indicators are not universal, i.e. all indicators are not relevant for each service!

Contacting the owner/provider of the service, in order to negotiate on the aim of the evaluation (what we want to know?), identifying user groups of the service, settling on the timeframe necessary for carrying out the evaluation with the selected methods and ask for cooperation in collecting data and informing relevant persons in the organisation who are responsible for the service.

- Offline and online procedures were compared in order to measure time savings (and based on that, cost savings). In the case of some services, the process had been changed, e.g. not all components were digitalized. This should be noted, as you cannot make direct calculation or comparison if service in comparison was significantly changed.
- The question of what is the added value of digitalization remains. Better access for users? Better quality, i.e. less mistakes by administration and also by users?

Example: *Statistics Estonia made a thorough audit of its processes and then set the aim of achieving administrative efficiency. It resulted in creating pre-filled forms, re-using information already provided by businesses, etc.*

Research methodology needs to be sound and well suited for the assignment.

- The aim was to assess the effectiveness and impact, but not to put focus on cost-effectiveness, i.e. the question whether the same results could have been achieved with less money, was not addressed.
- The aim to make comparative conclusions was not achieved. Lesson learned: in order to compare the success of e-services, the services should be selected on the same maturity level and development phase!

If there is no need to compare e-services, then the case description should be used flexibly (if facilitating a comparison not required, then the questionnaire can be adapted for a particular service), indicators can be omitted and cost savings should not be calculated if not relevant.

- In case quantifiable, objective indicators (such as time and cost savings) are not giving sufficient information on the value and effectiveness of the service, you should consider applying other indicators, before making conclusions on the impact.
- If you cannot rely on numeric data, do not use it! Rather give qualitative estimates.
- If possible, propose one or some indicators that could be universally used as an indicator for e-services (e.g. granting access to new users).
- For collecting reliable data on time savings, it is best to use observations and real-time testing (and not asking users for subjective estimates).
- If there are different user profiles, they should be tested separately.

4.5. LESSONS LEARNED ON THE EVALUATION PROCESS

Make a clear decision, what is NOT the object of evaluation. Defining the nature of the service and its objectives (what it is expected to achieve) is the key.

- Most of the evaluated services were platforms offering a range of different services for separate user profile. The evaluator selected one specific service and user profile (e.g. submitting a certain tax declaration by business user) to define stakeholders, intervention logic etc.
- The service and user profile choice from the platform was made with preference to services about which the most data had been already collected by the service owners/providers. And it is advisable to select indicators that can be backed by data.
- It was complicated to define the costs involved in developing and operating a particular service. Usually, the initial investment was made on the whole platform/web environment and was out-sourced (procured from IT developing agency), but later, the up-grades and maintenance was in-house. In-house operations were often not priced or calculated.
- It has to be clear, what is the exact offline counterpart of the e-service, only then can the comparison be made between time and cost of using offline vs digital service. Even though it is difficult, we advise to measure cost-efficiency for the service provider, as it is a vital indicator.
- It is advisable to plan repeated interviews for each case/service. At first you get some initial information, and then you need to go back to ask for clarifications, based on the collected information, or results of user interviews, quantitative data, etc. So you need to establish a point of contact in the organisation that can assist in getting the answers. A group interview with the key personnel from development and operation of the service could be considered.

5. IN SHORT

Governments around the world are extensively implementing information and communication technology in order to provide services and fulfil government functions. A systematic approach is needed to understand, describe and quantify the impact of e-services in order to make better decisions about them.

Evaluation is a systematic and objective assessment of the design, implementation and results of a service compared to objectives. Evaluation often determines the relevance, impact, efficiency, effectiveness and sustainability of an e-service.

Evaluations can be conducted before, during or after implementation of an e-service and, therefore, reasons for evaluations can be:

- To decide whether to implement an e-service
- To give input for improving the e-service in development
- To assess if the implementation of e-service has produced desired outcomes
- To evaluate the overall impact of e-service

Types of evaluations:

- Impact evaluations focus on questions of causality and the overall results of the service provision.
- Performance monitoring provides information on how a service is operating and the extent to which specified objectives are being attained. Performance monitoring informs on whether the set indicators can be reached.
- Process evaluations answer questions about how the service operates, documents the procedures and activities undertaken in service delivery. The focus is on how the service is provided to the user.
- Cost evaluations address how much the service provision costs in relation to alternative uses of the same resources.

The evaluation process involves:

- **Preparing for the evaluation.** The time, cost and needed analytical expertise depend on the complexity of the evaluation and may set serious limitations to the evaluation. High quality evaluation with sound methodology provides the needed value, so rather perform fewer but better evaluations.
- **Working out the intervention logic**. Intervention logic ties problems, objectives and actions in order to describe how the expected results will be achieved. Constructing and

analysing the intervention logic is a valuable result of an evaluation. Poorly designed intervention is not worth complicated evaluation effort. Cooperation with e-service provider to understand the e-service is recommended.

- **Setting evaluation objectives.** It is essential for keeping focus to define why the evaluation is undertaken. The evaluation framework should support setting a focus of evaluation, but also describe relevant dimensions, aspects and problems of the service under examination. Continued cooperation with e-service providers is advised.
- **Determining evaluation design.** Evaluation criteria determine what aspects of an e service are under evaluation. These criteria can be relevance, effectiveness, efficiency, sustainability, flexibility, institutional constraints, acceptance by users, etc. Then the evaluation questions are determined and the process of elaborating indicators can be started. Indicator is a targeted metric that measures the course of a process or phenomenon. The indicators can be divided into four categories: resource, output, result and impact indicators. An indicator consists of indicator base level, target level, time period that is needed to reach the target level.
- **Data collection.** After the existing data has been mapped out, it will be clear what kind of information is still missing and must be collected in order to provide answers to evaluation questions. Quantitative data helps to find whether there is an impact as well as estimate the size of the impact. Qualitative data helps to understand how and why the change has occurred
- **Conducting data analysis and getting the evaluation results.** The reliability of results, necessary data, duration of evaluation, etc is dependent on the selected evaluation methodology. The aim is to estimate impact by constructing the alternative situation - situation without the implementation of e-service in ex-post evaluations and forecasting the situation after the e-service is implemented in ex-ante evaluations. If comparison between e-service and paper-based service is not possible, then an earlier version of e-service and upgraded e-service could be compared. Methods are divided into quantitative and qualitative. Due to the limitation of both types of methods, often a combination of qualitative and quantitative methods is used. In addition to combining methods, triangulation (answering the same questions with different methods/data/analysts) can be used to increase the reliability of conclusions.
- **Reporting results.** Use visualisation to bring out important relations, give meaning to a large amount of data and present evaluation results in the evaluation report. Ensure that the target audiences know about and can easily access the evaluation report. Produce separate short forms in addition to the evaluation report and adapt the form of presenting results to the target audience to effectively transmit information.

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ANNEXES

Annex 1. Methods for describing the intervention logic

Result chain means describing the service from inputs to impact as shown in Figure 7. This graphic depiction should give an easy overview of how the impact is achieved – which inputs are transformed and activities used to attain the desired changes.

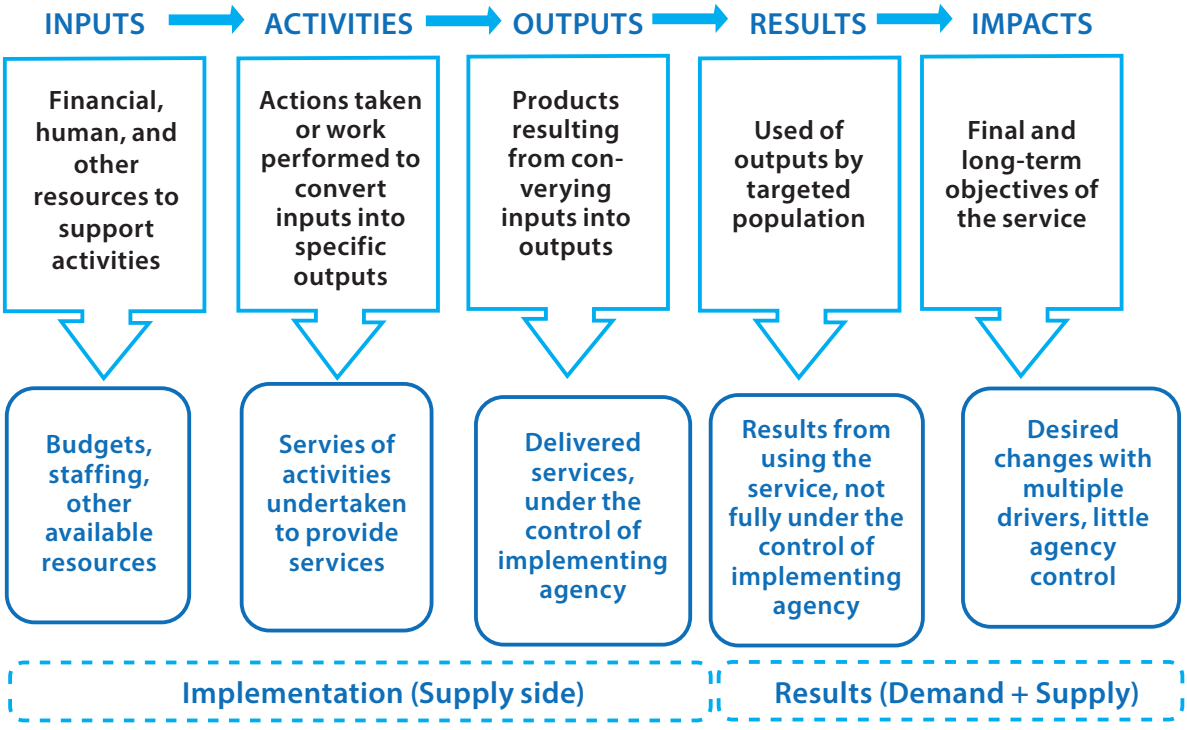

Figure 7. Result chain

Source: Gertler et al 2011

Logical framework (logframe) is a hierarchical framework that also illustrates moving from activities to the final goal using indicators. It also demonstrates interdependence – outputs can be achieved only when actions are performed, higher level depends on the lower one. In addition, logframe enables describing assumptions – what is needed or what conditions should be fulfilled in order to get the desired deliverables.

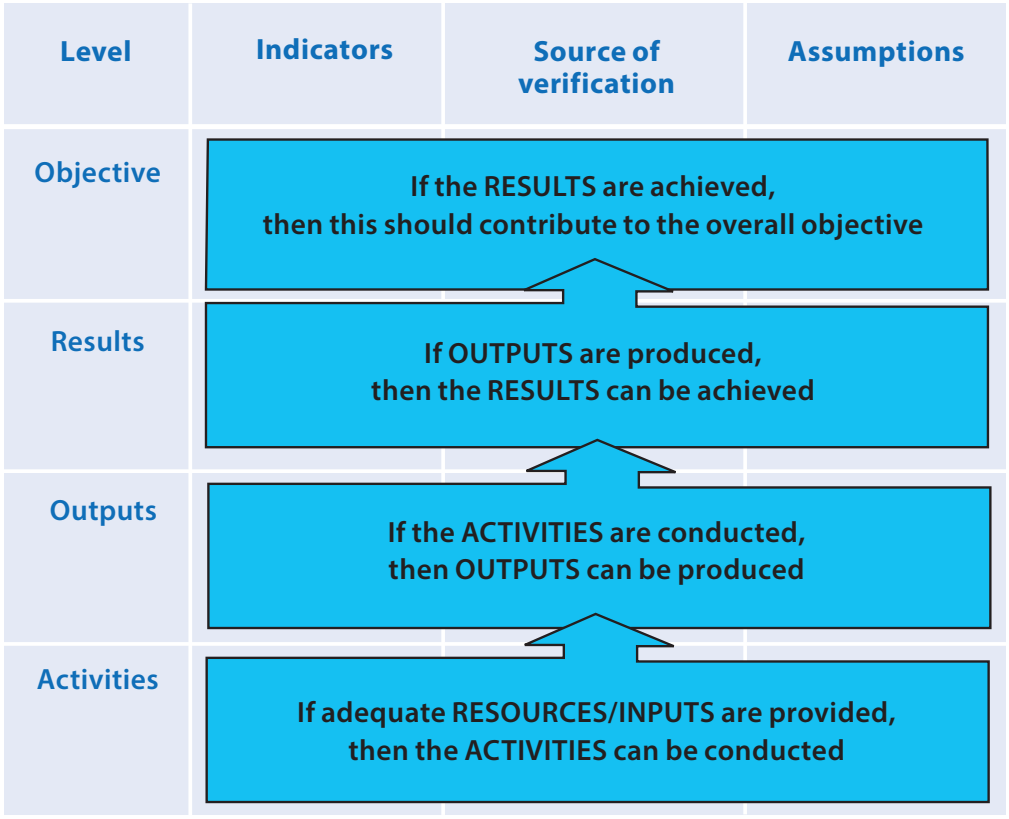

Figure 7. Result chain

Theory of change is a description of a logical causal pathway - how an intervention is supposed to deliver the desired results. It gives an overview of short and long term changes needed to achieve long term objectives, explores the conditions and assumptions for the change, makes explicit the causal logic behind the change and lists the interventions. The result is usually a descriptive text but can also be a graphical presentation of cause and effect relations, conditions and assumptions needed for the change to happen.

Problem tree/objective tree is an analytical tool to display the hierarchy of problems and objectives (Figure 9). Steps to build a problem tree:

1. Brainstorm to define problems. State problems as simple sentences
2. Choose a starting problem
3. Create the cause and effect hierarchy – problem tree
   - If the problem is the cause of another, move it down a level;
   - If the problem is the effect of another, move it up a level;
   - If it is not the cause nor effect , leave it on the same level.
4. Choose focal problem(s) and create a tree-like structure

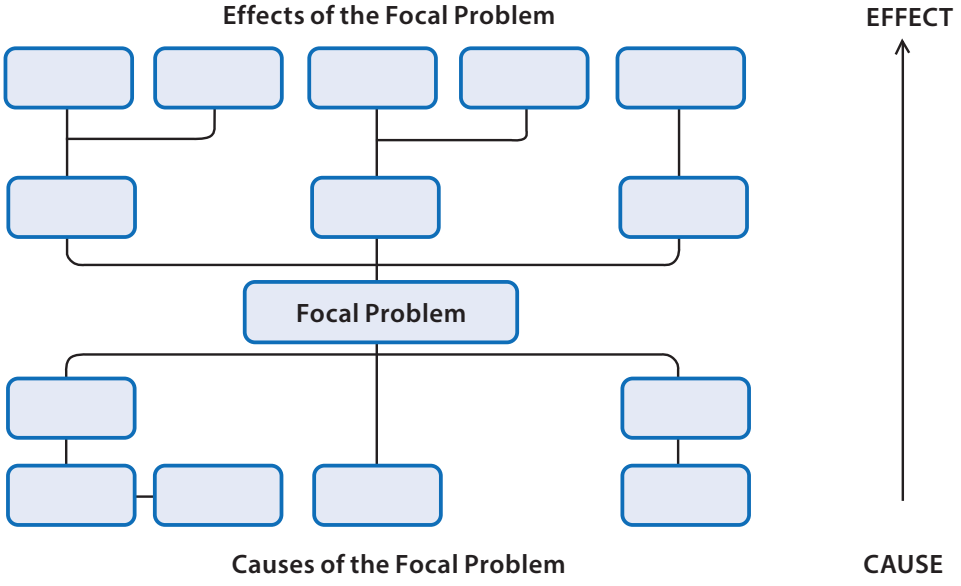

Figure 9. Problem tree

Then turn the problem tree into an objective tree by reformulating all negative situations of the problem tree into positive situations that are desirable and realistically achievable:

- Ensure there is a causal relationship ("if this is implemented then this will be achieved"). The causes become the starting point for the objectives. The effects become the results of fulfilling the objectives.
- If necessary:
  - Revise statements
  - Add new objectives if these seem to be relevant and necessary to achieve the objective at the higher level
  - Delete objectives which do not seem suitable or necessary

Two aspects to watch out for:

- Problem definition needs to be sufficiently detailed (e.g. management issues is too general – what exactly is the problem?)
- The problems should not be defined as a missing solution (e.g. lack of trained staff, no money – but what happens due to it?)

Annex 2. Evaluation methods

Importance of baseline

Measuring change requires understanding of the starting point from which change is measured. Baseline is the situation prior to an intervention, against which progress can be assessed or comparisons made. Baseline data are collected before a program or policy is implemented to assess the "before" state. Therefore, collecting baseline data should be kept in mind when planning an intervention and collecting data for evaluation.

Qualitative methods

Qualitative data is collected through interviews, observations, expert opinions, documentation analysis, etc. It is often analysed for compiling a case study or a grounded theory both for ex-ante and ex-post evaluations. These methods explain the way intervention achieves impact and enable using detailed and unstandardised information, and take the context into account. The description of logical causal pathways and the reliability of conclusions depend on the strength and consistency of arguments. Methods generally do not enable provision of numerical estimates and generalisation of results.

Mixed methods

Guestimates are used in situations where data is not available or data collection not possible due to time or budget constraints in ex-ante evaluations. Guestimates give evaluators numerical values without using complicated quantitative methods and large scale data collection by:

- Using data from other countries or previous periods
- Employing results from research and surveys with sound methodology
- Using elasticities, relations between figures
- Estimating lower or higher limits of an indicator if precise figures cannot be calculated
- Using trends, growth rates, assuming convergence to some level
- Collecting expert opinions to get an estimate

Multi-criteria analysis (MCA) is similar in many respects to CEA (introduced below) but involves multiple indicators of effectiveness. It combines qualitative and quantitative information, and needs agreement on criteria and weights. MCA takes into account the multidimensionality of a problem, enables the use of different types of data in the same framework and taking into account distributional issues. But it encompasses some subjectivity, particularly in setting the weights, is

not able to conclude whether benefits exceed costs and time dimension is usually not incorporated. MCA is used in ex-ante evaluations.

Undertaking a MCA involves the following steps:

- Identify the problem and objective
- Select policy options
- Select criteria (in practise max 8) that are clear, measurable, unique and linked to the objective
- Give the criteria weights (can involve stakeholders or experts)
- Each option (alternative way of securing the objective) is then given a score
- Weight scores and aggregate results
- Rank options
- Analyse the effect of uncertainty to the decision

Quantitative methods

Statistical modelling is used in ex-ante evaluations to forecast expected impact, in ex-post evaluations to isolate the impact of intervention from other factors, constructing a hypothetic situation where the intervention was not implemented or decompose the interaction of several interventions.

It is an empirical estimation of relations between parameters based on data of past periods, usually based on averages in the sample. E.g. micro simulation model – based on individual data a relation is estimated and policy effect simulated.

Method enables calculating numerical values to impact, estimate financial benefits and costs, compare policy alternatives. But modelling is also time- and money-consuming to develop, and with high uncertainty – not to overestimate the reliability of results. Sensitivity analysis is used to understand the robustness of results and the effect of assumptions made. Result must be: transparent, reproducible, and in accordance with other surveys and results. If model estimations contradict intuition or reality, then rather the model is wrong than intuition.

Cost-benefit analysis (CBA) seeks to quantify all the (expected) costs and benefits of an intervention in monetary terms and assesses whether benefits outweigh costs. For an intervention to qualify on cost-benefit grounds, its social benefits must exceed its social costs. "Society" is simply the sum of individuals. The context may be either ex-ante – determining whether something is worth implementing, or ex-post – estimating the value of past decision.

Steps for conducting a CBA:

- Identify the problem and alternative solutions (in ex-ante evaluation)
- Identify the costs and benefits.
- Determine the time horizon over which costs and benefits are estimated
- Find monetary values of costs and benefits
- Weigh the values if needed (e.g. higher weights to benefits and costs accruing to disadvantaged or low income groups)
- Select a discount rate (costs and benefits will accrue over time, not comparable without discounting since consumption in the future is usually valued less than consumption today)
- Account for the relative price change (some benefits and costs attract a higher value over time relative to the general level of prices, e.g. environmental assets)
- Conduct a sensitivity analyses (account for risks and uncertainties)
- Take into account non-monetary costs and benefits
- Finally, identify the distributional incidence of costs and benefits

Monetary values can be found using:

- Market prices, labour cost
- Opportunity cost: resources are priced at their value against their best alternative use, which may be above or below the actual cost of production
- Willingness to pay (WTP) for a benefit and a willingness to accept compensation (WTA)
- Value of statistical life (in health care, transport, environment) and valuing non-market impacts based on:
  - Revealed preferences
  - Stated preferences
  - Human capital approach

Cost-effectiveness analysis (CEA) differs from CBA in that benefits are expressed not in financial units but in physical units. Full CBA complicated, especially finding money values. CEA contrasts alternatives in terms of their relative contribution towards a specific objective. That is, a non-monetary criterion of effectiveness is predetermined and alternatives are compared in terms of either their cost per unit of effectiveness or units of effectiveness per dollar.

CBA or CEA? CBA is most useful when you are analysing a single program or policy to determine whether the program's total benefits to society exceed the costs or when you are comparing

alternative programs to see which one achieves the greatest benefit to society. The major difficulty with CBA is that it is often difficult to place monetary values on all (or most) costs and benefits.

CEA is useful in cases where major outcomes are either intangible or otherwise difficult to monetize. The major difficulty with CEA is that it provides no value for the output, leaving that to the subjective judgment of the decision maker. CEA may provide a good starting point by requiring the evaluator to identify the most important outcome and relate outcome to the money spent on the project.

Standard cost model deals with quantifying administrative burdens (do not include tariffs, taxes, investments, etc.) that are daily obstacles for enterprises. In order to fulfil obligations from public authorities, enterprises have to allocate resources to administrative activities rather than investing them in more productive activities. Information obligations are the obligations arising from regulation to provide information and data to the public sector and/or third parties. Amongst others Denmark, the Netherlands and Norway have set a reduction target on 25% of the overall administrative burdens for businesses and standard cost model is a useful tool in planning interventions and following progress toward this type of objectives. International Standard Cost Model Manual is available at http://www.oecd.org/gov/regulatory-policy/34227698.pdf

Macro level ex-post evaluations use statistical and econometric methods to determine the impact on macro (e.g. country) level. Method requires good data and sound theoretical base, but isolating the impact of an intervention is usually difficult on macro level.

Micro level ex-post evaluations or counterfactual impact evaluations. The same individual with and without intervention (e.g. using service/not using service) at the same point in time cannot be observed. There is a need to estimate the alternative situation or counterfactual - what would have happened without the intervention. And the difference between treated observation and counterfactual is the estimated impact. However, participants differ in observed and non-observable ways (selection bias).

Experimental design (controlled or natural experiments) and quasi-experimental design are used To construct a counterfactual. In experiments the random assignment (controlled or naturally occurred) to obtain intervention and comparison groups is used. It assumes large population and not too wide variability. An experiment needs to be planned prior the programme. Quasi-experimental design allows for the comparison group to be constructed afterwards by statistical and econometrical methods. The aim is to create a situation where participation (e.g. e -service use) would be independent from all other factors.

A comparison group can be constructed using:

- **Randomisation.** Individuals are randomly assigned into participation and counterfactual is the randomised-out group. It is often considered as the "gold standard" because by design the selection bias is zero on average and mean impact is revealed. Randomisation is also perceived as a fair process of allocation with limited resources. But ethical issues or political constraints appear on some areas and participants may not comply with the assignment (selective non-compliance). The estimation of entry effect not possible and the question of generalizability arises – usually a controlled experiment is run on a small scale and it is difficult to extrapolate the results to a larger population.
- **Simple before and after comparison.** Counterfactual is the same group before intervention. Often used due to simplicity, but makes implicit assumptions that there is no selection bias and results are affected only by the intervention. In real life these assumptions rarely hold.
- **Matching.** Participants are matched to non-participants from a larger survey. Each program participant is paired with one or more non-participant who are similar based on observable characteristics. This assumes no selection bias based on unobservable heterogeneity. The method does not require randomization nor baseline (pre-intervention data), but requires very good quality data to control for all factors that influence program placement and significantly large sample size to generate comparison group.
- **Difference in difference.** Both participants and non-participants are observed for changes over time and non-participants provide the counterfactual for participants. So, collect baseline data on non-participants and (probable) participants before the intervention, compare with data after the intervention, and subtract the two differences or use a regression with a dummy variable for participation.
- **Instrumental variables.** Variables that affect participation but not outcomes are identified. But it identifies the effect of the intervention only for the sub-population of those induced to participate by the instrument. Validity of the instrument can be questioned, cannot be tested.
- **Regression discontinuity.** Method exploits the rule where participation depends on exceeding a given threshold. Makes the assumption that there is a discontinuity in participation but not in counterfactual outcomes. Counterfactual is constructed by individuals just below the cut-off who did not participate. The threshold needs to be applied in practice and individuals should not be able to manipulate their score to become eligible.

Annex 3. Registering a company in Estonia via the e-Business Register

Name of the e-service: registering a new company via the e-Business Register

Service provider: Ministry of Justice, Centre of Registers and Information Systems (RIK, Registrite ja Infosüsteemide Keskus), registry departments at county courts. Estonian Ministry of Justice is the responsible authority. The service was developed by RIK, which subsequently took over the administering duties for the e-Business Register. Petitions for entry are reviewed by courts.

Maturity level of e-service: in routine operation

Launched in: 2007

1. The objective and target group of the e-service

The Centre of Registers and Information Systems (RIK), responsible for developing and administering the e-service, is a government agency operating in the jurisdiction of the Ministry of Justice. According to the head of the court registers department at the RIK, the main objective for developing this e-service was, first, to simplify things for prospective entrepreneurs, and secondly, to foster entrepreneurship/the establishment of new companies. Additional impulse to deal with this issue came from the European Council which tasked the member states, in its conclusions adopted in June 2006, to ensure by the end of 2007 that establishing a company would not take longer than a week. These obligations led to legislative amendments, and pursuant to the current Estonian Commercial Code a petition for entry into the commercial register must be reviewed by the registrar (registration departments of the county courts) within five working days (as opposed to 15 working days stipulated in the previous version) after receipt of the petition. What is more, launching the Company Registration Portal also helped accelerate the registration proceedings, because registration by electronic means is considered an expedited procedure (within 24 hours). However, no specific numerical targets were set.

The service is aimed at both private persons looking to establish a company, and legal persons establishing new companies (except public limited companies).

The service has been used very actively. Actually, it is no longer possible to register a company using completely non-electronic channels. Even those, who do not register their companies via the e-service and use notary services instead, will have their petitions entered into the e-Business Register by the notaries. Thus, from the perspective of the RIK or person actually reviewing the petitions, there is no difference whether the petition was entered by the entrepreneur him/herself or by a notary.

During the first couple of years the number of e-service users increased by 20% per year, but starting from 2011 to 2012 the proportions have largely remained the same: approximately 80% of petitioners use the e-service, and the remaining 20% prefer other means. In 2011 85% of new companies (16,781) were registered by their founders via the Company Registration Portal, and 15% (2,859) as a notary service. Statistical data for the period from 2006 to 2012 is illustrated in Figure 10.

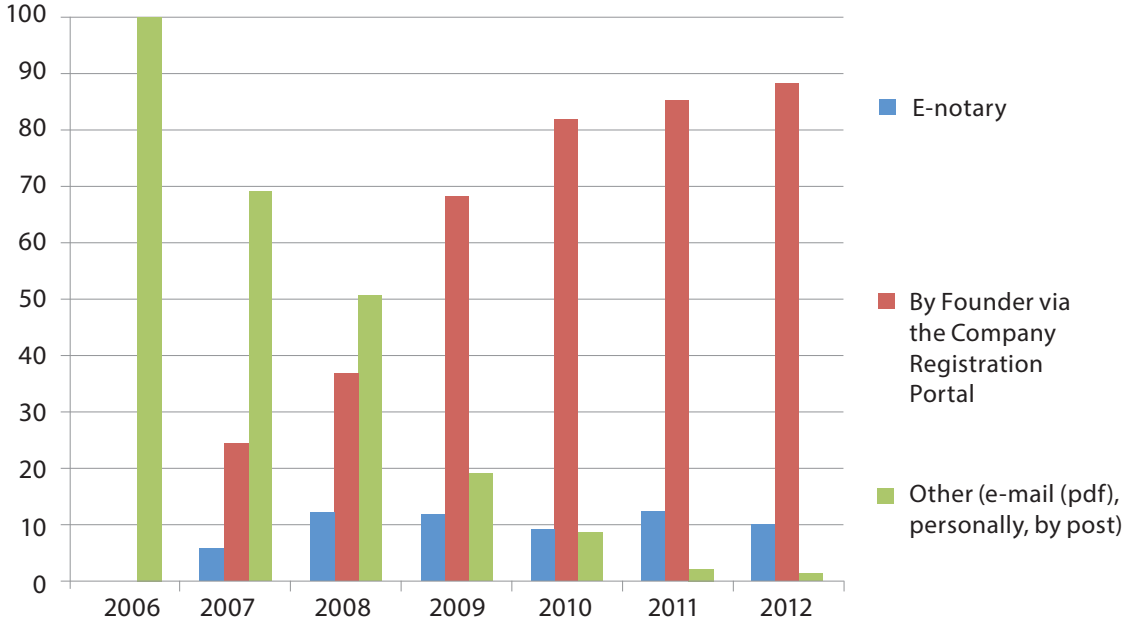

Figure 10. Company registration via different channels (%)

Source: RIK

2. Overview of the Content and Decision-Making Process of the e-Service

Currently the company registration procedure is fully electronic in Estonia. The founder(s) must have an ID-card or mobile-ID, and special computer software for digital signatures. In the e-Business Register the founder(s) must:

- Enter the necessary data regarding the founders, and the company under establishment
- Enter the business name (the system will automatically check whether the name is available If the preferred business name is not available, then the founder must decide whether to pursue establishment of a company with an already existing name or not
- Make any necessary changes, and approve the standard statutes
- Pay the state fee (185.34 euros for a private limited company)
- Pay the nominal capital contribution – can be done later, i.e. one year after the start of business activities

Electronic registration without the help of a notary is treated as an expedited procedure. The petition for entry is reviewed within a couple of hours, and if there are no problems, the court shall approve the foundation resolution by sending a confirmation to the founder. In 2009 a world record was documented in Estonia – establishment of a company in 18 minutes (Kõmmus, 2009). According to the seven entrepreneurs who answered the questionnaire prepared in the framework of this study, the time for establishing a company ranged from 15 to 60 minutes, averaging at about 30 minutes, corresponding to the estimates made by experts.

The Company Registration Portal allows for the establishment of the following types of companies: private limited company, general partnership, limited partnership, and also sole proprietorship. It is not possible to register a commercial association or a public limited company via the e-Business Register. It is necessary to use the services of a notary if the company's capital contribution is non- monetary (i.e. a thing which is monetarily appraisable and transferable to the private limited company, or a proprietary right, e.g. equipment, software), or if the founders cannot sign association documents digitally (e.g. foreign citizens, who do not have a suitable ID-card). In such cases the following steps must be taken in order to establish a company:

- Pay the capital contribution, and the state fee (140.60 euros for a private limited company), plus notary fee
  Choose a notary, an book an appointment
- Prepare the necessary documentation with the help of a notary, and submit the documents to the Business Register (incl. memorandum of association of the company, statutes, petition for entry, telecommunications numbers, proof of payment of the capital contribution, and state fees)

Registering a company through a notary will usually take about two or three days.[9]

Before 2007 the process of registering a company was relatively long, and entailed a considerable amount of paperwork. It included the following:[10]

- Familiarising oneself with the necessities (talking to someone knowledgeable, making phone calls or browsing the Internet) – at least 1 hour
- Setting up an appointment with a notary, and sending the necessary information. The appointment could be made by phone, but the information had to be relayed either by fax or personal delivery (this option was usually easier). At the notary's office one had to

[9] https://www.eesti.ee/est/teemad/ettevotja/ettevotte_loomine/ettevotte_asutamise_toimingud/ettevotte_registreerimine

[10] The time estimate is based on expert opinions

make photocopies etc. – 30 minutes spent on getting there[11], plus one hour at the notary's totalling at 1.5 hours

- Opening a bank account for the company, payment of state fees, and making the capital contribution – 30 minutes spent on getting to the bank, plus 30 more minutes at the bank (usually there is a small queue) totalling at 1 hour
- If the company was registered in a field of activity requiring a license, one had to visit the field of activities register – 30 minutes spent on getting there, plus 30 more minutes at the register totalling at 1 hour
- Return to the notary's office to fill out and sign the full documentation package, making photocopies (e.g. if the documents were faxed), payment of invoice – 30 minutes spent on getting there, plus one hour at the notary's totalling at 1.5 hours
- Delivering the documents to the registration department. Unfortunately there is no data regarding the proportion of people who delivered their documents personally vs those who sent theirs by post or courier. We assume that people were trying to save time, and sent their documents by post – 15 minutes to post the documents
- Once the company was registered the founders needed to acquire a confirmation letter, and take it to the bank in order to finalise the opening of the bank account. This confirmation was usually delivered by post, but if people were in a hurry they usually picked it up themselves. Assumption that the confirmation letter was delivered by post – 30 minutes spent on getting to the bank, plus 30 more minutes there totalling at 1 hour

In total the registration process used to take approximately 6.25 hours, plus waiting time due to queues at the notary´s office need to be factored in. All these procedures could not have been completed on the same day.

3. The main prerequisites for successfully launching an e-Service

The main prerequisites for launching the e-service were the following:

- Authentication with an ID-card (already available)
- The X-Road service allowing the pooling of necessary data from other registers
- e-Business Register allowing for the development of additional e-services. Initially the e-Business Register was used only for information queries. The registration of companies

[11] Hereafter the time spent on getting to the various offices is estimated at 30 minutes, which is a rough estimate, and should not be considered an objective average in any case. It should be taken into account that in a city environment it might take less time, whereas in the countryside it might take longer. Effective people will plan their errands accordingly, and therefore their trip to the city might not be related only to the registration procedure. That is the reason why we have not taken into account the time spent on returning home.

became the first state provided e-service utilising digital signatures

- Public readiness to use state provided e-services, fostered by the newly launched e-Tax Board
- Legal grounds – several legislative acts had to be amended

The e-Business Register was launched quite quickly: it took about six months (in 2006) to make the necessary legislative amendments, and design the system. Legal questions were handled by the Ministry of Justice, and the programme was developed by RIK. Quick action was bolstered by a small and effective team, and the Justice Ministry´s commitment and support as the contracting agency

4. Time and investments spent on deploying the e-service

It took six months in 2006 to deploy the first phase of the e-service, and subsequently the e-service was launched. The second phase involved a further development which allowed from 2008 the citizens of four countries – Portugal, Finland, Belgium, and Lithuania – to register companies in Estonia using their respective ID-cards. Contrary to the first phase, the new legislative amendments were made under the leadership of RIK. Currently RIK is collaborating on new registration application procedure software.

The cost of launching the service was 193,728 euros, which comprises the cumulative investment made from 2006 to 2007 for the purposes of developing the current version (incl. investments in personnel and hardware). The life-span of the investment is estimated at 20 years, and annual operating costs are 1,021,925 euros. This includes the costs of court registration departments (50% of total cost), the Justice Ministry's personnel costs, and RIK's costs (30% of total costs related to the e-Business Register).

5. E-service Impact Assessment

No previous studies have been conducted to assess the impact of this e-service. An international study titled „Doing Business" does not accurately reflect the speed of registering a company in working hours, but takes into account all waiting periods. Thus, according to this study, company registration in Estonia took 72 days in 2005, and during 2006-2007 it totalled 35 days (mainly due to long queues at the notary´s offices). Later they have estimated the process to take 5 days, which is also not an accurate estimate (each step described above has been designated one day, although each takes only a few minutes to complete). However, it does indicate that the time period related to registering a company has decreased considerably.

Impact on the users of e-service

For persons wanting to go into business this e-service will mainly help save a considerable amount of time. Currently the registration process takes approximately half an hour (plus waiting for the confirmation), whereas it used to take about 6,25 hours, and therefore we can see that the immediate gain for users is 5,75 hours. Prior to the launch of the e-service company registration entailed several types of monetary costs (which are difficult to estimate in retrospect) - transport costs, postal service fees, notary fees, state fees, phone bills, and photocopying. Currently the user of the Company Registration Portal only has to pay the state fee.

In addition, entrepreneurs benefit indirectly from shorter waiting periods, i.e. they are able to start their business activities at least one month earlier than before. Since the registration process used to take so long, people preferred to buy so-called shelf companies. What is more, there was also a share capital contribution requirement (but when buying a shelf company, one did not need to pay the share capital contribution), which does not exist in that form anymore.

Access to the service has also improved considerably, mainly affects entrepreneurs operating in the countryside. A recently published study indicates that the simplification of the registration procedure is one of the best state offered solutions for fostering entrepreneurship.

However, the new system is unfortunately a bit too complicated for smaller businesses that have limited computer skills, and must therefore turn to business consultants and courts for advice. Harju county court house has set up a computer station in its foyer for the purposes of accessing the service with the help of the secretary.

RIK has indicated that convenience, reduction of mistakes, and improved security should also be celebrated as positive developments, resulting in improved information confidentiality, integration, and access.

Impact on the provider of the e-service

There are actually several parties involved in service provision. Things have not really changed for assistant judges, whose task it is to review and approve petitions for entry, because reviewing documents and comparing them to the letter of the law still takes the same amount of time as before. Efficiency is achieved mainly in the form of:

- Receipt of petitions for entry – reduced office staff
- Simplified archiving – no need to expand archival rooms
- Typing information into the computer – no need to do it anymore
- Document circulation among officials – no need to circulate documents anymore

- Resolution notice – previously sent by post, now mainly via e-mail (even without the e-service notifications could still be sent via e-mail)

In addition, there are fewer mistakes, because when information is entered electronically it can be automatically checked, which makes processing easier for the registrar. The system will be improved further with the upcoming launch of the new review software.

In conclusion, from the perspective of the service provider the working process has become more effective, especially in terms of supporting activities, e.g. receipt of documentation, dispatch of resolutions, and archiving. However, the actual review process still takes practically the same amount of time, although it will become more convenient with the coming software upgrade.

Obstacles to increasing effectiveness

The main obstacles are as follows:

- The e-Business Register does not allow for registering public limited companies. Technically it could be possible, but this would entail major investments into system development, and these are not foreseen for the near future
- In certain fields of activity companies are required to apply for a license, which can be done electronically (via a separate service), and later they can add the relevant license to their file at the e-register. The license application system will soon be redesigned, and simplified
- Problems with authenticating foreign citizens upon company registration. 2008 saw a giant leap forward, and now citizens of some countries (namely Portugal, Finland, Belgium, and Lithuania) are able to register companies in Estonia using their respective ID-cards
- The review of petitions of entry at the courts is sporadically ineffective. This situation should improve with the transition to new software
- Some first-time entrepreneurs are not very experienced Internet users, and therefore the service might a bit too complicated for them.

6. Potential for internationalisation and export

Initially the Estonian e-service was seen as extremely innovative in the EU context, but by now the same system has been deployed in several other countries as well. However, according to RIK the Estonian system is still the best in the EU with regard to accepting ID-cards of foreign citizens. The fact that the Estonian e-service has set an example for others is confirmed by numerous awards received at the EU level.

Thus far the RIK has shared its know-how with other countries free of charge, but in the future they plan to make it a payable service. The Company Registration Portal runs on the basis of the e-Business Register, and together they share great export potential – especially with regard to practical experience, but also in terms of exporting technical solutions.

The upcoming software upgrade, based on freeware and aimed at improving the work done by courts, also enjoys a certain export potential. The software could be exported as part of a package paired with training and consultation services. RIK is already organising payable trainings to other countries, offers consultation services, and is willing to continue on this path in the future. Their development partner is also very interested in export.

The copyrights related to the e-service belong to the Republic of Estonia, but it can be used with the European Union Public License.

7. Concluding impact evaluation

In conclusion, the e-service has managed to effectively fulfill the objective of simplifying life for entrepreneurs, although there remains a group of people whose poor computer skills do not allow them to take full advantage of this feature. However, they are free to employ the services of a notary if necessary.

The positive effect on start-ups is especially pronounced in rural areas. The e-service takes much less time, and there have been overall improvements in terms of accessibility, simplicity, convenience, and quality.

With regard to service users the work process has been made more effective, but there is still room for improvement. The export potential lies mainly in the practical experiences related to the deployment/launch of the e-service, and the software paired with training, and consultation.