RTDI PROGRAMME EVALUATION GUIDELINES

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TABLE OF CONTENTS

Introduction

Technological innovation is argued to be an important driver of long-term economic growth. As such, governments all over the world aim to improve the conditions that foster technological progress. Among others, they launch research, technological development and innovation (RTDI) programmes,[1] with planned expectations but also uncertain impacts, since knowledge dynamics involve complex phenomena. The global crisis started in 2008 might also be overcome by certain scientific-technological advances, which we may not yet be fully aware of. Evaluations can greatly help structuring the uncertain and complex information, for which the project titled 'Fostering Evaluation Competencies in Research, Technology and Innovation in the SEE Region (EVAL-INNO)' has already developed RTDI Evaluation Standards to help the development of the evaluation culture in South-East Europe.[2] Complementing the Standards, the present RTDI Programme Evaluation Guidelines were compiled, focusing on programme evaluations.

As the Standards also illustrate, evaluations in the RTDI policy domain entail a number of complex management and methodological questions in a highly interdisciplinary area. The Guidelines primarily target evaluation practitioners in the South-East European countries, namely:

- organisations thinking about commissioning an evaluation,

- analysts in the commissioning organisations, who support the decision making process pertaining to evaluations, and

- current and future evaluators, who need to conduct their work in a policy- and politics-influenced environment, which impose certain limitations compared to pure research assignments.

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[1] Certainly, there are many social and cultural factors that enable innovation and the term 'technology' is interpreted more and more broadly by economists. Nevertheless, long-term economic development remains closely linked with technological advancement and the capability of an economy to apply new ideas in producing value added. 'Innovation' is thus also interpreted broadly in these Guidelines, yet the focus remains on RTDI programmes.

[2] See the *RTDI Evaluation Standards* (2012) developed in the framework of the Eval-Inno project.

RTDI evaluations are often distinguished as 'summative' and 'formative' evaluations. Summative evaluations focus on measurement and impacts and an implicit assumption is that the process of intervention is unproblematic, all that needs to be done is to measure and summarise the impacts, performance etc. In contrast, formative evaluations do not simply measure and assess the impacts but focus heavily on insights to future improvements.[3] Given the still evolving RTDI evaluation cultures in most of the South-East European countries as well as the limited knowledge on how RTDI programmes work exactly, these Guidelines have been collected with a standpoint clearly closer to the formative way of implementing and using evaluations.

Contents of the Guidelines have been developed as follows:

- In the first chapter, the concepts used throughout the Guidelines are presented. These help decision makers to position the intended RTDI programme evaluation and determine which steps, decision making points, challenges and methodologies will be relevant for the given case – giving also hints how to tackle them. Among others, the chapter introduces the basic RTDI programme and evaluation types, for which the evaluation guidelines were developed. It defines the evaluation issues, which are typically addressed. These starting points will be used extensively in forthcoming chapters and can easily be viewed as the very starting determinants of any RTDI programme evaluation.

- The second chapter presents the ways to enforce the six most important principles of RTDI programme evaluation. These comprise ethical issues, independence and impartiality, quality assurance, multi-methodology evaluation design, interdisciplinarity, and appropriate committment. If the principles are enforced, the individual relevance and high value of the evaluation will be hard to question.

- There is a number of relatively quick decisions that define evaluation objectives and shape the evaluation methodologies to be used. Additionally, a past decision – namely the existence of evaluation plans – also has a great impact on viable objectives and methodologies. These and the consequences for the evaluation are discussed in the third chapter.

- The fourth chapter provides a start-kit for the basic methodological design that assist in requesting the appropriate evaluation methodologies (from the evaluators) and posing the right evaluation questions, which the evaluators can use in the evaluation process accordingly. This chapter also builds on preceding chapters and discusses the use of reconstructed theories, the suggested methodological techniques and guidance to the three basic evaluation types introduced in the first chapter (concept/design evaluations, process evaluations and impact evaluations). While there are many more methodologies applicable in an RTDI evaluation context than what is actually developed and proposed in the Guidelines, those are much less relevant in countries with relatively underdeveloped evaluation cultures – such as the South-East European countries. The provision of generalised practical advice is more relevant than discussing complex, but unfeasible methodologies.

- Finally, the last chapter provides guidance on how to manage RTDI programme evaluations as a process. It connects directly to the preceding chapters and the guidelines there provided. It presents how to focus the evaluation, how to conduct a preliminary study that enhances the robustness of the whole evaluation, how to prepare the Terms of Reference, what structures are needed for appropriate governance of the evaluation project, how to assist the data collection, what has to be done when the evaluation is ready to conclude and how to handle feedback loops.

As the above structure suggests, with the help of the Guidelines the organisations responsible for commissioning RTDI programme evaluations can make the most important decisions and take the necessary steps for managing viable, relevant and good quality RTDI programme evaluation projects. At this point it also needs to be underlined that RTDI programme evaluation is always context specific, which fact these Guidelines greatly respect. As a consequence, substantial flexibility has to be exercised when adopting these Guidelines and we encourage the users to build bravely on the text presented here and design and manage the evaluation with the

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[3] The line of thought can be found in *Arnold and Guy* (2001), p.70. The *RTD Evaluation Toolbox* (2002) formulates it this way: Formative evaluation is concerned with examining ways of improving and enhancing the implementation and management of interventions. Formative evaluations tend to be conducted for the benefit of those managing the intervention with the intention of improving their work. Summative evaluation is concerned with determining the essential effectiveness of programmes. Summative evaluations tend to be conducted for the benefit of external actors (groups who are not directly involved in the management of a programme), for reasons of accountability or to assist in the allocation of budgetary resources (also quoted in the *RTDI Evaluation Standards* (2012)).

necessary amendments adding the necessary local flavour. As we accumulate practical evaluation knowledge about the working of programmes, it increases the probability of repeating the useful and reasonable RTDI programmes, whereas the less effective ones can be improved at a faster pace.

The author aimed to keep the Guidelines concise and as much practice-oriented as possible. Therefore, for more in-depth or more technical information the references can be consulted.

1.   CONCEPTS USED IN THE GUIDELINES

Chapter 1 introduces the basic concepts for understanding the rest of the Guidelines. Theory-based evaluations and their extension to the RTDI domain are introduced. An understanding of RTDI programmes is developed as well as commonly implemented types of RTDI programmes, for which the Guidelines are relevant. The three basic types of evaluation – concept and design evaluations, process evaluations and impact evaluations – are explained. Last, but not least, the chapter on the concepts introduces ex-ante, interim and ex-post evaluations and links them to the evaluation types.

1.1. EXTENDED THEORY-BASED EVALUATION

In the Guidelines evaluation is defined as the systematic acquisition and assessment of information to provide useful feedback about research, technological development and innovation programmes or in short, RTDI programmes.[4]

These Guidelines assume that the evaluation is designed as theory-based evaluation extended to the territories of innovation system thinking:

- Theory-based evaluation starts with identifying an underlying theory about how a program works and then this theory is used for designing data collection to explain why and how effects occur. By combining the analysis of outcome with an understanding of the context and the processes that lead to the outcomes, much more can be said about a programme's impact and its most influential factors.[5]

- Since RTDI and the related knowledge processes are complex and dynamic, the evaluation should also relate to the state-of-the-art of knowledge about the context and the broader innovation system, in which the RTDI programme is supposed to work.

The above has direct practical consequences as long as enforcement of three of the six basic principles of RTDI programme evaluations are concerned. For example:

- at least one of the principal evaluators should have 'systems thinking' (ingredient of enforcing the quality principle)

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[4] More generic definitions are presented and explained in the *RTDI Evaluation Standards* (2012).
[5] See the *W.K. Kellog Foundation* (2004) handbook, p. 11.

- quantitative methods are advised to be combined with robust qualitative evaluation methods (ingredient of enforcing the multi-methodology design principle)
- many eyes are needed for correctly interpreting the evaluation results (ingredient of enforcing the multidisciplinarity principle)

For more details, please consult Chapter 2.

1.2. RTDI PROGRAMMES: THE SCOPE

Out of the many RTDI policy instruments, the Guidelines were developed for programme evaluations.[6] As the RTDI Evaluation Standards (2012) define, a programme is a set of financial, organizational and human interventions mobilised to achieve a clearly stated objective or set of objectives within a given period. The budget of a programme is limited.

The Guidelines are focused on RTDI programmes, so the main goal of the programme must be:

- relevant to R&D, i.e. the programme aims at market-oriented applied R&D results (or experimental development goals)[7], or
- relevant to innovation, i.e. the programme aims to implement a novel application in the private or public sector or assist the successful implementation thereof, or
- relevant to the RTDI system, i.e. the programme aims to improve the components of the system with a declared RTDI objective.

There are many programmes, which satisfy the above conditions, moreover, one will experience the proliferation of RTDI programmes, whereby their complexity also increases.[8] The Guidelines were developed for 12 RTDI programme types, grouped into four distinct intervention areas:

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[6]Fiscal incentives (tax measures etc.), venture and other capital schemes, guarantee instruments etc. are excluded from the scope of the Guidelines
[7] The Eval-Inno project, in the framework of which these *Guidelines* are developed, has a focus on innovation: this is one of the main reasons for the limitation. The other is that evaluating basic (or exploratory / fundamental) research would require in some parts substantially different Guidelines.
[8] For a taxonomy of regional innovation policy instruments (many of which can be translated into RTDI programmes), see *OECD* (2011) p.93.

a.) ***Support for R&D and the R&D process***: RTDI programmes, whose primary aim is to provide funding for research and development projects and support the activities that are directly related to R&D. Of this set, programmes focused on three types of support will be used in the Guidelines:

1. Support to individual organisations for R&D: this support type does not require collaborative R&D, which is defined as research and/or development activities pursued by at least two indepentent organisations. An individual, or a distint organisation receives support for conducting R&D activity or for activities related to R&D.

2. Support to consortia for R&D: this support type requires collaborative R&D, which is defined as research and/or development activities pursued by at least two indepentent organisations. In this case the supported organisations are motivated to work together, share the fruits and bear the risks of R&D.

3. Outgoing and incoming mobility schemes: this support type is provided for researchers to do research work outside their home country.[9]

b.) ***Support for capacities and system ingredients***: RTDI programmes, whose primary aim is to implement the development of organisations that are vital to innovation systems. Three such programmes are covered by the Guidelines:

4. Support for S&T parks: support for the real estate and related physical infrastructure development, accompanied by technology transfer activites and partnerships between academic organisations, government and the private sector.

5. Support for R&D infrastructure: investments in new or relocated research labs and large-scale research facilities.

6. Technology transfer organisations: support for organisational entities, whose primary aim is the commercial exploitation of new knowledge produced by the nearby academic or university organisation. Typical channels for technology transfer include licensing and the promotion of academic entrepreneurship (spin-offs).

c.) ***Support for building or expanding the business***: RTDI programmes, whose primary aim is to support the development of new and/or (highly) innovative

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[9] Certainly, there are other important types of mobility, e.g. education or labour mobility.

companies and the development of new applications that help business expansion.[10] Four types will be used in the Guidelines:

7. Incubation and support for start-ups: incubators accelerate the successful development of innovative companies through an array of business support resources and services. Services are provided by incubator management and offered both in the incubator and through its network of contacts.[11]

8. Innovation support services for existing SMEs: Support includes innovation management advice, audits to identify needs, innovation coaching, as well as services such as the design and support for marketing innovative products.

9. Support for IP protection and management: Support for programmes that aim directly or indirectly at protecting the new knowledge developed by an individual or one or several organisations. Such programmes may encompass for instance initial IPR check for products and services (prior to their development), assistance in the commercialisation of research results, provision of services pertaining to the IPR protection of results, patent filing, management of patent portfolios etc.

10. Voucher scheme: This type of RTDI programme is designed for SMEs, who may not possess all the knowledge that is needed for an innovation. If an SME needs advice or service for an activity that is aimed at RTDI, the firm can commission the given service, it receives the invoice of the service provider, however, payment will take place from the supporting funding source directly to the organisation that issues the invoice. To facilitate the process fast, vouchers are issued and used by the client SME to pay the service provider (often a public, or non-profit research organisation).

d.) **Support for enhancing mechanisms in the innovation system**: RTDI programmes that take a systemic standpoint and aim at complex development of system components or phenomena, which rely on the concentrated networking of stakeholders. Two such RTDI programmes have been identified for the development of the Guidelines:[12]

11. Clusters: cluster initiatives aim to facilitate the emergence of clusters.[13] Such RTDI programmes provide funding to co-operative research-industry platforms that can act as nodes of knowledge-based clusters.[14] Clusters are focused on the business side of the innovation process.

12. Competitiveness poles: Compared to clusters, these RTDI programmes target larger and broader partnerships of industrial, public and academic research organisations located in a distinct region. In this case the development of whole geographical areas is in focus.

The above RTDI programmes represent commonplace interventions found in many innovation systems. These programmes are specifically relevant in the South-East European countries.

1.3. EVALUATION TYPES

Out of the many types of evaluations, the Guidelines will use and refer to three basic types:[15]

Concept and design evaluations focus on reviewing the mission, assumptions, fundamental hypotheses and basic conditions of RTDI programmes as well as how they are designed and organised. They assess the appropriateness of the programme and its organisational structure to solve the problems identified earlier and the likelihood to reach the planned objectives.

Process evaluations are organised during the lifetime of an RTDI programme. Programme processes are the subject of evaluation, which means that first the processes need to be clearly identified. Such processes may include proposal assessment, management of the contract, monitoring, problem identification and resolution and so on.

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[10] Definitions for the RTDI programme categories under c.) and d.) were developed using the OECD (2011) publication.
[11] In practices there are different levels of services provided by the incubator.
[12] As both cluster policies and competitiveness pole programmes are complex, guidance to the evaluation of these types of programmes remains somewhat limited in the Guidelines.

[13] As defined by Michael Porter, clusters are 'a geographically proximate group of interconnected companies and associatedinstitutions in a particular field, linked by commonalities and complementarities'. Its is clusters that actually compete in the world economy and not companies.
[14] There are other types of cluster support, which reflect more complex interventions by policy. See also: *OECD* (2011), p.208,
[15] The types were adopted for the Guidelines from the *RTDI Evaluation Standards*(2012), which refer to the *FTEVAL* (2003) publication.

Impact evaluations seek to find details about causality and investigate cause-and-effect questions. Such evaluations aim to show the effects that are attributable to the RTDI programme whether these effects were direct or indirect, intentional or not. In doing so, a differentiation is made between the immediate 'output' of a programme (e.g. the number of projects funded), the result or 'outcome', (e.g. the number of usable patents), and the effect or 'impact' (e.g. market profits, increases in turnover, but even more importantly, social returns).

1.4. THE QUESTION OF TIMING

According to the timing of evaluations, the three well-known general types will be referred to:

1. Ex-ante evaluation: the evaluation is conducted prior to the implementation of the RTDI programme.

2. Interim evaluation: the evaluation is conducted during the implementation of the RTDI programme.

3. Ex-post evaluation: the evaluation is conducted after the end of the implementation of the RTDI programme.[16]

The timing of evaluations has an impact on the methodologies to be applied and it is also linked with the evaluation types:

- Ex-ante evaluation is more commonly used for concept/design evaluations (although some impacts can also be surveyed / modelled prior to launching the RTDI programme). The evaluation results will need to rely more on expert work and somewhat less methodological effort is concentrated on newly collected empirical information.

- Interim evaluation is typical for ongoing RTDI programmes and is frequently used for process evaluations (but, again, the impacts can also be evaluated). The full range of methodologies can be used, with slightly more emphasis on surveys, interviews and focus groups.

- Ex-post evaluation is commonplace for impact evaluations. In the RTDI domain, traditionally impacts are surveyed using secondary data sources

(such as official statistics or administrative data gathered from monitoring), but the design of primary information collection is also frequent. Complex methodologies (such as statistical and econometric investigation of cause and effect) as well as survey techniques are often used for capturing the impact. In the South-East European context, reliance on surveys and interviews is more relevant: these Guidelines also take this standpoint, however, where appropriate, reference to the more complex methods is also made.

SUMMING UP

Chapter 1 introduced the concepts, which are important for using the Guidelines:

- It was argued that systems thinking and theory-based evaluation is advised in the case of RTDI programmes.

- The scope of the Guidelines has been explained, narrowing it to common RTDI programme types, but with reference to the innovation system concept. The Guidelines provide orientation for evaluating programmes, which:
  o Support for R&D and the R&D process – both individually and in consortia,
  o Support capacities and system ingredients, such as S&T parks, the R&D infrastructure, technology transfer organisations,
  o Support the building and expanding the innovative business, such as programmes for incubators, start-ups, services for existing SMEs, IP management,
  o Support mechanisms in the innovation system, for instance clusters and competitiveness poles.

- The main evaluation types – concept/design evaluation, process evaluation and impact evaluation – were introduced and defined.

- Ex-ante, interim and ex-post evaluations were explained, with reference to the evaluation types.

In subsequent chapters, the above concepts are commonly used and referred to. For successfully commissioning and implementing RTDI programme evaluations, enforcement of some basic principles in practice is necessary. Chapter 2 deals with these issues.

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[16] Additionally, the *RTDI Evaluation Standards* (2012) introduce terminal, periodical and ad-hoc evaluations as well.

2. ENFORCING BASIC PRINCIPLES

Successful evaluation requires the successful enforcement of principles. Chapter 2 explains six basic principles and the minimum ingredients of their enforcement. The principles are ethical behaviour of the parties working in any evaluation, independence and impartiality of the evaluators, aiming for quality, multi-methodology design of evaluations, the interdisciplinarity principle and the commitment by decision makers. These are discussed in the context of RTDI programme evaluations.

2.1. ETHICAL BEHAVIOUR

Evaluation as a process involves persons with varying interests. Trust and good faith are very important values that can greatly assist throughout the process; however, there are also some practices that help the emergence and keeping of ethical behaviour during an RTDI programme evaluation.[17]

Discussion and negotiation of specific subject matters in advance: the costs, tasks to be undertaken, limitations of methodology, risks and potential harms of the study, scope of results likely to be obtained, and uses of data resulting from a specific evaluation should be discussed in an honest and fair way. It is primarily the evaluator's responsibility to initiate such discussions – if it does not happen, those commissioning the evaluation are encouraged to enquire about these issues during the negotiation phase of the evaluation contract.

Disclosure of conflict of interest: evaluators should disclose any roles or relationships they have that might pose a conflict of interest (or appearance of a conflict) with their role as an evaluator. This should be done in writing. To avoid future conflicts of interest, evaluators should disclose all sources of financial support for an evaluation, and the source of the request for the evaluation.

*Table 1. **A checklist for RTDI programme evaluation: disqualifying and potential conflicts of interest** (the lack of which is to be explicitly declared)*

Disqualifying conflict of interest	Potential conflict of interest
The evaluator was involved in the preparation of the programme	
The evaluator is benefitting directly from the programme (past contracts should not be necessarily disqualifying)	
The evaluator has close family relationship with anyone in the programme owner organisation	The evaluator was employed by the programme owner organisation within the previous three years
The evaluator is member of the governing body of the programme owner organisation	
The evaluator is employed by the programme owner organisation	The evaluator is in any other situation that compromises his or her ability to evaluate the proposal impartially, or that could reasonably appear to do so in the eyes of an external third party.
The evaluator was involved in the preparation of the ToRs of the call for tendering the programme evaluation	
The evaluator is in any other situation that compromises his or her ability to evaluate the proposal impartially	

Source: some wording in the checklist was adopted from documents by the European Commission evaluation practices

Responsible decision making: evaluators should be strongly encouraged to openly communicate and explain if certain procedures or activities[18] are likely to produce misleading evaluative information or conclusions. If the discussions do not resolve these concerns:

- the evaluator can and should decline to conduct the evaluation,

- or if declining the assignment is unfeasible or inappropriate, options include discussions at a higher level, a dissenting cover letter or appendix, or refusal to sign the final document.

Informed consent: participants of the RTDI programme evaluation must be fully informed about the procedures and risks involved in the evaluation and must give their consent to participate. In evaluation practice discussed in the Guidelines, this can be done verbally in an interview, or discussion situation or in writing (e.g. when

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[17] Many of the practices advised in this chapter were adopted from the overall evaluation principles published by the American Evaluation Association (see *AEA* (2004)).

[18] Evaluators have a special relationship with the client who funds or requests the evaluation. Evaluators might be in difficult situation, when the client's interests conflict with other interests. In these cases, evaluators should explicitly identify and discuss the conflicts with the client and relevant stakeholders, resolve them when possible, determine whether continued work on the evaluation is advisable if the conflicts cannot be resolved, and make clear any significant limitations on the evaluation that might result if the conflict is not resolved. For further details see *AEA* (2004).

surveys are organised and the respondents are informed). In any case, evaluators of RTDI programmes must have predefined policies in place to enforce informed consent.

<u>Avoidance of unnecessary harm</u>: a credible RTDI programme evaluation must state justified negative or critical conclusions as well, therefore, there is the potential that client or stakeholder interests are harmed. Without questioning the integrity of evaluation findings, such unnecessary harm should be reduced during the evaluation activities as well as when results are reported and communicated. It may happen that the evaluation is suspended or foregone, because of the extent of risks and harms. During the negotiation phase of the evaluation, these issues should also be on the plate. The organisation that commissions the evaluation and also the evaluators should communicate any potential harm in an open and timely manner.

<u>Mutual benefits</u>: an RTDI programme evaluation is almost never only about the evaluation itself. There are various interactions, where parties and different stakeholders of the evaluation have mutual interest in learning. A good RTDI programme evaluator will behave like a tutor and provide opportunities to obtain benefits from the evaluation for those, who contribute with data and information for the evaluation and bear the incurring risks of doing so (see also the competences part in chapter 2.3.). When programme participants are interviewed or surveyed, they should be informed that their participation in the evaluation has no links with their future participation in or, benefits etc. from the RTDI programme.

<u>Handling of personal data and information</u>: an RTDI programme evaluation typically involves the following data, which is linked to individuals or distinct organisations:

- *Organisational data* about staff, funding, intellectual property, strategic decisions, contracts, sales, failures, alliances and relationships etc.

- *Individual data* about motives, perceptions and opinions, decisions, plans, intellectual property, mobility, professional relationships etc.

The problem with the above information is that they are directly linked to identifiable organisations and/or individuals, and, as such, can potentially harm the interest of those providing the information. However, without these data (which are linked to identifiable data owners) an RTDI programme evaluation would become very difficult.

Therefore, the above information shall be protected by all means and the evaluator must guarantee that individual personal and organisational data are kept confidential.[19]

<u>Ensuring enforcement of the ethical principles</u>: There are two ways to ensure ethical behaviour of the evaluating team:

1. the organisation that leads the evaluation is renowned as a credible organisation,

2. the lead scientist / coordinator / the principal evaluator in charge has appropriate references.

References in both regards are important. It is not enough to have evaluation experience or RTDI policy references, but in an ideal case, there are also credible research results in the broader-narrower innovation management / innovation policy domain, published in peer-reviewed scientific journals. This requirement is needed to ensure that the 'researcher's eye' is present in the evaluation and not simply a consulting type of work is conducted.[20]

2.2. INDEPENDENCE AND IMPARTIALITY

The formal declaration of conflict of interest (see chapter 2.1.) is a necessary, but not sufficient condition to independent and impartial evaluation: high-standard <u>professional independence and integrity</u> shall also be part of the evaluator's assignment:

- *Integrity* refers to the fact that the principal evaluator(s) are honest, trustful, truthful and accurate professionals and also prior to the evaluation assignment have conducted their work according to ethical and professional values.

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[19] There can be rare cases, when – despite the provision of information to informants about the limits of confidentiality – the evaluation discovers information that refers to wrong-doing. It is not the evaluator's job to investigate these cases, therefore, it is advised that the evaluator behaves like a journalist, who keeps the confidentiality of the information source by all means, and reports the phenomena anonymously (especially if justified by more information sources). Overall, evaluators should be prepared for such cases and clarify at the start of the evaluation how and to whom such cases are reported (see also IEG-WB (2007), p.47).
[20] Both consultancy and research are highly knowledge intensive activities, however, according to practice, in an evaluation situation handling uncertainty linked with the knowledge processes – which is inherently present in an RTDI programme – requires also the researcher's approach.

Integrity also contains the concept of completeness: an evaluator should take responsibility for doing a 'complete' work.[21]

- *Professional independence* refers to a number of characteristics of the principal evaluator(s). An independent evalutor does not depend on authority or control and his/her expert opinion is not biased in any way by others' opinion. For instance, the evaluator's expert opinion shall not be biased towards any interest group.[22] Additionally, and perhaps more importantly, the evaluator should be capable of demonstrating independent intellectual products, which are commonly accepted as unbiased quality products in the innovation management / policy domain.

In an RTDI programme evaluation context, professional independence and integrity are advised to be taken together, which means that the principal evaluator(s) should demonstrate both integrity and professional independence. In small countries, where the community of innovation management / policy researchers is small, and where RTDI-related evaluation is only a small portion of the work of consultancy companies, the practical enforcement of independence and impartiality is not easy.

Ensuring enforcement of independence and impartiality: Two practices, which can more or less ensure independence and impartiality in the strict sense above, are as follows:

- When references are requested prior to the selection phase (when the evaluators are shortlisted and finally selected), a specific request should be formulated to demonstrate intellectual products (papers, books, studies, reports etc.) that are publicly available and show independent thinking. After the references arrive, a check on the internet and in scientific databases can show if those products are actually acknowledged by the community. The selection committees should always pay strong attention to the intellectual products in order to assess the evaluators.

- Opinion of the fellow professionals about the quality and 'opinion leading nature' of the provided references can also be asked. When this is done, it is important to receive opinion from those, who have no interest in the evaluation concerned.

The above procedures may seem overly rigorous, however, over the long term – when the results of the evaluation are finalised, published and discussed – the enforcement of independence and impartiality will actually protect the decision makers, who have stakes in the RTDI programme to be evaluated.

2.3. QUALITY

The enforcement of the quality of evaluations is as important as in the case of independence and impartiality, yet it has more details to arrange for. Quality has a more direct relationship with the interest of the decision makers and the organisation commissioning the evaluation. As evaluation is always costly, a high quality evaluation will be easier to be accepted by both the taxpayers and those bearing the responsibility of the decision to implement the RTDI programme evaluation. Even more importantly, if the evaluation is of good quality, it is more likely to be used and over the mid-term, the culture of evaluation can also start to develop.[23] There are many aspects of the quality of an RTDI programme evaluation; below an account of the most important ones are given with guidance on their enforcement in practice.

Systematic inquiry / evaluation research: Since 'evaluation is a form of research that entails a judgment',[24] appropriate judgment can only be made if the research component of the RTDI programme evaluation is appropriate. The following ensure appropriate research in an RTDI programme evaluation context:

- The exploratory work is *systematic and based on empirical information*:
  - It is advised that there are evaluation hypotheses formed in the first phases of the work (if the proposing potential evaluators have enough knowledge about the RTDI programme, hypotheses can also be part of the evaluation proposal submitted in the competitive procedure). The number and depth of such hypotheses should be in accordance with the scale and scope of the work (for a smaller evaluation, a few – i.e. 3-4 – broad hypotheses is enough, for a larger work, the number of hypotheses can easily move above 20). Content, scope and even the quantity of the hypotheses may change during the evaluation, but such

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[21]In practice this means that the limitations of the final evaluation report are also fully reported.
[22]Sometimes judging this criterion is not easy, because formal individual membership in an interest group may leave the evaluator's independence intact.

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[23] For the policy-level discussion of the process, please consult chapter 5 of the *RTDI Evaluation Standards*(2012) document ('Recommendations for an evaluation roadmap for the SEE countries').
[24] Phrased by *IOB* (2009) p. 24. *Rossi et al*. (2004) are also advocates of the term 'evaluation research'.

changes should be justified and take into account the work implied after the changes.

- o The existing know-how (documents, easily available data, previous reports / analysis etc.) should be used and processed in a pre-defined way (using, for example, intermediary tables for qualitative assessment), similarly to desk research.

- *Advantages and limitations* of the methodology to be used is clear for the organisation commissioning the evaluation: it is the evaluator's responsibility to explore jointly with the client the advantages and disadvantages of the research design in a timely manner so that correction remains possible if necessary. It is primarily the evaluator's responsibility to initiate such discussions – if it does not happen, those commissioning the evaluation are encouraged to enquire about these issues during the negotiation phase of the evaluation contract.

- *Quality assurance* of research is abode by: The steps of evaluation research should be documented (practically, in a chapter on methodology of the final report, and, as necessary, further details in the annex). These should be written sufficiently clear so that others can review and comment the work (and, in case it is needed in the future, the work can be replicated). During the course of the work, if methodological details require, the consequences of changing or supplementing the methods should be highlighted in advance for the client. The ethical evaluator will follow these rules, however, it is advised for the commissioning organisation as well to follow changes during the actual implementation of the methodology. If there is a researcher in the evaluator team (which is advised), these rules will be easy to follow, however, the researcher shall bear in mind that quality assurance in the case of evaluating an RTDI programme is different from that in standard social science research. The reason for this is that there are more direct interests in the results of the evaluation than in the results of a social science research project and consistency should be clear for each parties – including those without basic knowledge of social science research – throughout the process.[25]

Competence of evaluators: By this point, it should be clear for the reader of the Guidelines that the evaluator team needs to possess a number of key competences beyond standard project management competences.[26] Five of them needs specific attention and needs to be enforced in the evaluation of an RTDI programme:

- *Research skills*: social science research capabilities and capacities, including the domains of quantitative and qualitative research.

- *Reporting skills*: presentation of findings in a clear structure, with enough details and without unnecessary details – this is a challenge for many evaluation reports, especially when there is no established providers of RTDI evaluations.

- *Consultancy skills*: the ability to formulate of recommendations so that they can actually be implemented by the public administration.

- *Innovation management / innovation policy analysis skills*: the ability to view, analyse and improve RTDI as it should be – neither purely from a scientific-technological, nor from a purely economist point of view.

- *Teaching/coaching skills*: While the above skills are required in the case of every RTDI-related evaluation, the importance of teaching/coaching skills needs to be emphasised in the South East European context as the ability to view actors as 'students' who need to learn how to behave in an evaluation situation.

- *Reflexive thinking*: Enforcement of the above skills is possible if relevant references are presented during the selection procedure (see also the requirements for impartiality and independence in chapter 2.2.). However, there is one specific set of skills, which is hard to enforce but deserves mentioning: reflexive thinking. Reflexivity is especially important in countries where the evaluation culture is underdeveloped, as the evaluation of RTDI programmes covers more areas from science, technology, market and society to public administration. In practice enforcing the interdisciplinarity principle (see chapter 2.5.) helps to encourage the needed reflexive thinking of the evaluator team.[27]

Theory-based evaluation: If there is a theory behind the RTDI programme evaluation, it already assists in developing a better quality evaluation compared to the situation when there is no effort to position the programme in a broader innovation-based

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[25] For example, when questionnaires for an evaluation survey are developed, the staff from the client organisation may intervene and ask for the inclusion of specific topics and questions. Whether these are taken on board by the evaluator team, the decision and its consequences should be clearly explained for the client.

[26] Which, in brief, means the ability to manage available resources in accordance with pre-defined tasks and budgets within given deadlines.
[27] The officials in charge of the evaluation on behalf of the commissioning organisation should also possess reflexive thinking. For instance, it may easily happen that the relevance of the RTDI programme evaluation will become much more different than foreseen, for which there can be methodological reasons or differences of understanding the innovation logic.

theory. The steps needed for constructing or reconstructing the theory is presented in chapter 4.1.

Control case / control group: If possible, it is advised that the evaluation relies on comparison (or, even better, multiple comparisons). The possibility of having control cases depends on available datasets, the access to individuals and individual organisations and time – these issues are dealt with in more detail in chapter 3.4. and 4.2. Meanwhile comparisons are very important, control groups should not be overemphasised in the case of RTDI evaluations, since many characteristics of the knowledge processes remain unobservable by conventional statistics – so control groups are but one important element of an RTDI programme evaluation.

Avoiding political influence: The influence of politics – to the detriment of professionalism – shall be avoided, however, this is not always easy in the countries of South East Europe. When stakes are high and the RTDI programme evaluation is implemented in a politicised context, responsibility of the evaluator will also be rather high. There is no one-fits-for-all recipe, however, publication of the final evaluation report and as wide publicity as possible can greatly contribute to help the avoiding of such unnecessary influences in practice.

2.4. MULTI-METHODOLOGY DESIGN

Quantitative analysis combined with qualitative study: Depending on where the RTDI programme is positioned in a theoretical framework and how it is supposed to achieve impact on the society and the economy,[28] there is an increased likelihood of the quantitative measurability of the impacts as the RTDI programme extends towards the market and applications. Nevertheless, even if the RTDI programme is close to application, the validity and robustness of quantitative approaches will imply serious statistical and modelling constraints, not talking about cases when the new knowledge generation potential of the programme is high, or when the programme is a research-focused activity.[29] Additionally, *in practice there are always problems with*

secondary data,[30] especially in countries where statistical data collection has different traditions than those in developed economies or where the reliability and accessibility of administrative data pose challenges (see also chapter 3.4.). Therefore, in the context of evaluating RTDI programmes in the South East European region, is strongly recommended that:

- the use of secondary data is complemented with the use of primary data, whenever possible;

- quantitative and statistical assessment is complemented with evaluation results based on qualitative studies (in particular: interviews, focus groups / expert panels and case studies – for some details on these methods please consult chapter 4.2.).

Triangulation principle: The above practice can be generalised as follows. In RTDI programme evaluation it is advised that the evaluation hypotheses (see chapter 2.3.) are studied and justified (or rejected) on the basis of research that applies more than one method. The above practice suggested – the combination of quantitative methods with qualitative ones to check the same hypotheses – can be seen as 'convergent validation' in the triangulation continuum, however, for RTDI programme evaluation the application of qualitative methods shall be implemented also in order to 'enrich our understanding by allowing for new or deeper dimensions to emerge' (*Jick* (1979)), which is exactly the expectation in these Guidelines.[31] Another simple rule of thumb is that – if possible – both primary and secondary data sources should be used to test the most important evaluation hypotheses.

Enforcement of the multi-methodology evaluation research design: During the preliminary study phase (which more or less establishes the limits of the evaluation object, see chapter 5.2.), the available quantitative datasets (secondary data) is advised to be identified. During this phase, the possible options of questionnaire surveys can also be defined, as well as some ideas about interviews and other basic qualitative methods. After selecting the evaluator, when the methodology of the RTDI programme evaluation is finalised, it should be checked if the most important evaluation questions (hopefully embodied also in evaluation hypotheses) are

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[28] For details on this issue please consult chapter 4.1.
[29] A similar argument can be found in Arnold, E. and Guy, K. (2001) p.85.

[30] In our case, primary data are those collected by the researcher / evaluator, secondary data are those collected by other (third) parties and re-used by the evaluator / researcher for the evaluation of the RTDI programme.
[31] In chapter 2.1. on ethical behaviour, the importance of learning has already been underlined.

approached both by quantitative methods (i.e. statistical 'numbers', 'figures', numeric 'coefficients' and graphs) and qualitative ones (i.e. answers to questions in an 'interview schedule', 'consensus opinion' of peers and focus groups, and the explored phenomena described and explained in 'sentences' – but not with 'exact numbers').

2.5. INTERDISCIPLINARITY

Research and innovation can be discussed from various standpoints:

- social,
- business success,
- science and technology,
- social and economic policy,
- new idea management,
- creativity,
- leadership... just to mention a few.

In a given RTDI programme evaluation any of the above standpoints can justifiably emerge to dominate the evaluation whereas others might be sufficient to 'check only'.[32] Even more importantly, the above viewpoints can and should be mixed in an evaluation, because it is easy to miss an important phenomenon, fact or circumstance and provide conclusions that do harm to the society. The need for a holistic view cannot be overemphasised, which requires special skills and sensitivity from the principal evaluators, which is hard to check prior to launching the work. At best references that discuss RTDI in a systemic context can be asked for.

Enforcement of taking the holistic view on board: In an ideal case, two pairs of professions need to be represented in the RTDI programme evaluation. They are:

- *Researcher and consultant*: What a researcher can do and see during the evaluation, a consultant might not be able to do. However, what and how a consultant can present and make decisions, the researcher might not be able to do. Both are needed.

- *Technological/scientific expert and economist*: The scientific details on which an RTDI programme might rely can remain in unknown territories for the economist, who, however, can initiate the right discussions in the evaluation context and assemble the technological information accordingly. Both professions are needed.

Additionally, the holistic view should be enforced with attention to the context of the RTDI programme, which is under evaluation (e.g. a cluster programme needs a different composition of professions in the evaluation team than a voucher scheme).

At this point it is clear that the references for the evaluator team – most importantly, for the lead scientist and the principal evaluators – is crucial in the evaluation of an RTDI programme. The most important ingredients of the references to be requested are provided in the summary of this chapter and the checklist in the Annex.

2.6. COMMITTMENT BY DECISION MAKERS

2.6.1. STRATEGIC COMMITTMENT

Evaluation? It is natural! When RTDI programmes are designed, those responsible for planning should take it naturally to plan for evaluations and also to openly disclose the most important results of evaluations. This is also suggested in the *RTDI Evaluation Standards* (2012), and, if current evaluation plans can refer to earlier documented intentions (especially if the idea can be traced back to the same family of political parties), commitment can be easier to achieve. Nevertheless, this will not be commonly the case[33] so various other practices need to be implemented.

Key message(s): It is very important to have a few good arguments when the decision maker first meets the evaluation idea. These arguments should centeraround the following issues:

- evaluation is an international good practice, but it is also a current domestic interest, an interest for all;
- taxpayers like the idea that feedback and control mechanisms are actually in place;

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[32] This issue is also linked to the motivation and professional background of the decision maker – on motivation of the decision maker see chapter 2.6.2.

[33] The country reports elaborated within the framework of WP7 of the Eval-Inno project also confirm this statement.

- evaluation of RTDI programmes can provide arguments for future actions (e.g. increased budgets, modified target groups etc.) in the area under the responsibility of the decision maker;
- ordering evaluations and publishing evaluation results protect the decision maker;
- decision makers, who are advocates and sponsors of high-quality RTDI evaluations, are likely to be respected by an influential community of intellectuals – also beyond the national borders.

Involve interest groups: Articulation of the need for evaluating an RTDI programme can also originate from influential professional communities – they can be provided with information on evaluation (such as the RTDI Evaluation Standards (2012)), and the voice of such communities may also reach the decision maker helping to make the evaluation idea natural and friendly.

Place evaluation continuously on the agenda and involve the legal staff in iteration: Lower levels of government administrations should be well informed (and, to some level, trained) about RTDI evaluations so that they can easily provide arguments when decisions are actually made (by higher-level officials and politicians). In governments it will be the legal staff, who finally 'shape and polish' materials for final decision making. Therefore, the non-legal experts should have the evaluation idea 'at hand' both when they send preparatory materials for legal experts, and when legal experts ask for expertise beyond legal issues.

2.6.2. OPERATIONAL COMMITTMENT

Igniting the flame: If the practices in chapter 2.6.1. are more or less followed, there is an increased likelihood that at some point in time the ice is broken and a concrete evaluation can actually start.[34] There is no one pattern as to how, why and when a decision to launch an RTDI programme evaluation is made, what the focus of the

evaluation will be and who can conduct it. Nevertheless, two – in some cases, conflicting – aspects are very important throughout the evaluation process:[35]

- a certain research quality level must be assured, to which these Guidelines are assumed to contribute (see particularly chapter 2.3.);
- the main motivation of the decision maker should be remembered once the decision is made.

Involve the decision makers periodically at important stages: Chapter 5 provides detailed guidance for the evaluation process as a project, which has some important stages. For increasing the commitment, it is advised to involve decision maker at some stages. In practice not all of them will be possible:

- When the *Terms of References* are formulated,[36] it is important to assign a high weight to the motivation of the decision maker – provided there is no conflict with quality.
- After the selection of the evaluator(s) is done, the decision maker can be provided with concise information on the most important merits and past references of the evaluator(s).
- The decision maker should be provided with appropriate access to information on managing the evaluation project. It is best done with the help of very brief periodical reports / emails about important milestones of the evaluation project.
- When the likelihood that the selected methodologies can actually deliver the evaluation results is high, a brief report / email should be communicated also with details if there are changes in regard to the main motivation of the decision maker (i.e. if the methods cannot fully deliver what is expected).
- Appropriate platforms for communicating the evaluation results should be provided to the decision maker so that the fruits of the evaluation (i.e. good quality results) can be communicated at high levels. Therefore, the administrative staff shall be prepared to deliver materials for policy communication in due time and when it is possible.

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[34] And in the long run, if the practices suggested for strategic committment are consistently enforced, a series of evaluations can follow. The last chapter of the *RTDI Evaluation Standards* (2012) also envisages this process at higher decision making levels.

[35] If there are conflicts between the two aspects (quality versus decision maker motivation), it is the best to convince the decision maker. If it is not possible, and the conflict is substantial, and the basic quality requirements have been followed, the evaluator is likely to decline the evaluation.
[36] For the general content please consult the *RTDI Evaluation Standards* (2012), for practical guidance chapter 5.3. in these Guidelines can be consulted.

Increased responsibility of evaluators: In countries with less developed evaluation cultures evaluators should be prepared that evaluation is commissioned and practiced not for its original purposes, but as an exercise that is 'fashionable' to show commitment of policy makers. However, those making decisions may not be convinced and influenced by the evaluation, for which there can be many reasons, and hence recommendations of the evaluation report may not be taken on board. Therefore, evaluators must bear in mind that the evaluation should sell itself – if it does not happen, the final report is likely to land on one of the dusty shelves of an office without making any use of the conclusions.

SUMMING UP

Chapter 2 argued that the enforcement of six basic principles is needed in order to successfully commission and manage RTDI programme evaluations. These principles are the following: ethical behaviour of all parties, independence and impartiality of evaluators, quality of the evaluation research, multi-methodology design of the work, interdisciplinarity of evaluation approach and commitment by the decision makers.

Ethical behaviour can be enforced if specific subject matters are discussed on time and conflict of interest situations are addressed. In certain situations evaluators can and should decline continuing the work, which also helps the evolution of ethical behaviour. Informed consent of the participants needs to be established. Personal data and information linked to people and organisations need to be carefully handled. These issues are best dealt with if credibility of the evaluator is justified.

Independence and impartiality of evaluators requires professional independence and integrity. Integrity refers to the fact that the principal evaluator(s) are honest, trustful, truthful and accurate professionals. An independent evaluator does not depend on authority or control and his/her expert opinion is not biased in any way by others' opinion.

There are many aspects of the quality of an RTDI programme evaluation, but some needs specific attention:

- The evaluation is a systematic enquiry, which requires social science research that is based on (empirical) facts. It is advised to use evaluation hypotheses during the work.
- Evaluators think in a reflexive way and have specific skills: research skills, reporting skills, consultancy skills, innovation management / innovation policy analysis skills and teaching/coaching skills.
- The evaluation tries to enforce a theory-based evaluation embedded into a systems thinking.
- If possible, the evaluation relies on comparison (e.g. control cases, control groups).
- The evaluation manages to avoid political influence.

To enforce a multi-methodology evaluation design, quantitative analysis shall be combined with qualitative studies, or, in a broader approach, the triangulation principle should hold (i.e. when the evaluation hypotheses are studied and justified or rejected on the basis of research that applies more than one method).

Although it is hard to enforce interdisciplinarity in the evaluation, two simple practices were shown, namely to include researcher and consultant as well as technological/scientific expert and economist in the evaluation team.

In order to achieve commitment by the decision decision makers, long-term strategic committment and operational commitment to a particular evaluation should be distinguished. The former is an ongoing task that requires to have some key messages always on the agenda and to involve influential interest groups as well as the legal staff in delivering the evaluation message. For operational commitment, not only the main motivation of the decision maker should be taken into account, but involvement at some stages (formulation of ToR, evaluator selection, periodical reports).

After discussing how the basic principles of an RTDI programme evaluation can be enforced, the next chapter discusses the decisions, which actually put limitations to the evaluation. Guidance on the decisions that will finally define the evaluation objectives and shape the applicable methodologies is important, as they are more directly linked to the actual output of the evaluation.

3. THE DECISIONS THAT DEFINE EVALUATION OBJECTIVES AND SHAPE EVALUATION METHODOLOGIES

There is a number of decisions, or 'framework conditions', which will have a direct consequence on the formulation of evaluation objectives and the applicability of certain evaluation approaches and methodologies. If there were evaluation plans defined in the past, it will have consequences on the evaluation. The decisions on focus of the evaluation and the kinds of evaluation results expected will necessarily be in relationship with the applicable evaluation approach and the methodologies. The time and resources available and the data constraints create certain trade-offs in the practice of RTDI programme evaluations. Chapter 3 deals with these.

3.1. EXISTENCE OF EVALUATION PLANS A PRIORI

If there are more or less elaborated evaluation plans of the given RTDI programme (which could be elaborated during the programme design), not only the decision to launch an evaluation will be easier, but also the decision on the evaluation objectives.[37] The reason is that out of the various possible objectives an evaluation might have (for these see the next chapter), the most obvious ones may have been decided earlier. Therefore, the responsibility of making a new decision will not burden the current evaluation context. Where and how such evaluation plans can be placed and found? The following options can easily be checked:[38]

- Legislation: are there programme evaluations mentioned in laws, acts or other lower level legislation? If so, how specific they are – do they provide arguments for the current RTDI programme evaluation plans?

- Strategic documents: are there strategic documents to which the RTDI programme can be directly linked? If so, do they mention evaluation – do they provide arguments for the current RTDI programme evaluation plans?

- Policy documents: are there other policy documents (briefs etc.) that can be referred to in the current RTDI programme evaluation context?

- Programme planning documents: are the programme planning documents available internally or publicly? If so, does it mention evaluation and provide arguments for the current RTDI programme evaluation plans?

- Founding documents: is there a funding instrument legally structured as an organisation that provides financing for the RTDI programme? If so, do the founding documents of the organisation mention evaluation and provide arguments for the current RTDI programme evaluation plans?

Note that not all the previous decisions or statements on policy directions will be publicly available or available for research purposes – or at least there is some effort is to be made first. Nevertheless, if evaluation or any other assessment plans for the purposes of learning is found in the 'memory of the organisation'[39] commissioning the evaluation (or which is responsible for the RTDI programme), it may be easier both to argue for evaluation and to state the evaluation objectives (or focus of the evaluation, see the next chapter).

3.2. FOCUS AND THE KINDS OF RESULTS EXPECTED

The range of evaluation objectives: Drawing on the survey of the literature, 15 broad evaluation objectives were defined for these Guidelines. RTDI programme evaluations can take these as starting points for defining the evaluation focus. It should be noted that in practice all of the broad evaluation objectives cannot be dealt with at appropriate depths and quality, and, as the table below shows, not all of them are relevant for the evaluation types:

- In the case of *concept / design evaluations*, relevance, policy consistency of the RTDI programme, the planned economy of the programme, effectiveness (expectations), programme efficiency, the anticipated quality of outputs, the likely sustainability and strategic options can be evaluated.

- In the case of *process evaluations*, appropriateness of the processes, cost and process efficiencies of the programme, the links between the processes and quality, process improvement and strategic options can be evaluated.

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[37] Certainly, past plans can also lead to some limitations – but in general, the existence of such plans makes the evaluation easier.
[38] The list provided can also be used in drafting the evaluation report.

[39] Huber (1991) provides an account of how organisations accumulate knowledge. The author argues that 'an entity learns if, through its possessing of information, the range of its potential behaviours is changed'. Therefore, imprinting evaluation in the organisation is a lengthy process, whereby the above suggested mechanisms can foster some development.

- In the case of *impact evaluations*, RTDI programme effectiveness / efficiency / efficacy, quality of outputs, impacts and additionalities, displacement and crowding out effects, sustainability and strategic options can be evaluated.

Focusing: The table below provides a summary of the broad objectives and also questions to obtain the focus of the evaluation. Unless very large evaluations are planned, it is advised to select not more than five evaluation questions from the table below. The approximate threshold of five evaluation objectives is estimated on the basis that 6-8 core people implement smaller scale evaluations in a period of 3-10 months.[40] Given the elaborated methodologies (in chapter 4.2.), finding valuable evaluation results seems possible up to about five such evaluation questions.

Table 2. Questions to obtain focus of the RTDI programme evaluation*

	Concept and/or design evaluations	Process evaluations	Impact evaluations
Relevance	Was the RTDI programme the right thing to do?		
Appropriateness		Are the programme processes well-designed?	
Policy consistency	How well does the RTDI programme fit in the wider policy environment?		
Economy	Are there expensive elements in the programme design that can be omitted?	Has the RTDI programme worked out cheaper than expected?	
Effectiveness	Is the programme likely to live up to expectations?		Has the programme lived up to expectations?
Efficiency	What otherwise unnecessary bottlenecks can be eliminated in the programme design?	What otherwise unnecessary bottlenecks can be eliminated in the process?	What is the return on the investment?
Efficacy			How does the return compare with expectations?
Process efficiency		Is the programme working well?	
Quality	How good outputs can be anticipated?	What is the relationship between programme processes and the quality of outputs?	How good are the outputs?
Impact			What has happened as a result of the RTDI programme?
Additionality			What has happened over and above what would have happened anyway?

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[40] In the case of RTDI, such smaller scale evaluations seem more appropriate. It does not mean that large and complex evaluations are not implemented in the RTDI domain, however, if possible, is better to avoid the complexity of evaluations sometimes discussed in the *MEANS Collection Vol.3.* (1999). Therefore, if larger RTDI programme evaluations are planned, the above rule of thumb of having a few central evaluation objectives is still advised.

	Concept and/or design evaluations	Process evaluations	Impact evaluations
Displacement			What has not happened which would have happened had the programme not been in place?
Process improvement		How can the RTDI programme be better?	
Sustainability	Does the programme design support well future sustainability of the likely programme results?		Are the impacts sustainable?
Strategy	Should and how should the programme construct be redesigned?	Should and how should the programme processes be redesigned?	Given the results on impacts, what should be done next?

*Assuming the most common use, i.e. ex-ante evaluation for concept/design evaluation, interim evaluation for process evaluation, and ex-post evaluation for the assessment of impacts. The tense of the questions can easily be modified if, e.g. ex-ante evaluation of impacts is planned.
Source: own table; the categories and some questions are based on the concepts by *Arnold and Guy* (2001) and *IOB* (2009).

Expected results and common tradeoffs: Given the above guidance, the expected results need to be aligned with the time and resources available for the evaluation. Please note that even if not aligned, the final results will nonetheless be in accordance with the resources and the time invested into the evaluation. Here are a few considerations that determine how the expected results are related to the time and resources available for the RTDI programme evaluation:

- *Quantified results are expected*: the more precise quantitative results are needed the more expensive the evaluation becomes – and the relationship is exponential. Therefore, unless there are considerable funds available for the RTDI programme evaluation, complex econometric modelling will not be feasible. From a methodological standpoint, besides some quantitative research, reliance on surveys and qualitative methods suits well with the knowledge dynamics and the characteristics of RTDI programmes – and the more so it becomes as data constraints prevail.

- *Clear evaluation statements* – either very positive or negative – *are expected* (regarding complex phenomena): the more clear evaluation statements are needed the more expensive the evaluation becomes. Evaluators bear the responsibility of making judgement, however, if a 'black or white' assessment and a 'go or no go' recommendation is needed,[41] it will imply that all options have been duly examined with multiple methodologies, and future contextual factors have also been modelled. This will usually not be the case and as the

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[41] Quite frequently in summative evaluations.

RTDI Evaluation Standards underline, 'Evaluation is not a replacement for policy delivery!'. What can be added is that evaluation is not a replacement for the responsibility of decision making either.

- *Detailed executable recommendations are expected*: the more detailed executable recommendations are needed the more expensive the evaluation becomes. It is better to leave the operationalisation of recommendations to the policy professionals – commissioning the evaluators to learn the full logic of policy delivery and execution will not be cost effective.

Forward and backward looking 'blindness': The question of orders from higher positions in the hierarchy is a sensitive one. Namely, it may happen that:

- results of the RTDI programme evaluation are more or less defined or expected in advance, without justifiable evidence, or based only on anecdotal evidence;
- results of a past RTDI programme evaluation are not respected as a starting point, even if the evaluation was a good quality one.

When it happens, the above situation will pose serious challenges to the evaluators as well as the organisation commissioning the evaluation.

Unexpected, but justifiable results: In countries with less developed evaluation cultures (and thus little literature that involves the publishing of evaluation results) the organisation commissioning the evaluation should be prepared that there will be unexpected results from the evaluation.

If the basic principles are enforced (see chapter 2.), blindness and unexpected results will cause that the learning potential is misinterpreted (evaluation results become 'too hard to digest'), which means that the evaluation situation becomes difficult to manage for both the evaluator and the organisation commissioning the evaluation. It is best to avoid such cases, which can be done if the evaluator openly communicates about these issues to staff of the organisation commissioning the evaluation (and, if necessary, the decision maker) while the original professional and policy motives are also respected. This is exactly the situation when the coaching skills of the evaluator will be important (see also chapter 2.3.).

3.3. TIME AND BUDGET

Planning and contracting phases: There is a need for appropriate planning in the case of any RTDI programme evaluation and it takes time. Focusing the evaluation, conducting a preliminary study, writing the Terms of References and getting to a signed contract will take time prior to any evaluation research is done (for more details see chapter 5). The more complex the work, the more time it takes to get through the planning and contracting steps – varied in practice between 1 and 3-4 months.

Timespan: Since resources and time depend on the evaluation methodology, it is hard to estimate the overall time span of a good quality evaluation in general. However, given the previous indications, after the contract is signed, the shortest feasible time is around 2-3 months, whereas conducting an RTDI programme evaluation for more than 1.5 years is not worth it – and even when it expands beyond one year, there should be good reasons for that (i.e. methodological).

Evaluation focus and budget: There is an exponential relationship between the focus of the evaluation and the budget. As the number of questions to be answered from the table in chapter 3.2.increases, so does the reasonable budget, because of the complicated internal consistencies between the questions and the methodology that accords with that complexity. Finding and presenting the links to the contextual factors also depends on the budget (for the details see also chapter 4.1.2).

3.4. DATA CONSTRAINTS

Quality of monitoring data: the data collected during the implementation of the RTDI programme can be crucial for the success of the evaluation. Unfortunately in countries with less developed RTDI evaluation cultures, these data are not of good enough quality for the purposes of analysing the innovation relevance.

Primary versus secondary data: As it was mentioned in an RTDI programme evaluation primary data are those collected by the evaluator individually from the unit of analysis/measurement (e.g. companies, interviewees, informants, managers of RTDI programmes etc.), while secondary data have been collected by someone else. The most important secondary data for RTDI programme evaluation include

published statistics, administrative data (collected by the government and other authorities, including, for instance, the monitoring data of RTDI programmes) and databases collected by third parties (most often: private companies). Consequences of using primary and secondary data are as follows:

- *Primary data collection* takes time and is expensive. In these Guidelines, primary data collection methodologies are limited to surveys, interviews and focus groups,[42] because evaluation is usually a very resource-intensive activity bounded by strict timing, and analysis that relies on these primary information collection methods are feasible given the time constraint of evaluations. The most important issue of using surveys is sampling and representativity, which should be discussed in-depth with the evaluator team.

- Although the time constraint is less critical, access to *secondary data* can also be expensive.[43] More importantly, in South East Europe, where the sophisticated monitoring of RTDI programmes may be lacking, very often secondary data were collected for other purposes than evaluation and also the original individual data records may not be accessible, but only some aggregated data. The lack of appropriate secondary data may be commonplace and may emerge as a critical issue, when the evaluation methodology is finalised. The organisation commissioning the evaluation should be prepared for such cases and understand the analytical consequences of such a situation.

Hence, in practice, the RTDI programme evaluation is advised to rely on an appropriate mix of primary and secondary data, and, if possible, both types of data collections should support the most important evaluation hypotheses – in accordance with the triangulation principle discussed in chapter 2.3.

Operationalisation and contents of data: After the evaluation focus is clear and there are evaluation hypotheses, an important step is to define the exact measurable meaning of the hypotheses, which may involve what social researchers call 'operationalisation'. In an ideal case, the more or less fuzzy concepts of the evaluation focus (for the broad foci see also chapter 3.2.) shall be clearly defined and measured including fitting of measurable dimensions to the evaluation focus – which

means that, if necessary, an own individual custom measurement tool shall be developed and used during the evaluation. However, in real life this is rarely the case and compromise shall be made while relying on primary and secondary data. This means that:

- construction and collection of primary data will capture only some part of the broad evaluation focus (but if well done, this will be an important portion), and

- the contents of secondary data will not match 100% the evaluation hypotheses.

The above two consequences are natural and those commissioning the evaluation shall not be surprised when the above are given some stress in the final evaluation report.

Linking datasets: Especially when quantifiable results are expected as part of impact evaluations, the linking of different datasets would be ideal for the evaluation. This means that the individual data records of one database is linked with individual data in another database (e.g. corporate profit and loss statements are linked with monitoring data of RTDI programmes). Such linking may also be needed at higher aggregation levels, e.g. when not individual, but sub-sectoral data is getting linked. However, in practice access to and use of individual data will be possible only exceptionally. Linking the datasets poses methodological problems and the rights of data usage must also be clarified case by case. For this reason, in the Guidelines details for impact evaluation have been elaborated for the survey method (see chapter 4.5).[44]

Obtaining data owner's agreement: Evaluators can do a lot of things with the primary and secondary data they access. In the case of primary data a written agreement is advised that the data owners agree and know about the use of data, whereas the evaluators should not use the data for other purposes than justifying the evaluation hypotheses. The same should be stated in the case of surveys: respondents need to be informed how the data they provide will be handled. These issues, as well as the

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[42] Some other examples, which may eventually be used include in RTDI programme evaluation are observation and narrative inquiry. Other research methods – such as ethnographic research, film-making, participatory research – have little relevance for these Guidelines.
[43] This is the case when for example corporate databases are to be used.

[44] The quantification of cause and effect relationships in the RTDI domain is a challenge for econometricians in the case of developed economies as well and requires the development of individual methodologies for each case. In Austria, for instance, in the case of evaluating research, development and innovation there is also a need for more quantification – most of the evaluation done relies on qualitative methods and softer quantitative ones – such as those proposed in the Guidelines.

eventual erasing of data from the evaluators' computers shall be stipulated in the contract for the evaluation.[45]

Using data of control groups / comparison groups (mostly for impact evaluation): If there are reliable and easily accessible databases of beneficiaries (which can be the case when the beneficiaries are companies), it is possible to select a control group for comparison– i.e. a group of otherwise eligible beneficiaries, who did not receive support from the RTDI programme. The goodness of evaluation will depend on how close the comparison group is to the beneficiary group in terms of some observed characteristics. However, time series data for both the beneficiary and the control group is needed over a longer period of time for a number of variables that are linked to the programme impacts, which is not commonplace or not cost effectively available in South East European countries. Therefore, the control group can be targeted with a questionnaire survey, or, in the absence of an appropriate comparator group, the survey of beneficiaries and rejected proposers can contain appropriate questions to find about the programme impacts (although the questions need to be very carefully and professionally formulated, still, it will bring about less robust results than with the help of using comparator control groups).

Critical information is missing or becomes way too difficult to collect: Despite all the good faith and good preparations for handling data and collecting the necessary information, it may happen that access to critical information is not possible. In such cases the redesign of the evaluation will be hard to avoid, for which the contract should provide enough flexibility.

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[45] Certainly, it is good to save data for future research purposes, however, the rights of those providing the data must be respected in all circumstances.

SUMMING UP

Chapter 3 deals with the decisions, which will enable the formulation of evaluation objectives and the methodological approach in case of an RTDI programme evaluation.

One past decision – i.e. if an evaluation plan of the RTDI programme was defined – can have great importance. If there are defined evaluation plans, the decision on the evaluation objectives will be easier. However, quite commonly in South East Europe, this is rarely the case. Therefore, the decisions of the 'now' will be of great importance for the RTDI programme evaluation.

Decision on the focus of the evaluation is decisive. 15 broad evaluation objectives can be at the centre of the evaluation:

- In the case of concept / design evaluations, relevance, policy consistency of the RTDI programme, the planned economy of the programme, effectiveness (expectations), programme efficiency, the anticipated quality of outputs, the likely sustainability and strategic options can be evaluated.

- In the case of process evaluations, appropriateness of the processes, cost and process efficiencies of the programme, the links between the processes and quality, process improvement and strategic options can be evaluated.

- In the case of impact evaluations, RTDI programme effectiveness / efficiency / efficacy, quality of outputs, impacts and additionalities, displacement and crowding out effects, sustainability and strategic options can be evaluated.

If the number of focal questions in the evaluation is high, the evaluation budget will rise sharply.

Expectations on the results are also of key importance, because there are some tradeoffs. The more precise evaluative statements and quantitative results are needed the more expensive the evaluation becomes. Detailed executable recommendations also add to the price of evaluation.

Blindness about facts and unexpected results can cause that the learning effect is too strong, which means that the evaluation situation becomes hard to manage for both the evaluator and the organisation commissioning the evaluation. It is best to

avoid such cases, which can be done if the evaluator openly communicates about these issues to staff of the organisation commissioning the evaluation.

An RTDI programme evaluation requires careful planning and responsible contracting. Focusing the evaluation, conducting a preliminary study, writing the Terms of References and getting to a signed contract will take time prior to any evaluation research is done.

The time span of the evaluation is usually in the 3-18 months range, depending on the resources available and importance of the RTDI programme in question.

Usually there are data constraints – which means that there is not enough data and not good enough quality data to appropriately address the evaluation questions. Linking datasets is desirable, but in practice it is very time consuming. Collection of primary data takes time and resources, which should be taken into account. Agreement of the data owner should be obtained, and explanation on the exact use of data is required. Implementing a real control group analysis has preconditions, which should be checked. If critical information for obtaining the evaluative statements is missing, the redesign of the evaluation will be hard to avoid, for which the contract should provide enough flexibility.

With a good understanding of the most important decisions and decision making points that have an impact on the evaluation design, Chapter 4 provides the methodological details that are needed for assembling RTDI programme evaluations.

4.   A START-KIT FOR THE BASIC METHODOLOGICAL DESIGN

Enforcement of the basic principles and the decisions about the evaluation are necessary, but not sufficient conditions for the professional purchasing of evaluation services. The organisations thinking about commissioning an evaluation and the analysts, who support the decision making process need to be aware of a number of issues, which are specific to RTDI programme evaluations. What is the reconstruction of theory and why is it important? What are the methodologies available for RTDI programme evaluations in a data-poor environment? How can specific evaluation questions be formulated for concept/design evaluations, process evaluations and impact evaluations and which methodologies are suitable for delivering the answers? These questions will be answered in Chapter 4 of the Guidelines.

4.1. RECONSTRUCTING THE THEORY

Re-visit defined and plausible programme objectives, or state the lack of: RTDI programme objectives are defined beforehand and in an ideal case, efforts were also made to achieve coherence among these objectives. The extent to which the RTDI programme can be evaluated is greater if there are clearly formulated policy and programme objectives, a description of the activities undertaken, and a logical relationship between policy, objectives and activities. Practice shows that these criteria are not always met and also that the larger the RTDI programme is, the fuzzier becomes the relationship between policy, RTDI programme objectives and activities. Especially at the level of specific RTDI programme objectives, the umbrella policy often remains simplistic, broad-ranging and general – from the evaluation perspective. If the RTDI programme objectives are not very specifically and precisely formulated and the logic of interventions is not sufficiently explicit (including, among others, unclear expectations regarding effects), it will be the first evaluation challenge, which needs to be resolved.[46]

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[46] For a general description of the challenge see also *IOB* (2009).

Developing a policy theory and a reconstructed intervention logic is a generally advised solution to the problem (see also chapter 1.1.). In practical terms four steps can relatively easily be taken by the organisation commissioning the evaluation of an RTDI programme:

- embed the RTDI programme in the socio-economic environment;
- understand the programme's position in its national innovation system or in other words and from a slightly different angle: uncover the national innovation system context of the RTDI programme;
- position the RTDI programme and its evaluation in the general theoretical framework;
- use concept mapping of impacts and/or a logframe matrix to systematically uncover how the RTDI programme actually works, or is supposed to work.

In practice, *the entire reconstruction of the programme logic is part of the evaluation work.* Nevertheless, it is advised to go through the steps described below also 'in-house', because:

- the evaluation can be more precise and more easy if there are also some in-house concepts available and the organisation can be prepared for the evaluator's enquiries (see chapters 4.1.1. through 4.1.4);
- when the work with the construction of the logic of the RTDI programme is more or less clear for the organisation commissioning the evaluation, the decisions on the type of evaluation is worth revisiting, for which some guidance is also given in chapter 4.1.5.

If there is no commitment 'in-house' to attempt the reconstruction of the programme logic, it can be left to the external evaluator, but clearly it is a less favourable option.

4.1.1. EMBEDDING THE RTDI PROGRAMME IN THE SOCIO-ECONOMIC ENVIRONMENT

In order to well explain how an RTDI programme could or should work (and reconstruct the theory of the intervention), a common understanding of knowledge processes with links to the innovation processes need to be developed. To do so, the Open Innovation paradigm, introduced by *Chesbrough* (2006) will be referred to, using the example of a profit-oriented company.

A potential beneficiary company of an RTDI programme may be engaged in many new knowledge development and utilisation activities that aim to improve its competitiveness position. Some typical 'routes' are described as follows:

- *The company engages in research*: Route 1 in the figure below represents an example, when the company launches an R&D project and makes use of the results, reaching its target market. Route 2 is an example when originally the research was started beyond its organisational boundaries, however, new knowledge gets into its pipeline and similar results are produced as in the case of Route 1. Route 3 and 4 represent cases when development of the new knowledge had started within the company, but for some reason, utilisation of the results takes place outside the company. Route A and B show research and development projects, which did not get to the market, because R&D is risky and not all knowledge developed will reach the market or have some other use.
- *The company engages in development*: Route 5 represents a development project, the results of which were not kept within the boundaries of the company, whereby Route 6 is an example when the development has started outside the organisational boundaries, but finally the knowledge developed was utilised within the company to reach its target market.
- *The company builds prototype:* Route 8 is an example of developing a new product or service, without doing substantive R&D.
- *The company renews its processes or its business model:* Route 9 represents a non-technological innovation, which becomes accepted by the market.

Figure 1. ***Knowledge development and utilisation projects in an open innovation setting***
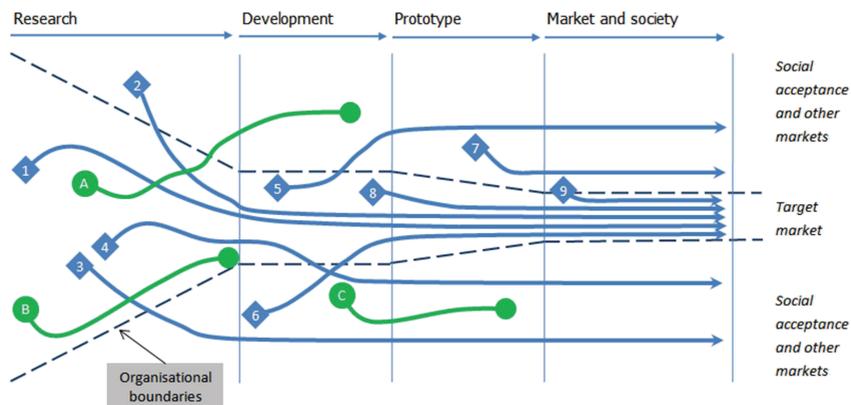
Source: own drawing – concept developed based on *Chesbrough* (2006)

It is important to understand and accept the fact that knowledge and the utilisation of knowledge is not necessarily kept within the organisational boundaries. Many companies can capitalise on the more and more permeable organisational boundaries and increased flows of knowledge,[47] and the above illustrations are only a few examples – many others can be constructed in a similar way.

There can be knowledge flows between successful and unsuccessful projects, as well as between funded projects and other, not funded projects and economic actors.
It may easily happen that funding for unsuccessful projects has important impacts in other domains, which were originally not intended. Although theoretically it is possible that funding for developing new knowledge has negative economic and social impacts, it is much more frequently reported that funding for the development of new knowledge has important overall positive impacts, resulting from spillover effects.

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[47] The original examples and the reasons for the phenomena are presented *Chesbrough* (2006). For a more recent discussion see *Chesbroughand Vanhaverbeke* (2011).

Figure 2. ***Possible spillovers between individual knowledge projects***

— possible "cross-fertilisation" or "spillover" between individual projects
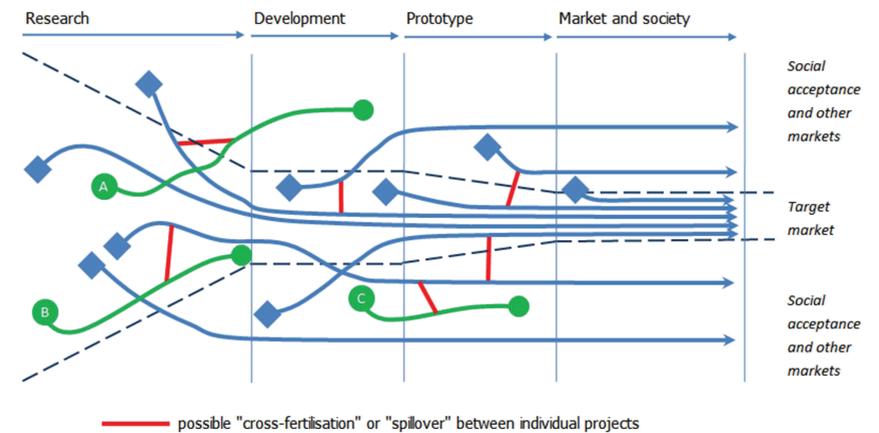
Source: own figure

The above simple interpreted simple logic of the flows of knowledge between research, development, the prototype phase and the market/society is important to understand and demonstrate prior to or during the starting phase of the evaluations of RTDI programmes discussed in these Guidelines.

4.1.2. UNCOVERING THE NATIONAL INNOVATION SYSTEM CONTEXT OF THE RTDI PROGRAMME

The National Innovation System (NIS) is different in every country – so are the RTDI programmes, which are the subject of these Guidelines. As such, it is almost impossible to give detailed guidance. However, the analysis of the context and putting stress on certain contextual factors is a must in every RTDI programme evaluation. Answers to the following general questions – when they are relevant – need to be considered:

- Are there specific economic (macro-economic or industry-specific economic) conditions that affect the RTDI programme? Such conditions may cover entrepreneurship, business demography, foreign direct investments etc. as well.

- Are there specific regulations (laws etc.) in place – or have such been introduced – which have impact on the RTDI programme? Are there socio-

cultural factors that can have links with the implementation of the RTDI programme?

- Are there specific human resources, technological knowledge, or financial market considerations that are beyond the boundaries of the RTDI programme, but nevertheless are very important for the implementation of the RTDI programme?

- Is there a solid knowledge base available in the country, which is relevant for the RTDI programme? If yes, where is it found and how does it affect the RTDI programme?

- Is there a specific market on the demand side of the RTDI programme? If yes, can this market be characterised as a promising one? If so, why, and how does this affect the RTDI programme?

- How does the global environment of the RTDI programme look like? Are there any specific characteristics worth mentioning or stressing?

- Are there any synergies or complementarities of the studied programme with other RTDI programmes that formulate all together a portfolio of programmes placed in the National Innovation System?

When the answers to the above questions are sought, analysis of official statistical data and available reports/articles can be of great help. The depth of elaborating the answers depends on:

- the significance of the RTDI programme in question;
- the focus of the evaluation (see chapter 3.2.);
- the time and resources available for the evaluation (see chapter 3.3.)

What is important, however, is that the most important contextual factors are underlined and stressed so that the evaluation is capable of taking them into account throughout the evaluation process. Ideally, the context should be studied before finalising the empirical methodology, but at the latest before there are evaluative conclusions drawn from any empirical work.

4.1.3. POSITIONING THE RTDI PROGRAMME AND ITS EVALUATION IN THE GENERAL THEORETICAL FRAMEWORK

The different RTDI programmes, the evaluation of which is assisted by the Guidelines, may have different relevance and can be positioned differently in the general theoretical framework provided in chapter 4.1.1.

*Figure 3. **Position of the RTDI programmes in a generally reconstructed theory***
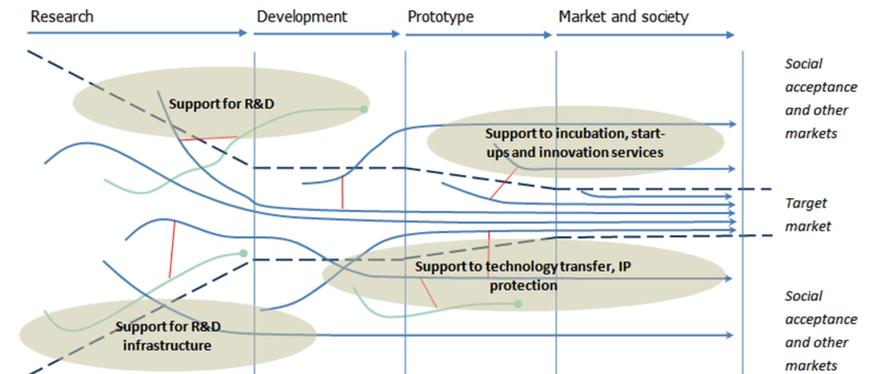
Source: own figure

The above positioning also implies certain considerations, which have to be taken into account when the intervention logic of the RTDI programme is reconstructed. The most important of these considerations are summarised in the table below by RTDI programmes.

*Table 3. **Issues to consider when reconstructing the intervention logic of RTDI programmes***

RTDI programme type	Considerations for a reconstructed theory
Support for R&D and the R&D process	
Support to individual organisations for R&D	The target markets (and potential impact) of the intervention may have not been well-defined in advance. Whether or not the potential impacts were defined well, overall positive impact in the society is likely, but it can easily prove to be difficult to show especially in quantitative terms.
Support to consortia for R&D	
Mobility schemes	Mobility schemes connect knowledge bases via the mobility of individuals, thereby exposing professionals to new experience and accelerating spillovers. Short-term direct impacts are more likely, when the mobility is closer to the application of knowledge, but generally the impacts are long-term.
Support for capacities and system ingredients	
Support for S&T parks	Increased localised interactions between businesses and other organisations shall result in innovation 'hot-spots', however, there can be many missing elements along the way, which may prove the programme to be ineffective at the first sight. As a result, the conditions for the success of S&T parks should also be heavily considered during an evaluation.
Support for R&D infrastructure	Research in the 21st Century depends more and more on available infrastructures. Support to these is only a precondition to quality research, which is only the start in the above illustrated flow of knowledge processes. This should be an important starting point for any evaluation in this domain.
Technology transfer organisations	The success of technology transfer mechanisms is a function of capabilities and competences (of individuals managing the transfer), trust (between the parties and in the (legal) institutions in general), the efficiency of the IP regimes and the throughput of novel ideas for applications.
Support for building / expanding the business	
Incubators, support to start-ups	When this type of support is needed, technological and scientific uncertainty had already been reduced, there are 'only' business risks – still, these risks are much higher than in the case of ongoing businesses. As a result, in an evaluation situation a low success rate of the programme can be acceptable, provided that improvement is 'inherent' in the programme and longer term favourable impacts can counter the low success rate.
Innovation support services for existing SMEs	In this case business risks are still considerable, yet at a lower level than in the case of start-ups.
Support for IP protection and management	In a country where the enforcement of Intellectual Property Rights is at low levels (and/or has little tradition), initially the demand for such programmes may strongly be biased (i.e. not those will obtain support, who would otherwise need). Additionally, successful IP management requires specific past experience, which may take time to obtain.
Voucher scheme	Funding is usually small-scale per firm and the most important policy aim is usually to link SMEs with public R&D organisations. As such, the immediate innovation impact is not expected to be very high and it also depends on the absorptive capacity of the SME sector. If eligibility criteria for the participating firms are not kept simple, if administration is too complicated, voucher schemes may cost more than what they yield.
Support for enhancing mechanisms in the innovation system	
Clusters	Instruments in cluster policies tend to support: engagement of actors; collective services and business linkages; and collaborative R&D/commercialisation (see *OECD* (2010/b)). Impact evaluation is not a frequent practice in these cases, due to the numerous factors that jointly determine the success or failure of clusters or competitiveness poles. As such, evaluations tend to focus on processes or comparative analysis of clusters / cluster policies (e.g. using a benchmarking technique).
Competitiveness poles	

Source: own table

For identifying the direct logic of the RTDI programme's intervention, two techniques are shown in these Guidelines. The *concept mapping of impacts* is a technique to be used if the more or less detailed intervention logic of the programme is not available, not valid and/or the programme impacts are more complex. *Logic models* might have been built at the programme design phase and can be used later for the evaluation. If such logic models are not available, but there are initial ideas of how the programme was supposed to work (e.g. outputs expected are formulated against some inputs), building the full logical framework ('logframe matrix') will greatly help the evaluation.

The result of both techniques is a <u>conceptual map how the programme works</u> (or is/was supposed to work) <u>directly</u>. Note that the RTDI programme evaluation should take into account indirect and broader social effects as well, even if they do not fit (or do not easily fit) in the logical framework of the programme (for a broad understanding of these, please consult chapters 4.1.1-4.1.3).

<u>Concept mapping of impacts</u>: implementing the concept mapping of impacts involves the following steps:[48]

1. *Group formation*: a balanced and stable group of 7-10 people is formed. Members of the group must have knowledge about the programme and the broader context, in which it was launched (see also chapters 4.1.1-4.1.3.)

2. *Inventory of impacts*: the group produces an exhaustive list of all the impacts expected from the programme. The original programme design and the group's own experience and past knowledge can both be taken into account.

3. *Weighting and grouping the impacts*: Group members give scores (e.g using a Likert-scale between 1 and 7) to the impacts, which shall correspond to the strategic importance of the impact for the given RTDI programme. Impacts, which are conceptually close to one another, are put together by each group member.

4. *Calculation of an impact map*: Given the above data (proximity of impacts and strategic importance of the impacts), a statistical software can be used to do a

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[48] Based on and adapted from the *MEANS Collection Vol.3.* (1999).

so-called two-dimensional scaling.[49] The result is a map of impacts, where similar impacts will be graphed together.

5. *Definition of how the programme works*: The group members revisit the map and validate if conceptually they represent the programme logic. The impact families can be named and refer to an (impact or logical) evaluation criterion, to which indicators can also be developed.

Logical framework: it is a simplified presentation of the programme logic, showing the links between resources, activities and results. The following six components need to be collected:[50]

1. *Priorities or objectives hierarchy*: identifying the environment or context and the priorities that were born. The assumptions and the programme response need to be understood precisely by answering questions like what was the problem (to which the RTDI programme wanted to respond), for whom was it a problem, who are the stakeholders in problem resolution.

2. *Inputs – what is invested*: identifying the financial, human, technological, material and other resources (including e.g. involved cooperations, partners etc.) to the programme.

3. *Outputs – what is done*: identifying the activities within the programme and the collaborating parties (beneficiaries, proposers, managing authorities, decision makers, market players etc.).

4. *Outcomes – what is achieved*: distinguishing short term, medium term and long-term impacts

5. *Assumptions – what are the underlying conditions*: what was hypothesised about people, organisations, processes etc. during programme implementation.

6. *External factors – what are the external impacts on the programme*: a complete PESTEL scan[51] of the environment can be advised to control for the impacts beyond the influence of the programme.

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[49] This is a statistical technique that belongs to the family of multidimensional scaling. It requires statistical knowledge to produce the result as briefly desribed above. If such statistical knowledge is not available, simpler intuitive techniques for grouping might also be acceptable (the result is less robust though).
[50] The *University of Wisconsin* (2003) and the EVAL-INNO course booklet (training material) has been adopted for the purposes of the Guidelines.
[51] Systematic investigation of political, economic, social, technological, environmental, and legal factors.

To complete the logical framework, a series of if-then relationships can be drawn, especially between 2, 3 and 4 on the above list (but it can be extended to 5 and 6, depending on the programme and the availability of analytical knowledge).

Both above presented techniques, but especially the concept mapping of impacts requires experienced personnel to implement it. The theory and the logic can then be presented to the policymaker to check whether they are in line with what the decision makers had in mind (IOB (2009)). If there are larger gaps between original intentions and what experts built, it can be the first – and indeed rather important – evaluative statement of the work.

Besides understanding the relationship between the original intentions and the reconstructed theory, it should not be forgotten to reflect also on the linkages between the more direct programme logic and the broader reconstructed theory, especially if they are far away from one another. Whether the evaluation is a concept/design evaluation, a process evaluation or an impact evaluation, the intervention logic as well as the broader reconstructed theory can be an important ingredient to relate the evaluation to. In practice it may happen that the presented theoretical considerations of how the programme works are not discussed in depth – it is not requested, or it is not given high priority during the evaluation. If so, the presence of innovation policy expert(s) in the evaluation team can reduce the associated risks of such practice.[52]

4.1.5. LINKING THE RECONSTRUCTED THEORY AND THE TYPE OF EVALUATION

Depending on how the RTDI programme is positioned in the general reconstructed theory (see chapter 4.1.3.), the commonly used evaluation types (shown in chapter 1.3) also suit differently. For example, if the RTDI programme is about funding research and commercialisation is not part of the scheme, then:

- process evaluation could consider processes up to the point when research outputs are produced;

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[52] The risk is that the evaluator team necessarily works with such a logic in mind even if logframe matrices are not drawn or used only internally, and it is easy to fall into the trap of linear thinking with such matrices.

- concept / design evaluations can deal with how the RTDI programme works until dissemination; and

- impact evaluations need to consider broader impacts in the market and overall social wellbeing.

The above also implies that appropriate impact evaluation can easily become relatively distant from the implementation of projects under the umbrella of the RTDI programme (which is a research funding scheme in this case). Therefore, either complex modelling efforts are needed or some time should be elapsed before an impact evaluation is launched, or impacts need to be considered without solid quantitative basis, for which a more careful evaluation design is needed (and the holistic view of the evaluators becomes an important issue, see also chapter 2.5).

*Figure 4. **Reconstructing the theory: the main stages and commonly used evaluation types in case of an RTDI programme that funds research***
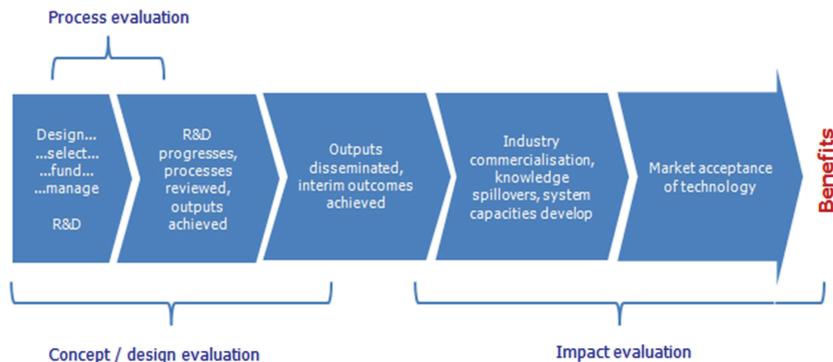
Source: Jordan, G. 2007, with additions

If another type of RTDI programme, which is closer to the market, is positioned in the general reconstructed theory, the above 'evaluation sequence' becomes shorter, as illustrated in the figure below:

*Figure 5. **Reconstructing the theory: the main stages and commonly used evaluation types in case of an RTDI programme that assists commercialisation****
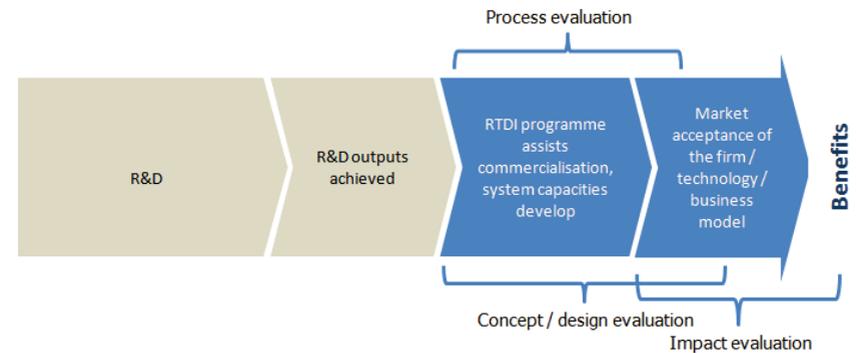
* Note that an R&D component is not necessary
Source: own drawing from Jordan, G. 2007, with additions

It is important to align the type of evaluation (process, concept/design or impact evaluation) with the general reconstructed logic and actual timing of the RTDI programme in order to avoid situations, when evaluation is actually not possible, not reasonable or has limited learning potential. Two examples of such situations:

- impact evaluation of research programmes, which have just started (and there is no substantive modelling experience of future impacts);

- detailed concept or process evaluation of programmes, which have been completed long time ago.

Consequently, at this point the basic questions that help to obtain the focus of the evaluation is worth a look again and a checking should be made whether – in light of the more or less reconstructed RTDI programme logic – all the evaluation questions are still relevant or some refocusing needs to be made.

4.2. SELECTED METHODOLOGIES

In chapter 4.3.the guidance provided for concept, process and impact evaluations of RTDI programmes rely on a set of methods. These methods are introduced and explained very briefly below to those not familiar with them. Explanation is provided to the extent an analyst preparing for the decision to launch an evaluation may need, but even more importantly, some practical issues are also underlined, which may not be evident for public organisations responsible for RTDI programmes. Each of the methods have particular strengths, for which they are used.[53]

Document review and analysis of administrative data: it is a starting point for any evaluation and virtually any document can be of interest in an evaluation situation, from internal policy briefs, semi-finished concepts to published strategies. By their confidentiality status, documents and data can be classified from publicly available to strictly confidential, and it should be clear from the start of the process to which depths the evaluators will have access to these data and documents as well as to what extent they can be referred to. Once it is clarified (advisably prior to the evaluation contract) evaluators will tend to ask everything. Arranging documents (and data, as necessary) in priority order (by their relative importance, from strategic to less important) will greatly help smoothness of the evaluation.

Analysis of official statistical data: the national statistical services and international organisations (such as the Eurostat, the OECD, theWorldbank etc.) publish a string of RTDI related statistics, which can and should be used for the evaluation. These data are relatively easy to access, however, as other secondary data sources (such as the administrative data, or databases compiled by companies), they were not collected primarily for the purpose of evaluation. For more developed countries more statistics are available and they often prove to be suitable for evaluations relying on econometric analysis. Hence, in the context of RTDI programme evaluations, these statistics are usually best suited for analysing the context of the programme (see chapter 4.1.2).

Desk research: the analysis and processing of existing studies, research and other reports, books, journal articles, scientific and professional blogs can be used for any part of the evaluation. For its general usage, in the following desk research will not be mentioned specifically, but during an RTDI programme evaluation, it is highly advisable to rely on desk research as much as possible.

Interviews: in the approach of these Guidelines, individual interviews are necessary ingredients for RTDI programme evaluations. Interviews allow for in-depth investigation of all phenomena, which are not necessarily available in writing, but which are important to understand the programme. In the statistical sense, interviews are not used for representative interpretation of the 'reality'. The views and reasoning of actors, conduct and behaviour, individual practices and divergent experiences are among the most important results interviews usually yield. Although looks easy, interviews require careful preparations from the selection of the interviewees, drafting the questions, the training of interviewers, planning the time etc. Effective interviews are 30-90 minutes long, two interviewees (one present as an observer) makes the interpretation of results even more effective. Anonymity of interviewees must be respected in the rest of the evaluation process, which means that the views of the interviewees must not be connected to identifiable individuals. This does not contradict that the list of interviewees should be published – but the views expressed and the individuals should not be linked. Note that the selection and composition of interviewees may prove to be crucial for the robustness of the evaluation and it is important to have interviewees from all important aspects of the RTDI programme.[54]

Focus groups: this technique is also highly advisable in many regards that these Guidelines discuss. The reason is that interaction between members of the focus group may catalyse the emergence of results that cannot be expected from the studying of documents or individual interviews. An effective focus group is composed of 6-9 people and requires professional facilitation around a few central questions for not more than 2 hours. The composition of the group as well as the eventual presence of strong opinion leaders will have a great impact on the outcome, which needs to be interpreted in the rest of the evaluation – just as the tendency for group

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[53] The strength of one method is usually the weakness of the other. Both weaknesses and strengths are discussed in depth in standard social science research books, in these Guidelines only the most important aspects needed for arranging practical evaluation situations are mentioned.

[54] CATI (Computer Assisted Telephone Interview) does not require that the people are in one space. This technique reduces the possibility for personal interactions, so less in-depth information can be expected. CATI therefore is better suited for investigating relatively simple phenomena.

conformity. Focus groups do not yield statistically representative results, but similarly to interviews, they add particular in-depth information to the evaluation otherwise not available.[55]

Expert panels: expert panels are usually convened for a longer period of time and are tasked with the in-depth investigation of a few central questions related to the evaluation (but panels can also be tasked with a full evaluation). Composition and size of the panel must be manageable and in accordance with the central questions to be answered. Expert panels have a chair, there are formal structures of operations (e.g. there can be supporting staff) and beside their own expertise, panel members also rely on background materials provided. For members, conflict of interest must be excluded. Again, dominant members can easily influence the opinion of others, which needs to be handled.

Questionnaire surveys: with the help of questionnaire surveys, the evaluation expects to have statistically representative data for generalised and easy-to-capture observations.[56] For such surveys, the surveyed population must be homogenous in terms of the surveyed phenomenon, whether they are related to the concept, the processes or the impacts of the RTDI programme. The central starting question is the so-called sampling from the basic population, which must be representative.[57] In surveys a series of closed questions are put in the same structure and in terms of the scales of measure, the required data will be on the nominal, ordinal, interval or ratio scale.[58] Additionally, there are open-ended questions, for which words or complete

opinions are recorded. For the scales used, there is a specific trade-off: the lower end of the measurability scale (nominal) will be easier to answer, however, the higher end allows for more quantitative analysis. Although looks easy, the design of a questionnaire survey requires careful considerations, which should be left to the evaluator. Patience is also needed: a few-page, but good questionnaire alone needs 2-3 weeks of development, not talking about testing the questionnaire before launching the full survey. A general problem is low response rates, because in many RTDI programmes, the beneficiaries are not obliged to answer. In South East European countries, response rates to voluntary survey around 10% can be considered acceptable. IT tools allow for different questionnaire survey designs than postal or paper-based surveys. These issues as well as processing the questionnaires requires specific skills and is best to be left for the evaluator team.[59] Questionnaire surveys in total are expensive, but compared to the robustness of results, it is a relatively cheap method.

Control group approaches: for measuring impacts (see chapters 3.2 and 4.5), a significant evaluation challenge is to identify what happened that would not have happened if there was no RTDI programme. To carefully examine this question, it also needs to be stated what would have happened anyway and what was displaced as a result of the programme. In real-life evaluations of RTDI programmes, the latter questions are less in focus (due to data constraints and the complexity of related phenomena), but still, attempts are needed. To look for answers, as one solution, examination and survey of control groups can be planned in an evaluation. The basic idea of a control group is randomly finding a population (of individuals or organisations) that is similar to the beneficiaries, but who had nothing to do with the programme. In case of firms, similarity can be measured by different observable characteristics, such as employment, sales, region, capital leverage, industry, but any available statistical variable that has no direct relationship with the spending from the RTDI programme can be used. If there is enough data available for a wide range of firms, the propensity score matching (PSM) family of methods can be used for finding the control group. If there is not enough data, control groups still can be attempted but more careful interpretation of the comparisons will be needed.

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[55] New developments of focus groups design include two-way focus groups (one group observes the other and then results are discussed – reducing group conformity), smaller (3-4 person) focus groups for discussing sensitive issues, IT-backed focus groups (video/teleconference/e-focus group) for geographically distant members (less interaction though), townhall focus groups (homogenous sub-teams, and inter-group discussions). For details see *Gajdusek et al.* (2013).

[56] Previously used questionnaire concepts can also be used and adopted, e.g. from the Community Innovation Surveys or the Frascati family of OECD manuals as they help structuring RTDI concepts that are complex. This does not mean that experimentation is discouraged.

[57] Representativity means that those receiving the questionnaire had equal probabilities of receiving the questionnaire, the sample of potential responders is not influenced in any particular way compared to those not scheduled for responding. One way to ensure representativity is to include the whole basic population in the survey, which can be easily done e.g. with the beneficiaries in RTDI programme evaluation (for the control group, it is another issue, see later). Stratified sampling and other sampling techniques can also be used. For those interested in these topics, social science research books can be consulted.

[58] Here are a few examples. The gender of the responder is on the nominal scale- When there is an order in the requested answer, but without numbers, the scale of measurement is ordinal. The interval scale of measurement assumes equal distances between different answer-options and there are associated numbers (e.g. on a Likert-scale) for which averages can be computed. Measurement on

the ratio scale will imply data is for which the full range of mathematical computations can be used (e.g. the volume of sales expressed in financial terms).

[59]. These are not discussed in these Guidelines.

Case studies: case studies tell a story digging deep. They can bring to the surface phenomena no other methods can. Case studies make an attempt to understand the studied subject in a holistic approach, paying particular attention to present multiple perspectives and complex interactions. They can be used at various stages of and for various purposes in an RTDI programme evaluation, such as providing in-depth information behind more aggregate data, laying foundations for a questionnaire survey, explore the unknown that could not be captured, verify statements, draw far-reaching conclusions in an inductive way etc. The main advantage of use is the richness of data and the in-depth understanding of contexts – always important in the RTDI domain. The main disadvantage is the lack of generalisability. If used, for RTDI programme evaluation it is advised to use multiple case studies, focusing on different subjects/angles etc.

Beside the above-detailed basic methodologies, programme evaluations – depending on the availability of appropriately detailed and good quality data – deserve their own custom methodologies:

- Some of these have roots in mainstream economics, and standard econometric and statistical modelling (see *Shahidur et al*. (2010)). Care should be taken, however, because the basic modelling assumptions may not be entirely valid for the socio-economic phenomena in and around innovation and research. In such cases it is advised to check specifically the relationship between the econometric assumptions and how the RTDI programme is embedded in the socio-economic environment (chapter 4.1.1). All econometric and modelling results shall be interpreted accordingly.

- Some other methodologies have been developed so that the knowledge dynamics and research and innovation phenomena were the starting points, and as such, they are more suitable for RTDI programme evaluation. Bibliometric analysis, patent analysis, network analysis, technology commercialisation tracking, productivity analysis etc. These and others can be checked in *Ruegg and Jordan* (2007), *Louis Lengrand&Associés* (2006) or the *RTD Evaluation Toolbox* (2002), and after data considerations, those methodologies may also be applied.

- Additionally, it should be mentioned that qualitative research has developed a lot in recent decades and will soon filter into evaluation research. Content

analysis of interviews, case studies, policy documents etc. is just one, yet important direction of qualitative enquiries.

Using the basic methods briefly explained, in the following chapters methodological guidance is given and explained for:

- the relatively distinct and earlier introduced cases of concept/design evaluations, process evaluations and impact evaluations (see also chapters 1.3 and 3.2.), across

- the RTDI programme types (see chapter 1.2.).

It should be noted that the evaluation elements presented below can and should be mixed when used in practice. For instance, it is possible that

- the processes of an RTDI programme are in the focus of the evaluation, but some aspects of impact and the programme design are also assessed, or

- there are particular impacts, which the evaluation is looking for, but some elements of process evaluation is also paid attention to etc.

4.3. GUIDE TO CONCEPT AND/OR DESIGN EVALUATIONS

Please note that for this type of evaluation, ex-ante evaluation is assumed throughout chapter 4.3. The tense of the questions and formulating the evaluation problems need to be modified if interim or ex-post evaluation of the RTDI programme concept/design is planned.

It is also assumed that before the evaluation questions and methods are clarified and developed further in the given evaluation exercise, the programme intervention logic is either clear, or has been reconstructed (see also chapter 4.1.).

4.3.1. EVALUATION OF RELEVANCE AND POLICY CONSISTENCY

When relevance and policy consistency are evaluated, the following questions need to be answered:

- Was the RTDI programme the right thing to do? Finding answers to this question can be supported by posing additional questions:
    - Is there (theoretical, policy and empirical) evidence that the programme is in need?
    - Is there (theoretical, policy and empirical) evidence that the programme can lead to favourable impacts?
- How well does the RTDI programme fit in the wider policy environment?
    - Do the broader socio-economic policies of the country (region) support RTDI-based development? Among others, economic policies, regional (industrial etc.) development policies, research policies, innovation policies, education policies, science policies – and their international linkages – can be taken into account.
    - Are there a clear and hierarchical system of strategic policy documents (or strategic policy guidance) that help positioning the RTDI programme?

Principal methodologies: finding evaluative conclusions to the questions on relevance and policy consistency will require document review (including literature review) and analysis of administrative data. If there is a questionnaire survey, one-two questions may be used to check the need for the programme. Additionally, a few interviews and/or one-two focus groups can also be planned. Note that the same interviews and focus groups may be expanded to more topics. For instance a focus group of beneficiaries may be asked about the relevance of the programme as well as impacts, the reliability of programme processes etc. Once the evaluation questions are clarified, the number of interviews and focus groups can be matched accordingly.

4.3.2. EVALUATION OF THE ECONOMY OF RTDI PROGRAMME DESIGN

When the economy of the RTDI programme design is evaluated, the following questions need to be answered:

- *General programme economy*: are there expensive elements in the RTDI programme design that can be omitted?
    - What are the main processes when the programme is in operation?
    - What time intervals and financial and human resources are allocated to these processes?
    - How do the resources relate to the outputs of the processes?
- *Effectiveness*: is the RTDI programme likely to live up to expectations?
    - Are there similar programmes, which have been / were successful? If plans of the current programme are compared to the actual outputs and outcomes of other programmes, do the plans look convincing?
    - What outcomes the evaluators expect from the programme? How do they compare with the plans?
- *Efficiency*: what otherwise unnecessary bottlenecks can be eliminated in the RTDI programme design?
    - How do the outputs relate to the expenditures and resources in the plans? And according to the evaluator's opinion? If there are significant gaps between the plans and evaluator expectations, what is the explanation for these gaps?

Figure 6. A simple evaluation calculus for the RTDI programme design
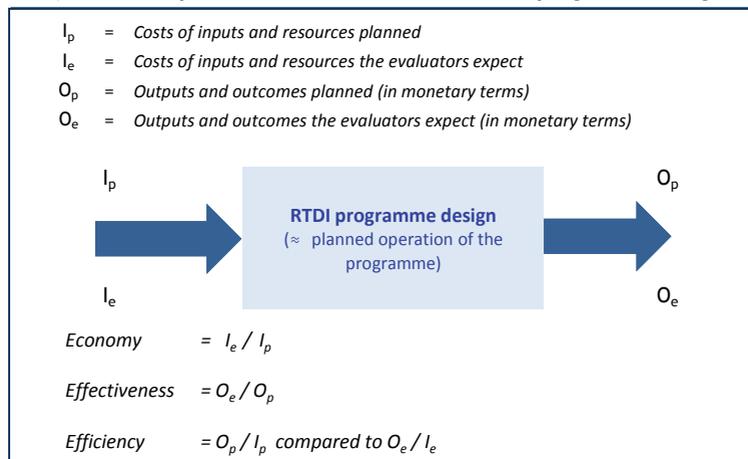
I_p = *Costs of inputs and resources planned*
I_e = *Costs of inputs and resources the evaluators expect*
O_p = *Outputs and outcomes planned (in monetary terms)*
O_e = *Outputs and outcomes the evaluators expect (in monetary terms)*

I_p $\rightarrow$ **RTDI programme design** ($\approx$ planned operation of the programme) $\rightarrow$ O_p

I_e O_e

Economy = I_e / I_p

Effectiveness = O_e / O_p

Efficiency = O_p / I_p *compared to* O_e / I_e

Source: adapted to these Guidelines from *Arnold and Guy* (2001)

Principal methodologies: finding evaluative conclusions to the questions on the economy of RTDI programme design will require document review (including literature review) and analysis of administrative data. For comparison, data of other programmes and previous evaluations can also be used. Additionally, interviews with experienced programme designers and managers or one-two focus groups are advised.

4.3.3. EVALUATION OF THE QUALITY OF OUTPUTS AND SUSTAINABILITY OF PROGRAMME RESULTS

Quality: When the anticipated quality of the RTDI programme outputs is evaluated, the following general question needs to be answered: given the time and resources dedicated to the RTDI programme, can good quality outputs be expected? However, the quality of RTDI programme outputs is a specific issue, because success of both innovation and research is measured in 'hard', real-life circumstances. The former is measured by the market, where new products, services and business methods have to find their way and earn reputation as increased sales, reduced costs, improved technologies. The latter is measured by the scientific and researcher community with its traditional quality assurance processes.[60]Therefore, it is the breadth of outputs

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[60] Embodied in research methodologies and protocols, peer-reviewed journals etc.

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and the appropriate reach to target audience that determines the quality of RTDI programme outputs a priori.

Table 4. Possible anticipated outputs of RTDI programmes

RTDI programme type	Outputs
Support for R&D and the R&D process	
Support to individual organisations for R&D	Increased additional R&D spending; Patents filed, quality publications; Prototypes, new products developed; Increased productivity, faster time to market;
Support to consortia for R&D	Better quality production/service; Enhanced/renewed skills of HR; Entering new S&T areas; Developing innovation management potentials
Mobility schemes	Increased mutual (incoming and outgoing) knowledge transfer (e.g. co-authored publications); Better quality research results, resulting from the collaboration and access to resources (publications, patents); Impacts in the incoming and outgoing organisation (better collaboration strategies, new research directions etc.)
Support for capacities and system ingredients	
Support for S&T parks	RTDI-intensive tenant firms Linkages between tenants and academia and associated funding New product / service developments
Support for R&D infrastructure	Novel (and infrastructure-dependent) research results Attraction of talent and renowned scientists
Technology transfer organisations	IP protection and commercialisation of academic research results (and diffusion thereof) New ventures and spin-off companies
Support for building / expanding the business	
Incubators, support to start-ups	Incubated firms and their business success Services provided to start-ups and incubated companies Sales, export and employment in (formerly) incubated companies
Innovation support services for existing SMEs	SMEs receiving services and innovation management services provided Design and support services for new market development Market success of SMEs receiving support
Support for IP protection and management	IPR checks in organisations IP services provided (consultancy, patent filing, other protection, IP portfolio management) Accomplished protection of IP and business success of IP
Voucher scheme	SMEs receiving services for RTDI Business success of participant SMEs

Source: own table

Support to clusters and competitiveness poles represent complex schemes, comprising many of the above RTDI programme types (and many others). The quality of programmes related to developing clusters and competitiveness poles requires additional – mostly territorial and competitiveness-related – considerations, whereby direct quality issues are somewhat less relevant.

Sustainability: When the sustainability of an RTDI programme concept or design is evaluated, the main evaluation question is if the programme design support well future sustainability of the likely programme results. Sustainability can be looked at from different standpoints:

- *Economic*:[61] the evaluation question is centred around the likely sustained results and impacts of the RTDI programme, having examined the programme design. If, for example, the participants of the programme have to give back the funds they received upon certain success conditions (e.g. if a newly developed product proves to be successful on the market etc.), then the economic results will have a higher probability to last longer and to be sustainable without state intervention. It is important to show if the activities induced by the programme can continue in the future with limited additional public funding. Last, but not least, an interesting aspect of economic sustainability is the extent to which the program concept / design is likely to be useful in the case of other programmes / contexts.

- *Social*: the long-term social consequences and the likely changes in the society are evaluated. Ex-post this can be fairly precisely evaluated using attitude change surveys and examining the consequences on communities. The ex-ante evaluation of the RTDI programme design is more challenging, and involvement of social-psychologists can be advised.

- *Ecological*: the environmental dimension of an RTDI programme can be approached with the concept of ecological footprint, which measures how much a certain activity consumes from the environment ('biocapacity') and how much effort it takes by the biosystem to regenerate (*Ewing et al.* (2010)). RTDI programmes also consume some part of the environment, but can also result more efficient and Earth-friendly use of resources. These are the questions to address when environmental sustainability of an RTDI programme is evaluated, and it requires specialised professionals.

Principal methodologies: finding evaluative conclusions to the questions on the quality of anticipated outputs will require interviews and focus groups[62] with potential beneficiaries and experienced programme designers and consultants. Together with document analysis, the same methods can be used for evaluating economic sustainability. Assessments on social and ecological sustainability of an RTDI programme requires expertise that is beyond the standard research and innovation management and policy expertise.

Strategy assessment: When the above suggested questions are answered, recommendations on whether and how the programme construct should be redesigned can be given.

4.4. GUIDE TO PROCESS EVALUATIONS

Please note that for this type of evaluation, interim evaluation is assumed throughout chapter 4.4. The tense of the questions and formulating the evaluation problems need to be modified if ex-ante or ex-post evaluation of the RTDI programme processes is planned.

It is assumed that before the evaluation questions and methods are clarified and developed further in the given exercise, the programme intervention logic is either clear, or has been reconstructed (see also chapter 4.1.).

4.4.1. EVALUATION OF APPROPRIATENESS

Before evaluating appropriateness, at least a short evaluation of relevance and policy consistency is advised (see chapter 4.3.1.), with reflections on the theory and the intervention logic (see chapter 4.1.).

The evaluation of appropriateness of the processes of an RTDI programme seeks to answer the question, whether programme processes are well-designed. To answer this question, the following steps need to be taken:[63]

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[61] Here economic sustainability is discussed in terms of RTDI programmes and with a micro-perspective. In macroeconomics, sectoral or industry analysis, sustainability is a different concept.

[62] Delphi-survey and other futures research techniques can also be used.
[63] Similarly to the components of a business process model. See: *Cousins and Stewart* (2002).

- *Identification of main processes and sub-processes*: RTDI programmes can be structured into main processes and their sub-processes. The table below can be used as a starting point for this description (a similar table should be compiled and verified).

- *Description of each process and sub-process*: The main processes and sub-processes need to be described in terms of their working logic, including milestones and tollgates of 'stop or go' decisions.

- *Drawing the relationship between the processes and sub-processes*: Gantt-charts and CPM (critical path method) diagrams can be used in order to identify linkages, dependencies and critical paths associated with the RTDI programme processes.[64]

- *Identification and analysis of key input and output indicators assigned to the processes*: Each process requires time and resources, of which the programme budget is composed, and the programme processes also produce certain outputs.

- *Comparison of inputs and outputs* and drawing evaluative conclusions.

Table 5. **Typical processes in an RTDI programme based on grants**

Main process	Sub-processes
Planning the RTDI programme	Analysis of regulation and strategic policies Definition of legal framework Identification of beneficiaries and supported activities Approval
Designing call for proposal	Preparation of call text and forms Preparation of indicators form Preparation of guidelines to the call Defining budget Preparation of legal documentation (model contract etc.) Preparation for database programming Launching the call via the web
Processing proposals	Formal and eligibility check Requesting supplementary information Evaluation of proposals Ranking above threshold Decision for funding
Managing the grant agreements	Concluding the contracts Scientific reporting Financial and administrative reporting Collection of monitoring and future evaluation indicators Controlling of grants Closure of contracts
Monitoring	Aggregation and analysis of monitoring indicators Aggregation and analysis of administrative data Preparation of monitoring reports
Closure of programme	Preparation of final report on the programme Decision on concluding the programme

Source: own table, using a process evaluation case

Principal methodologies: the above evaluation of appropriateness requires document review and analysis of administrative data first of all. Interviews with key people – structured by, for instance, the main processes – can be particularly useful for understanding the dynamics of the individual main processes. Case studies can also be written up, e.g. by selecting grant agreements and telling the story in-depth throughout the processes with the aim of understanding good and less fortunate process management practices and bottlenecks. If questionnaire survey is used, a few questions can also be dedicated to enquire about programme processes.

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[64] Relevant project management software can also be used.

4.4.2. EVALUATION OF THE EFFICIENCY AND ECONOMY OF RTDI PROGRAMME PROCESSES

The previously defined analysis of processes – including the analysis of quantitative data or indicators – helps to evaluate the overall process efficiency, i.e. to answer the question if the RTDI programme is working well. The quality of outputs has some link with the process efficiency, and also the indicators that can be assigned to the processes (see the table in chapter 4.3.3.).

The following questions can also be in the focus of an evaluation of process efficiency:

- Does the programme have a transparent, fast and acknowledged project proposal assessment system?
- Compared to similar business practices, does the (process) management of the programme show particular strengths? For example:
  - o Is there a monitoring system, that can aggregate the information in a timely manner and suitable for decision making? If so, how does it work and what type of information is delivered by the monitoring system?
  - o Would the programme processes stand against Quality Assurance standards? If so, what properties of the programme flow confirm this?
- What is the perception of clients (and the taxpayers) in general? Does the programme run smooth and in a timely manner?
- Does programme implementation – such as monitoring or controlling – put an unnecessary burden on beneficiaries / clients / stakeholders? If so, what is the proof of it?
- Having overviewed the structure of processes and sub-processes, are there bottlenecks that can be eliminated? Are there indicators – administrative statistics, such as the number of days elapsing between programme implementation milestones – available for analysis?

For evaluating the *economy of the RTDI programme processes*, the overall evaluation question is if the RTDI programme worked out cheaper than expected. This analysis requires the comparison of planned costs and actual costs, and/or, the comparison of measures linked with the resource intensity of the programme (such as hours / man-months planned and actually used). If there had been no resource planning for programme implementation, actual costs / man-months incurred can be analysed and compared to existing practices.

Principal methodologies: the above evaluation of the efficiency and economy of programme processes requires document review and analysis of administrative data first of all. Interviews with key people can assist in identifying cost-carrier processes, departments, units etc. depending on the organisational structure of the programme implementation. In addition, surveys and case studies can also be conducted for the identification and in-depth description of resource intensive activities.

4.4.3. EVALUATION OF THE QUALITY OF OUTPUTS FROM THE PROCESSES

The overall evaluation task is to find the relationship between the processes of the RTDI programme and the quality of outputs from these processes.

There are two types of outputs, the quality of which can have links with the programme processes:

- *Administrative outputs*: these include archived documents (contracts, other documents accumulated during the project run), databases (linked to the programme processes and sub-processes as well as monitoring indicators) and aggregated information based on the documents and the databases. Additional attention can be paid to delays and the handling of appeals as proxies for process quality.
- *Programme outputs*: these cover the various outputs an RTDI programme can yield (c.f. the table in chapter 4.3.3.).

Finding the relationship between the quality of administrative outputs and the programme processes and evaluating this relationship is relatively easy. Comparing the overall programme design, its appropriateness (c.f. chapter 4.4.1.) and the available information on administrative outputs will speak for itself. However, the relationship between the quality of programme outputs and programme processes is a challenging task, not only because it requires empirical research, but because this is perhaps the most sensitive evaluation question from the viewpoint of programme

managers and administrators alike. The following evaluation questions can be explored:

- Are the plans of the programme (the concepts of supported activities/processes) in accordance with the practices of the beneficiaries? If not, what are the greatest discrepancies and how do they affect the final results from individual projects?

- Is the administration of the programme appropriate as perceived by the clients and beneficiaries? Is there an unnecessarily rigorous administration of the programme? Or it is on the contrary and administration is lax?

- Is the time needed for the approval of contracts, project reports etc. relatively short? Especially in high-tech research, the time factor can be critical.

Principal methodologies: the first evaluation (links between processes and the quality of administrative outputs) requires the analysis of administrative data and the document archives with a 'Quality Assurance' approach in the evaluators' mind. The second evaluation (links between processes and the quality of programme outputs) can capitalise on various empirical information collection methods: interviews, focus groups, expert panels, questionnaire surveys and case studies.

4.4.4. EVALUATING THE OPTIONS FOR PROCESS IMPROVEMENT

When RTDI programme process improvement is on the agenda, the general evaluation question is if and how the RTDI programme can be better. This evaluation question cannot be answered without having results of evaluation of appropriateness, processes and their economy, or the evaluation of the links between the quality of outputs and the processes (see the preceding chapters). These evaluation results will show bottlenecks of processes and different problems regarding the organisation and handling of the programme.

Finding the options for improvement can also be done in house, but the involvement of independent evaluators is also possible. At first, a methodology similar to scenario-building is suggested. Steps of the process are:

- *Identification of focus*: When the different areas for improving the management of programme processes have emerged (from the evaluation of

appropriateness, processes and quality, see above), it has to be decided which of these should be the focus of the evaluating the options for improvement. The table in chapter 4.4.1 can be used as a start.

- *Analysing and ranking the drivers of the problem areas*: In a brainstorming session, the factors that cause the problems should be listed and put in priority order.

- *Consolidation of the main drivers*: The problem-causing factors shall be classified into groups, where the similar factors are listed. The most influential group of factors should be chosen along with the group that contains factors, which are cheap to improve.

- *Drawing the 2 by 2 matrix*: The two groups chosen above represent the 'driving forces' of potential change for improvement. They should be drawn in a coordinate system-like drawing, where the origin represents the current situation. The up-right corner shows the case when both groups of factors is improved, the down-left corner when both group of factors deteriorated.

- *Analyse the options*: Analyse what happens in each corner and describe what has to be done to move towards the up-right.

As a second step, the involvement of decision makers is suggested, because at this point, the strategic question if should and how should the RTDI programme processes be redesigned need to be answered. If there are resources, an evaluation team can elaborate on qualitative ex-ante impacts of the suggested changes.

Principal methodology: Focus groups suit best for evaluating the options for process improvement, however, it is best done when there are evaluation results available in advance (see above).

4.5. GUIDE TO IMPACT EVALUATIONS

Please note that for this type of evaluation, ex-post evaluation is assumed throughout chapter 4.5. The tense of the questions and formulating the evaluation problems need to be modified if ex-ante or interim evaluation of the RTDI programme impacts is planned.

It is assumed that before the evaluation questions and methods are clarified and developed further in the given exercise, the programme intervention logic is either

clear, or has been reconstructed (see also chapter 4.1.). If there are no evaluation results available as far as relevance and policy consistency are concerned (see chapter 4.3.1.), the impact evaluation should either take relevance and policy consistency heavily into account when designing the methodology, or such an evaluation should be done prior to the evaluation of impacts.

4.5.1. EVALUATION OF RTDI PROGRAMME IMPACT

When the impact of the intervention (the RTDI programme) is to be captured with numbers and figures, there are a number of issues to deal with.

Monitoring statistics measure direct outputs only: Monitoring data can be very useful for measuring the outputs (the so-called output additionality, see later), however, the overall logic of the RTDI programme may bring about results and impacts that are beyond the scope of the collected monitoring data. Further, if good quality monitoring indicators are not readily available, reliance on survey(s) and interviews will become rather important in the course of the evaluation.

Unobservable counterfactual: If one considers only the counterfactual – i.e. the outcome had the RTDI programme not existed –, there are many statistical challenges related to the fact that the counterfactual cannot be observed. These statistical challenges are centred around two issues:

- the so-called *selection bias*, which, in our case means that participants of the RTDI programme are usually not randomly selected from the total target population of beneficiaries in terms of the actual effects/impacts to be supported by the programme,
- *factors that are outside the RTDI programme*, but which have impact in the domain where the RTDI programme also wants to achieve some results.[65]

Therefore, the actual impact of the programme can be underestimated or overestimated, depending on what the selection bias and the external factors are causing. There are different solutions how to deal statistically with the problem of

selection bias and external factors,[66] however, in the practice of evaluating an RTDI programme, finding a good comparison group, which behaves in accordance with the counterfactual, is advised, for instance, by using the propensity score matching technique (see also the control group approach in chapter 4.2).

Nevertheless, finding and using a good control group or comparison group of beneficiaries takes a lot of time and resources, and in the context of RTDI programmes, many of the impacts are likely not to be observable and measurable for both the beneficiary and the control group. If so, the measurable statistics can easily lead to evaluations not fitting the RTDI context – this may easily happen even when there are available monitoring indicators originally suited to the RTDI programme. Overall, a control group is advised, however, it should be handled with great care and not be used standalone.

Impacts are manyfold: As the *AEA* (2004) principles underline, 'evaluators should consider not only the immediate operations and outcomes of whatever is being evaluated, but also its broad assumptions, implications and potential side effects.' It is strongly advised that the evaluation of the impact of RTDI programmes takes a holistic approach and attempts to acknowledge the diverse impacts of knowledge flows and knowledge dynamics. Therefore, even when a limited set of particular impacts are interesting for the decision makers, evaluators and those commissioning the evaluation shall never forget about knowledge flows and the fact that indirect economic impacts can be more important and substantial than the direct ones (see chapter 4.1. on the basics of reconstructing the theory).

With the above in mind, the basic evaluation question in the case of impact evaluations is the following: What has happened as a result of the RTDI programme? RTDI programme impacts are recommended to be evaluated as additionalities, when the evaluator looks for phenomena that have happened over and above what would have happened anyway. This is what actually socio-economic programmes are used for, to have impacts that add to the usual course of events. There are three types of additionalities, input additionality, output additionality and behavioural additionality,

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[65]For details see 'Basic issues in evaluation' in *Shahidur et al*. (2010)

[66] From randomised evaluation through instrumental variables to structural approaches. For a quick summary see *Shahidur et al*. (2010) p.27-28.

and different issues will become the subject of analysis, depending on what type of additional impacts are looked at.[67]

Input additionality: It refers to the extent to which resources and certain activities increased as a result of the RTDI programme. This can be a very important impact, because as the RTDI Evaluation Standards (2012) also underlines, investment in R&D is always sub-optimal at the macroeconomic level. The following questions help deciding on what to look at when input additionality is at focus during impact evaluation.

Table 6. ***Starting questions for finding facts about impacts by RTDI programme type – input additionality***

RTDI programme type	Questions on input additionality impacts
Support for R&D and the R&D process	
Support to individual organisations for R&D	How much R&D spending has increased? How many additional R&D staff were employed? What resources were available, which would not have been available was there not an RTDI programme? What kind of new knowledge could become available in the course of the work?
Support to consortia for R&D	
Mobility schemes	What financial sources became available for the individual / the organisation? Has the mobility scheme affected employment? If yes, how? What kind of new knowledge could become available in the course of the work and for whom?
Support for capacities and system ingredients	
Support for S&T parks	How many tenant firms found better location than without the programme? How many additional highly-skilled staff could be attracted?
Support for R&D infrastructure	What quality infrastructure became available? How much R&D investment has increased? How many scientists could start novel research? How many new scientists were attracted by the infrastructure?
Technology transfer organisations	How many techtransfer professionals became employed (and/or trained)? How much financial resources for technology transfer have increased?
Support for building / expanding the business	
Incubators, support to start-ups	How much has the incubation capacity increased? How many additional skilled professionals assist incubation? Which statistics indicate and support the increased service activity to incubation?
Innovation support services for existing SMEs	How much has the innovation management service capacity increased? How many additional skilled professionals assist the SMEs that demand such services? Which statistics indicate and support the increased service activity to SMEs?
Support for IP protection and management	How much has the IP management capacity increased? How many additional skilled professionals assist the firms that demand such services? Which statistics indicate and support the increased IP management service activities?
Voucher scheme	What additional resources have been available for RTDI-related services? (estimation on the crowding out effect is particularly interesting)

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[67] For details on the additionalities, please consult OECD (2006).

*Table 6. **Starting questions for finding facts about impacts***
by RTDI programme type – input additionality (cont.)

RTDI programme type	Questions on input additionality impacts
Support for enhancing mechanisms in the innovation system	
Clusters	How many cluster managing organisations and with what capacities have entered the regional/sectoral landscape? How much additional capacities the cluster participant organisation dedicated to achieving the cluster objectives?
Competitiveness poles	What additional capacities have the programme mobilised? [Depending on the nature, size and scope of the programme, inputs can be various: infrastructure, administration building, capacity building, changed legislation etc. The additional development - that compared with the situation without the programme - of these inputs should be summarised.]

Source: own table

Output additionality: the extent to which additional outputs increase as a result of the RTDI programme, e.g. the growth of new product sales, export activity, patents, technological levels, scientific outputs.

*Table 7. **Starting questions for finding facts about impacts***
by RTDI programme type – output additionality

RTDI programme type	Questions on output additionality impacts
Support for R&D and the R&D process	
Support to individual organisations for R&D	Were there new products, services, technologies, methods introduced (on the market or within the organisation) as a result of the programme? If yes, what is their significance? Is there an increased publication / patenting activity?
Support to consortia for R&D	Were there technological or human/social/legal standards or regulations modified or introduced as a result of the programme? Are there new (additional) revenues as a result of the programme? If yes, what is their significance?
Mobility schemes	Were there new intellectual products (papers, technologies, methods etc.) born? Were there dissemination activities (presentations, interviews etc.) implemented? If yes, how extensive and impactful were they?

*Table 7. **Starting questions for finding facts about impacts***
by RTDI programme type – output additionality (cont.)

RTDI programme type	Questions on output additionality impacts
Support for capacities and system ingredients	
Support for S&T parks	As a result of concentration in space, are there additional outputs - new products and services - produced by the tenant firms?
Support for R&D infrastructure	What are the R&D results - such as publications, patents, methods, theories, models etc. - born as a consequence of launching the infrastructure?
Technology transfer organisations	How can the additional IP and knowledge protection activities be described? What are the commercialisation success rates? How many new ventures and spin-off companies were born and / or received additional support?
Support for building / expanding the business	
Incubators, support to start-ups	How many (start-up) firms received incubation services? How have sales, exports, and employment in (formerly) incubated companies developed? How many new markets were entered by the incubated firms? How many incubated firms received additional capital and what was the size of that capital?
Innovation support services for existing SMEs	How many SMEs received and what kind of services? How have sales, exports, and employment changed in the supported firms? How many new markets were entered by the SMEs that received the services?
Support for IP protection and management	How many knowledge products were handled and how many of them received protection or other IP treatment? How many companies approached the IP services and how many of them were serviced with what results? How can the commercial success of treated knowledge products be described? What was the impact of IPR checks on running the business?
Voucher scheme	How many SMEs received and what kind of services? How have sales, exports, and employment changed in the supported firms?
Support for enhancing mechanisms in the innovation system	
Clusters	How have sales, exports, and employment changed in the supported cluster participant firms? Have the competitiveness position of the corresponding parts of the value chain changed - productivity and employment in particular?
Competitiveness poles	Did the region change its development trajectory? Are their increased sales, improved competitiveness positions and welfare effects?

Source: own table

Behavioural additionality: the extent to which the beneficiaries and other stakeholders change their behaviour and become more competitive as a result of the RTDI programme.

Focus on behavioural additionality: Even if the statistical challenges of the counterfactual cannot be solved, evaluation of RTDI programme impacts must have a clear focus on behavioural additionality or if it's not in the focus, the behavioural perspective and broader (and long-term) impacts beyond the beneficiaries must be taken into account. With careful evaluation design, behavioural additionality will always be measurable to some extent, and this focus is what suits best with the knowledge dynamics.

*Table 8. **Starting questions for finding facts about impacts
by RTDI programme type – behavioural additionality***

RTDI programme type	Questions on behavioural additionality impacts
Support for R&D and the R&D process	
Support to individual organisations for R&D	Are there better (innovation) management capabilities available as a result of the programme? Have the quality of human resources and organisational processes improved? Have new strategic partners become more easily accessible for the future?
Support to consortia for R&D	Have new scientific / technological perspectives opened as a result of the programme? Are their new sponsors (venture capital etc.) available for the future? Is the production / service production faster and of better quality?
Mobility schemes	Is there a better research potential for the incoming/outgoing organisations/individuals than prior to the programme? Has the programme affected future research directions / strategies? If yes, how? Has knowledge transfer accelerated between the participants and wider stakeholders?
Support for capacities and system ingredients	
Support for S&T parks	Were there new linkages born between tenant firms and other knowledge intensive entities (universities, consultancies etc.)? How does the S&T park affect future competitiveness of the tenants and the broader environment?
Support for R&D infrastructure	How has the research plans of attracted scientists (and their peers) have changed? Is there an increased local scientific potential? Have the firms in the broad - possibly also global - environment of the infrastructure changed their plans? If yes, how?

RTDI programme type	Questions on behavioural additionality impacts
Technology transfer organisations	How has the knowledge generating organisation in the vicinity of the technology transfer organisation change its research and commercialisation plans? Were there strategic alliances with the techtransfer organisation born? Has the commercialisation potential increased?

*Table 8. **Starting questions for finding facts about impacts
by RTDI programme type – behavioural additionality (cont.)***

RTDI programme type	Questions on behavioural additionality impacts
Support for building / expanding the business	
Incubators, support to start-ups	Are there better (innovation) management capabilities available as a result of the programme? Have the quality of human resources and organisational processes improved?
Innovation support services for existing SMEs	Have new strategic partners become more easily accessible for the future?
Support for IP protection and management	Have new commercial perspectives opened as a result of the programme? Are their new sponsors (venture capital etc.) available for the future?
Voucher scheme	Did SMEs become more aware of the importance of RTDI? Have they changed their future development plans?
Support for enhancing mechanisms in the innovation system	
Clusters	Could the cluster strengthen its strategic (global) positions? If yes, how? E.g. by more sensitive adaptation to the industry and the environment? [other relevant questions can be taken from above, depending on the type of cluster policy tool]
Competitiveness poles	Are there local spillover impacts and increased flows of knowledge? Have the major local actors (companies, universities, civil organisations etc.) increased their networking capabilities and did the local authorities / governments become more receptive to Triple / Quadruple Helix settings?

Source: own table

Besides additionalities, displacement is also of interest when evaluating RTDI programmes. The question on displacement is formulated as follows: What has not happened which would have happened had the programme not been in place? In practice studying displacement (or crowding out) implies serious quantitative measurement challenges. Displacement will be easier to interpret if first the additionalities are analysed, because then the alternatives of the additional impacts can be estimated and evaluated.

Challenges: When decisions on ordering an impact evaluation of RTDI programmes have been taken, it is advised to think over some important challenges and the likely consequences on the methodology and/or the approach of the evaluation. These are summarised in the table below.

Table 9. **Some important impact evaluation challenges in the case of RTDI programmes**

RTDI programme type	Impact evaluation challenge	Solution
Support for R&D and the R&D proces		
Support to individual organisations for R&D	Quantification of spillover impacts and knowledge dynamics is a rather complicated task Random selection for comparison is usually not possible	If modelling of spillover impacts is not possible, alternative research designs (including bibliometric analysis, qualitative research, surveys of programme participants, non-participants and rejected proposers) need to be used in a robust and convincing way For control groups, propensity score matching (PSM) techniques are advised
Support to consortia for R&D	The contexts of sectoral and technological innovation systems and the impacts thereon are almost impossible to take into account in a quantitative way Various behavioural additionalities need to be researched	
Mobility schemes	The most important impacts are long-term and indirect	Adding evaluation of long-term plans and attitude changes to the evaluation design
Support for capacities and system ingredients		
Support for S&T parks	RTDI-intensive tenant firms are attracted and intersectoral linkages are built not only by the fact that there is support	Localised contextual factors need careful examination together with impacts
Support for R&D infrastructure	The most important impacts are long-term and indirect	Evaluation by peers, relying on bibliometric data. Analysis of information on attracted researchers and research contracts.
Technology transfer organisations	Performance of such organisations highly depends on local contexts	Careful examination of the interplay between the environment and the techtransfer organisation

Table 9. **Some important impact evaluation challenges in the case of RTDI programmes (cont.)**

RTDI programme type	Impact evaluation challenge	Solution
Support for building / expanding the business		
Incubators, support to start-ups	A portion of the incubated firms will not be competitive in the long run, which is natural. Finding control groups is not possible.	Overall programme impact should be evaluated, with specific attention to the provision of examples of successful channels for other start-ups (behavioural additionality in start-ups not supported by the programme)
Innovation support services for existing SMEs	Despite possible clear programme expectations, besides output additionalities behavioural additionality should also be paid attention	Survey of behavioural impacts besides otherwise measured outputs and available monitoring indicators
Support for IP protection and management	Success depends largely on the business model linked to the IP	Evaluation includes analysis of the change of competitiveness position of beneficiaries in their industry
Voucher scheme	Contribution to company competitiveness is more likely to be measurable than direct outputs	
Support for enhancing mechanisms in the innovation system		
Clusters	It is virtually impossible to show the impact of the RTDI programme only: there are many factors, which contribute to both success and failure	Elaboration of in-depth case studies can complement any quantification
Competitiveness poles		

Source: own table

Principal methodologies: When programme impacts are evaluated, quantitative analysis – econometric modelling, cost-benefit analysis, estimation of technological impacts etc. – are preferred. If econometric-statistical analysis of impacts is not possible – which will often be the case – impacts can be well evaluated with the use of questionnaire surveys, interviews and focus groups. The suggested starting questions by RTDI programme types and the basic impact evaluation objectives above can be customised and more questions can be formulated in accordance with the characteristics of the programme under evaluation. It should be noted that drafting questionnaires requires specific expertise and it is best to listen to the evaluator team when this issue is addressed:

- the longer the questionnaire is, the worse the response rate becomes,
- open-ended questions should be limited,

- the formulation of answers can be less precise than the programme terminology (and more understandable for the responder),
- questions, which have no link with the evaluation focus and hypotheses should be avoided,
- categorical questions – which help classifying the responders – may be considered in terms of comparing the results to statistical data from other sources.

The questions in tables 6, 7 and 8 and the considerations in table 9 provide guidance for formulating questions in a questionnaire that aims at exploring impacts.

When impacts are evaluated, attention should also be paid to the causes / explanatory factors of impacts. The questions, which can lead to evaluative statements, are:

- How and why the detected outcomes were born – and why others could not evolve?
- Given the analysis of impacts, can it be summarised what was going on well and not so well?

4.5.2. EVALUATION OF THE ECONOMY OF RTDI PROGRAMME IMPACTS

When the economy of RTDI programme impacts are evaluated, the evaluation questions are not centred around only what the additional impacts are – which are very important and challenging in themselves, see chapter 4.5.1. – but whether the impacts have been achieved with reasonable resources. The following questions can be addressed:[68]

- *Effectiveness*: Has the programme lived up to expectations?
  - Compared to plans, how do the actual outputs and outcomes measure?
  - Were there particular barriers and enablers that caused the difference between successful and disappointing outcomes?
- *Efficiency*: What is the return on the investment?
  - How much funding was used and what is the return?

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[68] Some sub-questions were formulated using the Community Solutions website (www.communitysolutions.ca).

- How does the actual outcome compare with the plans – given the resources?
- Did the program use well the resources to achieve outcomes of the greatest possible value to participants and the community?
- *Efficacy*: How does the return compare with expectations?
  - Do outcomes outweigh the resources used to obtain them?
  - Was the program worth implementing?

Although in theory the below given calculus of 'costs and benefits' looks simple, in reality there are many challenges (including the financial aggregation of the impacts), which makes the actual calculation and assessment a demanding task. This evaluation should be attempted only if the evaluator team has good experience in this type of calculus with particular references to research and innovation.

Figure 7. **Simple evaluation calculus for RTDI programme impacts**

I_a = *Inputs and resources achieved (in monetary terms)*
I_p = *Inputs and resources expected during planning (in monetary terms)*
O_a = *Outputs and outcomes achieved (in monetary terms)*
O_p = *Outputs and outcomes expected during planning (in monetary terms)*

I_a → RTDI programme operation → O_a

I_p → → O_p

Economy $= I_a / I_p$

Effectiveness $= O_a / O_p$

Efficiency $= O_a / I_a$ compared to O_p / I_p
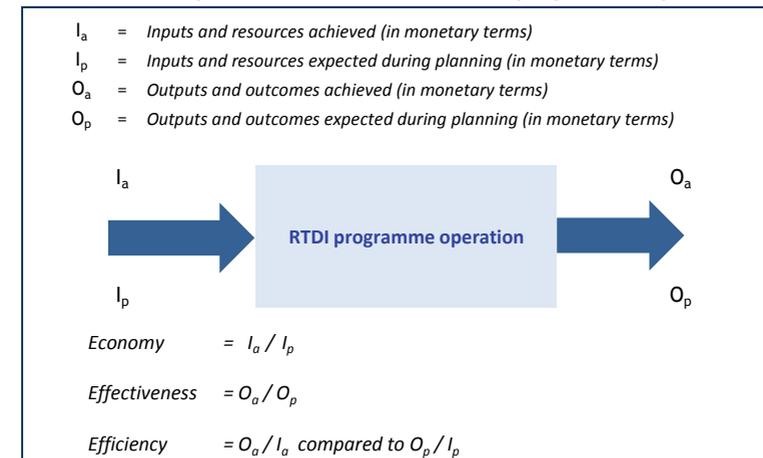
Source: adapted to these Guidelines from *Arnold and Guy* (2001)

Principal methodologies: The measurement of the rate of return requires financial-statistical analysis, for which the more or less exact quantification of impacts is needed as input – and that is usually a great challenge, given the externalities of knowledge. When the RTDI programme is positioned closer to the market (see chapter 4.1.3.), the use of monitoring indicators and the analysis of administrative data may enable some type of cost-benefit analysis, however, a lot of care should be taken because of potential behavioural additionalities and spillover impacts (see 4.1.1.).

4.5.3. EVALUATION OF THE QUALITY OF RTDI PROGRAMME IMPACTS

The evaluation of the quality of RTDI programme impacts requires qualitative enquiry to find how good the outputs are. Sustainability – whether economic, environmental or social, see chapter 4.3.3. – can be an important component of quality, but the value of the outcomes to programme participants and to the broader community should also be assessed.

Principal methodologies: Economic sustainability and the value of the programme outcomes can be assessed with the help of questionnaire surveys, focus groups and interviews. Evaluating social and environmental sustainability will require the involvement of specialised professionals, expertise that is beyond the standard research and innovation management and policy expertise.

SUMMING UP

Chapter 4 attempts to provide as much methodological assistance to RTDI programme evaluations as possible to enable organisations that commission the evaluations posing the right questions and managing the evaluation from a methodological stance. This methodological guidance can be divided into two parts:

- general preparation for understanding innovation management and policy theories related to the RTDI programme,
- guidance for the three types of evaluation – concept/design evaluations, process evaluations and impact evaluations.

When preparing for an RTDI programme evaluation, first, a good understanding of how the programme was supposed to work and how it fits to the macro-contextual working logic of innovation and research is needed. This requires the development of a policy theory and a reconstructed intervention logic, including the following steps:

- Embed the RTDI programme in the socio-economic environment: to appropriately evaluate the RTDI programme, a common understanding of knowledge processes with links to the innovation processes need to be developed. It is important to understand and accept the fact that knowledge

and the utilisation of knowledge is not necessarily kept within the organisational boundaries.

- Understand the programme's position in its national innovation system (uncover the national innovation system context of the RTDI programme): the most important contextual factors that have an impact on the RTDI programme needs to be stated before there are evaluative conclusions drawn from any empirical work (ideally, the context is studied before finalising the empirical methodology).

- Position the RTDI programme and its evaluation in the general theoretical framework: when there is a broad theory and common understanding of RTDI processes available, the RTDI programme to be evaluated can be placed in the general theoretical framework.

- Use concept mapping of impacts and/or a logframe matrix to systematically uncover how the RTDI programme actually works, or is supposed to work. The result of both techniques is a conceptual map how the programme works (or is/was supposed to work) directly. Note that the evaluation should take into account indirect and broader social effects as well.

- The more or less reconstructed theory – whether attempted in house or commissioned to the external evaluator – and the type of evaluation should be aligned.

Second, the most important basic methodologies that are frequently used in data-poor environments were introduced (if there are good quality data available across many RTDI-related and corporate domains, individual model building for detecting impacts may as well be attempted). The general properties and practicalities of document review and analysis of administrative data, analysis of secondary statistics, desk research, interviews, focus groups, expert panels, questionnaire surveys, control group approaches and case studies were shown. Each of the methods have particular strengths, for which they are used, and each of them requires specific expertise and care during the evaluation.

For concept/design evaluations, the focus is on how the programme has been designed (or being designed). Evaluation of programme relevance and policy consistency are generally needed for any evaluation. The economy of RTDI programme design can also be evaluated, seeking answers to questions about possible bottlenecks and expensive/inefficient programme elements as well as the

likely expectations of results (during and after the implementation of the programme). When the quality of outputs is evaluated, a careful matching of programme resources and anticipated outputs are contrasted. The evaluation of the sustainability of programme results may cover three broad perspectives: economic sustainability, social sustainability and ecological sustainability.

For process evaluations, the focus is on RTDI programme processes. The starting point is the identification of main processes and sub-processes and attempting drawing evaluative conclusions on programme appropriateness:

- relationship between the processes will determine further evaluation steps;
- to the processes, different data (about resources, time, outputs) can be assigned, which will be valuable for further process evaluation questions.

The identified processes and related data can be used to evaluate the overall process efficiency, to answer the general process evaluation question, i.e. if the RTDI programme is working well. Process efficiency can be decomposed into evaluations of proposal assessment, particularly strong (or weak) programme processes, the monitoring subsystem, processes from a quality assurance point of view, and the perceptions and burdens of clients (stakeholders). The evaluation should also strive to formulate recommendations for eliminating bottlenecks. For the evaluation of the economy of the RTDI programme processes, the overall evaluation question is if the RTDI programme worked out cheaper than expected. This analysis requires the comparison of planned costs and actual costs, and/or, the comparison of measures linked with the resource intensity of the programme (such as hours / man-months planned and actually used). Evaluation of the quality of outputs from the processes may cover the analysis of administrative outputs and the analysis of programme outputs. The former is relatively easy, as the focus is on the relationship between the quality of administrative outputs and the programme processes. The latter is highly challenging as the analysis of the relationship between the quality of programme outputs and programme processes is a sensitive issue. Accordance of the programme plans/processes and beneficiary practices, appropriateness of programme administration from the point of view of clients/beneficiaries, and timing between the processes can be in the focus of evaluating the relationship between programme processes and the quality of programme outputs. When any, or all of the

above process evaluations have been performed, the options for process improvement can be drafted. For such options, the drivers of problem areas can be mapped in a 2 by 2 matrix. For drawing realistic options about how the RTDI programme processes can be redesigned, the involvement of decision makers is advised.

For impact evaluations, the focus is on programme impacts. Because of the complexity of RTDI and the related knowledge flow dynamics, this type of evaluation requires the greatest care. The understanding of how the programme was supposed to work and how it fits to the macro-contextual working logic of innovation and research is a strict precondition for impact evaluations. After understanding the contextual factors, the appropriateness of monitoring data and the counterfactual are the first issues to consider before moving on with impact evaluation. Even if relatively good comparator groups (control groups) can be identified, the evaluation should be prepared for the fact that many of the impacts are likely not to be observable and measurable for both the beneficiary and the control group. Indirect economic impacts of the RTDI programme can be more important and substantial than the direct ones. For capturing all relevant impacts, the focus of RTDI impact evaluations shall be on behavioural additionalities, however, input and output additionalities can and should also be looked at:

- Input additionality: It refers to the extent to which resources and certain activities increased as a result of the RTDI programme. The starting questions for evaluating input additionalities by RTDI programme type have been summarised in Table 6.

- Output additionality: the extent to which additional outputs increase as a result of the RTDI programme, e.g. the growth of new product sales, export activity, patents, technological levels, scientific outputs. The starting questions for evaluating output additionalities by RTDI programme type have been summarised in Table 7.

- Behavioural additionality: the extent to which the beneficiaries and other stakeholders change their behaviour and become more competitive as a result of the RTDI programme. Evaluation of RTDI programme impacts must have a clear focus on behavioural additionality or if it's not in the focus, the behavioural perspective and broader impacts beyond the beneficiaries must

be taken into account. The starting questions for evaluating behavioural additionalities by RTDI programme type have been summarised in Table 8.

When the economy of RTDI programme impacts are evaluated, the evaluation questions are not centred around only what the additional impacts are – which are very important and challenging in themselves – but whether the impacts have been achieved with reasonable resources. The comparison of impacts and the resources will result in the evaluation of programme effectiveness (has programme expectations been met), programme efficiency (the rate of return on the investment), and programme efficacy (the comparison of the return with expectations).

The evaluation of the quality of RTDI programme impacts requires qualitative enquiry to find how good the outputs are. Sustainability – whether economic, environmental or social, see chapter 4.3.3. – can be an important component of quality, but the value of the outcomes to programme participants and to the broader community should also be assessed.

For the evaluation of RTDI programme design/concept, processes and impacts, the basic methodologies that fit to the evaluation type have also been indicated in Chapter 4.

The next, last chapter provides guidance for RTDI programme evaluations from an organisational point of view: the typical processes of an evaluation is discussed in Chapter 5.

5.   GUIDANCE FOR THE EVALUATION PROCESS

RTDI programme evaluation, once there is a decision to launch it, can be interpreted as a set of interrelated processes. There is a start – what shall be in focus – and an end – evaluation reports, dissemination and feedback loops. In between there are certain steps to be managed, and they require substantial time and resources of the organisation commissioning the evaluation. Chapter 5 shows guidance through these processes. A good overall understanding of the preceding chapters is assumed, as the themes developed before are not revisited again, only mentioned (cross-references will also be widely used for quick jumps, if needed).

5.1. FOCUSING, INDICATIVE BUDGETING AND TIMEPLANNING

As it has been explained with regard to timing, whether the evaluation is ex-ante, interim or ex-post is likely to have some relationship on the basic character of the type of evaluation – should it be a concept/design evaluation, a process evaluation or an impact evaluation (see chapters 1.3 and 1.4). It has also been argued that unless very large evaluations are planned, it is advised to select not more than five focal evaluation questions with the help of Table 2 in these Guidelines (see chapter 3.2).

It is advised that the general focusing, the indicative budgeting and the timeplanning phases of the evaluation takes place at the same time. The following steps should be taken:

1. *Elaborate a first draft* of focus, budget and timespan. During the draft planning, a first checking for predefined evaluation plans, policy motives, and available data is also advised. (chapters 2.6 and 3 can be checked for more details).

2. *Convene a working group of stakeholders with high levels of representation*: if possible, the group should consist of all stakeholders, if not, at least those most directly affected by a future evaluation of the RTDI programme (e.g. programme management, the funding organisation) and people having some experience in evaluation (or social science research)[69] should be present.

3. *Announce the plan* to launch an evaluation with its indicative focus, budget and timespan.

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[69] Pay attention to conflict of interest: these experts shall not be involved in the evaluation work itself.

4. *Aim at reaching consensus* around the broad focal questions of the evaluation.

Although this phase of the work may remain inside the commissioning authority – which is often the case in practice –, the legitimacy of the evaluation will be higher if a broader group of stakeholders is involved already at this stage.

5.2. PRELIMINARY STUDY

In parallel with or after the work described in chapter 5.1, a more systematic in-house study is also needed to define precisely the limits of the evaluation (with the indicative budget, timing and the focal evaluation questions in mind) so that 'the focus remains clear and that only those questions are formulated that can reasonably be expected to be given a valid answer' (*IOB* (2009)).

The following steps are needed to be done and summarised in a preliminary study document:

- collection of relevant policy themes and policy documents (c.f. chapter 3.1);
- collection of studies related to the RTDI programme: the most important and influential studies/reports/articles that have relevance should be collected;
- conversations with relevant informants and experts: as part of policy networking, some hints and stakeholder viewpoints can be summarised;
- summarising the intervention logic (c.f. chapter 4.1);
- collection of monitoring indicators – including results indicators – in a set of databases;
- identification of secondary data sources and other administrative data;
- identification of multi-methodology evaluation research design (c.f. chapter 2.4 and the suggested principal methodologies in chapter 4).

Note that the preliminary study is not a research document: it is a concise brief supporting the crucial initial decisions about the evaluation. Its main function is to detect the serious and the less crucial, but nevertheless important discrepancies between the focus, the (indicative) budget and the (indicative) timeplanning of the evaluation, if any. This requires some experience, but hopefully these Guidelines

provide the needed initial steps even in countries with less developed RTDI evaluation cultures.

When the preliminary study is finalised, revisit the consensus around the focal questions, budget and timeplanning. If substantial modifications are needed, the working group of stakeholders (see chapter 5.2) may need to be convened again.

If there is accordance between what the preliminary study detected and the focal evaluation questions, the budget and the timespan available for the evaluation, a crucial step, the elaboration of the Terms of Reference will follow.

5.3. TERMS OF REFERENCE

The Terms of Reference (ToR) document defines a framework of how evaluators will have to conduct the RTDI programme evaluation. The involvement of an external expert – e.g. an evaluator, who is not in a conflict of interest situation and who will not take part in the future evaluation – to assist the preparation of a ToR can also be advised.

The RTDI Evaluation Standards (2012) provides a list of components needed for a good quality ToR:

- *Background and rationale*: it is the opening section providing an orientation about the RTDI programme to be evaluated. Motivations of the decision maker to launch the evaluation can also be highlighted here.
- *Specific objectives of the evaluation and evaluation questions*: a brief but important section of the ToR. The stated objectives and evaluation questions will be important throughout the negotiation and implementation of the assigned tasks (c.f. Table 2 in chapter 3.2 as well as chapters 4.3-4.5)
- *Scope and limits of the evaluation:* what is included in and covered by the evaluation and what is not.
- *Approach and methodology*: this section briefly outlines how the evaluation needs to be conducted, leaving room for the evaluator(s) to define a more detailed methodology in line with the prescribed scope and objectives. (c.f. also chapter 2.3 and chapters 4.3-4.5).

- *Governance and accountability*: this section specifies the governance and management arrangements, including decision-making arrangements (such as the need for a steering committee or an advisory group). Participation of other stakeholders (for example, beneficiary representatives in validating results) and the lines of accountability should also be noted with, at minimum, clear guidance on who will review and approve the evaluation plan and subsequent products of the evaluation (e.g. inception report, draft report and final report).

- *Guiding principles and values*: research ethics or procedures that evaluators should follow (e.g. fundamental principles of the organization commissioning the task(s), basic tenets that should guide the study – e.g. transparency, cost-effectiveness, collaboration with beneficiaries, hiring of local consultants, involvement of local agencies etc. –, practices expected to be taken into account by the evaluators (e.g.confidentiality of data, anonymity of responses, making data publicly available in a usable format and so on).

- *Professional qualifications*: The mix of requested knowledge, skills, and experience. The ToR should specify as clearly as possible what the profile of the evaluator or team should be to attract the strongest candidates for conducting the study (c.f. chapter 2.3).

- *Deliverables and schedule*: The outputs and reporting requirements, along with the required or proposed timeline.

- *Budget and payment*: the funds available to support the tasks envisioned for the evaluators. In cases where a limited budget will likely constrain the scope and methodology of a study, an effective practice is to state the available budget and ask proposers to describe what they expect to achieve (resulting 'value-for-money' assessments of the evaluation offers).

- *Structure of the proposal and submission guidelines*: whether and how the proposals from potential evaluators are part of a competitive bidding process, providing instructions for the proposal format, content, and submission process.

- *Additional references and resources*: identification of useful information sources for the evaluator to better ensure that this body of knowledge is taken up in planning and conducting the evaluation.

In order to hire the best candidates for the RTDI programme evaluation, the ToR is commonly used in a competitive bidding procedure. In such a procedure, the conflict of interest cases should also be explicitly dealt with (see chapter 2.1).

Evaluations are expensive, so public procurement rules also need to be applied in many cases. Yet evaluation is also a form of research (that entails a judgment),[70] which implies complexity, uncertain developments and risk during the work. Therefore, the public procurement rules should be used with care and with a reasonable degree of flexibility that suits to the nature of the work (check especially the 'Approach and methodology' part of the ToR).

5.4. CONTRACTING AND THE FIRST STEPS

The ToR is used for drafting and finalising the contract, which is a legal step between the parties. Until this point, the following are not in the forefront of the evaluation process, however, at this stage they become important:

- *Evaluation inception report and further reports*: when are they due and what are the broad contents? Should the inception report contain the set of evaluation hypotheses or is it enough at later stages? For an RTDI programme evaluation continuous and flexible planning of these arrangements are advised (so there should be plans, but, if justifiable also from a methodological point of view, these should be subject to change within the ToR framework). At this point the limitations of the evaluation study should also be clear to the contractual parties.

- *Project Steering Committee*: if there is a need for such a body during the evaluation, who are the members exactly and what is the exact flow of decision-making? When are announcements due and when do the meetings of the committee take place? What happens in the case of conflicting views or missing members?

- *Intellectual property rights of the methodologies and the results*: who will have the right to use the methods developed and the empirical results in the future? It is recommended that these could be used at least for research and teaching purposes.

- *Contacts and communication channels*: who are the contact persons and what constitutes official communication between the contractual partners?

- *Anonymity of informants*: what are the arrangements to guarantee that individual data and opinions are not abused? (see also chapter 2.1)

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[70] See also footnote 24.

- *Inaccessibility of data*: there can be cases when datasets are foreseen for the evaluation, but for some reason they cannot be accessed. In such cases contingency planning can be part of the evaluation contract.

- *Performance of the evaluation contract*: at different stages of the evaluation, what are the aligned interim and final reports and outputs to be delivered? What does non-performance of the evaluation entail exactly and what are the sanctions of non-performance?

It is advised that the above points are dealt with in the evaluation contract.

5.5. RESOURCE MANAGEMENT AND PROJECT STEERING

Implementing the RTDI programme evaluation is a project: it has specific goals and deadline, limited tangible and intangible resources (including human resources, methodological experience, the budget etc.). A given programme evaluation is a one-off activity, risky and complex. As such, project management techniques can be used for effective implementation, but the ToR and the contract needs to be heavily taken into account, because they already constitute the most important elements of the evaluation project. Additionally to what is defined therein, the following steps need to be taken. These are under the responsibility of the evaluator team, however, an RTDI programme evaluation will always be in close relationship with the commissioning organisation, therefore, the responsible personnel need to be at least informed about the listed steps:

1. *Detailed definition of tasks*: the broad tasks in the ToR and the contract can be complemented and decomposed into further tasks (workpackages) and related sub-tasks. Milestones[71] and responsible personnel (parties to be involved) need also to be defined.[72] It is advised to draw a Gantt-chart with all this information.

2. *Definition of interdependencies*: two (or more) tasks are dependent, if to start one, another has to be finished, or to finish one, another has to be finished, or to start one, another has to be started. There can be dependencies external to the project. The Gantt-chart can contain this information as well.

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[71] Milestones are certain points (deadlines, products etc.) during the evaluation, which must be passed in order to know that the evaluation project is on track. Frequently they constitute decision making points as well.
[72] Certainly, the evaluation team should be the same as in the proposal submitted and approved. A common phenomenon is to involve respectable experts in the evaluation proposal and after the proposal is approved, they are replaced with less experienced and qualified experts.

3. *Optimisation of the resource-planning*: to the tasks defined, it is important to overview if staffing, setting the milestones and timing are adequate. Optimisation of the tasks is the responsibility of the evaluation team leader.

When the tasks are more or less clear for the organisation commissioning the RTDI programme evaluation, it is crucial to dedicate enough internal personnel for the whole lifetime of the evaluation project. It is better to have more such internal personnel available for the evaluator team than not enough – understaffing will have consequences on the evaluation (and not in favour of the commissioning organisation as it can be interpreted as insufficient commitment). The contact persons shall be responsible for the preparation of materials for decision making at higher levels (e.g. to the Project Steering Committee, or if it has not been set up, to the managers in the commissioning organisation).

5.6. DATA AND INFORMATION COLLECTION AND ANALYSIS

In every RTDI programme evaluation, there will be processes related to data and information collection and analysis. In this regard, the organisation commissioning the evaluation (or which is responsible for the RTDI programme) will face double pressure:

- In all circumstances, evaluators must respect anonymity of their informants, despitethe fact that some of the information explored during the evaluation might prove to be very useful for the commissioning organisation.

- To achieve the best possible evaluation, evaluators will need to access information and data inside the organisation commissioning the evaluation (or the related public organisation), which may look disadvantageous for some people.

These challenges are shown in the table below.

Table 10. Challenges related to data handling by type of enquiry

Data type/enquiry	Challenges	Confidentiality issues to resolve
Administrative documents	Preparation in a structure suitable for evaluation	Evaluators make electronic copies or work in office?
Administrative data and monitoring indicators	Judgment on the quality and importance Missing data	Access to classified data/documents should be regulated
Official statistical data	--	Only in the case of customised enquiry from the statistical

		services
Existing (published) studies	--	Only in the case of unpublished material
Interviews	Information needs to be stored not in the commissioning organisation	Anonymity must be respected. Information identifying the individuals should eventually be erased
Focus groups	--	--
Expert panels	Preparation of data/documents in a structure suitable for evaluation	Evaluators make electronic copies or work in office? Access to classified data/documents should be regulated
Questionnaire surveys	The data on the population of potential responders need to be given to the evaluators	Anonimity must be respected. Information identifying the individual responders should eventually be erased

Source: own table

<u>Preparatory materials</u>: Evaluators may ask from the commissioning organisation the preparation of certain materials/data in a predefined structure. It may happen that the staff in the organisation commissioning the evaluation does not fully understand the purpose of such preparatory materials. In such cases it is advised to prepare the material and enquire about the purpose – evaluators shall behave responsibly and provide the necessary information in good faith.

<u>Role of a service office</u>: Generally speaking, during the different stages of data and information collection and analysis, the organisation commissioning the evaluation will take particular roles of a service office. It needs to assist the evaluators in organising interviews, facilitating data access, provision of room and space for work etc. Such roles are natural and temporary for the course of the evaluation.

5.7. REPORTING, DISSEMINATION AND FEEDBACKS

It is usual practice in evaluations that <u>the evaluation report has several versions</u> that can be reviewed before a final evaluation report is created. It has to be decided as part of the evaluation contract if the interim reports are available for stakeholders beyond the contracting parties. Under any circumstance, evaluators must 'respect the security, dignity and self-worth of respondents, program participants, clients, and other evaluation stakeholders' *AEA* (2004)

In the final evaluation report a comprehensive understanding of the <u>important contextual elements</u> of the evaluation should be clearly visible. Such contextual

factors include geographic location, timing, political and social climate, economic conditions, and relevant activities in progress (*AEA* (2004)) – these will influence the interpretation of the evaluation results. The final evaluation report should also have a highlighted section on the <u>limitations of the study</u>. Some general guidance on the expected content of an RTDI programme evaluation can be given as follows:

- Executive summary
- Introduction: summarising the evaluation context, evaluation hypotheses, partners involved, limitations etc.
- Methodology used: Summarising the final set of methodologies chosen – details, such as questionnaires, should be put in the Annex
- The socio-economic context of the RTDI programme: political, economic, social, technological, environmental and legal factors affecting the programme
- Literature review of similar RTDI programmes in other countries
- Relevance and policy consistency of the RTDI programme: what and how had been planned, and identification of the intervention logic (c.f. chapter 4.1)
- The evaluation of the RTDI programme concept/processes/impacts (as necessary, c.f. chapters 4.3-4.5)
- Recommendations
- References
- Annexes: basic statistics of respondents, list of interviewees/focus group participants, list of the documents studied etc.

What needs to be underlined is that the final report should reflect a high-quality <u>replicable study</u> of publishable quality: if other evaluators were given similar mandates and resources, a similar study could be carried out.

<u>Evaluative statements</u>: do not forget that a good evaluation report will contain a number of systematically justified 'opinions', if certain elements of the RTDI programme were good, adequate or inadequate (certainly, many other terms referring to scales can be used, such as excellent, insufficient, sufficiently effective etc.). This is actually what makes the evaluation report valuable and as such, should <u>not be taken personal</u> at all.

<u>Disclosure of the final evaluation report</u>: it is strongly advised that the final evaluation report is published and reaches the widest possible audience. There are explicit advantages of such practice:

- evaluators will take the job more seriously and will exert particular effort for reaching justifiable evaluative conclusions;
- every stakeholder, who is part of the process, will take the evaluation more seriously and will exert particular effort to contribute to the process;
- in the long term it will have a very positive effect on the informed audience of the RTDI programme and beyond.

Feedback mechanisms: as noted before, during the interim reporting phase, it is a question if other stakeholders (beyond those involved in the evaluation contract) should be involved in the review of the evaluation reports. If so, it can have particular advantages of creating additional interactivity, but it will also require additional efforts (organisation of workshops, roundtables, facilitation). When the final RTDI programme evaluation report is published, it is recommended to organise a workshop,[73] where the results are presented and stakeholder groups can be informed. In the long run, the methodologies developed and the results obtained will generate additional feedbacks (in professional/scientific conferences, journals etc.) which are important building blocks for developing the evaluation culture.

The question of consequence: According to the Standards accompanying these Guidelines,[74] 'the implementation of evaluation results leads to consequences, which are either to prolong the programme under scrutiny, to terminate it or to modify and adapt it'. In practice these consequences are not that straightforward in countries with less developed RTDI evaluation cultures – actual decisions may easily contradict the recommendations of an evaluation. However, 'freedom of information is essential in a democracy. Evaluators should allow all relevant stakeholders access to evaluative information in forms that respect people and honor promises of confidentiality. Evaluators should actively disseminate information to stakeholders as resources allow. Communications that are tailored to a given stakeholder should include all results that may bear on interests of that stakeholder and refer to any other tailored communications to other stakeholders. In all cases, evaluators should strive to present results clearly and simply so that clients and other stakeholders can easily understand the evaluation process and results.' *AEA* (2004). Thereby, RTDI

programme evaluations can accelerate feedback loops and contribute to the development of the respective innovation systems.

SUMMING UP

The last chapter in the guidelines deals with some practical information pertaining to the evaluation as a process that has to be managed. The most critical conceptual and methodological issues are not revisited, instead, the practices that so far were given less attention (but which actually need attention when an evaluation exercise is managed) are shown.

The general focusing, the indicative budgeting and the timeplanning phases of the evaluation usually need to take place at the same time. Then the first draft need some discussions with representatives of the stakeholders – at least with those most directly affected by a future evaluation of the RTDI programme – and a consensus around the broad focal questions, budget and timeplan of the evaluation should be agreed.

In parallel with or after the general focusing, the indicative budgeting and the timeplanning work, a more systematic in-house study is also needed to define precisely the limits of the evaluation. Relevant policy documents, studies related to the programme, stakeholder viewpoints, the intervention logic, the available monitoring indicators, secondary data sources and other administrative data and the multi-methodology design needs to be identified in a concise draft – as much as possible. Its main function is to detect the serious and the less crucial, but nevertheless important discrepancies between the focus, the (indicative) budget and the (indicative) timeplanning of the evaluation, if any. If there is accordance between what the preliminary study detected and the focal evaluation questions, the budget and the timespan available for the evaluation, a crucial step, the elaboration of the Terms of Reference will follow.

The Terms of Reference (ToR) document defines a framework of how evaluators will have to conduct the RTDI programme evaluation. Besides describing the background and rationale of the RTDI programme, the most important elements of the ToR are

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[73] Or a series of workshops, a conference, etc. depending on the importance of the RTDI programme and the importance of the evaluation itself.
[74] See the *RTDI Evaluation Standards* (2012) volume.

the specific objectives of the evaluation and evaluation questions, scope and limits of the evaluation, approach and methodology for the evaluation, governance and accountability of the evaluation project, the required professional qualifications of the evaluators, deliverables and schedule, budget and payment. The ToR is commonly used in a competitive bidding procedure and will form the basis for the evaluation contract, in which some additional details also have to be arranged for (e.g. the intellectual property rights of the methodologies and the results, guarantees for the anonymity of informants).

For managing the evaluation, project management techniques can be used for effective implementation. It requires the definition of tasks and sub-tasks, milestones and the resources dedicated. Interdependencies should also be dealt with. The use of Gantt-chart will help the optimisation of resources and the detecting of potential bottlenecks or overestimation of time. Although it is mostly the responsibility of the evaluators, internal practices should be accorded: for the organisation commissioning the RTDI programme evaluation, it is crucial to dedicate enough internal personnel for the whole lifetime of the evaluation project.

During the phase of data and information collection and analysis, there are a number of challenges related to the anonymity of informants (which must be respected at all times) and the strive of evaluators to access a lot of internal information and data inside the organisation commissioning the evaluation (or which is responsible for the RTDI programme). The internal staff may be involved in the preparation of materials and should occasionally play the role of a 'service office' assisting the evaluation team.

A good quality evaluation report of an RTDI programme reflects on the important contextual elements and highlights the limitations of the study. It pays enough attention to methodologies so that the evaluation could be replicated. It is strongly advised that the final evaluation report is published and reaches the widest possible audience. Additional interactive events – workshops, discussion round tables – can greatly contribute to the development of an attitude conducive to evaluations and the respective innovation systems.

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Annex: A checklist for RTDI programme evaluations

Stage of the evaluation	Reference in the Guidelines
PREPARATION / PRELIMINARY STUDY PHASE	
Focus of the evaluation clarified?	chapter 3.2
Time and budget available agreed?	chapter 5.1
Monitoring data available?	chapter 4.6
Multi-methodology design enforced?	chapter 2.4
Control group approach feasible?	chapter 2.3 chapter 3.4
Interdisciplinary approach enforced?	chapter 2.5
Flexible structures ensured in the future contract?	chapter 5.3
BEFORE THE EVALUATION CONTRACT	
Conflict of interest clarified?	chapter 2.1
Independent high quality evaluator team available?	chapter 2.2
Commitment by decision makers attained?	chapter 2.6
Terms of Reference compiled?	chapter 5.3
Intellectual property issues clarified?	chapter 5.4
AFTER THE LAUNCH OF THE EVALUATION EXERCISE	
Evaluation hypotheses solidified?	chapter 2.3
Evaluation governance structure and decision making agreed?	chapter 5.4
Limitations of the study clarified?	chapter 2.3
Evaluation milestones fully clarified?	chapter 5.5
Enough internal personnel dedicated?	chapter 5.5
Administrative data and documents fully compiled?	chapter 4.2
DURING THE IMPLEMENTATION	
Attempt to reconstruct the theory?	chapter 4.1
Programme logic identified in a dynamic knowledge context?	chapter 4.1
National innovation system context to be provided appropriately?	chapter 4.1
Questionnaire: are respondents duly informed about data handling?	chapter 2.1
Interviews: are respondents duly informed about data handling?	chapter 2.1
Behavioural additionality adequately addressed?	chapter 4.5
BEFORE THE FINALISATION OF THE EVALUATION REPORT	
Anonymity of respondents fully enforced?	chapter 5.6
Structure and content appropriate?	chapter 5.7
Evaluative statements present?	throughout chapters 4.3-4.5 and chapter 5.7
Report is of publishable quality?	chapter 5.7 pp.79-80
AFTER THE CONCLUSION OF THE CONTRACT	
Evaluation report published?	chapter 5.7
Evaluation report discussed with stakeholders?	chapter 5.7
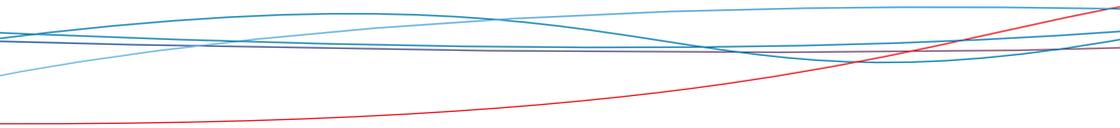
RTDI Programme Evaluation Guidelines

Evaluations can greatly help structuring the uncertain and complex information, for which the project titled 'Fostering Evaluation Competencies in Research, Technology and Innovation in the SEE Region (EVAL-INNO)' has already developed RTDI Evaluation Standards to help the development of the evaluation culture in South-East Europe.

Complementing the Standards, the present RTDI Programme Evaluation Guidelines were compiled, focusing on programme evaluations. With the help of the Guidelines the organisations responsible for commissioning RTDI programme evaluations can make the most important decisions and take the necessary steps for managing viable, relevant and good quality RTDI programme evaluation projects. The author aimed to keep the book concise and as much practice-oriented as possible: the checklist at the end also serves this purpose.

Throughout the Guidelines, the specific characteristics of knowledge dynamics are emphasised, making the book a useful contribution to the evolutionary perspective of evaluations.