

# EVALUATION STANDARDS IN RESEARCH AND TECHNOLOGY POLICY

full length version

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# INTRODUCTION

The Platform Research and Technology Evaluation is a working group of institutions dealing with evaluation matters in research and technology policy in the fields of policy development, the funding of research, technology and innovation programmes projects.

The aim of this working group is the comprehensive development of the culture and practice of evaluation in Austria. This constitutes a particular challenge against the background of the emerging European Research Area; the Platform's "Standards of Evaluation in Research and Technology Policy" are a central element in this context.

These Standards have been drawn up in an interactive process involving all Platform members; exchanging and discussing experience of suitable methods, procedures, professional approaches and conditions is a central task of the Platform and has been a key factor in developing the Standards in their present form.

The Standards of Evaluation in Research and Technology Policy specifically aim to provide evaluators and institutions commissioning evaluations, as well as those to be evaluated, with a framework and a set of guidelines for the evaluation process. The Standards thus support:

<b>policy-makers</b>	<ul style="list-style-type: none"><li>• in designing programmes</li><li>• in formulating terms of reference (TORs)</li><li>• in selecting evaluators</li><li>• in implementing evaluation results</li><li>• in public relations work</li></ul>
<b>RTD (programme-) management</b>	<ul style="list-style-type: none"><li>• in setting up monitoring systems</li><li>• in assessing individual projects</li></ul>
<b>those to be evaluated</b>	<ul style="list-style-type: none"><li>• in formulating project proposals</li><li>• in planning their projects in terms of content and timing</li></ul>
<b>evaluators</b>	<ul style="list-style-type: none"><li>• in designing evaluation projects</li><li>• in positioning themselves vis-à-vis commissioning institutions</li><li>• in positioning themselves vis-à-vis those to be evaluated</li><li>• in establishing the data base for evaluations</li></ul>

Taken together, these dimensions allow us to postulate that a developed culture of evaluation is an integral part of strategically oriented research and technology policy that con-

tinues to learn. A good culture of evaluation is both a pre-requisite for and a consequence of good policy: in other words, efficient, transparent and fair.

The members of the Platform Research and Technology Evaluation have voluntarily adopted the Standards, as summarised in a short formal version, as a set of binding guidelines for their own work. Over and above this, the Platform also wishes to ensure that these Standards are disseminated and applied by others. This version is intended to be of motivational value, to explain what is behind the individual points of the short formal version and, in some cases, to provide instructions on how the situation outlined as a "Standard" can be achieved.

## SIGNIFICANCE AND FUNCTION OF EVALUATIONS IN RESEARCH AND TECHNOLOGY POLICY

Research and technology policy comprises all public initiatives which organise research and innovation systems - i.e. not only public programmes, policies, strategies and regulations but also the "landscape" of institutions which carry out research and develop technology. What is special about research and technology policy in comparison with other policy areas is that programmes, policies and institutions legitimise their existence on the basis of certain phenomena of the market and system failure inherent in research, technological development and innovative dynamics. Market and system failure arises primarily from the fact that the results of knowledge and research can rarely be used exclusively by those who generate them (as these are a kind of public good) and that inventing, applying and disseminating innovation happens within complex policy, research and market systems, which are generally highly susceptible to interference.

Research and technology policy should be in a position to show that investments in this field are worthwhile. Particularly within a European context, decision-makers in Austrian research and technology policy require instruments and techniques appropriate to the growing need for information, e.g. on the functioning of Austria's research and innovation system, the quality of Austrian research and technology by international standards, and the effectiveness of research and technology funding. As a result, the Member States of the European Union have mutually agreed on the creation and strengthening of a European research area as instrument for achieving "the most competitive and dynamic knowledge-based economy" by 2010 (the Lisbon Objectives). This means that the Austrian research scene has to focus even more on the European research area, and evaluation can form an integral part of this process.

## ► Evaluation and research & technology policy

Research and technology policy should be in a position to show that investments in this field are worthwhile. "Evaluation", an umbrella term covering a range of different techniques, methods and measures, has become internationally established as a tool of assessment in the process of research and technology policy; as such, it provides information for politicians, programme managers and the interested general public on the suitability of specific initiatives for achieving objectives in the public interest and for overcoming market and system failure.

### Functions of Evaluation

What are the functions of evaluation? Different types of evaluation have different functions and effects. What they all have in common, however, is the fact that they can fulfil, or help to fulfil, a number of tasks within the policy cycle.

Evaluation can, depending on the basic conditions given, fulfil various functions:

- a legitimising function - e.g. justifying the use of public funds,
- an information function - providing the public with information on how public funds are being used and to what effect,
- an information-oriented learning function for those funding and/or implementing programmes, decision-makers in the field of technology policy, scientists, etc.
- a steering function for establishing policy objectives, planning measures, etc., for the future,
- and a controlling function, as in private enterprise.

Evaluation can also fulfil a mediating function between the competing interests of various players in research and technology policy.

To avoid misunderstandings between the evaluators and the institutions commissioning an evaluation, it is necessary for them to discuss the function of the evaluation and make this transparent right from the beginning.

## ► Functions of evaluation

The relative weight of each function differs from evaluation to evaluation. The expectations of the institution commissioning the evaluation should be clarified at the beginning and should be laid down in an unambiguous and transparent manner in the Terms of Reference.

# LEVELS AND TIMES OF EVALUATION

Evaluation is a very comprehensive concept and, in principle, almost anything can be evaluated. In practice, however, and particularly with regard to public-sector measures, its application turns out to be limited to one or several - but usually not all - of the following levels:

- Policy constitutes a set of activities (programmes, procedures, regulations, etc.) which may be very different in type but share a common motivation or objective. They usually only refer to a generally defined policy area (e.g. labour market policy, or social policy). In contrast to projects and programmes, policy is generally not limited by time or budget.
- Institution - This refers to physical institutions (mostly of a permanent character). Any kinds of institution can be evaluated. In this context three main blocks are worth mentioning: universities with their combination of research and teaching, research institutions, and funding organisations or agencies.
- A programme is a combination of interventions where the underlying intentions refer to each other, projects, measures or sub-programmes that are aimed at achieving a specific, previously defined objective. A programme is usually for a fixed time period, has its own centrally administered budget and a clear hierarchical structure.
- A project is an individual, indivisible measure with its own fixed time plan and its own budget.

## ▶ Extend the levels of evaluation

In order to establish evaluation as standard practice in Austria, the possible levels of evaluation should be extended to include institutions and, subsequently, policy areas in every case, taking into account justified differences between the different levels, but also between fundamental and applied research.

## Ensure the Effective Planning of Evaluations

It is useful to divide up evaluations according to the time when they are carried out:

- ex-ante evaluations start before the project begins and are focused on the future. Above all, they improve the internal structure of programmes and extend the ability to steer such undertakings from within.

- interim evaluations are carried out while a programme or project is running, or while an institution or policy is in operation.
- ex-post evaluations start after the programme or project has finished (or a policy has expired, or an institution stops operating) and look retrospectively at its development, effects and cost-benefits (where possible). Ex-post evaluations that take place immediately after the completion of a programme or project differ from backward-look evaluations, which are carried out several years afterwards.

Apart from the various functions, we also distinguish between the different content of evaluations:

- Concept evaluations review the mission, assumptions, fundamental hypotheses and basic conditions of the programmes (institutions or projects). This process assesses the extent to which it is justified to use this policy, programme or project (including any methods of resolution it comes up with) to combat the problems identified earlier. Concept evaluations are typically component parts of ex-ante evaluations.
- Design evaluations deal with the effectiveness of the programme design and its organisational structure. They assess the extent to which the designated operational objectives are appropriate to the respective problems, also whether the instruments used are suited to these objectives and whether it is, or was, possible to reach them. Above and beyond this, the organisational structure - in other words, all the steps to be taken and their sequencing - is to be evaluated with regard to the consistency of timing, as well as the appropriacy of methods of resolution. Design evaluations are typically component parts of all stages of programme evaluations (ex-ante, interim and ex-post).
- The trend away from a mere "before and after" comparison ("black box evaluation") has given rise to evaluating in detail exactly how a particular programme, above all, is carried out as part of a process evaluation. This involves looking at the quality of implementation, ongoing performance checks, as well as the efficiency and effectiveness of operations. Process evaluations are typically component parts of interim evaluations and are predominant in programmes, demanding a great deal of the programme and project management.
- Finally, impact analyses assess the extent to which programme objectives have been reached and attempt to identify all of the effects brought about, directly or indirectly, by the programme and, as far as possible, to quantify them. In doing so, a differentiation is made between the immediate "output" of a programme (e.g. the number of projects funded), the communicable result or "outcome", (e.g. the number of usable patents), and the effect or "impact" (e.g. the market profits or increases in turnover brought about). The effects of programmes are to be found where new inventions and developments interact with the market: they are usually expressed in economic terms, but can also take other forms in the context of fundamental research. The focus is on recording the return on the programme/project in social terms, going beyond mere private benefit. Impact analyses are important component parts of ex-post evaluations.

## Develop Evaluation Systems

Evaluation systems provide a sensible sequence for the different phases of evaluation, as well as laying down the times for these phases and providing answers to the questions of "Who evaluates when and how?", and "What are the objectives and consequences?".

Ideally, an evaluation system would therefore cover the following:

- the times and objectives of the different evaluation steps at programme level
- the times and objectives of the different evaluation steps at project level
- the minimum methodological requirements
- the consequences of the respective evaluations: how are the results to be translated into action?
- those carrying out the evaluation (external experts, and/or programme management or funding agency)
- how the results are published
- the transparency of decision-making criteria in the project evaluation
- involving decision-makers
- guaranteeing the collection of information from the beginning of the project/programme onwards
- guaranteeing interaction between controlling, monitoring and evaluating.

### ▶ Develop Evaluation Systems

Evaluation systems provide a sensible sequence for the different phases of evaluation, as well as laying down the times for these phases and providing answers to the questions of "Who evaluates when and how?", and "What are the objectives and consequences?".

The minimum components of an evaluation system (times and objectives of the different evaluation steps at the project and programme levels, stop-or-go decisions) are to be fixed in the programme rules/guidelines or similarly binding documents

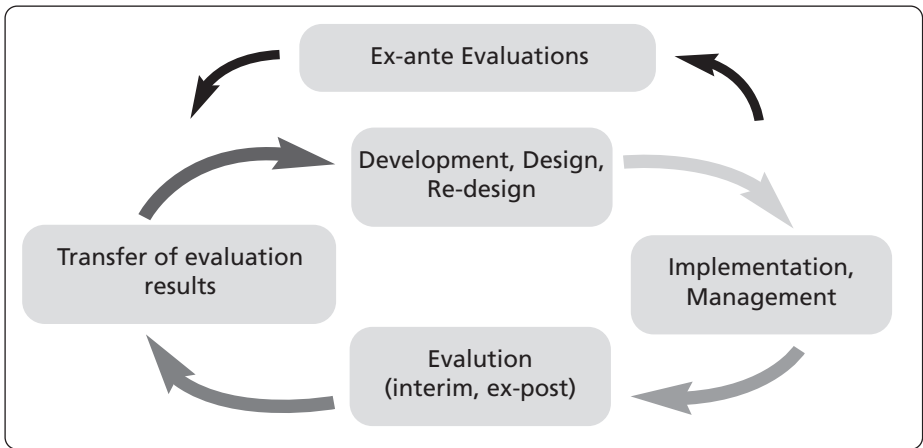
# EVALUATION IN THE POLICY CYCLE

How is research and technology policy developing and how does it react to new challenges? What is the role of evaluation in the further development of research and technology policy?

New institutions, programmes and initiatives usually come into being in a rather complicated way. The number of players involved is manageable in small countries and consists of political representatives, civil servants, experts and employees of funding institutions, as well as researchers and representatives of private enterprise who are also integrated accordingly in the planning, consulting and discussion processes. The fact that this is a rather small and rather closed group is worth highlighting here, a phenomenon which is not exclusive to the field of research and technology policy.

Relevant knowledge and information is indispensable for all those involved. The more knowledge is openly available and has been reflected upon together (up to and including jointly-held beliefs), the more successful discussion and work processes can be and the more they will go according to plan. This is important since it is not only scientific research and technological development that produces innovations in rapid succession; policy-makers also tend to come up with relevant proposals and initiatives in a similar fashion. In the second half of the Nineties, Austrian research and technology policy has brought into being as many as fifty, maybe more, initiatives, programmes, bodies, funding campaigns, etc., at federal as well as provincial level.

Evaluations are important for research and technology policy both as providers of information and (potentially) significant adjustment tools for generating and maintaining research and technology policy, particularly since monetary and other market-based signals are lacking in this field. Evaluations provide orientation, contribute external knowledge and opinions, and also provide the necessary documentation of how policies are implemented. Of particular importance in the context of generating policy is the evaluation of planned action (ex-ante evaluation), although evaluations of similar or earlier programmes and/or initiatives could also be important here, especially if international evaluations are taken into consideration. Of course, evaluations are not the only - and often not the most important - instruments of information and orientation. They cannot replace political responsibility nor developing concepts, and most definitely not the processes of considering, jointly developing and discussing new instruments; instead, they are certainly to be seen as an important part of the whole process. Over the past few decades evaluations of all kinds have been underrepresented in Austria inasmuch as they did not exist, or were not visible or effective. Although not the only reason, this is important when considering why other elements and traditions of policy-making have been in the forefront.



This flow-chart shows an ideal type of policy cycle for research and technology programmes. A programme is conceived and developed on the basis of a problem. The ex-ante evaluation assesses the suitability and design of the programme. After any necessary modifications the programme is then implemented - i.e. in general, given to an institution that carries out programmes and handles programme management. An interim evaluation makes a provisional appraisal of the programme: it looks at the status of the projects as well as the programme management and makes recommendations on how to continue. The transfer of evaluation results - those of the interim evaluation as well as of the final evaluation - has consequences for the programme concerned: whether it is to be continued or not, modified or not, expanded or downsized, etc.

The diagram also shows that there are always several levels to evaluations, namely a strategic level responsible for development and design, a management level which carries out the evaluation, and the target group of the programme, the clients and the recipients. Clear dividing lines need to be drawn between the work which is done at these different levels, but the lines of communication between them need to be just as clear. Attention is drawn here to only one such line of communication: the results of evaluations must be passed "upwards" to become part of the evaluation, learning and decision-making activities of the policy-makers in research and technology evaluation; in other words, going beyond those responsible for the programmes. If this policy cycle is not completed, there is a risk of such things as rogue projects, unwanted continuity, or the lack of it, and acting against one's better knowledge (or what ought to be known).

A further pre-requisite of being able to utilise evaluation results is the timely planning and writing of evaluation reports. The institution commissioning the evaluation and the evaluators themselves should ensure that the reports are available when the information has the greatest potential for utilisation. This means, for instance, that evaluation results should be available before a decision is taken to extend a particular programme or to

phase it out (cf. diagram above). This requirement presupposes an evaluation planning process which works backwards from future deadlines. Realistic planning requirements facilitate this process.

The following should be taken into account when planning the sequence of the individual steps of an evaluation:

- 1) The results of project evaluations can be used as input for programme evaluations.
- 2) In larger projects in which an interim evaluation is planned the interim evaluation also serves as the ex-ante evaluation of the next project phase.
- 3) In any case, policy measures should be planned so that the results of the individual evaluation steps can be appropriately integrated into the planning process.
- 4) If the focus is on the analysis of effects, it can be a good idea to evaluate a programme at different times after its completion as certain types of effects are not to be observed until much later.

## Carry Out Evaluations at Different Points in Time

Sensible planning and designing evaluation systems is a pre-requisite for the following scheme:

All programmes lasting longer than 5 years (or with a volume of at least € 1,000,000 a year) should be subject to ex-ante, interim and ex-post evaluation by external reviewers. For smaller programmes of a shorter duration, an ex-post evaluation and a brief ex-ante assessment by an external expert should be provided for.

In addition, depending on the volume, structure and duration of the programme in question, effective structures for continuous learning should be set up. These could take the form of workshops or discussion platforms with project leaders, monitoring by groups of experts, international exchange with similar projects, or various forms of accompanying research.

Institutions should develop binding structures of self-evaluation, which should be checked by external experts. Furthermore, an evaluation by external - and, at least, in part international - experts is to be carried out at regular intervals (every 4 or 6 years). The institutions can formulate an opinion on the evaluation criteria (TORs) to be applied.

Projects should be evaluated ex ante by the competent funding agency (possibly with the help of external experts or specialist reviewers, depending on the content of the project); larger projects should also be subject to interim and ex-post evaluation. The evaluation criteria to be applied here should be closely linked to the objectives of the respective programme, as well as being defined in advance and publicly accessible. The times of evaluation should be arranged so that the results can be effectively utilised by both the project team (i.e. those to be evaluated) and the programme management.

## Evaluation and Governance

There are always several levels to evaluations: those who commission the evaluation, those who carry it out/implement it, and the customer/recipient. Furthermore, the levels mentioned earlier are always to be seen in connection with each other: institutions participate in programmes and projects, which, in turn, are carried out by institutions; and programmes are made up of individual projects. Clear dividing lines need to be drawn between the work to be done at these different levels, but the lines of communication between them need to be just as clear. Attention is drawn here to only one such line of communication: the results of evaluations must be passed "upwards" to become part of the evaluation, learning and decision-making activities of the policy-makers in research and technology evaluation, which means going beyond those responsible for the programmes. If this policy cycle is not completed, there is a risk of such things as rogue projects, unwanted continuity, or the lack of it, and acting against one's better knowledge (or what ought to be known). Greater consideration of the policy cycle contributes considerably towards improving the deployment and implementation of evaluations because it makes clear the sequencing of steps, the division of responsibilities, what is attributed to whom, and the different levels of reporting. The addressees of evaluations should be integrated into the evaluation process. However, it is necessary to take evaluation into account from the start, planning it into the whole cycle as outlined above:

### ▶ Take evaluation into account from the start

In order to make the best use of evaluation it must be taken into account throughout the whole of the policy cycle and integrated into it. In other words, the instrument of evaluation should be an integral part of planning and developing research and technology policy.

## Formulate Objectives

Clearly formulated objectives are a pre-requisite for evaluating any kind of policy measure, be it a programme, an institution or a project. In the course of putting the programme together, the responsible level should clearly develop concrete ideas with regard to what constitutes the success or failure of the programme. The objectives are to be very carefully developed in accordance with these ideas so that decision-makers, programme mana-

gers, evaluators and, not least, the addressees (e.g. the employees of an institution, those supported by the programme, etc.) are clear on and agree on what is to be achieved by the programme.

This is generally not the case and also becomes difficult when there are multi-dimensional objectives. It is worth striving to quantify objectives, but this is not necessarily useful in every case. Formulating a great number of very comprehensive objectives is not useful either: "goal overload" should be avoided.

*The main issues when formulating objectives are:*

- Motivation: Where do we want to go? What is our mission?
- What are the main strategic objectives?
- Which sub-objectives or operational objectives can be formulated with reference to these objectives? Is it possible, or useful, to quantify these sub-objectives? Or, alternatively, can a procedure be set up to review these objectives from a qualitative point of view?
- How and by means of which mechanisms is the programme supposed to have an effect? Which hypotheses have been made? When - is it assumed - will the effects start?

Directly derived indicators for monitoring and evaluation can then be formulated from this system of objectives.

#### ► Formulate clear objectives

Clearly formulated objectives are a prerequisite for evaluating any kind of policy measure, be it a programme, an institution or a project. Carefully formulated objectives include both strategic and operationalised or, if possible, even quantified aims, with the relation among the different objectives clearly defined so that they form a transparent system of objectives. On the other hand, there is also a close link between these aims and the evaluation criteria to be applied. This interdependence is relevant to the evaluation of institutions, too. Thus any institution should lay down in its charter or similar document a clear statement of its mission and of its key objectives.

### **Combine Evaluations with other Elements of Strategic Planning**

Methods of evaluation - indeed, evaluation as a whole - constitute the main instrument for assessing the effects of planned, ongoing or completed projects, programmes, institutions and policies in research and technology policy. Evaluation is, however, not the only method of assessment.

## *Benchmarking*

The importance of benchmarking has, for instance, increased in recent years on a European level. It attempts to determine the relative position of individual countries and/or regions with regard to certain aspects of research and technology policy.

Evaluation and benchmarking usually look back on the past or analyse the present situation. Research and technology policy is, however, by dint of necessity, oriented on the future. The policy decision-makers have to react to previously identified deficits, available potential, and expected future opportunities and risks with the most effective and efficient measures possible to improve the performance of research and technology policy. Learning experiences from the past, from evaluations and benchmarking, contribute considerably towards this. Above and beyond this however, other, more strongly prospectively oriented instruments are necessary for policy-making in order to make the most rational, comprehensible and socially acceptable decisions possible about the focus of research and technology policy and the measures to be taken within it.

## *Foresight*

Besides evaluation, other instruments of assessment and scientific consulting in decision-making processes are, above all, methods of technology foresight (e.g. foresight studies) and technology assessment (e.g. CTA constructive technology assessment). Today, these approaches have been established in many European countries to advise and further develop research and technology policy. In Austria the first steps towards establishing a foresight approach were taken with Technology Delphi. These concepts can contribute towards combining the respective strengths of retrospective as well as prospectively oriented assessment and support instruments. When deciding on programmes and measures the results should also be taken into account of a consultation and discussion process which is as wide-ranging as possible, especially in those fields of research and technology which can potentially have a considerable socio-economic impact in the future.

At European level there is currently a debate going on under the heading "Science for Policy" as to what scientific expertise is necessary in the policy-making process and how this should be organised and utilised in the context of preparing socially accepted decisions (i.e. as "robust" as possible). For example, in Great Britain rules have been laid down to guarantee a link between evaluation with the national foresight programme and ministerial planning processes. Austrian research and technology policy still has a long way to go before it is in a position to discuss organising and linking evaluation with the results from other sources.

## ► Combine evaluation with other elements of strategic planning

In order to be able to best utilise evaluations for policy-making and for strategic planning, it is important to consider the interdisciplinary aspects of evaluation and connections to other analysis techniques (e.g. Foresight Assessment).

## Utilise, Feed Back and Implement Evaluation Results

In addition to the methodological challenges posed by planning and carrying out evaluations, the question of how to utilise the evaluation results also constitutes a considerable challenge. Evaluations are not carried out for their own sake; rather, they provide knowledge which should lead to concrete action. Evaluation results should, directly or indirectly, support decision-making processes in research and technology policy. Besides preparing evaluation results in such a way as to make them "easily digestible" for those involved, it is also important to create supporting structures and conditions to facilitate the utilisation of evaluation results.

### *Steps Towards Improving the Utilisation of Evaluation Results*

Create a demand for evaluation results by ...

- ensuring the support of the top level decision-makers
- integrating those involved in and affected by planning, implementing and reporting in order to motivate them to actively acknowledge the evaluation and utilise its results
- raising realistic expectations.

Create an appropriate environment for evaluations by ...

- carrying out evaluations systematically
- linking evaluations to budget planning.

Create an appropriate environment for carrying out and implementing evaluations by ...

- planning evaluations within the policy cycle
- taking the needs of the addressees into consideration in the evaluation results
- ensuring the relevance of results
- integrating those involved and affected
- ensuring the methodological quality of evaluations
- making assessments and recommendations
- following up on the implementation of results; ensuring follow-up activities
- highlighting the support and further training needs of those involved
- designing appropriate communication strategies
- disclosing evaluation results, as long as no justified interests stand in the way of this.

## Possible Steps Towards Improving Reporting and Communicating Evaluation Results:

- Communicate the evaluation results in a way appropriate to the specific information needs of those affected.
- In addition to a written report, use an executive summary and other forms of communicating the results.
- Comprehensively describe the object of the evaluation (e.g. the programme to be evaluated).
- Describe the exact purpose of the evaluation in the evaluation report.
- Describe in detail in the evaluation report the design of the evaluation and exactly how it was carried out.
- Clearly separate the results, conclusions and recommendations from each other in the evaluation report.
- Include in the evaluation report observations from those affected by it - if useful (or compare them with the evaluation results).
- Make the evaluation results available in a timely manner.
- As far as possible, integrate all of those involved in the selection of the evaluation design and the requirements of the report.
- Make the methods of data collection and data analysis sufficiently transparent.
- Describe the choice of method and/or the strengths and weaknesses of the selected evaluation design.

### ► Utilise, feed back and implement evaluation results

Evaluations are not carried out for their own sake; rather, they provide knowledge which should lead to concrete action. Evaluation results should, directly or indirectly, support decision-making processes in research and technology policy.

This, in turn, requires that evaluation results be presented in a timely and effective manner and that sufficient scope be given to communicating them. The credibility and effectiveness of evaluations will, generally speaking, be enhanced by disseminating them widely and ensuring a suitable level of publicity.

### **Make Evaluation Binding**

Just how binding should evaluations be? Hardly any other question is as dependent on context as this one: project evaluations have to be binding to the highest degree; since they often involve stop-or-go decisions, programme and institution evaluations can be binding to different degrees. It depends, amongst other things, on the political/policy cul-

ture of a country, on the mission, on policy instruments, on interests pursued by means of an evaluation, and - not least - on what can be said with relative certainty. In other words, the more definite the findings, the more binding the consequences can be. Some factors positively influence the consequences: use of quantitative indicators, clear statement of objectives in advance, limitations of unpredictable influencing factors.

#### ► Make evaluation binding

Commissioning institutions must ensure that evaluation results are treated as binding. The extent to which they bind those concerned should depend on the context: the more definite the findings, the more binding the consequences can be

### **Institutional Aspects of Evaluation in the Policy Cycle**

The role and status of evaluations in the making of research and technology policy and its institutional forms is outlined here in more detail by means of a series of questions; a number of conclusions and demands are drawn from these.

*Should there be special institutions for evaluations?*

If yes, where and why? Various forms of institutions are possible and have been realised to varying degrees in many countries: for instance, ministerial evaluation departments dealing with the organising of evaluations, evaluation agencies for programmes or institutions, sub-functions of courts of audit, etc. The advantages of such institutions include accumulating relevant know-how, pursuing a mission, as well as a greater probability of working out and using comparable methods and increasing the binding nature of evaluations, as mentioned earlier. The disadvantages include bureaucracy, generating opposition, and a potential narrowing of agendas and/or methodological diversity. Austria urgently needs to initiate debate on the issue of greater institutionalisation.

*Should there be a legal basis for compulsory evaluation and evaluation processes?*

Evaluations are compulsory within the legal framework of research and technology policy in several countries and due to this are non-negotiable to the extent that they are required by law. This ensures the advantages of regularity, legal enforceability (to varying degrees) and the development of appropriate structures, and it influences the attitudes of those involved in the process. There is a lot to be said for compulsory evaluation, although there is a danger of those involved not seeing the evaluations as their own, but as

a burdensome responsibility, or some kind of strange affliction ("evaluitis"). Content can end up being overwhelmed by form. Although voluntary commitment and bottom-up processes are fundamentally preferable, there is still a demand for greater regulation and more binding procedures in Austria.

*Should there be rigid, pre-defined machinery for evaluations or are one-off evaluations for specific purposes the right approach?*

In some countries, such as the USA, all government offices have to undergo strict evaluations to legitimise their work, and their budgets for the next term are tied to the outcome of these. Other countries - such as Austria - have a culture of one-off evaluations for specific purposes (the purposes of which are not always as clear as they could be). Legitimation is also a reason why programmes, which have a fixed time frame, are evaluated more regularly than other policy instruments. International experience has shown that a middle course should be steered here, providing for the regular evaluation - applying defined quality standards - of programmes, institutions and projects without, however, imposing any kind of streamlined procedures which are to be applied in exactly the same way every time. In this context, too, it is crucial that the players involved are willing to utilise evaluations and to learn from them.

*Should evaluation be used, above all, as a hierarchical instrument or should the players (e.g. research institutions) be encouraged to take the initiative themselves?*

Self-evaluations cannot be the norm. Due to the steering and controlling function of evaluations, most instruments are in the hands of those paying for and commissioning them. At the same time, however, it is also a question of ensuring, in an appropriate form, the participation of those involved and promoting and utilising their interest in such processes.

*What should be the cost-benefit ratio in evaluations?*

Evaluations have their price, as do consultants and auditors. There simply has to be money available for one of the few objectivising and legitimising instruments that exist in research and technology policy. Internationally it is assumed that approx. 0.5-1% of a programme budget should be spent on evaluations - of course, this depends on the objectives and the scope of the evaluation task. The value of a (good) evaluation is, on the other hand, almost impossible or very difficult to quantify.

### ▶ Institutionalise evaluation

The Platform wants to see a discussion process initiated on institutionalising the instrument of evaluation in Austrian research and technology policy; such a discussion process should focus, in particular, on the types of measures for which evaluation is to be required by law or other kinds of rules or regulations, and on the level at which this should be regulated. In the Platform's opinion, the discussion should start from the assumption that a general evaluation requirement should be laid down in the various legal acts regulating the organisation and funding of research in the broadest sense. Another aspect concerns the question to what extent special evaluation institutions, in whatever form, could contribute to increasing the use of evaluation and enhancing its quality.

### ▶ Provide for regular evaluations

The Platform neither advocates rigid, pre-defined evaluation machinery nor mere one-off evaluations for specific purposes. International experience has shown that a middle course should be steered here, providing for the regular evaluation - applying defined quality standards - of programmes, institutions and projects without, however, imposing any kind of streamlined procedures which are to be applied in exactly the same way every time.

### ▶ Providing sufficient funding for evaluation

Thorough, high-quality evaluation processes require sufficient funding. The necessary means should be set aside before the launch of a programme; international guidelines on this are available.

▶ See tables in the appendix.

## EVALUATION: METHODS AND TECHNIQUES

The choice of methods to be used is dependent on the scope and objectives of the project/programme/institution/policy in question. Besides an appropriate cost-benefit ratio, pragmatic conditions such as the availability of data, for example, make up decisive factors in the method selection process.

The fact that evaluations have, on the one hand, to be analytic and independent and, on the other, problem-oriented and customer-oriented, gives rise to a general area of conflict. Summative approaches tend to emphasise the analytic aspect more and in formative approaches the evaluators tend to be seen more as "coaches".

## *Quantitative Methods*

Quantitative methods can be divided into three main groups:

Descriptive and comparative statistical analyses generated from surveys, monitoring data or secondary statistical data, form the most fundamental quantitative group of methods. These analyses constitute a component part of every evaluation. It is important that the information that is collected and structured as part of such an analysis is at least partly condensed into quantitative indicators and that the net effects of the intervention are also presented with the aid of control group- and/or comparison group-based approaches (additionality).

Econometric models are probably the most widespread method of measuring the economic effects of R&D programmes. They are applied at enterprise level, as well as sectoral and national economy level, to test and/or quantitatively assess the correlation between interventions by public authorities and their resultant effects. Only the larger interventions can be examined on a national economy level (e.g. in the field of assessing indirect, i.e. tax-based, R&D funding). Micro-econometric studies which, for example, link the development of performance indicators of companies with participation in a technology programme, are still rare in Austria.

Cost-benefit analyses, or fiscal analyses, constitute a very rigid framework for examining research and technology policy-based interventions in a structured way. In the case of large public infrastructure investments (motorways, tunnels), as well as in other policy areas (particularly labour market policy), cost-benefit analyses are considered standard methodology in evaluations. In the context of research and technology policy, however, this analytic instrument is a rare thing, being difficult to use in connection with multi-dimensional and strategic objectives. The advantage of cost-benefit analyses is that they do not only make explicit statements about the types of costs and benefits, but these also have to be quantified. Cost-benefit analyses are of importance whenever it is a question of the social returns or economic effects of technological programmes. Essentially, this means that:

- those effects - both positive and negative - are also appraised that do not occur in connection with those directly involved in the programme
- an attempt is made to assess those effects for which there is no appropriate market price (e.g. environmental effects)
- discounting allows the comparison of the flow of costs and benefits incurred at different points in time.

## *Qualitative Methods*

Generally speaking, qualitative methods are derived from the criticism of quantitative social research and constitute an interpretative approach. In the context of evaluation the term is usually used in the following connections:

Qualitative methods of collecting data: These include open, semi-open and narrative interviews as well as participatory observation. The data thus obtained can then either be analysed in a traditionally quantitative manner or, where only ordinal sequencing of the data is possible, using non-parametrical methods.

Qualitative research to generate hypotheses: This involves formulating hypotheses on the effects of certain interventions on the basis of data obtained using qualitative methods. This makes sense mainly when dealing with very complex questions. In this context qualitative research is not a method in its own right but, rather, it prepares for or accompanies other research processes.

An interpretative approach within the framework of the sciences of social research: In this case individual attributions of meaning, situative contexts and basic conditions in society are included in the research process and made accessible by means of communicative action. These methods of qualitative interpretation are key when the focus is on complex social processes, but also when evaluations are strongly formative or mediating in character. Important features include: dovetailing the implementation and evaluating processes, numerous feedback loops and learning in social contexts.

There is often considerable pressure on the evaluators to come up with results that are as quantifiable as possible and can be presented as concisely as possible. However, it should be taken into account that quantitative information alone does not usually provide a sufficient basis for strategic policy decision-making. A summative presentation of results has to be supplemented by formative-descriptive information in order to accommodate the complexity of the underlying policy processes. A formative presentation of results is particularly important when recently introduced instruments are to be evaluated so that they can be appropriately interpreted and assessed in the context of research and technology policy. Summative data cannot manage this alone. On the other hand, when programmes are regularly and repeatedly evaluated a systematic procedure with a sizeable summative component is required for reasons of efficiency.

### ► Promote a mix of methods, try out new methods

The method mix to be applied in any given evaluation is to be derived from the content of the respective programme (or institution, or policy area) and to be laid down along general lines in the TORs. TORs provide a good context for critically examining methodological issues; this is important as evaluators are often under considerable pressure to come up with quantifiable results which lend themselves to concise presentation. However, it is

important to note here that quantitative information alone cannot usually provide an adequate basis for strategic-political decisions. Concisely summarised findings must be complemented by more extensive, descriptive information if justice is to be done to the complexity of the underlying policy processes. Evaluators should be encouraged, also when formulating TORs, to try out new methodological approaches.

## Information Materials and Sources of Data in Evaluation

The quality of existing and/or collectable data is particularly crucial when applying quantitative methods. Sources of data can be grouped as follows:

- Primary surveys: usually in the form of surveying the participants (in written or interview form)
- Using secondary databases: Secondary databases usually exist as aggregates and are therefore to be seen as complementary to, rather than as a substitute for, primary data collection. The data banks of individual companies are useful for micro-data to a certain extent; however, these databases are usually subject to statistical biases and therefore are not necessarily representative of all companies in a representative way.
- Using data from programme monitoring: This is a key data source for evaluations - a good monitoring system alleviates the workload of evaluators enormously and avoids surveys covering the same ground twice, thus saving on costs.
- Primary surveys in the context of other, wider-ranging primary surveys: In principle, this constitutes an ideal case. The data needed for the evaluation can either be taken directly from the raw data of a primary survey or be combined with supplementary, evaluation-specific surveys. Control groups can also be defined relatively easily and precisely in this way.

### ► Clarify issues of data collection and transfer at the design stage

The quality of any evaluation depends to a high degree on the quality of the data supplied to the evaluation team. In addition to project-based data, the results of general primary surveys (e.g. Community Innovation Survey, R&D surveys) should also be utilised for evaluation purposes. Furthermore, the issue of passing on data to evaluators should already be raised at the design stage of the respective programme and possibly be regulated in any funding agreements concluded with third parties.

## *Monitoring*

Monitoring requirements are derived directly from the connection between objectives and evaluation parameters. A catalogue of minimum monitoring data is compiled to guarantee comparability. Monitoring includes the following:

- the development of individual projects (performance checks)
- cost efficiency and financial controlling

- data and information for the evaluation
- basic indicators which show the extent to which the programme is achieving its objectives and which can continue to be used for "self-evaluation".

In many cases it makes sense to continue monitoring after the completion of the project or programme.

### ► Collect the relevant data

Good monitoring systems are supposed to collect all relevant data - and only that - and to document it, as far as possible, in a straightforward, systematic and gender-sensitive manner. For one thing, this set of data serves the purpose of project controlling in scientific and financial terms; for another, it should also give evaluators an appropriate insight into the respective project. This can considerably enhance the quality of the database of an evaluation while avoiding the same set of data being collected twice. It will be up to funding agencies to determine to what extent appropriate programme management information systems can be employed.

#### *Making indicators and criteria transparent from the start*

Indicators are supposed to represent, in figures, complex realities which cannot be measured directly. Generally speaking, there are three main types of basic indicators (example from a technology transfer programme):

- Output indicators (physical, and relating to implementation - e.g. set up a consultation infrastructure, hired two innovation consultants)
- Result indicators, or outcome, indicators (relating to the result of the intervention, e.g. carried out 50 consultation sessions a year with the SME target group)
- Or impact, indicators (relating to the objective of the intervention, e.g. increased the innovative capability of 20 SMEs, as measured by, for example, the number of new products)

Above and beyond these basic indicators, there are also measurements of effectiveness (a basic indicator relating to planned objectives) and measurements of efficiency (a basic indicator relating to costs).

### ► Make indicators and criteria transparent from the start

Indicators do not have any meaning in and of themselves. Every indicator is based on a model assumption about reality and a concept of operationalisation. Indicators are supposed to represent, in a few figures, complex realities which cannot be measured directly. Key indicators are to be defined at the beginning of a programme and determined during the monitoring process.

# RULES AND ETHICS FOR EVALUATORS AND COMMISSIONING INSTITUTIONS

In planning and carrying out evaluations, evaluators and those commissioning an evaluation must comply with certain rules in order to ensure that the evaluation process can and will lead to a transparent and fair assessment of the research and technology policy measure in question. These rules, which can collectively be seen as a kind of code of conduct, primarily refer to:

- the competence of the evaluators
- the systematic planning and implementation of evaluations
- the correctness and credibility of evaluators
- independence and impartiality.

## Competence of Evaluators

What can be expected with regard to the evaluators' competence? The evaluation team must have at its disposal all the expertise necessary to successfully carry out evaluations and therefore needs the co-operation of people with different qualifications and from different professional backgrounds, depending on the object to be evaluated. The evaluators should only perform their duties within the limits of their professional training and acquired competences. Should the necessary expertise for specific tasks be lacking, the evaluators should ensure that they acquire the missing competences by bringing in third parties.

In case some fundamental competences for the implementation of an evaluation cannot be covered, the evaluators should make clear which content-based and/or methodological limits are to be expected in the evaluation.

It is essential that the most important methods, the most important effects of individual types of evaluation and the suitability of various instruments are known and understood. It is important that all those involved in the evaluation process should have a minimum level of (passive) knowledge and can communicate with each other about the application, interpretation and utilisation of evaluations. More training opportunities should be provided than has been the case so far in order to promote and support this process. Efforts to develop evaluation competence should address different target groups: programme managers, decision-makers in the field of research and technology policy, evaluators, representatives of institutions, etc.

## **Systematic Planning and Carrying Out of Evaluations**

The content-based and methodological planning and carrying out of evaluations should orient itself on the relevant international state-of-the-art. This applies to both content-based planning as well as the qualitative and quantitative methods used in carrying out the evaluation.

The evaluators should describe the evaluation questions (if the TOR are not sufficiently clear to that effect) in the evaluation offers they submit. In addition to this, they should also outline the respective strengths and weaknesses of the various methodological approaches with regard to answering these questions. Before carrying out the evaluation, the evaluators should discuss in depth their questions and methods with those commissioning the evaluation, in so far as this is necessary to clarify any open questions or to avoid unrealistic expectations.

Evaluation results are to be presented transparently and clearly; sources of data and information, as well as the methods used, are to be indicated: evaluation reports should provide all essential information, be intelligible and transparent. Sources of data and information used should be documented in as much detail as necessary so that the end-users can understand and assess the relevance and appropriateness of the information used.

When presenting the results, the evaluators should also present the methodological approaches and procedures used as comprehensively as possible. The end-users should be able to see how the results were obtained. They must be in a position to understand, interpret and, if necessary, criticise the results.

The methodological limits of an evaluation and the interpretation of its results should be outlined in detail in the reports. The way in which underlying moral concepts, assumptions, theories, methods and analysis influence the interpretation of the results must be clear to the end-user. All aspects of the evaluators' approach need to be transparent at every stage of the evaluation process, from the evaluation design draft to the interpretation of the results.

An evaluation is to be carried out fairly and impartially and should not arbitrarily leave out individual aspects of the object to be evaluated: the evaluators should strive to maintain a balanced approach throughout the whole evaluation process and preserve the integrity of the evaluation while carrying it out and presenting the results. The evaluations should present, as completely and as fairly as possible, both the positive aspects as well as the lacks or aspects to be improved on with regard to the evaluation questions; this will allow the addressees to build on their existing strengths and to eliminate their weaknesses.

Further important comments on the systematic planning and carrying out of evaluations, with regard to communicating, reporting and feeding back evaluation results, are dealt with above this paper.

## **Correctness and Credibility of Evaluators**

Evaluators are obliged to keep to the fundamental ethical principles of their profession: therefore, when carrying out an evaluation they should take great care to adhere to these principles, as well as the fundamental principles of scientific work. They should also ensure that the legitimate interests of third parties are in no way violated, which could lead to unnecessary friction or disadvantages for the individuals involved.

## Independence and Impartiality

The evaluators have, by dint of necessity, a special relationship to those who have commissioned and/or financed the evaluation. They should strive to fulfil all legitimate requests of the commissioning body in connection with the evaluation. This can become a problem for the evaluators if the interests of those commissioning the evaluation conflict with other interests or public interests, or if the interests of those commissioning the evaluation compromise those principles connected to carrying out the evaluation systematically, the competence and credibility of the evaluators, or the protection of the legitimate interests of third parties. In such cases the evaluators should make these conflicts transparent and discuss them with those commissioning the evaluation. If these conflicts cannot be resolved by discussion, the evaluators should decide whether they accept the responsibility of continuing the evaluation under these conditions. Whatever happens, it should be emphasised that the usefulness of the interpretation of evaluation results can be expected to be limited due to the different interests of those involved. The evaluators should make transparent their own interests in connection with the evaluation and clarify any possible conflict of interest: if evaluators have any interests of their own in connection with the object of the evaluation and if these could have an influence on the evaluation results or their interpretation by third parties, then these interests should be disclosed to the addressees. These interests could be of a political, financial, business strategy- or career-oriented nature. If the evaluators have a particular interest in the evaluation coming to a certain result then their impartiality can no longer be completely guaranteed and can therefore call into question the credibility of the results.

Evaluators are to ensure that results are reported impartially: an evaluation should take into account the various views of the different participants and those affected by it with regard to the object to be evaluated and the interpretation of the results. The reports should demonstrate, as should the whole evaluation process, the impartial role of the evaluation team. The assessments, conclusions and recommendations in the evaluation report should be formulated and presented fairly.

### ► Keep to the rules

In planning and carrying out evaluations, evaluators and those commissioning an evaluation must comply with certain rules in order to ensure that the evaluation process can and will lead to a transparent and fair assessment of the research and technology policy measure in question. These rules, which can collectively be seen as a kind of code of conduct, primarily refer to the competence of the evaluators, the systematic planning and implementation of evaluations, the correctness and credibility of evaluators, respecting the legitimate rights and interests of third parties, as well as responsibility vis-à-vis society at large.

Table 1: Evaluation of Programmes

	<b>ex ante</b>	<b>Interim</b>	<b>ex post (backward look)</b>
<b>Question</b>	Does the problem justify the planned programme? Can the objectives, as formulated, be achieved in the way intended?	How can the programme be improved? What can the programme management improve?	Has the programme had the desired effect? (Should it be continued and, if so, what modifications should be made?)
<b>Addressee</b>	Policy-makers	Programme management, (policy-makers), projects funded under the programme	Policy-makers, the public
<b>Character</b>	Conceptual and formative	formative (with a focus on learning)	summative (formative for follow-up programmes)
<b>To be checked</b>	Relevance and design	Effectiveness and efficiency of programme implementation	Effectiveness, efficiency, objectives achieved, usefulness, intended effects and effects which were not intended
<b>Components, method(s)</b>	SWOT, assessment of the strategic concept, coherence, target analysis, estimation of costs and size, catalogue of performance indicators	Assessment of organisation, management and programme implementation, performance checks, recommendations for continuation	Overall assessment of the programme (content and process), impact analysis with qualitative and quantitative elements, comparison with other programmes (backward look: long-term net impact in economic terms)
<b>Consequences</b>	Changes in programme design	Changes in organisation and management, changes in focus and financing, (stopping the programme),	Changes in the strategic orientation of research and technology programmes (above all in the same policy field), structure and objectives of a follow-up programme
<b>Minimum components</b>	Coherence, strategy and target analysis, performance indicators	Assessing organisation and management, recommendations for continuation	Overall assessment of content and process, impact analysis

Table 2: Evaluation of Projects (within the framework of programmes)

	<b>ex ante</b>	<b>interim (only in larger projects)</b>	<b>ex post (usually only in larger projects)</b>
<b>Question</b>	Should the project be funded (within the framework of a given programme and/or on the basis of existing criteria)? Under which conditions/with which modifications?	How can the project be improved? Does there need to be any changes (in project management, in financing, etc.)?	Was the project successful (in accordance with the programme objectives)? What consequences does this have for the continuation of the programme or for ongoing projects?
<b>Addressee</b>	Project applicants	The project being funded, programme management, programme controlling	Programme management und programme controlling
<b>Character</b>	Comprehensive assessment of a project application according to technical (content-based) and economic criteria	formative (with a focus on learning)	summative (formative on the programme level, as well as for other ongoing projects)
<b>To be checked</b>	Compatibility between programme objectives and project objectives, expected quality and success of project	Effectiveness and efficiency of implementing the project to date	Effectiveness, efficiency, objectives achieved, usefulness, intended effects and effects which were not intended
<b>Components, method(s)</b>	Evaluation of application by independent expert evaluators (peers), evaluation of plans regarding time-frame, personnel, costs and financing according to criteria that are transparent for the applicant (and as defined in the programme)	Assessment of organisation, management and project implementation, recommendations for continuation	Overall assessment of projects (content and process), impact analysis (in larger projects with quantitative elements), comparison between projects, input for programme evaluation
<b>Consequences</b>	Funding or rejection of project application, and/or formulation of conditions	Changes in organisation and management, changes in focus and financing, (stopping the project)	Changes in orientation and/or management of the programme
<b>Minimum consequences</b>	Selecting projects / applications worth funding according to clear and transparent criteria by independent assessors	Assessing organisation and management, recommendations for continuation	Overall assessment of content and process, consequences for programme and/or ongoing projects

Table 3: Evaluations of Institutions

	ex ante	interim	ex post
<b>Question</b>		How can the work of the institution be assessed so far and how can future work be optimised?	
<b>Addressee</b>		The institution being funded, its owners and/or financial backers.	
<b>To be checked</b>	Extremely rare, since new institutions rarely come into being in a strategically planned way. If this happens, the ex-ante evaluation will resemble an ex-ante evaluation of a programme. If (temporarily) institutions are set up within the framework of a programme, then it will resemble the ex-ante evaluation of a very large project.	Mission and achievement of objectives, effectiveness, efficiency and impact of the work carried out.	The ex post evaluation of institutions is even rarer than ex ante evaluations since the closing down of institutions is rarely planned. In institutions which have been planned as temporary from the start, as part of a programme, the ex post evaluation resembles the ex post evaluation of larger projects.
<b>Components, method(s)</b>		SWOT analysis, analysis of external and internal coherence, as well as the extent to which the institution is embedded in the relevant innovation systems, target analysis, assessment of organisation and management, impact analysis with regard to the projects and/or research work carried out by the institution, recommendations regarding the orientation, organisation and financing of the institution in the future.	
<b>Consequences</b>		Changes in organisation and management, changes in focus and financing (closing the institution).	
<b>Minimum components</b>		Assessing coherence, organisation and management, impact analysis, recommendations regarding the content-based orientation, organisation and financing of the institution in the future.	

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