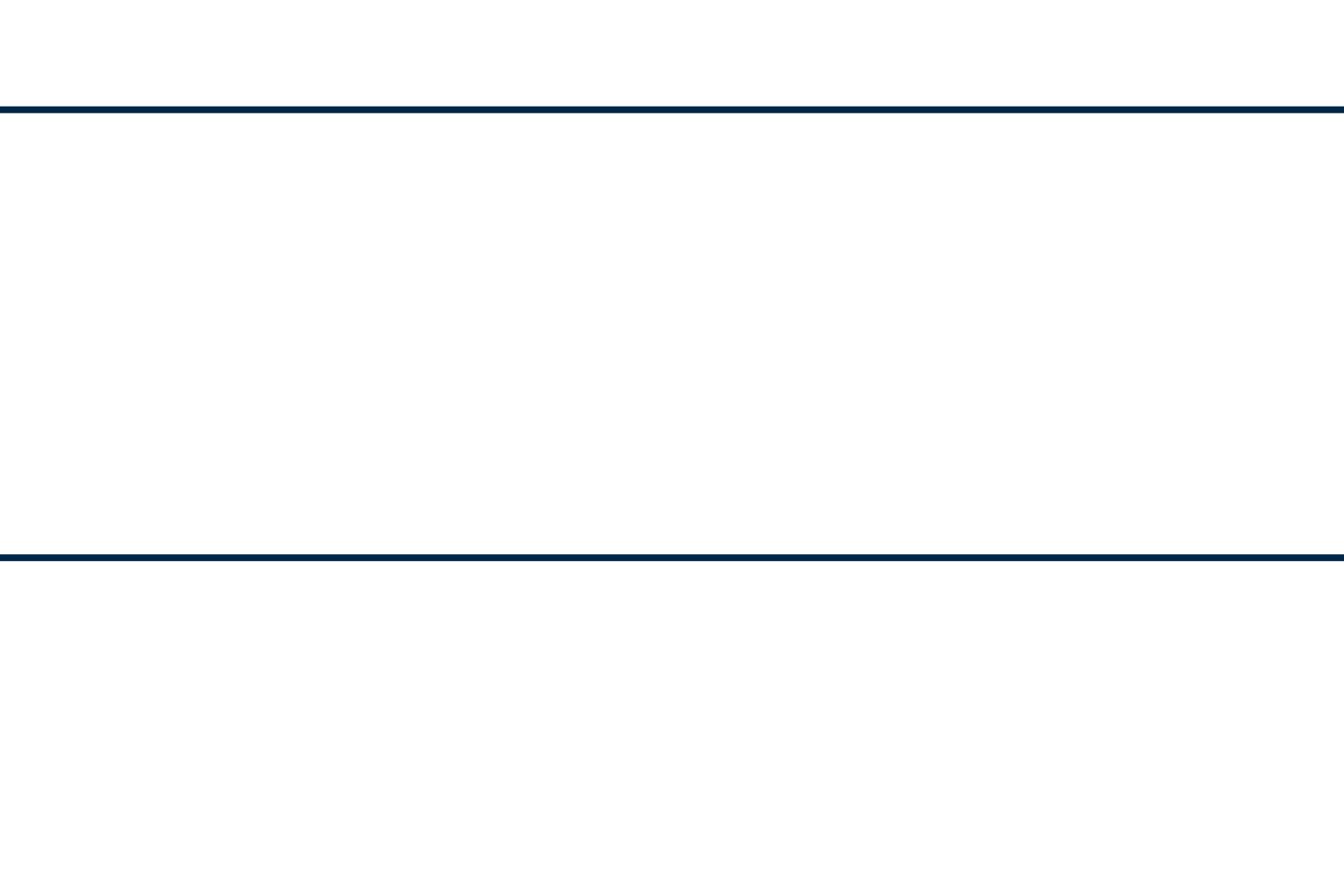




**RESEARCH EVALUATION GUIDELINES**  
of the Danish Agency for Science, Technology and Innovation



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## Table of contents

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Preface	4
1. Introduction	7
2. Introduction to the framework for research evaluation	8
3. The evaluation process	13
4. Annex 1: The Framework of the Danish Ministry for Science, Technology and Innovation for Evaluating Research	39
5. Annex 2: Focus points for the different quality perspectives	55



## Preface

With the implementation of the globalisation pool from November 2006, a broad parliamentary majority in the Folketing (Danish Parliament) has wished to focus on what comes out of the many funds used on public research every year.

The agreement states that the increased investments in research create a need for establishing significantly more follow-up and evaluation efforts than previously. The objective is to document the quality of Danish research, create a basis for qualifying future prioritisations, and assess the results of research investments.

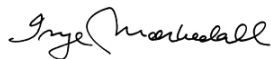
*The Framework of the Danish Ministry for Science, Technology and Innovation for Evaluating Research* describes the scope of the coming research evaluations. The framework answers a number

of principled questions concerning research evaluations, including, for example, what can be evaluated, how evaluations are to be organised, and the principles that the evaluations should live to.

To ensure transparency and quality in connection with the coming research evaluations, the Danish Agency for Science, Technology and Innovation has drawn up these guidelines. The guidelines apply to the evaluations that are initiated as part of the implementation of the action plan for research evaluation. To ensure the necessary distance the Danish Agency for Science, Technology and Innovation will not itself conduct the individual evaluations. Therefore the guidelines are also a tool for assuring the quality of the evaluations carried out on behalf of the Danish Agency for Science, Technology and Innovation.

I anticipate that all who are involved in the coming research evaluations or whom they affect in one way or the other will find the guidelines useful.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Inge Mærkedahl', written in a cursive style.

Inge Mærkedahl  
Director-general



# 1. Introduction

In accordance with the agreement on the implementation of the globalisation pool 2006, large-scale research programmes and initiatives are to be evaluated. The Danish Ministry for Science, Technology and Innovation has formulated this part of the agreement in a framework for research evaluation. The framework is elaborated in *The Framework of the Danish Ministry for Science, Technology and Innovation for Evaluating Research* (cf. annex 1), which also contains a number of principled considerations concerning evaluation in the area of research.

The objective of these guidelines is to give both internal and external stakeholders access to a more detailed description of the evaluation process itself and in this way contribute to the process becoming more transparent. The guidelines apply to the evaluations initiated as part of the implementation of the plan of action for the evaluation of research. In order to safeguard legitimacy and the necessary distance, the Danish Agency for Science, Tech-

nology and Innovation will not conduct the individual evaluations itself. The guidelines therefore also comprise a tool for the Danish Agency for Science, Technology and Innovation to assure the quality of the evaluations carried out on its behalf. In addition to the evaluations initiated as part of the plan of action, the Agency can initiate other evaluations, analyses and studies that do not necessarily meet the criteria of the guidelines.

The guidelines will be evaluated and if necessary adjusted after one to three years when the Danish Agency for Science, Technology and Innovation has gained experience of the way in which they function in practice.

The guidelines are divided into two chapters besides this introduction. Chapter 2 provides a short introduction to the framework for research evaluation, and chapter 3 contains a detailed, chronological description of the evaluation process.

## 2. Introduction to the framework for research evaluation

This chapter contains a short description of the framework for research evaluation. The objective is to describe the overall frames and principled considerations that form the point of departure for the evaluation process. A more elaborate description of the evaluation framework can be found in *The Framework of the Danish Ministry for Science, Technology and Innovation for Evaluating Research* (cf. annex 1).

### 2.1 INDEPENDENCE AND INVOLVEMENT

It is important for the legitimacy and utilisation of the evaluations that they are relevant and that the process and the results are regarded as trustworthy. For this reason, on the one hand the evaluations must be implemented independently of bodies that finance research, authorities and the evaluated research environments.

On the other hand, those undergoing evaluation and other key stakeholders are to be involved in the evaluation process at relevant points in time to ensure the quality, relevance and utilisation of the evaluation. The framework for research evaluation reflects these two considerations.

The first consideration means, inter alia, that the Danish Agency for Science, Technology and Innovation is not to conduct the evaluations itself. The Agency can identify the purpose, methodology etc. of the evaluation, but the evaluation itself is normally carried out by an external panel of experts that is responsible for the evaluation's conclusions, assessments and recommendations. The panel of experts is assisted by a secretariat that manages the practical planning of the evaluation.

The second consideration implies that the framework emphasises involving relevant stakeholders both in connection with identifying potential evaluation topics and during the course of the evaluation process.

### 2.2 FOCUS OF THE EVALUATIONS

The evaluations will focus on four different objects of evaluation: 1) funding instruments, 2) areas of research, 3) research programmes and 4) the research system. Table 1 contains a brief description of the four objects of evaluation.

TABLE 1. DESCRIPTION OF THE FOUR OBJECTS OF EVALUATION

OBJECT OF EVALUATION	DEFINITION
Funding instruments	<p>Funding instruments comprise the different types of grants utilised by the councils and the programme committees. An example of the evaluation of a funding instrument could be <i>Post doc.</i> or <i>The Industrial PhD programme</i>.</p>
Areas of research	<p>An area of research covers research within a defined area. The total research effort is ideally included in this type of evaluation. This is the case irrespective of whether it takes place at universities or government research institutes, and irrespective of whether it is financed through basic funds or funds from e.g. the Danish Council for Independent Research, the Danish Council for Strategic Research, the Danish National Research Foundation or the Danish National Advanced Technology Foundation. An example of an area of research could be <i>Food research</i>.</p>
Research programmes	<p>Research programmes are large-scale research investments the objective of which is to further knowledge within a delimited area. Research programmes are characterised by being limited in time and subject. An example of an evaluation of a research programme could be <i>Energy research programmes</i>.</p>
Research system	<p>The research system comprises the overall policies and frames in the field of research. An example of an evaluation of a research system could be <i>Participation in EU framework programmes</i>.</p>

As appears from *The Framework of the Danish Ministry for Science, Technology and Innovation for Evaluating Research* (cf. annex 1), the Agency anticipates that the evaluations will primarily focus on areas of research and funding instruments.

The individual evaluations can have different purposes and thus also different potentials for utilisation. In general, however, the evaluations are to ensure documentation and generate knowledge with a view to creating visibility and legitimacy, learning and quality development as well as strategy and policy development.

As previously mentioned, the evaluation framework of the Danish Ministry for Science, Technology and Innovation is to deal with different objects of evaluation and different objectives. There can also be differences between the quality perspectives that are included in the individual evaluations. In this connection a distinction is made between a research perspective, a commercial perspective, a societal perspective and an organisational perspective. An evaluation will typically adopt more than one perspective, and in some cases it may be appropriate to include all

perspectives. Please refer to *The Framework of the Danish Ministry for Science, Technology and Innovation for Evaluating Research* (cf. annex 1) for a description of the Ministry's quality perspectives.

## 2.3 STAKEHOLDERS

A successful evaluation is based on cooperation between the parties involved. This applies in connection with start-up, implementation and conclusion. Table 2 contains an overview of the key stakeholders of the evaluations.

The involvement in the evaluation process of those who are under evaluation, users and other stakeholders contributes to the evaluations' relevance and utilisation, and similarly dialogue increases understanding between the stakeholders. The Danish Agency for Science, Technology and Innovation stresses the involvement of relevant stakeholders in the evaluation process. For this reason the following description of the evaluation process also contains overviews of which stakeholders are involved and when, and what role each plays.

TABLE 2. DESCRIPTION OF KEY STAKEHOLDERS

CONTRACTING AUTHORITY	The party financing and defining the evaluation. In connection with the research evaluations, this will be the Danish Agency for Science, Technology and Innovation within the frames laid down by the Minister in the action plan upon the recommendation of the Danish Research Coordination Committee.
PANEL OF EXPERTS	The group of academic experts normally appointed in connection with the specific evaluation and who have the academic responsibility for the assessments and recommendations of the evaluation.
SECRETARIAT	The function that is established in connection with an evaluation to assist the panel of experts with the practical planning of the evaluation.
FOREIGN RESEARCH INSTITUTIONS, FIRMS OF CONSULTANTS, ETC	The actor or actors who are responsible for carrying out any supplementary studies that are to be included in the documentary basis of the evaluation.
THOSE WHO ARE EVALUATED	The party or parties who are the object of the evaluation and who are therefore directly involved.
USERS	The party or parties who can utilise the assessments and recommendations of the evaluation. These can be, for example, those who are evaluated, the research councils, the Danish Parliament or the ministries.
OTHER STAKEHOLDERS	The party or parties who are indirectly involved in the evaluation or who are influenced by or have an interest in the evaluation's results. These can be, for example, the research councils, Universities Denmark etc.



### 3. The evaluation process

This chapter contains a description of the evaluation process.

The evaluations are to be planned in accordance with a three-year plan of action that identifies what is to be evaluated each year. When the action plan has been adopted, the individual evaluations can be initiated. Firstly, a preliminary study is carried out which is to contribute to qualifying the terms of reference and identifying specific challenges and risks. Then terms of reference are drawn up defining the frames of the evaluation. When the terms of reference have been drawn up, under normal circumstances a panel of experts is appointed with responsibility for the academic assessment and recommendations of the evaluation. There can be evaluations where a panel of experts is not appointed. However, academic experts will always be utilised in cases where an evaluation is to assess research quality.

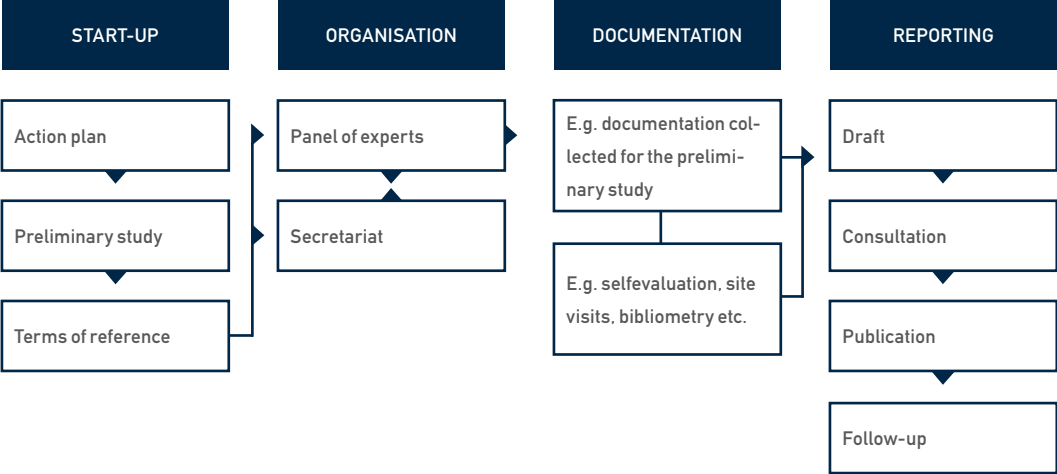
A secretariat is also appointed which is to assist the panel of experts with the planning and organisation of the evaluation. The panel of experts prepares a draft report that builds on the docu-

mentary basis indicated in the terms of reference, for example self-evaluation reports, site visits, bibliometric studies etc. Any studies conducted in connection with the preliminary study can also be included.

The draft report is then sent to relevant partners for consultation before the report is published. In connection with each report, the Danish Agency for Science, Technology and Innovation will make an assessment of which target groups could be interested in the evaluation and which channels would be appropriate for the wider dissemination of the evaluation results. Finally, the Agency monitors the extent to which the report is followed up. The main elements in the process of evaluation are illustrated in figure 1.

The individual elements in the evaluation process will be elaborated in the following.

FIGURE 1. THE EVALUATION PROCESS



### 3.1. ACTION PLAN

The evaluations will be mapped out according to an action plan. The action plan lays down the evaluations of the coming year and indicates the proposed evaluations for the two following years. On the one hand, the action plan must be anchored in the world of research in order to build on the assessment of the academic experts concerning what is most urgent and relevant to have evaluated. On the other hand, it is important that the evaluations are coordinated with the measures and considerations of the Danish Ministry for Science, Technology and Innovation in order to ensure the utilisation of the evaluations. In order to satisfy these two considerations, the action plan will be drawn up through a three-step process.

Firstly, proposals for evaluations are obtained from the research council system and other stakeholders. These include the Danish Councils for Independent Research, the Danish Council for Strategic Research, the Danish National Research Foundation, the Danish National Advanced Technology Foundation, the Danish Council for Research Policy, Universities Denmark, Board of Directors for Independent Public Research Institutions, representatives of research institutions (the universities and the government research

institutes), ministries with responsibility for research activities and representatives of relevant professional bodies and trade associations. The purpose of inviting these proposals is to generate as broad a basis as possible for identifying relevant objects of evaluation. All proposals must contain the grounds for initiating an evaluation together with a description of the purpose and utilisation of the evaluation.

The second step in drawing up the action plan is qualifying and prioritising the evaluations to be carried out. The following considerations are weighted in the context of prioritising the proposals:

- The evaluations should have political priority.
- The evaluations should be in demand.
- The evaluations should be cost-efficient.
- The evaluations should not place any unnecessary burdens on the research environments.

Please refer to *The Framework of the Danish Ministry for Science, Technology and Innovation for Evaluating Research* (cf. annex 1) for elaboration of the individual considerations.

**TABLE 3. ROLES, RESPONSIBILITY AND INVOLVEMENT IN CONNECTION WITH THE ACTION PLAN**

INVOLVEMENT OF STAKEHOLDERS	THE DANISH AGENCY FOR SCIENCE, TECHNOLOGY AND INNOVATION	THE DANISH RESEARCH COORDINATION COMMITTEE	THE MINISTER
<ul style="list-style-type: none"> <li>The research council system and other stakeholders submit proposals for possible evaluations.</li> </ul>	<ul style="list-style-type: none"> <li>Draws up overall list of possible evaluations.</li> </ul>	<ul style="list-style-type: none"> <li>Qualifies and recommends a prioritisation of proposals to the Minister.</li> </ul>	<ul style="list-style-type: none"> <li>Approves the final action plan.</li> </ul>

The Agency will draw up an overall list of possible evaluations on the basis of the proposals received as well as proposals from the Danish Ministry for Science, Technology and Innovation. When the overall list is available, it is the task of the Danish Research Coordination Committee to qualify the proposals and recommend a prioritisation of the proposals that are to be initiated in the coming

year, the evaluations that should be planned for the following two years, and the proposals that will not be prioritised in the three-year period covered by the action plan.

Finally, the Minister must approve the action plan. The final action plan will be posted on the Agency's website.

### 3.2. PRELIMINARY STUDY

The Danish Agency for Science, Technology and Innovation conducts a preliminary study before an evaluation is initiated. The general purpose of the preliminary study is to contribute to qualifying the terms of reference and identifying specific challenges and risks. In some cases a preliminary study can, moreover, result in an evaluation as such not being initiated. This may be because an evaluation would not contribute any new knowledge in relation to the evaluations already carried out in the area. As it is the Minister who approves the action plan, it would also be the Minister who would formally approve an evaluation not being initiated.

The scope of the preliminary study can vary according to which object of evaluation is involved. Actual studies can be conducted as part of the preliminary study. Furthermore, external consultants or the like can also be utilised to carry out parts of the preliminary study.

The following elements can be included in the preliminary study:

- Mapping and, if applicable, a summary of earlier national and

international evaluations conducted in the area

- A survey of strategies etc. for the area
- Mapping of the national and most important international actors that exist in the area
- Identification of the most important issues in the area
- Scope
- Identification of potential candidates for the panel of experts
- Mapping of different stakeholders' expectations of an evaluation, including its possible utilisation.

As part of the preliminary study, contributions will be obtained from the different research councils, the environments involved and other relevant stakeholders. The same actors will be asked to make proposals regarding the competences required of a panel of experts.

The main conclusions of the preliminary study are normally collected in a memorandum that can form the basis of further work with the terms of reference.

**TABLE 4. ROLES, RESPONSIBILITY AND INVOLVEMENT IN CONNECTION WITH THE PRELIMINARY STUDY**

THE DANISH AGENCY FOR SCIENCE, TECHNOLOGY AND INNOVATION	INVOLVEMENT OF STAKEHOLDERS
<ul style="list-style-type: none"> <li>• Conducts the preliminary study.</li> </ul>	<ul style="list-style-type: none"> <li>• Parties affected may contribute knowledge and material.</li> <li>• Parties affected may make proposals concerning interesting issues.</li> <li>• Parties affected may make proposals regarding the competences required of a panel of experts.</li> </ul>

### 3.3. TERMS OF REFERENCE

The purpose of the terms of reference is to define the evaluation framework in order to make it clear what is to be evaluated, why it is to be evaluated, how the evaluation is to be carried out, and what the result of the evaluation is to be used for. The Danish Agency for Science, Technology and Innovation will prepare a draft of the terms of reference with a point of departure in the preliminary study that has been conducted. Where relevant this work will be coordinated with other agencies under the Danish Ministry for Science, Technology and Innovation, other ministries etc.

As a point of departure the terms of reference will contain the following points:

- The background for initiating the evaluation
- Purpose, target group and utilisation
- Scope
- Basis of assessment
- Organisation
- Data collection methods
- Follow-up
- Annex: Timetable, competence profiles for the panel of experts, and overview of key documents etc.

A draft of the terms of reference will be sent to the evaluated parties and relevant research councils and subsequently to the Da-

TABLE 5. ROLES, RESPONSIBILITY AND INVOLVEMENT IN CONNECTION WITH THE TERMS OF REFERENCE

THE DANISH AGENCY FOR SCIENCE, TECHNOLOGY AND INNOVATION	INVOLVEMENT OF STAKEHOLDERS
<ul style="list-style-type: none"> <li>• Prepares draft of the terms of reference.</li> <li>• Draws up overall list of experts.</li> <li>• Draws up final terms of reference.</li> <li>• Makes final decision regarding composition of the panel of experts.</li> <li>• Appoints the panel of experts.</li> </ul>	<ul style="list-style-type: none"> <li>• Parties affected submit proposals for potential candidates for the panel of experts.</li> <li>• Parties affected receive draft terms of reference for consultation.</li> <li>• The Danish Research Coordination Committee prioritises an overall list of potential candidates for the panel of experts.</li> </ul>

nish Research Coordination Committee for consultation. In connection with the consultation, those who are to be evaluated and other relevant stakeholders will be asked to submit proposals for potential candidates for the panel of experts that comply with the competence profiles set up.

When the consultation is concluded, the Danish Agency for Science, Technology and Innovation will draw up the final terms of reference in the light of the comments received. The relevant research councils will be informed of the changes to which the consultation leads. In addition, the Danish Research Coordination Committee will be asked to prioritise the overall list of potential

candidates for the panel of experts for the Agency. On this basis, the Agency will make a final decision regarding the composition of the panel of experts.

The terms of reference receive final approval by the executive management of the Danish Agency for Science, Technology and Innovation. The final terms of reference will then be posted on the Agency’s website.

The individual points in the terms of reference will be elaborated in the following sections.

### 3.3.1 BACKGROUND FOR INITIATING THE EVALUATION

The terms of reference are to contain a section describing the background for initiating the evaluation. The section can be based on the grounds stated in the action plan and the preliminary study. The section should also contain a brief description of the object of evaluation.

### 3.3.2 PURPOSE, TARGET GROUP AND UTILISATION

The terms of reference are to contain a description of the purpose of the individual evaluation, the target group and the anticipated utilisation of the evaluation. As described in chapter 2, the evaluations focus on four different objects of evaluation: 1) funding instruments, 2) areas of research, 3) research programmes, and 4) the research system. Table 6 contains brief general descriptions of the individual objects of evaluations, their purpose and utilisation and target group.

TABLE 6. OBJECT OF EVALUATION

	FUNDING INSTRUMENTS	AREAS OF RESEARCH	RESEARCH PROGRAMMES	RESEARCH SYSTEM
DEFINITION	- the way in which the research councils seek to influence the research environments, i.e. the councils' forms of support.	- encompass research within a delimited area. In this type of evaluation ideally the totality of the research effort is included, irrespective of whether it takes place at universities or government research institutes and irrespective of whether it is funded through basic funds or project funds.	- large-scale research investments the objective of which is to further knowledge within a defined area. Research programmes are characterised by being delimited in time and subject matter.	- the overall policies and frames in the area of research.

TABLE 6. OBJECT OF EVALUATION (CONTINUED)

	FUNDING INSTRUMENTS	AREAS OF RESEARCH	RESEARCH PROGRAMMES	RESEARCH SYSTEM
<b>PURPOSE AND UTILISATION</b>	- to create both visibility and legitimacy concerning the grants awarded through the research council system and the possibility for revising the strategy for the utilisation of funding instruments.	- to create the basis for policy development. In addition, the evaluations can contribute to creating visibility and legitimacy concerning research activities in the area and to quality development in the research environments that are included in the evaluation.	- to create visibility concerning the results the programmes have given rise to. The purpose of the evaluations is also to qualify the strategies that exist for implementing and organising the research programmes. If the evaluations are carried out before the research programmes have been concluded, the evaluations can also form a basis for prolonging and revising the programme.	- to create a basis for policy development.
<b>TARGET GROUP</b>	- the funding bodies.	- ministries, the Danish Parliament, those who are evaluated and other stakeholders.	- the research council system, ministries, the Danish Parliament and other stakeholders.	- ministries, the Danish Parliament and other stakeholders.

### 3.3.3 SCOPE

The terms of reference are to contain a description of who and what is included in the evaluation, i.e. the scope. The scope can take a point of departure in the mapping that has been carried out in connection with the preliminary study. The criteria for the specific scope will depend on the object of evaluation.

### 3.3.4 BASIS OF ASSESSMENT

In order to create openness and transparency, the terms of reference are to contain a basis of assessment for the evaluation. This is to make it clear to those who are to be evaluated what the assessment relates to. The basis of assessment is to indicate the direction of the evaluation but simultaneously create room for the panel of experts to operationalise the basis. As stated in chapter 2, the Danish Ministry for Science, Technology and Innovation operates with four different quality perspectives: *research quality*, *commercial quality*, *societal quality* and *organisational quality*. These quality perspectives will be included in connection with the formulation of the basis of assessment. For further explication of the quality perspectives, please refer to *The Framework of the Danish Ministry for Science, Technology and Innovation for Evalu-*

*ating Research* (cf. annex 1) or to annex 2, which indicates some focus points for each of the Ministry's quality perspectives.

### 3.3.5. ORGANISATION

The terms of reference are to contain a section describing the organisation of the evaluation. It is important for the legitimacy of the evaluations that the process and results are perceived to be trustworthy. For this reason, the evaluations are to be carried out independently of the bodies that finance research, the relevant authorities and the research environments that are being evaluated. The Danish Agency for Science, Technology and Innovation conducts the preliminary study and is responsible for preparing the terms of reference. The evaluations themselves, however, are not to be carried out by the Agency. Instead, the organisation of the evaluations takes a point of departure in four elements:

- A *panel of experts* is appointed, which is responsible for the evaluation's academic assessments and recommendations.
- A *secretariat* is established, which is to assist the panel of experts with all the practical tasks that the evaluation gives rise to.

- *Studies* are carried out, for example, bibliometric studies or user surveys.
- A *report* is to be written. The panel of experts is responsible for a report being drawn up and for its contents, but others may write the report.

Under normal circumstances all four elements are included in connection with an evaluation. Sometimes, however, it will not be necessary to conduct the studies. The elements can also overlap as a foreign research institution, a firm of consultants or the like may very well undertake several roles simultaneously. For example, a foreign research institution can assist a panel of experts with the practical planning (secretariat function), conduct one or more studies, and assist a panel of experts in writing the report.

The way that the evaluation is expected to be organised will appear from the terms of reference. The Agency will try to organise the first evaluations in different ways to gain experience of what functions best. The four elements are described in more detail in the following.

## PANEL OF EXPERTS

Under normal circumstances, a panel of experts is appointed. The panel of experts is responsible for an evaluation report being drawn up and for the report's conclusions, assessments and recommendations. In addition, the panel is responsible for the terms of reference being complied with and for any adjustments to the timetable, for instance, being coordinated with and approved by the Danish Agency for Science, Technology and Innovation.

There can be cases where a panel of experts is not appointed, for example when individual funding instruments are being evaluated. When evaluations contain assessments of research quality, however, academic experts must always be utilised.

The composition and size of the panel of experts will depend on the object of evaluation and the purpose of the evaluation. For example, in connection with large-scale evaluations it might prove necessary to appoint sub-panels with special competences within defined areas.

It may be necessary to utilise both Danish and international experts to safeguard the independence of the evaluations and knowledge of the Danish context. The composition of the panel of experts will depend on the object of evaluation, and the subject area will also be important. However, the Agency anticipates that panels of experts will contain a majority of international experts.

It is important to ensure transparency when the panel is being appointed. For this reason, the following process will apply when a panel of experts is being appointed:

- The Danish Agency for Science, Technology and Innovation obtains proposals for expert profiles in connection with the preliminary study.
- The Agency draws up an annex to the terms of reference containing a description of the competences that the panel of experts should have.
- The Agency obtains proposals for potential candidates for the panel of experts.
- The Danish Research Coordination Committee submits a prioritised list for the composition of the panel of experts to the

Agency, which makes the final decision.

- The parties affected are consulted concerning the impartiality of the panel.

As appears from the above, the Agency obtains proposals for potential candidates for the panel of experts. All parties affected have the possibility of recommending qualified candidates, and the Agency will, inter alia, contact international partners etc. to have possible candidates identified.

In connection with drawing up the competence description for the panel of experts and the appointment of the panel, it is important to consider the following principles: specialist knowledge, broad academic range, impartiality and diversity. The individual principles will be elaborated in the following.

### SPECIALIST KNOWLEDGE

The panel of experts is as far as possible to represent the best available academic knowledge on the matters that the evaluation is to deal with. In addition, the panel's professional competence is to be recognised to the widest possible extent by peers and by the stakeholders affected by the panel's assessments.

### BROAD ACADEMIC RANGE

A panel of experts is all in all to cover the matters that the panel is appointed to assess. The Chair should have a broad academic profile, as he or she is to be able to mediate between all members of the panel in academic issues.

### IMPARTIALITY

A panel of experts should to the highest degree possible be independent of interests regarding the matters that the panel is to evaluate, and stakeholders who will be affected by the panel's assessments must acknowledge the panel's impartiality. In this context impartiality encompasses all matters that could cause doubt to be raised about the panel's disinterestedness. The mem-

bers of the panel are obliged to themselves provide information about all matters that could lead to incapacity. Where by definition independence cannot be achieved, a balanced representation of interest will be aimed at in the composition of the panel.

### DIVERSITY

When composing the panel, the highest possible degree of equal gender distribution and geographical, age and institutional diversity will be aimed at.

It will not be possible to comply with each of these principles in all cases. In such cases specialist knowledge and impartiality will be prioritised.

**TABLE 7. ROLES, RESPONSIBILITY AND INVOLVEMENT IN CONNECTION WITH THE PANEL OF EXPERTS**

THE DANISH AGENCY FOR SCIENCE, TECHNOLOGY AND INNOVATION	THE PANEL OF EXPERTS	INVOLVEMENT OF STAKEHOLDERS
<ul style="list-style-type: none"> <li>• Draws up a competence description for the panel of experts in connection with the terms of reference.</li> <li>• Draws up an overall list of potential candidates for the Danish Research Coordination Committee with a point of departure in the proposals received.</li> <li>• Makes the final decision about the composition of the panel.</li> <li>• Appoints the panel of experts.</li> </ul>	<ul style="list-style-type: none"> <li>• Has responsibility for a report being drawn up.</li> <li>• Has responsibility for the evaluation's conclusions, assessments and recommendations.</li> <li>• Has responsibility for the terms of reference being complied with and for any adjustments etc. being coordinated with and approved by the Agency.</li> </ul>	<ul style="list-style-type: none"> <li>• All parties affected can recommend potential candidates for the panel of experts.</li> <li>• The Danish Research Coordination Committee prioritises an overall list of potential candidates for the panel of experts, also including candidates for the Chair.</li> <li>• The parties affected are consulted about the impartiality of the panel of experts.</li> </ul>

### SECRETARIAT

A secretariat will be established in connection with an evaluation to assist the panel of experts with all the practical tasks that the evaluation gives rise to. This can consist in, for example, planning travel for the panel of experts. The Danish Agency for Science, Technology and Innovation selects who is to undertake the secretariat function in connection with the specific evaluation and enters a contract with the relevant party. The following could be possible candidates for the secretariat:

- A firm of consultants
- A foreign research institution
- A qualified person (review secretary). Typically a person known to the Chair, for example a PhD student, post doc. or the like.

Finally, in some cases the Danish Agency for Science, Technology and Innovation could also undertake the function.

**TABLE 8. ROLES, RESPONSIBILITY AND INVOLVEMENT IN CONNECTION WITH THE SECRETARIAT FUNCTION**

THE DANISH AGENCY FOR SCIENCE, TECHNOLOGY AND INNOVATION	THE SECRETARIAT
<ul style="list-style-type: none"> <li>• Selects and enters a contract with a person, a firm of consultants, or a foreign research institution to undertake the secretariat function.</li> <li>• The Agency itself can also undertake the secretariat function in some cases.</li> </ul>	<ul style="list-style-type: none"> <li>• Is to assist the panel of experts in connection with the practical planning of the evaluation.</li> </ul>

## STUDIES

In some cases different studies will have to be carried out as a part of the documentation basis of the panel of experts, for example bibliometric studies or different types of user surveys. To ensure the necessary distance and credibility, the Danish Agency for Science, Technology and Innovation will not carry out these studies. They will instead be conducted by qualified national or international research institutions or firms of consultants etc.

The Agency is responsible for appointing one or more research institutions, firms of consultants etc. to carry out the studies and for conducting quality assurance of their work – if possible together with the panel of experts.

**TABLE 9. ROLES, RESPONSIBILITY AND INVOLVEMENT IN CONNECTION WITH THE SELECTION OF AN EXTERNAL OPERATOR**

THE DANISH AGENCY FOR SCIENCE, TECHNOLOGY AND INNOVATION	INVOLVEMENT OF STAKEHOLDERS
<ul style="list-style-type: none"> <li>• Appoints one or more research institutions, firm of consultants etc. to conduct the studies.</li> <li>• Performs quality assurance of the work as far as possible in cooperation with the Chair of the panel of experts.</li> </ul>	<ul style="list-style-type: none"> <li>• Parties affected can make proposals for relevant external operators in connection with the terms of reference being sent for consultation.</li> </ul>

**THE REPORT**

The panel of experts is responsible for an evaluation report being drawn up and for the report’s academic assessments and recommendations. The panel of experts need not necessarily compose the report itself but can entrust this task to others, for example a PhD student or post doc, known to the Chair of the panel of experts. It could also be a firm of consultants or a foreign research institution with knowledge of the evaluated area. It is, finally,

a possibility that one of the members of the panel of experts writes the report. Please refer to section 3.4, The evaluation report, concerning requirements of the report.

The Danish Agency for Science, Technology and Innovation and the Chair of the panel of experts agree on who is to write the report when the panel is appointed.

**TABLE 10. ROLES, RESPONSIBILITY AND INVOLVEMENT IN CONNECTION WITH THE WRITING OF THE REPORT**

THE DANISH AGENCY FOR SCIENCE, TECHNOLOGY AND INNOVATION	THE PANEL OF EXPERTS
<ul style="list-style-type: none"> <li>• Agrees on who is to write the report with the Chair of the panel of experts.</li> </ul>	<ul style="list-style-type: none"> <li>• Responsible for an evaluation containing assessments and recommendations being written in accordance with the terms of reference.</li> <li>• The Chair of the panel of experts agrees with the Agency who is to write the report.</li> </ul>

### 3.3.6 METHODS OF DATA COLLECTION

The terms of reference will also contain an overview of the data collection methods. It is the specific object of evaluation and the purpose of the evaluation that determine the methods for collecting data. Every evaluation will typically contain several data collection methods. The most central and typically utilised methods will be briefly described in the following.

### SELF-EVALUATION

The purpose of self-evaluation is to obtain written documentation for use in the evaluation, to give those who are evaluated the opportunity to present their own assessment of the matters that are to be evaluated, and to inspire the latter to develop their quality. The self-evaluation is also normally used as a basis for conducting site visits to those who are being evaluated. It is crucial that those who have first-hand knowledge of the research in the area

evaluated have the possibility of contributing their experience and assessments to the evaluation. In addition, it is important that those who are evaluated have the opportunity to include any analyses they may have that are of relevance for the evaluation. However, a clear "self" that can evaluate will not exist in all evaluation designs. This will be the case in, for example, a research investment where funds have been granted to a wide circle of researchers. Self-evaluation is based on the experience and assessments of those who are evaluated. Therefore an evaluation will normally also be supplemented by other methodological elements.

### **SITE VISITS**

There are two objectives in carrying out site visits to those who are under evaluation. Firstly, the content of the self-evaluation report can be validated and supplemented. Secondly, the preliminary assessments occasioned by reading the self-evaluation and the other documentation can be tested. Simultaneously, a site visit is an opportunity for those under evaluation to meet the panel of

experts and elaborate on the descriptions and assessments contained in the self-evaluation report. Instead of making a site visit, the panel of experts can invite those who are to be evaluated to a meeting at a fixed location. This is a relevant framework if many research units are involved in the evaluation and it would be impossible from the point of view of time for the panel of experts to visit all units.

### **PEER REVIEW**

The purpose of peer reviews is to obtain a qualitative assessment of a research programme, research project etc. A peer review is carried out by experts with professional competence in the evaluated area. For a long time this has been a key method of assessing the quality and relevance of new scientific knowledge. Peer review is related to the concept of panel of experts. The difference is that a panel of experts usually is composed more broadly so that as well as peers it also contains experts with competences within other areas of interest to the evaluation. Thus, the members of a panel of experts can often carry out a peer review. It may

also be necessary to have a peer review conducted by experts outside of the panel. This can be the case if, for example, the panel of experts does not have the necessary professional specialist competences. Peer reviews will normally not be the only method employed in an evaluation, but will often be supplemented by other methodological elements.

### **BIBLIOMETRIC STUDIES**

The purpose of carrying out bibliometric studies is that they can be used as an indicator of the research quality across national borders and over time and they can also indicate something about the effect of the research. Bibliometric studies can take the form of, for example, publication analyses or citation analyses. Publication analyses can, for example, tell something about the activity in a research environment, while citation analyses have something to say about the impact of the research conducted in the research environment. As it takes time before the research materialises in publications and these are cited, bibliometric analyses will primarily be used when some time has elapsed from when

the research is concluded to when it is evaluated. Finally, there are great differences in the way bibliometric analyses can be utilised, and whether they are utilised, within the different subject areas. For this reason any bibliometric analyses undertaken will never be the only method used in an evaluation.

### **STUDIES AMONG STAKEHOLDERS**

It may be relevant in connection with some evaluations to have the assessment of different stakeholders of the object of evaluation clarified. For example, it is often relevant to obtain the users' assessment of whether the results of a specific research programme are useful and can be utilised in practice. Such studies can, for example, be conducted as interview or questionnaire surveys if specific data is to be obtained from many respondents.

### **3.3.7 TIMETABLE**

The timetable for an evaluation will depend on the object of evaluation and the purpose of the evaluation. The design of the specific evaluation will also play a role. For example, an evaluation invol-

**TABLE 11. ESTIMATE OF TIME CONSUMPTION FOR AN EVALUATION**

MONTHS	ACTIVITY
2	Appointment of the panel of experts and selection of secretariat.
1	Initiation of evaluation, including drawing up any guidelines for self-evaluation.
3	The institutions' self-evaluation process and preparation of analyses.
3	Panel of experts' processing of self-evaluations and analyses and conducting of site visits.
2	Drawing up the final report.
1	Consultation and quality assurance.
1	Proofreading, printing and press work.
13	Total

ving both self-evaluation and experts may be expected to take approximately one year from the time the evaluation's terms of reference have been approved until the evaluation is concluded. It will be possible to conduct evaluations that are primarily based on existing documentary material more quickly, while some evaluations of effects and connections between organisation and effects will require a longer time. It is relevant to consider a mid-term report in the case of evaluations that take more than one year.

Table 11 shows a preliminary estimate of the time consumption for an evaluation

### 3.4. THE EVALUATION REPORT

When the panel of experts has had the opportunity to read and discuss the documentary basis, a report is drawn up. The report is prepared by the panel of experts in close collaboration with the party appointed to write the report. The panel of experts has the professional responsibility for the conclusions of the report, its assessments and any recommendations. Table 12 provides an overview of the elements that a report must contain. However, the elements do not necessarily have to appear in the order below.

TABLE 12. REQUIREMENTS OF THE CONTENTS OF THE EVALUATION REPORT

THE ELEMENTS OF THE REPORT	CONTENTS
Foreword	The foreword should state that the evaluation was initiated by the Danish Agency for Science, Technology and Innovation as part of the action plan for the evaluation of research. The background and purpose of the evaluation should also be stated. The foreword can also contain an overview of the panel of experts.
Summary	Contains the purpose of the evaluation together with the most important conclusions, assessments and any recommendations.
Introduction	The introduction is to contain a description of: <ul style="list-style-type: none"> <li>- The reason for initiating the evaluation</li> <li>- The purpose, target group and anticipated utilisation of the evaluation as stated in the terms of reference</li> <li>- Scope</li> <li>- The documentary basis of the evaluation.</li> </ul>
Description of the object of evaluation	The report is to contain a brief description of the object of evaluation and of the frames that apply to the area.
Approach to the basis of assessment	The report is to explicitly address the basis of assessment indicated in the term of reference.
Conclusion and recommendations	The report is to contain a conclusion that collects together the most important issues that were identified together with any recommendations etc.
Annexes, if any	The following could be attached as annexes: <ul style="list-style-type: none"> <li>- Overview of any recommendations</li> <li>- Institution-specific responses</li> <li>- Brief CVs of the panel of experts</li> <li>- Programme for site visits made to institutions.</li> </ul>

TABLE 13. ROLES, RESPONSIBILITY AND INVOLVEMENT IN CONNECTION WITH DRAWING UP A REPORT

THE DANISH AGENCY FOR SCIENCE, TECHNOLOGY AND INNOVATION	THE PANEL OF EXPERTS	THE INVOLVEMENT OF STAKEHOLDERS
<ul style="list-style-type: none"> <li>• Ensures that the report meets the formal requirements and that the terms of reference are fulfilled.</li> <li>• Ensures that the report is printed and published.</li> </ul>	<ul style="list-style-type: none"> <li>• Has responsibility for drawing up a report that corresponds to the terms of reference and fulfils the Agency’s formal requirements.</li> <li>• The panel of experts is responsible for the report’s assessments and conclusions.</li> </ul>	<ul style="list-style-type: none"> <li>• Parties affected receive the report for consultation and have the opportunity to point out factual flaws and deficiencies.</li> </ul>

The report should be written in clear language and, furthermore, be targeted towards the group the Agency has defined as the users of the evaluation.

It is important that the report should be drawn up in such a manner as to make it possible to see the documentation on which the panel of experts have based their assessments and conclusions.

The report should explicitly address the basis of assessment that is indicated in the terms of reference. It is not a requirement that the report should contain recommendations about how the pro-

blems that have been identified could be solved, but if the panel of experts should have ideas for recommendations, these should, naturally, be stated in the report. If the panel of experts formulates recommendations, it should be easy to find these in the report and they should be addressed to the party who is mainly expected to follow them up.

For the sake of the legitimacy and academic soundness of the report, the aim is that all members of the panel of experts should to the highest possible degree support the report’s conclusions, assessments and recommendations. If it has not been possible to

reach a consensus, any disagreement should be made explicit in the report.

When the group of experts has drawn up a report, it is sent to the parties affected for consultation. The report is also forwarded to the Danish Agency for Science, Technology and Innovation whose only task is to ensure that it meets the formal requirements and that the terms of reference have been fulfilled. Neither the Agency nor the bodies in the council system are to approve the report.

When the panel of experts has incorporated the comments and corrections resulting from the consultation responses, the report is forwarded to the Danish Agency for Science, Technology and Innovation. The Agency ensures that the report is printed and published on the Agency's website.

### **3.5. DISSEMINATION OF KNOWLEDGE**

It is important that the assessments and recommendations of the report are followed up. It is also important that the results of the evaluation are disseminated so that a wider circle can benefit from them.

In connection with each individual evaluation, the Agency will prepare an overview of the target groups that could be interested in the evaluation and the channels that are appropriate for the broader dissemination of the evaluation's results.

Dissemination of knowledge can take place inter alia by the Agency, in the context of the publication of the report, convening conferences, seminars or workshops to further the dialogue between the groups that have been involved in the evaluation and others who could be interested in the evaluation's results.

To ensure the greatest possible impact of the report, the Agency will forward the printed report to relevant national and international stakeholders.

Finally, the Agency will follow up on the methodological and evaluation experiences and consider the extent to which the evaluation that has been carried out gives rise to methodological development and learning for the Danish Agency for Science, Technology and Innovation.

TABLE 14. ROLES, RESPONSIBILITY AND INVOLVEMENT IN CONNECTION WITH THE DISSEMINATION OF KNOWLEDGE

THE DANISH AGENCY FOR SCIENCE, TECHNOLOGY AND INNOVATION	THE INVOLVEMENT OF STAKEHOLDERS
<ul style="list-style-type: none"> <li>• Draws up an overview of those who could be interested in the evaluation and of the appropriate channels for broader dissemination of the evaluation's results.</li> <li>• Can convene conferences, workshops or seminars.</li> </ul>	<ul style="list-style-type: none"> <li>• Parties affected can participate in any workshops, seminars or conferences.</li> </ul>

### 3.6. FOLLOW-UP

The Danish Agency for Science, Technology and Innovation is responsible for the follow-up of the evaluations. The concrete follow-up strategy will be announced in connection with the publication of the evaluation. The strategy will also be published on the Agency's website.

As a point of departure, the Danish Agency for Science, Technolo-

gy and Innovation will go through the report and draw up an overview of whom the individual assessments and recommendations are directed at. With respect to the assessments and recommendations directed at the Agency, the Agency will respond to them explicitly. The Agency will, moreover, request authorities, research institutions etc. to prepare a description of whether and if so how they expect to act on the individual assessments and re-

TABLE 15. ROLES, RESPONSIBILITY AND INVOLVEMENT IN CONNECTION WITH FOLLOW-UP

THE DANISH AGENCY FOR SCIENCE, TECHNOLOGY AND INNOVATION	THE INVOLVEMENT OF STAKEHOLDERS
<ul style="list-style-type: none"> <li>• Draws up overview of whom the individual recommendations are directed at.</li> <li>• Responds explicitly to recommendations directed at the Agency.</li> <li>• Contacts those involved to obtain an answer to whether and how they will act on the individual assessments and recommendations.</li> <li>• One to three years after the report has been published, the Agency will investigate the extent to which the recommendations have been followed up.</li> </ul>	<ul style="list-style-type: none"> <li>• Parties affected answer the question of whether and if so how they will act on the individual recommendations.</li> </ul>

commendations. It may also be relevant in some case for the Agency to assemble those who have been evaluated with a view to finding good solutions to the issues identified in the evaluation.

One to three years after the publication of the report, the Danish Agency for Science, Technology and Innovation will investigate the degree to which the evaluation has been followed up.

In addition, in special cases the Danish Agency for Science, Technology and Innovation will be able to carry out re-evaluations in order to assess what has taken place in the area since the first evaluation was conducted.

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## Annex 1

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The Framework of the Danish Ministry for Science, Technology and Innovation for Evaluating Research

## Preface

World-class research has been one of the Government's focus areas for a long time. The target has been that total research funding should rise to one per cent of GDP. The agreement on the 2009 Finance Act makes this target a reality. This means that the conditions for research are particularly favourable at present.

The strong Government focus on research makes it increasingly more important that we know what we are getting for the huge sums of money we spend. With the agreement on the implementation of the globalisation pool from November 2006, a broad parliamentary majority focused on what comes out of the many funds spent on public research every year.

The agreement states that the increased investments in research create a need for establishing

significantly more follow-up and evaluation efforts than previously. The objective is to document the quality of Danish research, create a basis for qualifying future prioritisations and assess the results of research investments.

The framework for evaluating research describes the scope of the coming research evaluations. It answers a number of principled questions concerning research evaluations, including, for example, what can be evaluated, how evaluations are to be organised and the principles that the evaluations should live up to.

A wide circle of stakeholders has been consulted in connection with the preparation of the framework. These include the Danish Research Coordination Committee, the Danish Councils for Independent Research, the Danish Council for Strategic Re-

search, the Danish Council for Research Policy, the Danish National Research Foundation, the Danish National Advanced Technology Foundation, representatives of universities and government research institutes, and representatives of professional bodies and trade associations.

I anticipate that the framework will create a good setting for the coming research evaluations, and that the evaluations will contribute to qualifying the future prioritisation of research efforts.

Yours sincerely

Helge Sander  
Minister for Science, Technology and Innovation

## 1. Introduction

This publication describes the framework that the Ministry for Science, Technology and Innovation utilises as a point of departure for evaluating research. It is not an evaluation standard, but rather a structure within which the individual evaluations are to be designed.

The framework deals with seven key questions in terms of the Ministry's evaluation practice:

- What is the background for enhanced evaluation efforts?
- How are the evaluations to be organised?
- What is the purpose of enhanced evaluation efforts and how are the evaluations to be utilised?
- What is understood by quality?
- What considerations should apply in the selection of evaluations?
- What can be evaluated and for what purposes?
- What principles should the evaluations live up to?

The framework provides some general answers to these questions. As previously mentioned, the framework is to form the basis for designing the individual evaluations. The design is described in the terms of reference drawn up for each evaluation on the basis of a preliminary study. The *Research Evaluation Guidelines of the Danish Agency for Science, Technology and Innovation* describe in more detail the way in which this process is to take place in practice. These guidelines also provide specific directions about the way in which the evaluations are to be conducted, including how to ensure independence and involvement when the evaluations are carried out. In addition to contributing to ensuring independence in the evaluations, the guidelines also serve as tool for the Danish Ministry for Science, Technology and Innovation in the quality assurance of evaluations.

A wide range of stakeholders has been consulted regarding the framework. These which include the Danish Research Coordination Committee, the Danish Councils for Independent Research, the Danish Council for Strategic Research, the Danish Council for Research Policy, the Danish National Research Foundation, the Danish National Advanced Technology Foundation, representatives of universities and government research institutes as well as representatives of professional bodies and trade associations. The publication reflects, inter alia, the result of these consultations. The framework for research evaluation will, moreover, be reviewed when experience has been gained in conducting evaluations on the basis of the framework.

## 2. What is the background for enhanced evaluation efforts?

The political mandate for enhanced evaluation efforts is to be found in the Government's Globalisation Strategy and the agreement between the Government, the Social Democratic Party, the Danish People's Party and the Danish Social-Liberal Party on the implementation of the globalisation pool.

The agreement makes clear that the increased investments in research create a need for the establishment of significantly more extensive follow-up and evaluation activity than previously. The purpose is to document the quality of Danish research, to create a basis for qualifying future prioritisations and to assess the results of investments in research.

Already today the area of research is subject to a considerable degree of evaluation, for example evaluation of individuals in connection with appointments, of single projects in connection with funding decisions, and individual research results in connection with publication. In addition, several large research programmes have been evaluated, and a number of research environments have been evaluated under the auspices of research councils. Finally, internal evaluation is carried out at the research institutions.

At national level, however, there is no tradition of systematic evaluations of research quality. In this area, the UK, the Netherlands and Norway, for

example, are more active. The Ministry's evaluation efforts will focus on the national level.

### 3. How are the evaluations to be organised?

It is important for the legitimacy and utilisation of the evaluations that the process and the results are regarded as trustworthy. For this reason the evaluations are to be carried out independently of the research council system, authorities and the research environments that are undergoing evaluation. The organisation is described in more detail in the *Research Evaluation Guidelines of the Danish Agency for Science, Technology and Innovation* and is briefly summarised in the following.

#### 3.1 INDEPENDENCE AND INVOLVEMENT

Evaluation of research involves judgement. It is therefore crucial that the evaluations should be conducted in a manner that both those who are undergoing evaluation and those who are to make use of the evaluation find trustworthy. Evaluations must be carried out independently without any undue influence from politicians, authorities, the re-

search council system, or those who are evaluated. They must be conducted in a professionally accountable way. When the evaluation has been initiated, it is solely those who are carrying out the evaluation that can interpret the mandate and decide which conclusions to draw. This implies, concretely, among other things that the evaluation reports are not to be approved – neither by the Danish Ministry for Science, Technology and Innovation nor by bodies in the research council system. It also means that the Ministry is not responsible for collecting documentation in connection with the evaluation process or for drawing up the report. This responsibility is instead that of persons or organisations with no formal links to the Ministry.

In order to further the relevance and application of the evaluations, it is also crucial to involve both

those who are undergoing evaluation and other stakeholders. This will mainly take place in connection with drawing up a plan of action for evaluations and the preparation of terms of reference for the individual evaluations.

#### 3.2 THREE-YEAR PLAN OF ACTION

Evaluations will be planned in accordance with a three-year plan of action. The action plan will identify the coming year's evaluations and indicate which evaluations are to be launched in the following two years. The plan of action is to be based on suggestions from the world of research in order to build on the professional experts' judgement of the areas that need to be evaluated. It is simultaneously important that evaluations are coordinated with measures and deliberations in the political system and the research council system.

The plan of action will therefore be drawn up with proposals from a wide range of stakeholders that include the research council system and with the involvement of the Danish Research Coordination Committee, which will qualify and submit recommended prioritisations of the proposals to the Minister. It is the Minister who approves the plan of action. The process for drawing up the plan of action is elaborated in the *Research Evaluation Guidelines of the Danish Agency for Science, Technology and Innovation*.

### 3.3 TERMS OF REFERENCE

When the plan of action has been adopted, a preliminary study will be carried out for each evaluation. Contributions will be obtained from, inter alia, relevant academic research councils and the environments involved as part of the preliminary study. The contributions will concern, among other

things, relevant questions and proposals for the experts who are to be responsible for the academic assessments in the evaluation. The preliminary study will form the basis for preparing terms of reference and selecting the academic experts.

The terms of reference lay down the issues which the evaluation is to consider and the methodology to be employed. The choice of methods will depend on the specific object of evaluation and the purpose of the evaluation.

The relevant research councils and the Danish Research Coordination Committee are to have the opportunity to comment on the terms of reference. On the same occasion, the Danish Research Coordination Committee will be asked to prioritise an overall list of possible candidates for the panel of experts. The final terms of reference are to be ap-

proved by the executive management of the Agency, who also appoint the panel of experts. The process for preliminary studies and drawing up the terms of reference is described in detail in the *Research Evaluation Guidelines of the Danish Agency for Science Technology and Innovation*.

## 4. What is the purpose of enhanced evaluation efforts and how are the evaluations to be utilised?

The individual evaluations can have different purposes and thus also differ in their application potential. In general, however, evaluations are to ensure documentation and generate knowledge with a view to creating visibility and legitimacy, learning and quality development as well as strategy and policy development.

### 4.1 VISIBILITY AND LEGITIMACY

It should be possible to justify and legitimise the use of public research funds vis-à-vis politicians and the general public, not least in view of the increasing investments in research. Evaluations are to provide information about the quality of research, inter alia by means of international comparison. In this way evaluations can contribute to putting research on the agenda.

### 4.2 LEARNING AND QUALITY DEVELOPMENT

The evaluations will produce knowledge about research organisation, research policy funding instruments and research results. Evaluations simultaneously provide the possibility for exchange of experience by calling attention to good examples. This gives the participating research environments for instance, an opportunity for learning and quality development.

### 4.3 STRATEGY AND POLICY DEVELOPMENT

The evaluations are to make a contribution to strategy and policy development. In some cases the political level can make use of the evaluations to revise the general framework for research and the organisation of large-scale research initiatives. In other cases the funding bodies use the evaluations

in relation to prioritising funding instruments. In this way evaluations contribute to improving the quality of future efforts and to the best possible utilisation of resources. The point of time at which the evaluation is carried out will thus be decisive for the evaluations being able to fulfil this purpose.

## 5. What is understood by quality?

Quality is a concept that is difficult to define and it is easy to disagree about its meaning. There can be different views of how to operationalise high-quality research even in related disciplines. There are often very great differences between the different main fields of research concerning the perception of quality. At the same time the perception of quality is quite crucial in an evaluation, because a piece of research can be excellent on the basis of the one view of quality but poor on the basis of another.

In the Danish context, both the Danish Council for Research Policy and the Danish Council for Strategic Research have described what is to be understood by quality. In *A Tool for Assessing Research Quality and Relevance* the Danish Council for Research Policy presents six indicators of research quality and relevance. The six indicators are publications, citations, external research allocations/

earnings, formalised international research cooperation, relevance for the business sector and relevance for society in general. In *Funding of Strategic Research Programmes* the Danish Council for Strategic Research works with a framework that operationalises the concept of quality under the headings of relevance, effect and research level. Other typologies are employed internationally. For example, a Dutch evaluation framework works with quality, productivity, relevance, vitality and feasibility. This list of different definitions of research quality covers considerable overlapping, however.

In the Ministry's evaluations, the understanding of research quality depends on what is to be evaluated and the purpose of the evaluation. For this reason, the precise basis of assessment will be laid down in the terms of reference. The basis of

assessment for the individual evaluations will be formulated within the framework of four different perspectives, which are a research perspective, a commercial perspective, a more broadly societal perspective, and an organisational perspective, respectively. An overall quality concept is thus operated with rather than a fundamental distinction between quality and relevance. An evaluation will typically include more than one perspective, although in some cases it may be appropriate to include all perspectives.

In a *research perspective*, it is important that research should contribute to resolving existing research problems and the identification of new issues for research. Originality and methodological robustness are key concepts in this context. Research is to offer new, preferably groundbreaking, knowledge that is also recognised in the world of research.

From a *commercial perspective* it is decisive that research should contribute to value creation by means of new or better products, processes or methods. This means that research should be able to contribute to innovative processes or that research stimulates the demand for and application of new knowledge.

From a *societal perspective*, it is decisive that research should contribute to liberal adult education, personal development and a critically reflective,

open general public. It is, in addition, important that research should contribute to more qualified problem solving, not only in terms of innovation and value added, but also in relation to societal issues in the wide sense.

While the first three perspectives are concerned with research results or contributions, the *organizational perspective* is concerned with the organisation of the research process. In this context organisation is understood broadly to include, inter alia, division of labour and cooperation both internally and externally in the research environments. The organisation of research is decisive for achieving an effective utilisation of research funds.

As part of a consideration of the question of quality, in conclusion it should be mentioned that in research a significant space of time often elapses between the immediate results being presented

and the long-term effects being known. It is, for example, well known that Nobel Prizes for research are awarded for research that has been conducted a long time before the award is given. This is a challenge for evaluations, as it will not always be clear at the conclusion of a research process whether the results will in time prove to be uniquely original or radically innovative. If, on the other hand, the evaluations are only conducted when such matters can be assessed with a great degree of certainty, the relevance of the evaluations will be quite limited because the conditions under which the research was carried out will have changed on crucial points. The Danish Ministry for Science, Technology and Innovation will attempt to find a balance between the two extremes. This can take place by focusing on research organisation or by some evaluations being carried out over a longer period.

## 6. What considerations should apply in the selection of evaluations?

There can be many reasons for conducting an evaluation but in some contexts different considerations can point in different directions. The following considerations are weighted in connection with prioritising proposals in the plan of action for what research should be evaluated.

### **6.1 EVALUATIONS SHOULD HAVE POLITICAL PRIORITY**

Some areas have political priority because it is the view of the political system that some areas are economically important or which serve to resolve great societal problems such as climate changes or the pressure on energy sources.

### **6.2 EVALUATIONS SHOULD BE IN DEMAND**

Some evaluations will be in demand from the research council system, the stakeholders in research and other parts of the research system. In

this way potential problems and improvements in the present research system can be identified and addressed through evaluation.

### **6.3 EVALUATIONS SHOULD BE COST-EFFICIENT**

The costs involved in conducting evaluations should be weighed against the anticipated benefits so that costs and benefits are reasonably balanced. This implies that the area that is evaluated should have a certain volume or potential volume, that previously conducted investigations are taken into account, and that the anticipated application is considered.

With respect to the consideration of cost-efficiency, it is important to be aware that an evaluation involves both direct and indirect costs. The direct costs concern the implementation itself. The indirect costs are associated with the evaluations that

involve the evaluated research institutions and environments. The Danish Ministry for Science, Technology and Innovation will monitor the indirect costs when the first evaluations are being carried out within the boundaries outlined in this framework.

### **6.4 EVALUATIONS SHOULD NOT PLACE ANY UNNECESSARY BURDENS ON THE RESEARCH ENVIRONMENTS**

A distribution over research areas and research environments will be aimed at to avoid any unnecessary burdens being placed on the same research institutions and environments.

## 7. What can be evaluated and for what purposes?

In the Ministry's evaluations, the object of evaluation will vary from one evaluation to the other, and as previously mentioned the object of the individual evaluations will be laid down in the plan of action. In the following the possible objects of evaluation are outlined. Firstly, different types are described with a point of departure in an OECD typology. Then the objects of evaluation that will be typical in the Ministry's evaluations will be presented.

In *OECD Science, Technology and Industry Outlook, 2006*, the OECD operates with four types of evaluation objects:

- The first type comprises groups of researchers, which are regarded as the basic unit for research production. These units can be institutes, centres or other research groups.
- The second type consists of institutions that fa-

cilitate research, such as research councils and universities. Universities are included here because they organise and prioritise the financing of specific research activities.

- The third type constitutes programmes. Programmes focus on a defined theme and are of limited duration.<sup>1</sup>
- The fourth type is the research system, which in this case means the different elements in the Danish research effort and the interaction between them.

In relation to the OECD typology, the Danish Ministry for Science, Technology and Innovation would also include a fifth type of evaluation object, namely areas of research. A research area covers research within a defined area and encompasses all research activity across the lines of institutions and programmes. In relation to the institutions, the

<sup>1</sup> In OECD terms, programmes are associated with the establishment of knowledge bases and technologies with a view to promoting competitiveness. This understanding has been made broader here.

Ministry is only to evaluate the *funding instruments* employed by the research councils, while certain research environments, specific research councils, or specific universities will not be evaluated in the first instance. In other words, the Ministry is to carry out evaluations in relation to *funding instruments, research areas, research programmes and the research system*.

The Danish Ministry for Science, Technology and Innovation anticipates that the evaluations will in particular focus on funding instruments and research areas. The special focus on funding instruments is because of the need for more systematic knowledge about the extent to which the various funding instruments function as intended. The special focus on research areas is due to the fact that this type of evaluation facilitates assessments of research activities and results with an interdis-

disciplinary focus. Evaluations of research areas can also provide insight into Denmark's positions of strength in a given area and create a basis for prioritising efforts within the area. The Ministry anticipates that to a certain extent evaluations will be conducted of *research programmes* and aspects of the *research system*.

Below there is a description of what the Danish Ministry for Science, Technology and Innovation understands by the different objects of evaluation, the purpose of evaluating them, and who in the first instance are expected to be the users of evaluations. Indirect users such as the general public interested in research are not explicitly mentioned.

### **7.1 FUNDING INSTRUMENTS**

Funding instruments are understood as the manner in which the research councils seek to influ-

ence the research environments, i.e. the funding instruments are the councils' types of grants. Funding instruments can, for example, consist of post doc. fellowships, networks or support for equipment. They can also take the form of framework allocations that encompass specific types of support. Applications can be submitted to the Danish Councils for Independent Research for both specific types of support and framework allocations, while the Danish Council for Strategic Research only distribute framework grants (to smaller strategic research efforts, strategic research networks and strategic research centres). Evaluations can assess the results produced by an instrument. The primary focus will be on the results of the instrument rather than the results of specific research efforts.

The purpose of the evaluations of funding instru-

ments is to create visibility and legitimacy concerning the allocations awarded through the research council system as well as to create a possibility for revising the strategy for the application of funding instruments. The main target group for evaluations of funding instruments are those responsible for organising the allocation of research funds, i.e. first and foremost the funding bodies. Evaluations are thus to form the basis for the future implementation of funding instruments.

### **7.2 RESEARCH AREAS**

Research areas covers research within a delimited area. Ideally the total research effort is included in this type of evaluation irrespective of whether it takes place at universities or government research institutes, or whether it is financed through basic funds or project funds.

Subjects and themes are two different ways of delimiting evaluations. In *subject evaluations* the borderlines of the academic disciplines are employed to delimit evaluations. In order to obtain the desired degree of coverage, it will often be necessary to group several specializations in the same evaluation. In *thematic evaluations* a particular issue or technology is used to delimit evaluations rather than an academic discipline, for example food or the environment. Several disciplines will typically contribute to research within a theme.

The Danish Ministry for Science, Technology and Innovation will not evaluate all disciplines in turn and it is therefore anticipated that the majority of evaluations of research areas will be thematically delimited.

Evaluations of research areas can provide an overall assessment of the quality of the research activity within the area evaluated. For example, an

evaluation could answer the question of how Denmark is performing in certain areas in comparison with other countries, and how the effort is organised within an area in terms of the combination of funding instruments and number of research units. Finally, an evaluation will make it possible to assess the quality of the individual research environments within the field. It is, however, not given that all these aspects are to be included in all evaluations of research areas.

The primary purpose of research area evaluations will be policy development. In addition, evaluations could contribute to creating visibility and legitimacy concerning the research activities in the area and to quality development in the research areas included in the evaluation. Therefore ministries, the Folketing (Danish Parliament) and other stakeholders within the areas under evaluation will be the target group for the evaluations in the first in-

stance. An additional target group will be the research units involved in the evaluation.

### 7.3 RESEARCH PROGRAMMES

Research programmes are large-scale research investments focusing on a defined theme and they are limited in duration. In practice programmes can be delimited as areas for which special funding has been allocated in the Finance Act, for example *Technologies of the future*. Evaluations of research programmes can assess both whether the implementation of the research programmes has been appropriately organised and the quality of the research activities conducted under the programmes.

A primary purpose of evaluating research programmes is to create visibility about the results produced by the allocations. Another purpose of the evaluations is to qualify the strategies that

exist for the implementation and organisation of the research programmes. If the evaluations are conducted before the research programmes are finished, evaluations can also form the basis for prolonging and revising the programme. Therefore the target group for this type of evaluation will be the research council system, ministries, the Danish Parliament and other stakeholders.

#### **7.4 THE RESEARCH SYSTEM**

Evaluations of the research system focus on the way in which the different elements of the Danish research effort interact. Crosscutting issues, policies or structures may become the objects of evaluation.

The purpose of conducting this type of evaluation will be national policy development. This means that the primary target group for the evaluations

will be ministries, the Danish Parliament and other stakeholders. As evaluations of the research system can be very different in nature, it is difficult to outline the way in which these evaluations can be organised.

#### **7.5 POSSIBILITY FOR INTERNATIONAL COOPERATION**

The scope will be a challenge for all objects of evaluation. In most cases the geographical delimitation will be national. This means, for example, that the evaluations will focus on Danish research within a research area or the Danish application of an instrument. In some cases, however, it will be advantageous to coordinate or conduct evaluations internationally. This can take the form of, for example, joint evaluation of participation in international partnerships or joint organisation of related evaluation initiatives. Therefore, where it is

practically and economically possible, evaluations should be coordinated or carried out in cooperation with bodies responsible for evaluations in other countries.

## 8. What principles should the evaluations live up to?

The Danish Ministry for Science, Technology and Innovation is to carry out different types of evaluations. It is, however, crucial that all evaluations should live up to the four principles below. There are two reasons for this. First, because it is important to ensure the evaluations' legitimacy and utilisation. Second, it is important that evaluations promote appropriate behaviour with a focus on quality development in the research council system, and at the research institutions.

### **8.1 EVALUATIONS ARE TO BE CONDUCTED INDEPENDENTLY**

Evaluations are to be carried out independently of the research council system, authorities and research environments. The Ministry can decide the purpose of the evaluation and the basis of assessment, but the party that is to conduct the evaluation is solely responsible for assessments and recommendations as well as for decisions regarding the implementation of the evaluation within the terms of reference.

### **8.2 EVALUATIONS ARE TO BE PROFESSIONALLY CARRIED OUT**

Evaluations will combine documentation and the application of experts' academic judgement. The inclusion of documentation is to delimit the subjective element in evaluations, which is a necessary consequence of using academic experts. This presupposes that the collection of information and analysis in connection with evaluations is professionally carried out.

### **8.3 EVALUATIONS MUST BUILD ON AN EXPLICATED FOUNDATION**

At the commencement of the evaluation, an explicit purpose, a description of the intended application as well as the methods and basis of assessment that will form the point of departure for the evaluation must be presented. The purpose of explicating the foundation of the evaluation is to create openness and transparency for those under evaluation.

### **8.4 EVALUATIONS SHOULD SEEK TO BALANCE A WILLINGNESS TO TAKE RISKS AND DOCUMENTATION**

The desire to be in a position to document and legitimate the utilisation of public research funds to a higher degree is central to the motivation for enhanced evaluation efforts. Those who use the funds must explain what the funds are used for and the outcome of the efforts. At the same time, it is important that chances (risks) can be taken in the research process, which can potentially lead to academic breakthrough but could equally prove to be insignificant. It is crucial that the wish for documentation and legitimacy, on the one hand, does not, on the other hand, work against the willingness to take risks in research. Every evaluation should address this issue.



## Annex 2

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FOCUS POINTS FOR THE DIFFERENT QUALITY PERSPECTIVES

## 1. The research perspective

Quality in a research perspective may be evaluated in terms of, for example:

- Identification of new issues
- Research results
- Publication and citation (bibliometry)
- PhD production
- Grants from funding bodies that assess the quality of applications
- Recruitment of researchers who can match the best in the field
- Formalised international research cooperation (cooperation including joint publications and joint research grants).

## 2. The commercial perspective

Quality in a commercial perspective may be evaluated in terms of, for example:

- Cooperation (e.g. co-financing, participation in boards, Industrial PhD fellowships)
- Research-based consulting (clients' assessment)
- Dissemination of knowledge (patents, licenses and contributions to standardisation)
- Financial effects for enterprises
- Complementarity between the public and the private research effort (synergy).

## 3. The societal perspective

Quality in a societal perspective may be evaluated in terms of, for example:

- Contributions to education
- Public innovation (e.g. introduction of new patient treatment)
- Consulting and regulatory tasks
- Popular publishing
- Participation in councils and boards
- Appearance in the media.

## 4. The organisational perspective

Quality in an organisational perspective may be evaluated in terms of, for example:

- Research management
- Graduate training and qualification
- Human resource management
- Access to equipment and other research resources
- Cooperation relations internally and externally, including relations to trade and industry and the rest of society
- Distribution of research funds between units within an area
- Mode of functioning and funding instruments of the authorities that finance research.

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