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Evaluation of the Research Council of Norway

Background Report No 1. - Production of Strategic Intelligence and Advice

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Table of Contents

Table of Figures

List of tables

Summary

This report discusses RCN's functions in collecting and using strategic intelligence and in giving advice. Other background reports touch on these matters, too, and the evidence from them is used in conjunction with that from this report in reaching the overall conclusions and recommendations in the synthesis report.

We cannot evaluate RCN without reference to the overall governance context. Norway lacks an effective national research and innovation council in the Finnish style – a style that is increasingly imitated in various ways around the world. While KD has lead responsibility for research coordination across the government and for RCN, its ability to coordinate is constrained by the sector principle and the lack of a higher-level 'referee' such as a research and innovation council. This in turn regulates the effectiveness of RCN as an advice-giver.

Strategic intelligence

We distinguish between strategic intelligence and advice. Strategic intelligence – in the sense of the knowledge needed to make strategy but also the deliberate use of evaluation, foresight and technology assessment in policy formulation and implementation – is a characteristic of research and innovation systems that needs to be decentralised, to enable components of the system to work well. It is not enough that one central actor knows everything – knowledge must be developed and particularly shared across the system of actors involved.

Today, in partnership with others (eg SSB, NIFU), RCN generates a lot of 'systems health' indicators. These are now complemented by KD's 'research barometer'. It continues to be very open in the extent of its consultations with stakeholders. A number of research roadmaps for discipline development have been developed. These are valuable and play a role in guiding events among the research performers.

RCN undertook a number of research foresights from 2004 onwards. The use of foresight studies has since declined to a low level. RCN continues the practice of broad stakeholder consultations for the development of new programmes, but there is an ongoing lack of proper foresight exercises. Stakeholders regard RCN as an important arena for counselling and dialogue on research and innovation policies. However, meeting place participants tend to see participation as an opportunity to learn and to network rather than as a chance to influence RCN policy or practice. This is true both at the level of stakeholder meetings and in RCN's Boards.

RCN's expenditure and activity in evaluation are modest – this is an under-used tool. Field evaluation is an area where RCN does well – it has inherited and improved the NAVF tradition. This is normally followed up, with the evaluated fields being supported to develop a research road map. Where relevant, this can have an effect on future RCN programmes. However, we can see little evidence of work that problematises new fields or that tackles the problems of interdisciplinarity.

Evaluation is otherwise poorly institutionalised. The evaluation strategy dates from 1997 and has never been implemented. Evaluation is not embedded in the programme or policy cycle. There is a lack of meso-level studies. There is little interest in impacts. However, there is growing use of evaluation in relation to larger programmes. Dropping the evaluations of the institutes means that there is now no institutional perspective on their performance and that their chief source of feedback is instructions from their parent ministries and signals from markets.

Advice to government

RCN plays an important role as a co-operator in the production of strategic intelligence and policy. Since it does not work at the political level of the ministries and since – despite being uniquely well positioned to generate intelligence and advice – it does not have a monopoly of knowledge, it would be odd if it were otherwise.

The annual budget proposals are argued to be a key source of advice to government. They result from 16 intimate, parallel and increasingly detailed dialogues between RCN and the ministries. Ministries' needs of and attitudes to RCN differ widely. It is very complex for RCN to handle this diversity – it therefore acts case by case. However, RCN has succeeded in signing up more and more ministries to a declining number of common programmes, so it clearly is able to set or exploit cross-ministry agendas and find synergies in R&D funding.

At the level of national policy, RCN is a big and active participant in a debate that involves many other actors in addition. However, RCN advice on national policy tends to reflect the fragmented nature of its dialogue with the ministries. It sometimes produces proposals orthogonal to the contents of those discussions but there is not a clear whole-system vision from which RCN generates such advice. We argue that this results at least in part from decentralising the production of strategic intelligence within RCN to the divisions.

RCN's ability to 'sell' individual programmes to multiple ministries is an important (if labour-intensive) form of coordination. The ministries themselves show signs of coordinating specific strategies, such as those for generic technologies. In these cases, RCN aims to contribute strategic intelligence and secretariat support to the process of developing strategy. RCN coordination from 'below' to a degree complements inter-ministry coordination from 'above. (In other words, the system is itself evolving to cope with the coordination deficit at the highest level.)

At the government level, the sector principle is very valuable. While KD has responsibility for coordinating research policy, in practice it has limited authority. A consequence is that there is only in a limited sense a national strategy – that is the strategy that KD can negotiate with the other ministries during the White Paper and budget processes. There is no higher-level mechanism for creating a view that goes beyond the individual ministry views or the sum of ministry views where they choose to develop national strategies together, eg in bio- and nano-technology. This is increasingly problematic as the *locus* of research policymaking in Europe shifts towards Brussels

Advice to the research performers

RCN and others have identified needs for structural change in the research system, notably to tackle fragmentation, lack of mobility and the need for greater internationalisation. Government policy has been to make the research performing organisations more autonomous. Hence, the 'advice;' that RCN can give them has to be given at least in part through providing incentives. The three Centres programmes (SFF, SFI and FME) provide clear signals about building critical mass, training researchers and better international exposure. Other measures such as the research infrastructure plans developed in 2006 and subsequently similarly promote de-fragmentation and a better division of labour in the research system. More generally, RCN influences research performers through its thematic and non-thematic programmes.

RCN's strategic responsibility for the research institutes

RCN has always had 'strategic responsibility' for the research institutes – a responsibility it has been difficult to fulfil, given its lack of authority over them and lack of control over budget. RCN's main steering instrument has been its

programmes. In line with the government's policy to make research-performing institutions more autonomous, RCN helped develop a new performance-based research funding (PBRF) system for reallocating parts of the core funding among the institutes. It also revised its programme for providing 'strategic' funding to institutes, to help them develop capacity. The PBRF has affected the behaviour of many of the institutes. Not all the ministries have been prepared to transfer core funding into the PBRF-based part of their funding arena and only one area has so far implemented the new strategic programme. There has been little restructuring in the institute sector.

Internationally, the use of a PBRF in the institute sector is unusual but not unique. In developed countries, it is similarly unusual for **all** the institutes to have a single owner, but they are often grouped under umbrella 'owners' (like the Fraunhofer Society) in order to give common management to common categories of institute. But evaluation and funding tend to be done at the same level, so that evaluations have consequences. And where there is a need to steer the portfolio of institutes, it is done by active management rather than using indirect incentives such as PBRFs.

Conclusions

RCN has a substantial list of achievements to its credit. In many cases these cannot solely be attributed to RCN because they are produced in partnership with others. The ones we mention here are nonetheless ones where RCN has at least played an important role – and our list is not exhaustive.

- RCN produces or co-produces a very large volume of strategic intelligence at the level of indicators and surveys. These range from the Indicators Report to detailed monitoring of the research institutes. They are of general interest for making and implementing policy
- Strategic intelligence and policy are developed in the context of large-scale stakeholder consultation. This is difficult to benchmark but is certainly towards the most consultative end of the spectrum of policy development internationally
- Field evaluations are regularly conducted and provide information that is valuable to participants and their organisations as much as it is to RCN itself. These have consequences for participants' strategies and for RCN programmes
- Evaluation is to a growing extent informing RCN programming beyond disciplinary research (to which the field evaluations are primarily relevant)
- RCN plays a significant role in helping sixteen ministries plan a large and growing part of their research expenditure. The budget is a key process for doing this. While there are two parts to this discussion – one on the next year and one on the following year – a longer-term element might be beneficial
- RCN is an active and well-informed partner for ministries responsible for writing White Papers. The main interaction is with KD for the research White Paper, but there are also others
- RCN supports the coordination of sectoral research needs by developing and implementing research programmes of interest to multiple ministries. In this way, a declining number of programmes is satisfying the needs of a growing number of ministries (in the sense that the mean number of ministries per programme is increasing)
- Ministries are, singly and in groups, preparing thematic national strategies on research. RCN is increasingly providing coordination by supporting these with strategic intelligence and by providing or hosting secretariats
- These two coordination mechanisms appear to be evolutionary adaptations to the lack of an overall 'referee' in the policy system
- RCN is playing a significant role in the development and deployment of programmes that tackle structural deficits in the research system, including the Centres programmes (SFF, SFI and FEM), research infrastructure and the regional research funds. These systemic interventions tend to lie outside the interest of individual sector ministries and have been tackled using money from the Research and Innovation Fund. This underscores the importance of RCN as a

change agent and the need for 'strategic' resources to be available to counterbalance the tendency of sector-driven funding to cause lock-in
- RCN has made a major contribution towards strengthening the institute sector by designing and implementing the new performance-based funding system, even if that system has by no means been fully rolled out at this stage

Issues and problems raised in this report include the following.

- RCN made use of foresight for a short period but seems since largely to have dropped it. Foresight is a useful component of strategic intelligence because it helps you move away from consensus to explore disruptive possibilities and counteract the tendency of research agendas and programmes to lock in to existing ideas and trajectories
- Equally, we were not able to identify much strategic intelligence about interdisciplinarity or new and disruptive directions in research
- Evaluation is not properly embedded in the programming cycle at RCN. While we are cautious of the idea that everything has always to be evaluated, formally deciding whether to evaluate before, during or after a programme and in relevant cases doing such evaluations ought to improve the quality and efficiency of intervention
- Nor does evaluation adequately tackle impacts. As a result, RCN lacks evidence for accountability and to demonstrate the value of what it does
- The European and global context means it is increasingly important to have a clear national strategy in relation to quality, thematic focus, internationalisation, etc. Without this a small country easily becomes irrelevant in the international research system and resources are wasted on sub-critical and fragmented efforts. Given the lack of a 'referee' in the system, such a strategy is hard to make truly national in Norway
- Advice giving to government appears overly embedded in RCN's interactions with the ministries. RCN needs the capacity to develop strategy and advice that is not captive to the ministry agendas and that therefore has greater potential to induce disruptive change
- The availability of strategic resources in the form of the Research and Innovation Fund has been key to RCN's ability from time to time to act as a change agent. Replacing the Fund with a line in the KD budget exposes it to the short-term budgeting process and therefore political risk
- The reform of the research institute system is unfinished business. Neither component of the new funding system is fully implemented. The incentives for restructuring the system remain rather weak and the interest of a number of ministries in addressing institute policy seems limited. The end of evaluation means there is no rounded view of the individual institutes as organisations. International experience with performance-based funding systems suggests that strongly formula-based steering leads to perverse behaviour and lock-ins. We therefore would prefer to see a mix of measurement and judgement by one or more competent owners of clusters of institutes rather than treating the institute system as a quasi-market. But whichever view one takes, the institute system currently hangs between an evaluation-based system that had no 'teeth' and a performance-based system that is only partly implemented. This is clearly not satisfactory.

1. Introduction

The Research Council of Norway has three main functions: it acts as an executive agency, managing public funding of research and innovation; it is an advisory body, expected to provide input to government authorities as a basis for the formulation of research policy; and it is to provide an open arena for counselling and dialogue. RCN typically describes these tasks as its funding, advising and meeting places functions.

RCN's original statutes say that it shall "provide advice as a basis for the development of the government's general research policy."[1] The 2004 and 2011 statutes[2] both say "The Research Council shall serve as an advisory body to the government authorities on matters concerning research policy." Both versions underline that "The Research Council's Executive Board [HS] shall follow up the research policy guidelines drawn up by the Government and the parliament, and shall in its advisory capacity to government provide input for future research policy." HS is to oversee the creation and implementation of RCN's own strategy.

The difference between the two formulations of RCN's advisory role is subtle but important. In our reading of history, RCN was originally created as a way to reduce fragmentation in research and innovation funding, enabling holistic research and innovation policies to be developed and implemented. Its role as advisor to the government on research and innovation policy replaced the idea of a separate high-level committee t advise the government – following a long history of such committees proving ineffectoive. The reformulation of the relevant statute reflects (as we understand it) a perception that it was difficult for RCN to be an independent policy advisor at the same time as being a major policy actor; and that the government recognised the importance of obtaining research and innovation policy advice from multiple sources.

In practice, RCN expects and is expected to ensure the provision of several forms of information and advice.

- Information (strategic intelligence) as a basis for analysing the health of the Norwegian research and innovation system and in connection with the development and deployment of RCN programmes
- Advice
  - To government overall about research and innovation policy as well as advice about how to implement national priorities
  - Thematic advice to individual ministries about their research budgets and priorities– advice that appears to be more appreciated by some ministries than by others[3]
  - On specific needs in the research and innovation system, such as the development of research infrastructure or of the university colleges and structural instruments such as centres of excellence

[1] St. meld. Nr. 43, *Et godt råd for forskning. Om endringer i forskningsrådsstrukturen*, 1991-92

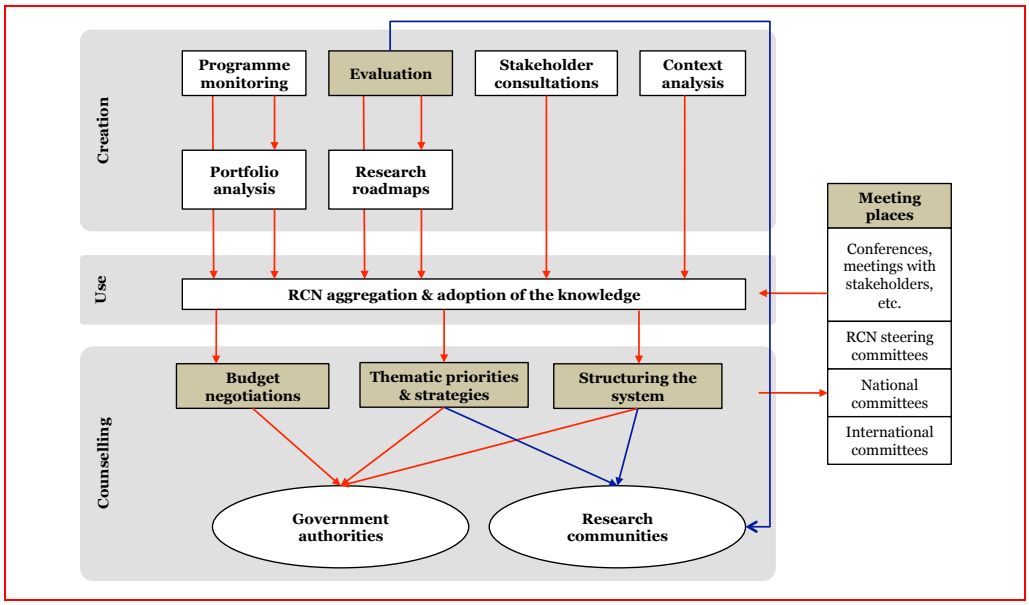
[2] The Research Council of Norway, *Statues*, Oslo, 2004; The Research Council of Norway, *Statutes*, Oslo, 2011

[3] RCN, *Kunnskapsbaserte råd, virkemidler og møteplasser: Policy for Forskningsrådets arbeid med kunnskapsgrunnlaget – med focus på det tverrgående kunnskapsgrunnlaget*, Oslo: RCN, 2011

- A combination of incentives and advice to research performer in the form of guidance about discipline development from scientific evaluations and action plans that respond to development needs
- And by taking what the statutes call "strategic responsibility for the research institute sector"

In Figure 1, we depict the various tools and instruments that RCN uses to create its strategic intelligence (the 'knowledge base') and for giving advice. In the wider Nordic research and innovation programming tradition, to which RCN historically belongs, strategic intelligence derives from at least two sources. One is analysis; the second is 'presence', in the sense of active engagement with researchers, the users of research and other stakeholders 'on the ground' both via the 'meeting places' and through routine interaction.

Figure 1 RCN's strategic intelligence production and the advisory function



This report provides the primary analysis of RCN's advisory function and the degree to which it is supported by the meeting place function. It is structured in four parts.

- First, we discuss the idea of 'strategic intelligence', the role we expect it to play in relation to the steering, strategy and operation of RCN and the role of evaluation as part f strategic intelligence
- Second, we analyse how RCN uses strategic intelligence to perform its advice-giving role in relation to government
- Third, we look at RCN' use of incentives to restructure the research system as forms of 'advice'
- Fourth, we discuss RCN's role in taking 'strategic responsibility' for the research institutes
- Finally, we draw conclusions and make recommendations

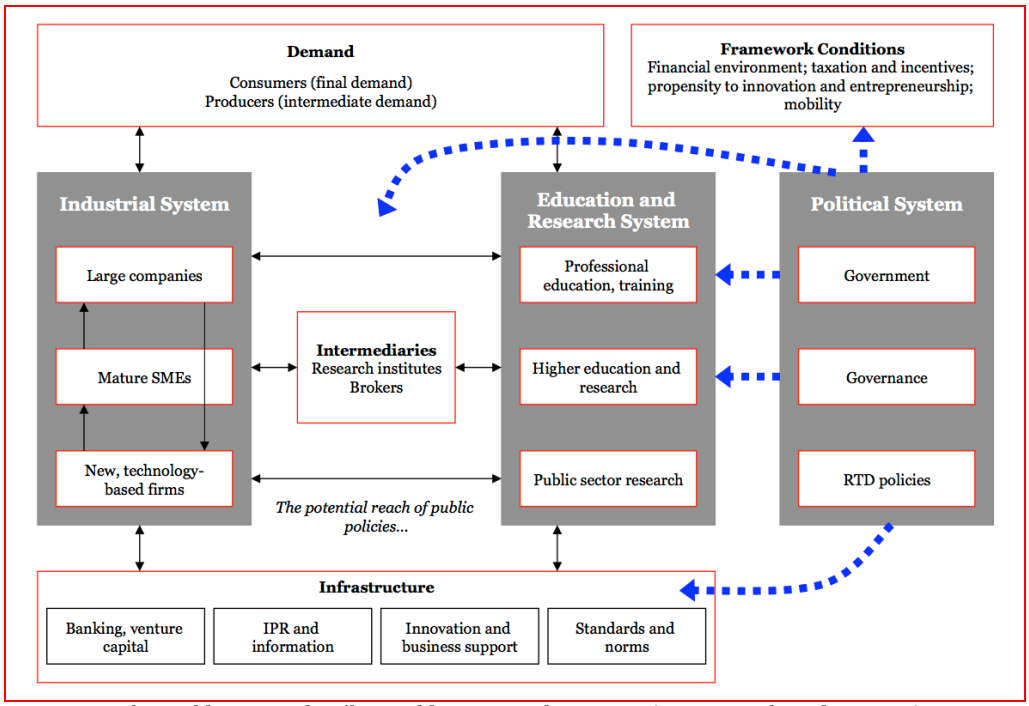
2. Strategic Intelligence

In this section we begin by discussing the idea of 'strategic intelligence'. What is it? How does RCN make it? We consider its production through externally commissioned studies, stakeholder consultation (including foresight) and 'meeting places'. Evaluation is an important source of strategic intelligence, so we analyse the way RCN does and uses it.

2.1 What is strategic intelligence?

The idea of 'strategic intelligence' has become important in the way we think about research, innovation and the institutions in which these happen in last 25 years or so, since the idea of 'national innovation systems' took hold. The old 'linear model' saw the link from research to generating new knowledge, innovation and wealth-creation as automatic and was completely unconcerned with **how** the links between successive stages in this innovation chain were made – or, indeed, what happened at each stage. The innovation systems view takes account of these things, of bounded rationality and of institutions. National innovation systems are nationally specific not only because of differences in factor endowments, geography and culture but also because they co-evolve with national systems of **governance**. That is why government and its influence is one of the major components in the way we typically sketch an innovation system (Figure 2). This influence needs to be exerted on the basis of good information and advice.

Figure 2 Research and innovation system and the reach of public



Source: Stefan Kuhlmann and Erik Arnold, *RCN In the Norwegian Research and Innovation System*, Background Report No 12 in the Evaluation of the Research Council of Norway, Karlsruhe: Fraunhofer-ISI, 2001

If strategy is (after Clausewitz) "the employment of battles to gain the end of war" then 'strategic intelligence' is, properly, the information and knowledge needed to determine strategy. The term entered the research policy vocabulary in the late 1990s, as a result of the ASTPP project, an EU-funded cooperation among R&D evaluators, foresight and technology assessment specialists, which defined it as

> *... a set of – often distributed – sources of information and explorative as well as analytical (theoretical, heuristic, methodological) tools employed to produce useful insight in the actual or potential costs and effects of public or private policy and management. Over the last two decades, considerable efforts have been made to improve the design and conduct of effective research, technology and innovation policies. In particular, formalised methodologies, based on the arsenal of social and economic sciences have been introduced and developed which attempt to analyse past behaviour (evaluation), review technological options for the future (foresight), and assess the implications of adopting particular options (technology assessment).*[4]

In the innovation systems view, governance is not a simple matter of top-down 'steering', in which an all-knowing principal sets agents to work to achieve goals that can be set from the top alone, but involves competition, consensus-building, networking and negotiating decisions in arenas in which multiple actors are involved[5]. According to Kuhlmann, the research literature indicates that the actual practice of governance within the research and innovation system sketched in Figure 2 is characterised by

- A high degree departmentalisation, sectoralisation of the political administration, and low inter-departmental exchange and cooperation
- Heterogeneous, non-inter-linked arenas: often corporatist negotiation deadlocks (e.g. health innovation related policy in Germany)
- Failing attempts at restructuring responsibilities in government because of institutional inertia
- Dominance of the 'linear model' of innovation in policy approaches (and of related economists as consultants) in many national authorities (e.g. ministries)

Tackling these problems – making sure that the different parts of the system can cooperate, find intelligent divisions of labour and where necessary work towards common goals – requires that strategic intelligence be distributed about the system. Analysts do not have a monopoly of knowledge; inputs from others, such as those who work with stakeholders or in the laboratories, are also needed. The system of distributed intelligence therefore needs to: be networked; involve active actors or 'nodes' in the different organisations involved; be transparent so that as many parts of the innovation system as possible can share intelligence; publicly supported, so that there are resources available to provide data and analysis; and quality-assured through the participation of multiple providers of intelligence and regular efforts to keep the knowledge involved up to date. [6]

In this version of strategic intelligence, then, the producers of strategic intelligence are better seen as co-operators than as leaders. The ability to produce strategic intelligence at multiple levels of the research and innovation system needs in turn to be matched by absorptive capacity: the ability to identify and exploit it.

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[4] Stefan Kuhlmann, Paries Boekholt, Luke Georghiou, Ken Guy, Jen-Alain Héraud, Philippe Laredo, Tarmo Lemola, Denis Loveridge, Terttu Luukkonen, Wolfgang Polt, Arie Rip, Luis Sanz-Menendez and Ruud Smits, *Improving Distributed Intelligence in Complex Innovation Systems*, Final report of the Advanced Science and Technology Planning Network (ASTPP), TSER Contract No SOE1-CT96-1013, Karlsruhe: Fraunhofer-ISI, 1999

[5] Renate Mayntz and Fritz W Scharpf, 'Der Ansatz der akteurzentrierten Institutionalismus' in (same authors) *Gesellschaftliche Selbstregelung und politische Steuerung*, Frankfurt: Campus, 1995

[6] Stefan Kuhlmann, Governance and Intelligence in Research and Innovation Systems, address delivered upon the acceptance of the office of a Fraunhofer-ISI Professor of Innovation Policy Analysis at Utrecht University on 7 October 2002, Universiteit Utrecht, 2002

2.2 How does RCN produce strategic intelligence?

RCN generates a lot of formal strategic intelligence by commissioning studies from external service providers (Section 2.2.1). RCN documents and the research budget data tell us that RCN builds upon expertise in other (public) organisations for the collection of statistical data and context information. The three other main activities are stakeholder consultations (Section 2.2.2), 'meeting places' (Section 2.2.3) and evaluation (Section 2.3).

2.2.1 Externally commissioned studies

One of the most conspicuous pieces of strategic intelligence is the annual Indicators Report. Indiktarrapporten[7] is a report published annually by RCN, NIFU and Statistics Norway, which describes and documents the Norwegian research and innovation system. It is produced using Norwegian R&D and innovation surveys, statistics from Statistics Norway and other relevant studies. The report produces and presents key indicators for Norwegian R&D&I with the purpose of presenting an overall view of Norwegian activity in R&D, higher education, science and technology. An English summary is also published to accompany the more comprehensive Norwegian version in order to reach an international audience.

The latest version stems from 2011. It compares data between 2003-2009 and encompasses the following chapters

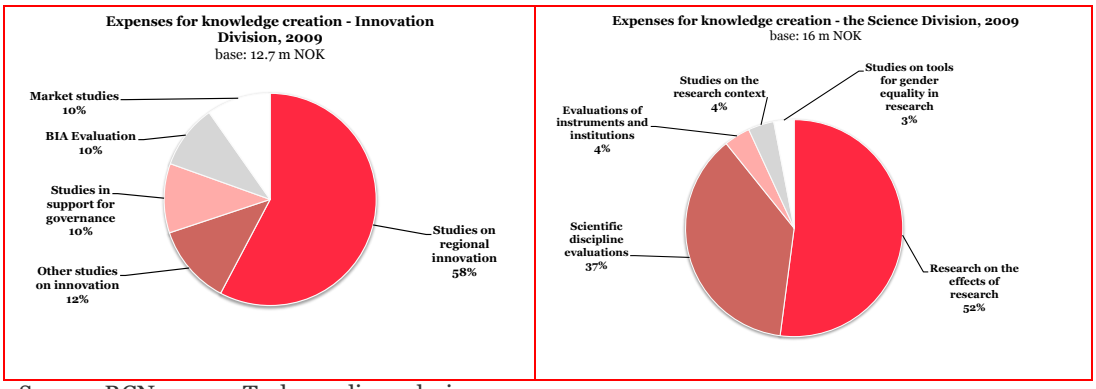
- Norwegian R&D and innovation in an international context – investment, human resources, and results
- The national R&D and innovation system – human resources, total resources, R&D financing per sector, results of Norwegian R&D&I
- Regional comparisons of R&D and innovation – human resources, business survival rates and investment per county (*fylke*), and regional indicators.

Other studies provided by NIFU in the last 3 years were also predominantly on innovation and R&D statistics and indicators. Topics included bibliometric data analysis, Biotechnology R&D, Marine R&D, polar research, policies for the 'knowledge society' and barriers to commercialisation. The state statistical bureau (SSB) provided inputs such as a study on the regionalisation of industrial R&D and innovation, while Møreforsking undertakes annual monitoring of the effects of user-directed research projects. Other service providers include the Norwegian Business School (BI), SINTEF Technology & Society and the TIK. Group at the University of Oslo.

In 2009, studies commissioned by the Innovation division were predominantly focused on topics related to regional innovation (close to 60%), while more general studies on innovation and market studies accounted for 10% each. The Science Division invested especially in studies on the effects of research, including a study on R&D, Industry Dynamics and Public Policy (about 50%) and in scientific discipline evaluations (about 40%).

7 www.forskningsradet.no/servlet/Satellite?c=Page&pagename=indikatorrapporten%2FHovedsidemal&cid=1224698172624

Figure 3 Expenses for knowledge creation – Innovation Division and Science Division 2009



Source: RCN, 2011 – Technopolis analysis

Most of the studies commissioned are ad hoc, and in its 2011 report on the knowledge base[8], RCN reports on the internal reflection that "identification of conservative traits or other dysfunctions in the research system is very demanding, and must in some sense be regarded as a research task in itself". RCN thus feels the need for both ad-hoc studies and longer-term research (e.g. through projects such as the newly launched FORFI project) that would provide more continuous but also more detailed understanding. Other agencies and some ministry personnel made the same point at interview – especially in relation to improving understanding of the innovation system as a whole rather than science.

In the 2001 RCN Evaluation, we estimated that in the years 1995-1999, the level of spending for evaluation represented no more than a maximum of 0.33% of the RCN research budget. Data related to 2003-2010 show that little has changed. As in the earlier period, RCN spends 1% of its budget on external services. On average approximately 30% of these external service costs are for studies building up strategic intelligence, while external evaluations accounted for about 20%. The 2011 RCN document on policy for work on the knowledge base[9] shows that some projects that were intended to provide strategic intelligence were launched within the 'normal' R&D portfolio. These costs are additional to the 'official' costs indicated above.

In its 2011 document "Knowledge-based advice, tools and meeting places - Policy for RCN's work in the knowledge base"[10], RCN considered that in particular the knowledge base for R&D policy and instrument development needed improvement by means of more strategic intelligence studies, an improved communication with the stakeholders and cross-divisional knowledge sharing. The possibility was put forward to finance these activities through a small taxation of the programmes (as is current practice within the Innovation Division).

2.2.2 Stakeholder Consultations

In the mid 2000s, RCN launched a set of stakeholder consultation initiatives for the development of its programmes and strategies. These included set-up of scientific discipline committees that were to draw research road maps to follow up discipline evaluations, foresight exercises involving larger groups of stakeholders and wider stakeholder consultations. These initiatives were concentrated around the time when

[8] RCN, Kunnskapsbaserte råd, virkemidler og møteplasser: Policy for Forskningsrådets arbeid med kunnskapsgrunnlaget – med focus på det tverrgående kunnskapsgrunnlaget, Oslo: RCN, 2011

[9] RCN, Kunnskapsbaserte råd, virkemidler og møteplasser: Policy for Forskningsrådets arbeid med kunnskapsgrunnlaget – med focus på det tverrgående kunnskapsgrunnlaget, Oslo: RCN, 2011

[10] RCN, Kunnskapsbaserte råd, virkemidler og møteplasser: Policy for Forskningsrådets arbeid med kunnskapsgrunnlaget – med focus på det tverrgående kunnskapsgrunnlaget, Oslo: RCN, 2011

new large-scale programmes were being launched by RCN. Now that several of these are coming to an end, RCN is preparing new initiatives to support the design of the follow-up programmes.

2.2.2.1 Research roadmaps for discipline development

The studies for the development of research roadmaps (the 'national plans' – *fagplaner*) most often constituted a follow-up of scientific discipline evaluations. These roadmaps included recommendations for systemic interventions and programmes to be launched or re-focused. Examples are:

- Strategic development plan for engineering science (2006)
- Strategic development plan for information and communication technology (ICT) (2004)
- Strategic development plan for mathematics (2004)
- Strategic development plan for political science (2004)
- Strategic development plan for bioscience (2003)

An example of such a strategic plan is **basic engineering science.** In 2004, RCN conducted a thorough academic evaluation of the major institutions in Norway offering education in **basic engineering science** at the master level: the Norwegian University of Science and Technology (NTNU), the Norwegian University of Life Sciences, the University of Stavanger and the Narvik University College. The international evaluation team, composed of 23 professors from leading universities in Europe and North America, considered all relevant professional groups at the four institutions. One of the main conclusions was that Norway should expand its critical mass in basic engineering science research. To follow up on this evaluation, the Research Council appointed a broad-based curriculum committee headed by the Rector of the NTNU, Torbjørn Digernes.

The purpose of the exercise was to establish a basis for the strengthening of basic engineering science research in Norway. An important part of the work of the committee was to describe the status and research challenges in eight thematic areas – petroleum technology, energy and environment, sustainable infrastructure, marine and maritime activities, materials, production, seafood's value chain, process manufacturing [*processindustri*], and – overall – systems knowledge.

Based on the challenges and the specific research tasks within the different thematic priority areas, the committee defined a number of fundamental engineering science research topics that required research. The committee concluded its report, delivered in 2006, with a number of recommendations to the Norwegian Research Council, the ministries, as well as to the research institutions themselves.

In summary, the HE institutions were advised to create a Committee for Engineering [*Fagråd for ingeniørvitenskap*], which should be the main instrument with which to implement a national strategy. HEIs should also establish collaboration within and between the institutions in the prioritised thematic areas, with each institute developing a strategy for its themes.

The publication of research results in international journals should be encouraged and research groups balanced so that supported projects cover a range of engineering disciplines as well as basic and applied research. The goal should be to strive towards high quality research and to avoid fragmentation of knowledge production. The institutions should also establish a framework for business innovation and coordinate measures to increase the stimulation of innovation.

Recommendations aimed at the Research Council were to

- Develop and implement a national plan to strengthen basic engineering research

- In collaboration with the Norwegian Association of Higher Education Institutions (UHR), establish a Committee for Engineering to lead the implementation of the national plan
- Anchor the national plan in the thematic priority areas identified by the curriculum committee and implemented through a collaboration between RCN and the UHR
- Ensure that the national plan contributes to and develop areas of importance in Norway, and ensure that engineering becomes a 'bridge from science to innovation'. The plan should also address recruitment
- Ensure budgets for basic science initiatives should be ring fenced, through for example the instrument Institution-based strategic projects [*Institusjonsforankrede strategiske prosjekt*] and independent of applied research budgets
- Ensure its Science Division should increase its support for basic engineering research
- Create 'competition arenas' that can assess the quality of Norwegian engineering research and which should be led by the Committee for Engineering and ensure resources are used effectively
- Continue and further strengthen initiatives such as the SSF and SFI, as these are good examples of activities to strengthen basic engineering research
- Support HEIs' laboratories and high quality research equipment/ infrastructure and ensure HEI have access to funds for operational costs.

Third, recommendations aimed at the ministries focused on the steering of funds. The sector ministries should ensure that their allocations cover long-term and basic engineering research, and earmark funding for restricted engineering areas that play an important role in the national context, as well as develop a plan for upgrading scientific equipment.

The ministries should continue to support funding to strengthen Norwegian researchers' publications in international journals and attendance at international conferences. They should specifically support publications produced by Norwegian researchers in collaboration with international researchers. The Committee report also called for the current bias in the reward system for PhD and postdocs should be adjusted, and for support the university colleges in their work to build strong research within niche areas. Furthermore, the departments should grant funding to the Committee for Engineering so it can engage in strategic initiatives such as the Framework Programme and other international schemes.

Follow-up of the work of RCN's curriculum committee can be traced via RCN's annual reports in subsequent years.

In 2006 RCN announced it was awarding NOK42m (with more than two-thirds awarded to NTNU) over a three-year period through the Institution-based Strategic Project instrument as a follow-up of the work of the Curriculum Committee. The funding was announced to the universities that were included in the evaluation and RCN monitored the use of the investment. The funds aimed to allow the recipient institutions to take on the recommendations made by the Committee, in particular doctoral training and a renewed focus on long-term basic research. Updates on the use of the funds were subsequently published in RCN's annual reports.

The same year (2006) RCN also prepared a draft national strategy for the reinforcement of basic research, in close consultation with UHR and KD. This was delivered to KD in October 2006. It identified recruitment, the upgrading of equipment and infrastructure, professional development and internationalisation as strategic priorities.[11] [12] [13]

[11] Årsrapport 2006 – Del III, p.146

2.2.2.2 Foresight exercises

Following recommendations from the 2001 evaluation, RCN decided in 2003 to use foresight as an integrated element in planning a new type of strategic instrument: the so-called large-scale programmes. The rationale was that "by utilizing a scenario-based foresight methodology and emphasizing broad participation, the quality of strategic plans and program development processes would be enhanced."[14] RCN launched a set of interconnected foresight activities, spanning roughly the years 2003-2007. Now that several of the large programmes are coming to an end, we see similar initiatives being launched to prepare for the design of the follow-up programmes.

RCN adopted foresight based on systematic study. A background discussion on foresight studies was provided through the 2003 CREATE report that RCN commissioned in 2003. This included an inventory of foresight studies. Consultancies and public bodies dominated the list, but it also included a few industry players. The most common type of foresight study in Norway was the use of scenarios, and the CREATE project suggested these were commissioned 'out of interest' or as a basis for decision-making. Largely, foresight studies tended to focus on national challenges – oil and energy, marine industries and environment *inter alia* – with a handful of the projects focusing on European or international projects. Studies were identified as: societal or culturally themed; industry-oriented; technology-oriented; or theory-oriented foresights.

In parallel with this initiative, the Research Council funded five pilot foresight studies – *Biotek Norge 2020*, *Avanserte materialer Norge 2020*, *Havbruk 2020*, *Energi 2020+* and *Utsikt*. These were produced with the aim of gaining experiences of foresight and dialogue-based methods as a tool in RCN programme planning and strategy processes.

A research policy commentary on the five thematic foresights[15] concluded that the foresight exercises had been successful in achieving their original goal of competence development, and were generally seen as positive experiences which brought more, and a broader set of, participants to the table and was said to have received an increased amount of public attention. They generated new ideas and created new networks and arenas. They also raised internal competence within RCN. The foresights projects exposed some shortcomings regarding the process of utilization of the results in the programme development and strategy processes that they were intended to support.

The report recommended that RCN (i) develop a strategy for future collaborative work involving 'horizontal partnerships' (ii) develop its capacity for development work, (iii) build on the competence developed and create partnerships for future collaborative work, and avoid building up an internal foresight expertise.

In October 2007, the Research Council and the Norwegian Institute for Urban and Regional Research (NIBR) organised a regional foresight conference. This had as a goal to articulate input to current challenges and experiments in foresight studies. The conference also looked in details at the conditions for regionalisation and cluster development, as well as ways in which to develop the knowledge base through programmes like VRI and Arena[16].

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[12] Årsrapport 2007 – Del III, p.156

[13] Årrsrapport 2008 – Del III KD, p.183

[14] Egenvurdering av satsingen på foresight og dialogbaserte arbeidsformer i Norges forskningsråd 2003 til 2005, Norges Forskningsråd 2006

[15] Trenger vi nye former for tverrfaglighet og samspill? En forskningspolitisk kommentar til fem foresightprosjekter, Norges Forskningsråd 2006

[16] Nye framtider i regionene, Norsk institutt for by- og regionforskning and Norges Forskningsråd, 2007

Since 2007, RCN has made little use of formal foresight. However, in preparation for the second generation of the Large-scale programmes, RCN has conducted various large-scale stakeholder consultations, receiving input from multiple research communities and providing the opportunity for vast stakeholder input through web applications. An illustration is the process adopted in the Biotek 21 initiative.

BIOTEK 2012

Following up on the bioscience evaluation in 2000 and an initiative of the research community, in 2002 RCN launched the national research programme for functional genomics (FUGE). In 2004/2005 RCN conducted a consultation process where different actors developed scenarios for the Norwegian biotechnology *("Biotech Norway 2020")*. The results of this exercise fed into the work plans for the FUGE large-scale programme.

The FUGE programme ended in 2011 and for the design of the follow-up programme, an open and inclusive consultation process was launched, "BioTek 2012". The objective was to identify areas where Norwegian biotechnology has the opportunity to contribute to solving social challenges and to strengthen the national added value. The ambition was to lay the groundwork for a broad community dialogue about the challenges and opportunities related to research, innovation and economic development based in biotechnological methods and knowledge. The initiative also included analyses of a number of national and international policy documents and evaluations. This exercise was carried out in close collaboration with universities, colleges and research institutes and the private sector and other relevant actors. There was a strong predominance of feedback from academia rather than the business community. Two major interest groups represented the private sector, i.e. the Pharmaceutical industry association and the Norwegian Biotech Forum; their comments were primarily focused on human biomedicine.[17]

The consultation is to be set within a broader initiative, launched by a set of Ministries for the development of the National Strategy for Biotechnology 2011. That multi-ministry initiative was prepared by the Ministry of Health and Care Services, Agriculture and Food, Fisheries and Coastal Affairs, Trade and Industry, and the Ministry of Environment, under leadership of the Ministry of Education and in collaboration with RCN and Innovation Norway.

2.2.3 The Role and Value of the RCN Meeting Places

The term 'Meeting Places' refers to all opportunities created or exploited by RCN, for knowledge sharing with key stakeholder groups, government and research institutions. These include formal meetings with the Ministries (which we also consider in our report on governance), meetings with representatives or groups of research institutes, universities or industry and/or their associations, meetings of RCN's steering committees and other committees such as the proposal appraisal ones, as well as conferences and events, such as the conference of the International Polar Year.

In the sections below we further describe these meeting places, including the representation of the different stakeholders, and report on their value from the stakeholders' point of view.

2.2.3.1 Meetings with the research and industry stakeholders

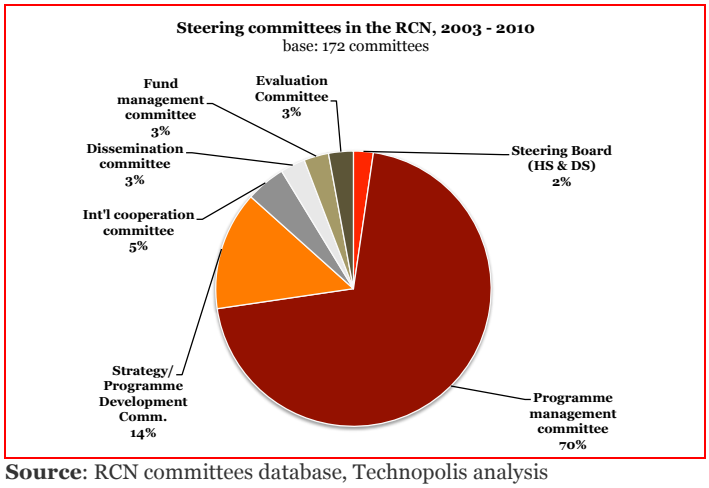
[17] Rapport fra "BIOTEK 2012": Kunnskapsgrunnlag for fremtidig satsing på bioteknologi, RCN, November 2010

In its 2012 report on the RCN meeting places[18], RCN reports on an internal survey trying to establish the intensity of RCN's activities from this perspective. In 2011, RCN organised or participated in approximately 350 'meeting places' involving meetings with stakeholder groups or events, excluding the management committees and appraisal/competition panels. This implies that there is a fraction less than one meeting for every single day of the year. The organisational responsibilities for these 'meeting places' were widely spread across the hierarchical system and only 14% were co-managed by different 'units' (program / activity, department, division management, communication, team). Most active were the Innovation and Health and Society Divisions, least active the Science and Energy, Resources and Environment ones.

Our analysis of the RCN committees showed that in the period 2003-2011, RCN set up a total of 238 committees, involving 1,541 individuals. We categorised these committees in terms of their function and type of input/support provided. As shown in Figure 4, the majority of committees (70%) were programme/instrument boards or scientific discipline committees, supporting RCN in the overall programme management processes; 14% were strategy/programme development committees (e.g. in charge of the development of research roadmaps).

Especially the Innovation division involved stakeholders to provide input for strategy and programme planning activities, while the Division for Strategic Priorities managing the Large-scale programmes set up 4 committees to foster internationalisation.

Figure 4 Type of committees or boards (2003-2010) (Percentages)



Source: RCN committees database, Technopolis analysis

In terms of stakeholder involvement, in its 2012 report[19] RCN indicated that for the meetings with stakeholder groups, "Researchers" is the dominant target, followed by "public administration" and "funding ministry." "Business / industry" was the least targeted stakeholder group.

Except in the Innovation Division, university researchers were the category of people most frequently involved in the RCN steering committees (Table 1). As one would expect, the industry sector constituted the most represented stakeholder group in that Division. Industry is little represented in the Strategic Priorities Division's committees. The Institutes sector is also poorly represented. According to interviewees, this is the case in order to avoid conflicts of interest, especially in the

[18] Forskningsrådets møteplasser 2011 og 2012 – Rapport fra kartlegging, RCN, 2012

[19] Forskningsrådets møteplasser 2011 og 2012 – Rapport fra kartlegging, RCN, 2012

programme boards. It should be noted that the current Executive Board (HS) now has a member from the institute sector – for the first time ever.

There was a considerable decrease over the years in the involvement of public administration (ministries, regions or town councils). In 2009, an agreement was reached that limited the potential membership of Ministries in programme boards to the policy-oriented programmes in order to avoid either the appearance or the reality of ministries steering programmes at the project level.

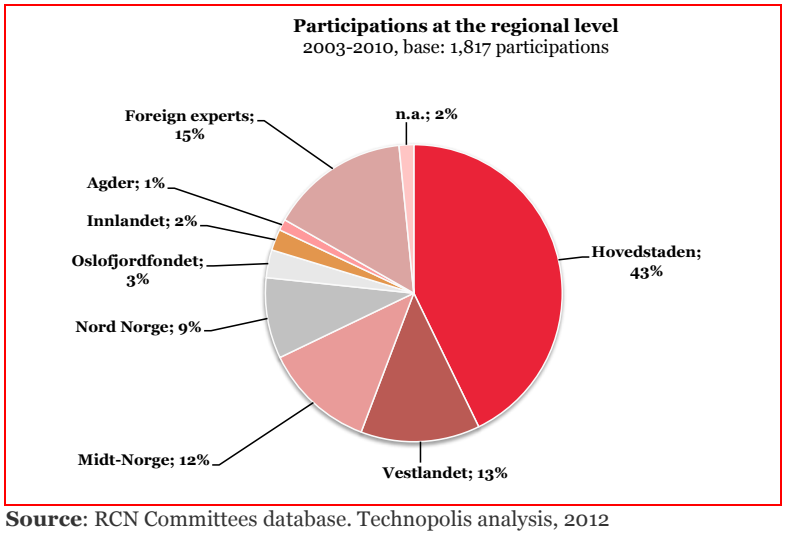
Table 1 Stakeholder involvement in RCN management committees, per division

Stakeholder group	Division for Strategic Priorities	Innovation Division	Science Division	Grand Total
University	24%	15%	54%	33%
Industry Sector	7%	38%	4%	16%
Foreign experts	17%	5%	24%	16%
Institute Sector	15%	10%	7%	10%
National PA	16%	9%	3%	8%
Public Agency	11%	6%	2%	6%
Univ. Colleges	4%	4%	3%	4%
Other	4%	3%	1%	3%
Regional/Local PA	2%	4%	1%	2%
N.A.	0%	5%	1%	2%
Total	100%	100%	100%	100%
Total number of participations	**474**	**573**	**693**	**1,740**

Women are quite well represented in the committee system. The committees contained on average 44% of women (2003-2010). Female experts constitute about 54% of the members of international cooperation committees and are fairly well represented also in dissemination committees and steering boards (about 49% and 46% respectively). However, they are underrepresented in 'strategic' committees (programme design and road mapping committees).

Over the years, regional representation in RCN committees has improved. Over the whole period (2003-2011), the majority of participants were from individuals active in institutions or firms based in the capital region (Hovedstaden) but their relative importance has decreased and experts based in other regions are now more frequently involved, in particular those based in West Norway (Vestlandet).

Figure 5 Regional participation in RCN committees, 2003-



Source: RCN Committees database. Technopolis analysis, 2012

2.2.3.2 The stakeholders' perspective

Stakeholders consulted in the survey conduced in the context of this study were overall rather sceptical about the effect of their participation in the committees on RCN's funding schemes or policy/processes (Table 2). Curiously, the responses of members and past members of RCN Boards varied little from the average figures shown in the Figure. We would have expected them to feel they had more influence than others over RCN policies, schemes, procedures and processes.

Table 2 Meeting place function: views on results from participation in RCN 'strategy meetings'

To what extent did your participation result in:	Very large	Large	Moderate	Limited	Not at all	Cannot say	N=
Your improved understanding of the rationale for RCN policies and strategies	9.4%	36.4%	34.1%	11.8%	2.0%	6.3%	651
Your improved insight into a wider set of research areas	6.4%	35.3%	33.9%	14.6%	3.6%	6.3%	638
Input to RCN for changes in policies/strategies	3.6%	22.5%	36.3%	18.8%	8.1%	10.8%	640
Input to RCN for changes in funding schemes	2.2%	10.3%	30.6%	23.7%	17.1%	16.1	633
Input to RCN for changes in management/procedures	0.9%	8.5%	23.6%	25.6%	22.9%	18.5%	542
Changes in RCN policy or processes	0.6%	7.1%	22.%	26.5%	23.7%	19.2%	634

Source: NIFU survey of leaders of Norwegian research institutions, researchers and participants in RCN meeting places (WP5)

Interviewees that had been involved in programme boards expressed their frustration at how little account RCN staff can take into their suggestions for changes in programmes because of lack of flexibility in the of system. They nevertheless did consider that programme boards and their inputs are of considerable value for RCN staff and for themselves in terms of knowledge building. Especially Division Board members emphasised this aspect, though they tended to mention it as a sort of compensation for their DS' lack of power.

Similarly, a reasonably high proportion of stakeholders consulted in the survey said they gained personally from their participation in the committees in terms of an improved understanding of the rationale for RCN policies and strategies and an improved insight into a wider set of research areas.

According to a large majority of survey respondents, RCN has an important role in the Norwegian system as 'meeting place' for policy discussions; for respondents from the research sector in particular in relation to research policies, for those from trade and industry and the government/public sector in relation to innovation policies.

As part of the analysis of its activities related to strategic intelligence, reported in the 2011 document "Knowledge-based advice, tools and meeting places - Policy for RCN's work in the knowledge base"[20], RCN also asked for feedback from the Ministries on the quality and relevance of its advisory activities. In general, the feedback was positive. Several ministries considered that RCN has been good at organising and developing venues and actively uses conferences and workshops to develop a broad knowledge base. The Ministry of Health, however, pointed out that they would welcome wider involvement in dialogue arenas, for example from the voluntary sector.

[20] Kunnskapsbaserte råd, virkemidler og møteplasser - Policy for Forskningsrådets arbeid med kunnskapsgrunnlaget – med fokus på det tverrgående kunnskapsgrunnlaget, RCN, 2011

2.3 Evaluation as strategic intelligence

2.3.1 Evaluation Strategy and Implementation

RCN is the main body responsible for research evaluations in Norway. The statutes say that RCN should "ensure the evaluation of Norwegian research activities"[21], which is a slight change of wording from the earlier stattes, which require the Council to "initiate and follow-up evaluations of research and research-performing institutions"[22].

RCN describes its evaluation activities using five categories.

- *Scientific discipline evaluations*, which are deemed important channels of communication with the Norwegian HEI sector. The RCN science division has a five-year plan for these types of study, which also encompass research conducted at research institutes and hospitals
- *Evaluations of instruments*. These are predominantly programme evaluations, looking at outcomes and impacts of R&D programmes or other RCN activities, programme design and goal achievements
- *Evaluations of institutes*. RCN has stopped doing these on the understanding that their direction is replaced by the new core funding system
- *Other types of evaluation*. These are generally contracts between RCN and particular ministries and tend to focus on policy reforms relevant to social policy and higher education, where RCN's expertise in procurement and research administration is exploited
- *Self-evaluations,* predominantly undertaken by the Innovation Division in RCN. This type of evaluation is implemented using a model developed by TAFTIE (The European Network of Innovation Agencies), and is focused around the improvement of additionality in innovation programmes.

This section focuses on RCN's commissioning and use of evaluations in the last decade. It looks in-depth into a number of RCN programme and instrument evaluations, discipline-specific evaluations and evaluations of research institutes.

2.3.2 Background

In 2001, we criticised the decentralisation of the evaluation budget, which lessened the influence and effects of evaluations studies and suggested that centralisation of the evaluation function would strengthen the strategic use of evaluations. At that point, RCN had two evaluation cycles in place.

- A six-year cycle of evaluation for the institutes under its auspices, which were evaluated by peer review, accompanied by user surveys
- A discipline evaluation cycle, managed by the Research Council's NT division.

We found that, with the exception of the discipline evaluations, there was an overall lack of organised and systemic use of evaluation studies within the Research Council. Similarly, there was no systematic evaluation training for RCN staff, beyond ad-hoc activities. Evaluation activities lacked sufficient consequence with regards to policy or learning. This was in particular true for institute evaluations, as RCN had little influence on funding or core funding levels. RCN was making extensive use of peer reviews. We indicated that in particular when evaluating larger entities such as disciplines, groups of institutes and policies, the use of other techniques

[21] Statutes of the Research Council of Norway, New version – 1 January 2011

[22] Erik Arnold, Stefan Kuhlman and Barend van der Meulen, *A Singular Council Evaluation of the Research Council of Norway*, Oslo: Royal Norwegian Ministry of Education, Research and Church Affairs, 2001

supplementing or substituting peer review is appropriate. Finally, we pointed to a undesirably high use of Nordic rather than truly international peer reviewers. We recommended that RCN should centralise its evaluation activities to allow for greater learning and follow-up, higher quality standards and consistent issue coverage as well as to consider establishing an overall evaluation budget to prioritise the use of evaluation studies.

In response, RCN set up a cross-divisional evaluation network to support the exchange of best practice, comprising representatives of each division. However, this network was discontinued within a small number of years.

The Research Council's current evaluation strategy still dates from 1997.[23] It indicates some long-term goals, to be implemented by 2003. They can be summarised as follows:

- To help provide methodical insight into the current status of and trends in Norwegian research in order to ensure quality, relevance and efficiency in performed R&D activities
- To develop informed and society-relevant decision making in research policy, strategy and operations
- To ensure evaluations are an integral part of the decision-making process of all internal and external levels of the Norwegian research system. RCN is responsible for recommendations being followed up and for facilitating an ongoing mutual learning process. Evaluation data should be preserved
- RCN should participate in international R&D evaluation cooperation in order to ensure international comparison and international expert input
- To ensure there is full confidence in RCN's objectivity and independence in their work concerning evaluation activities.

Perhaps prompted by the current evaluation, RCN has begun to update its evaluation strategy. In the meantime, it provided us with a background note[24] that clarifies its current approach to evaluations. RCN still favours a decentralised model but also sees a need for central coordination and intends to re-establish an evaluation network, connected to the current Analysis Forum. RCN says that it has strengthened its evaluation activities through increased discussions and organisation around the purpose, mandate and outcomes of evaluation studies and highlights the value of its annual portfolio analyses, which map its 'funding 'footprint' over various dimensions.

RCN says it aims to increase the aggregate strategic value of evaluation studies by thorough evaluations of programmes, scientific disciplines and institutions, but also by developing its use of strategic studies that take a more systemic approach and review larger sections of the R&D structure in Norway. It also considers that in areas that have particularly great national importance, thematic evaluations should supplement the traditional scientific discipline ones. Finally, it considers that alongside enhanced evaluation there should be more effort on indicator development and statistics "which in many areas will be able to replace the need for evaluations, for example through less costly monitoring exercises".

2.3.3 Evaluation Practice in 2003-2010

In this section we assess the overall quality of RCN's evaluation activities. We look into the scope of the evaluations, their frequency and timing, the methods adopted, the potential use of the evaluations, and the quality of the processes as such.

[23] Evaluation Strategy: The Research Council of Norway, 1996

[24] Evalueringsvirksomheten i Norges forskningsråd 25.11.2011

For this purpose we scrutinised all evaluations published in the period 2003-2010 and looked more in depth at representative types of evaluation, implemented a meta-evaluation and took an aggregate view in order to describe in a more systematic way the approach taken. The meta-evaluation also looked into the aggregated findings of the evaluations. We omitted from this analysis the monitoring activities that RCN regularly undertakes, including satisfaction surveys among the stakeholders and use of the TAFTIE-based self-evaluation model adopted in the Innovation Division, as well as the 2006 self-assessment.

2.3.3.1 Overall assessment

Table 3 breaks down RCN's evaluations in the last decade by type. It illustrates the current focus of evaluation activity on scientific disciplines. Programme evaluations were mainly the mid-term and final evaluations of the large-scale programmes, while instrument evaluations were predominantly focused on the Centre of Excellence schemes. There were almost no evaluations of the research institutes and very few evaluations of other institutes and centres. We grouped the policy evaluations that were commissioned by the Ministries within the 'others' category. These evaluations are not done for RCN's benefit. Rather, they address ministry policy needs, with RCN being involved because it is a professional procurer of studies and so as to distance the evaluations from the ministries whose policies are being evaluated.

Table 3 Evaluations undertaken by RCN 2001-2011

	Discipline	Programme	Instrument	Research Institutes	Other Institutes or Centres	Others
2000	2	2		6	1	3
2001	1			2		2
2002	4	1		1		
2003		2				2
2004	4	4	1			1
2005	1	3				4
2006	1	3	1	1	2	3
2007	2	2			2	3
2008	1	2	2			1
2009	2	3	1		2	2
2010	5	3	2	1		
2011	7	2				4

Source: RCN annual reports

Implementation of evaluations has been – and still is - rather ad hoc. According to our interviewees, only the Science Division has a systematic evaluation plan in place, implementing scientific discipline evaluations on a 10 years cycle. Among the programmes only the large-scale programmes integrate mid-term and final evaluations into the programme cycle. Instrument evaluations predominantly focus on the flagship Centres of Excellence schemes. An exception is the evaluation of the effects of the user-directed research projects. This is the responsibility of the Division for Innovation. Their annual nature, however, means that these evaluations have more the character of monitoring than evaluation. Routine evaluation of research institutes has essentially been abandoned - with the exception of evaluations requested by specific Ministries.

Except for the studies of user-directed R&D (which themselves only focus on private returns to the RCN investment), the evaluations are formative, geared towards learning and programme or policy improvement. They are rarely also summative, ie providing a view on impacts in order to provide accountability and material that RCN can use to demonstrate effects in society. This is particularly true for the evaluations of scientific disciplines, which make few connections between RCN-funded programmes and interventions and wider developments in the research sector. Programme and instrument evaluations increasingly try to make such links; for example in the study looking into the added value of the SFF centres of excellence.

Compared with ten years ago, the methods used are more diverse (which should mean that the evaluation findings are more robust). The latest programme

evaluations included surveys, case studies, interviews, bibliometrics and/or self-evaluations.

Methods used in instruments and scientific discipline evaluations were narrower: institutional self-assessments and peer reviews, in most cases complemented with bibliometric indicators. This is consistent with international practice. There is inconsistency in the depth of information requested from the institutions in their self-evaluations.

2.3.3.2 Meta-evaluation of Instrument and Programme Evaluations

We focused on a selection of programme and instrument evaluation studies in scope.

- Programme evaluations of the *SFI* and the *SFF* schemes. These focused on the centre organisation and quality of research in each individual undertaking, including industry collaboration in the case of the SFI
- The mid-term evaluation of the *Large-scale programmes*, which provided overviews of the individual flagship programmes, but predominantly focused on the implementation of the instrument itself
- The twin evaluations of *FUGE* and *Nanomat*. These could be described as mid-term evaluations, although they were undertaken towards the end of the programmes
- Evaluation of *SkatteFUNN*, which is a fiscal instrument (partly) administered by the Research Council, which is intended to stimulate R&D activities in Norwegian businesses
- Evaluation of the programme *User-directed Research* (Brukerstyrt forskning), which is an instrument for research and innovation activities, and which aims to stimulate industry and research collaboration

Looking across RCN programme and instrument evaluations discussed in this report, it is noticeable that *expert panels*, backed up by a secretariat, undertook the majority of reviews. The expert panels appointed for mid-term evaluation of the Large-scale programmes, the FUGE Technology Platform study, and the FUGE and Nanomat evaluations in 2010-11 were Nordic, while RCN Centre evaluations have had a broader geographical membership in their panels (UK, USA, France).

In most cases, the expert panels received background documentation for each evaluation subject. Often the evaluated unit completed self-evaluation forms before the site visits. However, the FUGE panel made contact with those evaluated through a 'hearing' – a day of interviews with representatives.

Apart from self-evaluations and site visits, the expert panel studies also tended to include (with support from the secretariat) bibliometric analyses, workshops and/or interviews and participant surveys, with accompanying desk research to support their findings and recommendations. Project case studies were produced for evaluations of FUGE (2010-11) and Nanomat (also 2010-11). These appear to be two of the most labour intensive evaluations undertaken, and both used a broader range of input, to support and balance the conclusions of the peer review panels.

Studies using other methods – evaluations of *brukerstyrt* research and the SkatteFUNN initiative – were predominantly micro- or macroeconomic, relying on statistical analyses. In the case of the study on *brukerstyrt* research, this is a recurring study, which has been done regularly since the early 1990s using similar methods by an evaluation team from Møreforsking.

The quantitative studies of SkatteFUNN and *Brukerstyrt forskning* excluded, RCN programme evaluations are rather uniform, with the focus very much on the scientific quality of the research undertaken, the implementation of the programme or initiative concerned, and (for Large-scale programmes) the added value of the particular design of the programme.

The timing of the evaluations suggests that there is not a standard evaluation cycle. A considerable number of evaluations are mid-term evaluations – there is no pattern of ex-ante and ex-post studies, which we would normally expect to see where evaluation is integrated into the programming cycle.

In the programme evaluation studies, research quality is often expressed in terms of the degree or level of internationalisation, and Norwegian research output is often compared to its Nordic neighbours. This is particularly evident when Nordic experts undertake the studies. Given the big differences between Norway and some of its neighbours, it is not always clear that this always produces a meaningful benchmark.

The evaluations tend to revolve around the core issues of Norwegian research and research policy – steering and the relationship between RCN and the ministries, progress towards increased internationalisation, research quality, industry collaboration, and the organisation of researcher training. There is a lack of analyses of additionality or longer-term outcomes and impacts. Discussions of appropriate programme budget sizes are also lacking.

As for the flagship Large-scale programmes initiative, the importance of policy and policy implementation came across as fundamental, as the four-fold objective was to

1. Evaluate Large-scale programmes as a strategic instrument for nationally prioritised areas
2. Evaluate whether the [policy] intention of the Large-scale programme was clear in the implementation phase and achievable with the current focus
3. Evaluate whether Large-scale programme areas should be further developed as an instrument for nationally priorities
4. Undertake an evaluation that contributes to learning and development.[25]

The studies of the FUGE and Nanomat programmes also emphasise the strategic and policy goals of the two initiatives, which are described as 'ambitious'. The Large-scale programme instrument has a broader range, bigger budget, and a longer time perspective that the programmes that RCN has traditionally run. Implementing them involves coordinated strategy across ministries as well as programme operation, involving RCN's role as advisor as well as funder.

In the view of the mid-term evaluation panel, the Large-scale programme instrument struggled to *link and coordinate clearly the national priorities* within each programme's remit. The evaluation report suggested that national priorities do not translate fully into the programmes, with some goals overlapping and other (more newly established) programmes competing for resources. The panel also argued that the Large-scale programmes should be given larger budgets, as they were the main vehicles for the implementation of the national policy priorities. RCN's internal organisation and coordination of the numerous ministries involved in the Large-scale programmes could become more efficient, and, as a response, planning work has subsequently been done by the Ministry of Education and Research (as the entity with overall responsibility), the other ministries and RCN.

The programme evaluations have generally been positive in their conclusions on *scientific quality*, albeit with pockets where there is room for improvement. The Centres of Excellence (SFI) and Innovation (SFF) schemes are deemed successful with regards to quality, as are the Nanomat projects and the FUGE Technology Platforms[26]. Both Centre evaluations show the SFF and SFI programmes had done very well in

[25] Our translation of the report SATS på forandring – Midtveisevaluering av Store programmer, Norges forskningsråd 2009

[26] The large-scale programme evaluation did not consider scientific quality

attracting national and international collaboration partners, as well as research recruits. The Research Centre programmes, and Nanomat and FUGE had developed into important research training arenas for Masters and PhD students.

Most if not all studies address *longer-standing issues* in the Norwegian research system including lack of researcher mobility and low levels of collaboration; both between Norwegian research environments, and with international counterparts. Studies often refer to the high level of fragmentation of research groups in Norway and, while commending RCN programmes for reducing fragmentation, often bring up the need for continued increase of collaboration (these are issues that will also be brought up in the subsequent section on discipline specific evaluations), including with industry and industrial partners. The SkatteFUNN report suggested the chances of achieving impact are higher when projects are done in collaboration.

A lack of *industry involvement* – as a collaborative partner, and in the programme design – is additionally an observation and elaborated on in the FUGE and Nanomat studies (programme design and the development of research questions).

Typically, feedback on industry, and socioeconomic aspects in programme evaluations was consistent with this extract from the Nanomat evaluation

> *The evaluation also indicates, however, that there are some areas in which NANOMAT has not fully exploited the possibilities inherent in being a Large-scale Program and part of the Research Council, a central actor in the Norwegian science and innovation system. Despite the many good results, the evaluation suggests that even greater effects could have been attained through more effective planning and management of the program. It is for example estimated that the public investments in nanotechnology that have been made so far could have created greater value for industry. On a similar note, the evaluation shows that the program has not succeeded in integrating the so-called Ethical, Legal and Social Aspects (ELSA) of science or perspectives regarding health, the environment and safety (HMS, short for Helse, Miljø og Sikkerhet) into research on nanotechnology and new materials*[27].

Meta-evaluation of Evaluations of Scientific Disciplines

Norway regularly evaluates national activities in single scientific disciplines, with each discipline going through a roughly 10-year evaluation cycle. The objective is to produce a critical assessment of the research system from an international perspective – the reviews are always carried out by a Nordic or international panel of experts in the field and should specifically provide recommendations to support increased quality and efficiency of research. The scientific evaluation conclusions and recommendations should also provide RCN with information to support its strategic research and policy work, as well as provide scientific and strategic guidance for the institutions reviewed.

The discipline evaluation studies on which we focused our analysis were: Physics (2000 and 2009); Political science (2002); Chemistry (2008-09); Sociology (2010); Philosophy and the history of ideas (2010).

The scientific evaluations are predominantly carried out using international expert panels appointed by RCN. The overall objectives tend to revolve around the identification of scientific strengths and weaknesses, level of international cooperation, and the identification of areas or themes of national priority. The intention provide feedback regarding the scientific performance of individual research

[27] DAMVAD and Econ Pöyry Evaluering av NANOMAT Forskningsrådets Store program innen nanoteknologi og nye materialer, January 2011

groups, as well as suggestions for improvements and priorities and assist RCN in its role as funder and advisor to the Norwegian Government and relevant ministries.

The final reports are based on various sources

- Self-evaluations done by all participating institutions. These tend to include SWOT analyses produced by the departments and research groups evaluated. The self-evaluations are discussed in meetings between the evaluators and research teams, consisting of presentations, formal and informal questioning, and input from PhD students. The self-evaluations also cover information on the evaluated organisation and its resources, development and future plans, as well as CVs and publication lists of the scientific staff
- Site visits to the institutions involved in the evaluation
- A bibliometric analysis.

Depending on the breadth and width of the discipline reviewed, the evaluations tend to include the majority of research groups and institutions, but may miss out small pockets of research within larger disciplines.

The systemic issues described in programme and instrument evaluations (eg scientific quality, fragmentation, internationalisation and recruitment) are generally also brought up, when applicable, in discipline evaluations.

Seen from a discipline perspective, the *quality of the research* undertaken is the most apparent strength. In particular for the physics evaluations (2000 and comparably in 2009), there is a positive development in the decade between the studies. The evaluation report singles out around a dozen sub-disciplines in physics that had particularly high quality. Quality improvement, perhaps to a lesser extent, is also evident in the Chemistry discipline review.

More generally, there are no disciplines that are strong across the board; rather sub-disciplines or themes are different in strength and excellence. In the case of the philosophy and history of ideas review, the evaluation team recognised the two disciplines are together too broad to be completely and thoroughly studied within the scope of the exercise.

Quality aside, the Social Sciences disciplines in particular also receive positive comments regarding the *relevance of the research* undertaken, and its national importance. The philosophy research community made big efforts in communicating its research with a broader audience in Norway.

The discipline evaluations also develop practical recommendation for i) the discipline overall and its national and strategic importance, and ii) the evaluated units, ie the university departments, faculties, research institute units etc.

The most pertinent weaknesses can be summarised as follows.

- The limited size of the Norwegian research system, and the lack of research groups and areas large enough to be described as having reached critical mass
- Lack of mobility, which in turn causes scientific inbreeding. The lack of mobility of researchers is not helped by the organisation of research education, which is frequently pointed out as an area that could usefully be improved. Other comments were directed to the relative old age of larger proportions of Norwegian scientists, as well as lower levels of networking and collaboration
- Publications rates and choice of publishers and language of research papers
- Structural relationships in the national research system, with higher education institutions operating in traditional ways, not always with fitting management structures in place, and often separate to the research institutes, and with limited input or interaction with Norwegian or international industry

- Funding structures. The large proportion of RCN funds channelled through programme activities, was pointed out in the Political science review, and was described as a constraint to basic research in the field.

Meta-evaluation of Evaluations of the Research Institutes

In this analysis, we covered all RCN evaluations of research institutes in 2006-2011. We included also evaluations of scientific discipline/area ones where research institutes were part of the scope, provided the evaluation report informed also on the outcomes of the assessment for the specific institutes.

For the discipline/area evaluations, we also looked into the value of the conclusions and recommendations from an institute perspective. The criterion we used was the extent and depth of the communication on the outcomes to the benefit of the institutes/departments' decision making.

We focused our analysis on the research institutes that are subject to the new guidelines for institutional funding and receive their core funding through RCN in the years 2000-2010.

In the last 5 years, RCN conducted only three evaluations that covered the institutes at the organisational level. In addition, RCN has organised an evaluation of Polarmiljøsenteret[28] – a joint centre of five research institutes – in 2006, at the request of the Environment Ministry. In each case, the evaluations were performed at the specific request of a Ministry, and not in connection with RCN's strategic responsibility for the institute sector as a whole..

Table 4 Evaluations of Research Institutes at the Organisational Level, 2006-2010

Funding	Category	Name institute / department or division	Year	Evaluation	Initiative of / requested by
Core funded RCN	Social Science - National	CMI - Chr. Michelsens Institute	2006	Evaluation of institute activities 1997-2006	RCN / Science division, follow-up of 1997 evaluation
Core funded ministry	Institutions with a natural science and technology-oriented research profile	Simula Research Laboratory	2010	In 2010, institute evaluation, follow-up of 2004 evaluation	Ministry agreement after 2004 evaluation for a 5+5 year core funding, on condition of mid-term evaluation
Core funded ministry		Bioforsk Bydgeforskning NILF Skog og Landskap Veterinary Institute	2010	Evaluation of the Research Institutes under the Ministry of Agriculture and Food, including Bydeforskning	Requested by LMD, the Agriculture Ministry

Below we provide a short summary of two of these evaluations

[28] Norges Forskningsråd, *Evauering av Senter for miljø og samarbeid i polarområdene og Barents-regionen (Polarmiljøsenteret)*, Oslo: Forskningsradet, 2006

Chr. Michelsen Institute - Evaluation of its activities 1997-2006, 2006

The institute was evaluated in 2006 as a follow-up of its evaluation in 1997. The evaluation panel encompassed a mix of Norwegian and international experts. The evaluation was based on interviews at the institute with board members, management, researchers and staff in charge of the library and the IT services, examination and analysis of a cross-section of its publications, and feedback from peers, partners, and users of the Institute's services. Topics covered were: the shifting context; how the institute managed its resources; the institutional partnerships; the strategic institute programmes; the institute's outputs and an assessment of its impacts.

The overall assessment of the strategic institute programmes covered (a) scientific quality, (b) policy relevance, (c) communications, (d) capacity-building, and (e) outreach in the South. Findings were that a majority of the programmes were performing at a very high international level while a few others have not done so well. CMI has a broad general competence that covers areas like human rights and democratisation, public sector reform, poverty and development. It has a more specialized competence in key aspects of governance as well as in specific areas like Southern and Eastern Africa and Palestine. The panel considered that what has been achieved in the past ten years has helped laying the foundation for the new 2006-2010 strategy "Research for Development and Justice" and concluded that in all, CMI performs at a high and respectable international level.

There was room for improvement. This report ended listing five challenges that the CMI faces as it moves forward: (1) linking research to policy in more effective ways, (2) identifying and implementing what is strategic in its programs, (3) ensuring a balance between interdisciplinarity and disciplinarity in its research, (4) improving the dissemination of its research findings, and (5) continue building stronger capacity both in-house and among partners in the South.

Evaluation of research institutes under the Ministry of Agriculture and Food, 2010[29]

In preparation for a report to the Parliament on agricultural and food policy, the Ministry of Agriculture and Food asked RCN to undertake an evaluation of the structure, roles and organisation of the institutes in its field of competency. Institutes included were Bioforsk, the CRR – Centre for Rural Research, NILF – the Norwegian Agricultural Economics Research Institute , NISK - Norwegian Forest and Landscape Institute, and VI - Norwegian Veterinary Institute .

The evaluation panel consisted of representatives from academia, government and Norwegian businesses with direct or indirect connection with the Ministry - predominantly Norwegians. The panel based its assessment on a self-assessment by the institutes, a bibliometric analysis by NIFU, a user survey by Econ Pöyry and interviews with the institutes. Key focus was the assessment of scientific quality of the institutes' research. Topics covered were the context (policy and funding sources), collaboration between the institutes, the level, quality & outputs of research; societal relevance and impacts; internationalisation; organisation & leadership; researcher mobility; geographical distribution.

In its conclusions, the evaluation panel recommended that the current financing scheme in which the ministry transfers an allocation for administrative support services directly to 2 institutes (Bioforsk and the VI) should be partially modified. In the new system the allocation for long-term research would be to a greater extent channelled as basic funding through the Research Council. Grants for short-term research-based consultancy assignments should be given to the Food & Safety Authority (Mattilsynet), which would then purchase the services from the institutes. In such an arrangement, the agency could be given limited freedom to purchase services in other countries, in order to compare costs and quality of the services delivered.

Evaluations of scientific disciplines/areas started including institutes and their departments or research groups especially in the second half of the decade, and in particular in most recent years. Table 5 shows where field evaluations included the work of entire institutes. Table 6 shows cases where field evaluations included the work of individual institute departments or divisions.

More than half of the research institutes were not evaluated at institutional level in any way during the last decade. The majority has not been evaluated at all in the last 5 years. The picture is especially negative for the institutes in the Technical/Industrial and environmental sectors. [30]

[29] En robust instituttsektor - gjennomgang av forskningsinstitusjonene under Landbruks- og matdepartementet, inkludert Bygdeforskning, Evaluering, Divisjon for innovasjon – NFR, 2010

[30] In 2011, an evaluation was launched covering the regional institutes.

Table 5 Discipline evaluation including institutes, with conclusions at the institutional level

Funding	Category	Name institute	Year	Evaluation
Core funded RCN	**Environmental**	**CICERO Centre for International Climate and Environmental Research, Oslo**	**2011**	**Evaluation of research in Earth Sciences**
		NIVA - Norwegian Institute for Water Research	2011	Evaluation of Biology, Health & Medical Science / Botany, Zoology & Ecology-related disciplines
		TØI - Institute of Transport Economics	2007	Evaluation of economic research
	Social Science - National	AFI - Work Research Institute	2010	Evaluation of Sociological Research
		FAFO - Institute for Labour and Social Research	2010	Evaluation of Sociological Research
		FNI - Fridtjof Nansen Institute	2009	Evaluation of Legal Research
		ISF - Institute for Social Research	2010	Evaluation of Sociological Research
		ISF - Institute for Social Research	2007	Evaluation of economic research
		NOVA - Norwegian Social Research	2010	Evaluation of Sociological Research
		NOVA - Norwegian Social Research	2011	Evaluation of social & cultural anthropological research
		SNF - Institute for Research in Economics and Business Administration	2007	Evaluation of economic research
	Social Science - Regional	Agder Research	2011	Evaluation of Geography Research
		Nordland Research Institute	2010	Evaluation of Sociological Research
	Technical-Industrial	IFE - Institute for Energy Technology	2010	Evaluation of Basic Physics research
Core funded ministry		BI - Institute of Accounting, Auditing and Law	2009	Evaluation of Legal Research
		FFI - Norw. Defence Research Establishment	2010	Evaluation of Basic Physics research
		IMR - The Institute of Marine Research	2011	Evaluation of research in Earth Sciences
		NGU - The Geological Survey of Norway	2011	Evaluation of research in Earth Sciences
		Ragnar Frisch Centre for Economic Research	2007	Evaluation of economic research
		SIFO - National Institute for Consumer Research	2010	Evaluation of Sociological Research
		SSB - Statistics Norway	2007	Evaluation of economic research
		The Norwegian Bank - Norges bank	2007	Evaluation of economic research

Table 6 Discipline evaluations including departments or divisions in research institutes, with conclusions at department/division level

Funding	Category	Name institute / department or division	Year	Evaluation
Core funded RCN	Environmental	NILU - Atmospheric & Climate Research, Atmospheric Transport Processes	2011	Evaluation of research in Earth Sciences
		NILU - Environmental Chemistry Department	2009	Evaluation of Basic Chemistry Research
		NINA - Arctic Ecology, Terrestrial Ecology, Landscape Ecology, Aquatic Ecology	2011	Evaluation of Biology, Health & Medical Science / Botany, Zoology & Ecology-related disciplines
	Primary Industry	Bioforsk - Entomology and Nematology, Plant Pathology, Fruit and Berries	2011	
		SINTEF Fisheries and Aquaculture - Interactive Biology & Aquaculture Technology	2011	
		NISK - Biodiversity, Forest Ecology, Forest Genetics, Forest Health, Forest Resources, Wood Technology	2011	
		Bioforsk - Genetics and Biotechnology	2011	Evaluation of Biology, Health & Medical Science / Molecular Biology
		NOFIMA - Breeding & genetics,Raw materials & process, Food & health, Food safety & quality	2011	
		SINTEF Fisheries and Aquaculture - Biochemistry and Biotechnology	2011	
		NOFIMA - Feed and Nutrition, Fish Health, Production Biology in Aquaculture	2011	Evaluation of Biology, Health & Medical Science / Physiology-related disciplines
		SINTEF Fisheries and Aquaculture - Marine Aquaculture	2011	
		VI - Infections in Fish, Biotoxins, Mycobacterial Diseases	2011	
	Social Science - Natl	SINTEF Technology and Society - Health Services Research, Global Health and Welfare	2011	Evaluation of Biology, Health & Medical Science / Public Health & Health-related Research
		SINTEF Technology and Society - Preventive Health Research	2011	Evaluation of Biology, Health & Medical Science / Physiology-related disciplines
	Technical-Industrial	SINTEF Material Physics	2010	Evaluation of Basic Physics research
		NORSAR - Seismology & nuclear test-ban treaty monitoring, earthquakes & the environment	2011	Evaluation of research in Earth Sciences
		SINTEF Petroleum Research - Formation Physics department	2011	
Core funded ministry	Government agency FKD	IMR - The Institute of Marine Research	2011	Evaluation of research in Earth Sciences
	Registries and archives	SSB - Statistics Norway	2007	Evaluation of economic research

The methods used in both the institutional and the field evaluations that involved institutes are traditional for this type of activity. In all cases they involved a self-assessment of the institutes/departments, a peer review of publications, other institutional reports, interviews and on-site visits. In most cases, the evaluation panel was also provided with bibliometric data. Institutional evaluations such as the one of the Chr. Michelsens Institute included also a survey of users.

The evaluation panels were most often international or mixed Norwegian/Nordic and International. Exceptions included a purely Nordic panel in the 2010 Evaluation of Sociological Research and a predominantly Norwegian panel in the Evaluation of the Agricultural research institutes.

In the field evaluations, naturally the overall objective was to depict the state of the research in the specific field: quality was the primary focus, combined with the societal relevance (reflecting the dominant criteria in the RCN funding system). Also some systemic measures were covered, such as human resource management. Some evaluations such as the 2007 Evaluation of economic research and the 2010 Evaluation of Biology, Health and Medical Science also looked into the follow-up activities on previous evaluations. The dimension of strategic planning of the institutes or departments objectives was therefore most often only a secondary topic. Few evaluations specifically focused on an evaluation of the institutes' strategic management and looked into the strategic planning.

The level of the conclusions/recommendations about the scientific fields was generally satisfactory from a research institute perspective. In two cases, we considered it to be limited (a one-page summary).

2.3.4 The stakeholder perspective

The 2004 NIFU-STEP study on RCN's approach to scientific discipline evaluations[31] is an enlightening source on how the evaluation-subjects looked upon, and responded to, these particular RCN exercises in the period preceding to the one in this study. It was largely based on a survey of institutions subject to one of four evaluations that were followed by national plans or roadmaps (*fagplaner*), namely Chemistry, Physics, and the Geo- and Biosciences.

The communities evaluated broadly disagreed about the value of the evaluation studies, but appeared to be increasingly finding the discipline evaluations to be showing a fair picture of the evaluated subjects.

- They saw the discipline exercises as providing RCN and other research policy actors with relevant data, and as being undertaken with the aim to improve the scientific quality of research carried out in the surveyed fields. However, many expressed doubt that the evaluation was undertaken, and expert panels chosen, in such as way as fairly to account for all aspects of the evaluation framework, including both scientific and organisational aspects. The evaluations concerning clinical and societal medicine, healthcare and psychology showed signs of a change in approach, as in these instances RCN arranged for three separate evaluation committees, to ensure sufficient expertise was provided
- Especially for evaluations undertaken early in the 2000s, the work method was considered ineffective and/or the researchers were dissatisfied with the contact established with the evaluation team. Later discipline evaluations – Political Science, ICT and Biosciences – were increasingly positive towards the work method, again indicating changes in RCN's approach to these exercises

[31] Brofoss *En gjennomgang av Forskningsrådets fagevalueringer*, NIFU-STEP Arbeidsnotat 7/2004

- The research community was rather split on the content of the evaluation reports, with notable variations among different disciplines. Again, Political Science, ICT and Biosciences – disciplines evaluated more recently – were less negative in their feedback. Nevertheless, opinion was divided on how well the evaluation reports ultimately reflected the scientific profile of the institution/department; the organisational behaviour of the institution/department; the scientific level of the institution/department; and the portraying of collaborations with other Norwegian research actors

In contrast with the researcher-level views reported by NIFU, our interviews with university and research institute management all confirmed the value of the discipline evaluations, which were seen as one of the few genuine sources of 'advice' RCN provides to the research-performing institutions. Stakeholders surveyed in the context of this study *confirmed the positive trend in quality and value* of the scientific discipline evaluations (see the WP5 report). Overall, significant improvement in the processes and underlying methodologies was noted compared to the evaluations of ten years ago; the quality of the evaluations was stated to be very variable, though.

Some criticism was voiced related to the value for the institutions of big-size evaluations such as the recent evaluation of Biology, Medicine and Health Sciences (2011), involving 3000 researchers. The peer review panels could dedicate only highly limited time to each research unit included in the evaluation. A number of interviewees argued that there is a systematic problem of using professors from abroad who do not understand structures and needs in Norway.

An overwhelming majority of research leaders at universities considered that the RCN-organised evaluations have been of high value to the Norwegian research community (90%) as well as for their specific research institutions (80%). Leaders in the research institutes sector and university colleges were less positive on the value for their research units (respectively 57% and 46%).

Interviewees highlighted the positive follow-up to field evaluations within RCN. These have driven big and useful changes in RCN research directions and programmes funded, triggered programmes and schemes like FUGE and the Centres of Excellence, and influenced the design of new or follow-up programmes.

Several interviewees also referred to important effects of the discipline evaluations on research strategies and reorganisation within their institutions. Field evaluations were considered to give useful signals about quality and had influence on how faculties and departments worked – at least at the overall level.

One interviewee, however, argued that some universities and institutes are monitoring their own performance so there is a declining need for field evaluations from that perspective; key is that evaluations provide information to RCN on how it can contribute to advancements in the scientific and technological fields.

Interviewees from the institute sector were divided about the current lack of institute evaluations. Some saw institute evaluations as an unnecessary nuisance. They felt that institutes had owners or operate in various kinds of markets and that these were sufficient to provide the needed feedback. Others highlighted the importance of previous institute evaluations and their positive effects on their institutional strategy development and re-organisation, facilitated by the SIP scheme. They considered that external evaluation may be more important for the small institutes than the big ones, "which after all have the resources to fund their own evaluations", and indicated an added value in evaluating groups of institutes, allowing for comparison and providing an overview of blocks in the national portfolio. They stressed that institutional evaluations can give domain-specific strategic advice that cannot be supplied by something like a performance-based research funding system.

As part of the analysis of its activities related to strategic intelligence, reported in the 2011 document "Knowledge-based advice, tools and meeting places - Policy for RCN's

work in the knowledge base"[32], RCN also asked for feedback from the Ministries on the quality and relevance of its advisory activities.

RCN reports that many interviewees at the Ministries believe that the Research Council should be better at following up their programmes, both as part of an active policy development and to gain better insight into whether the grant is used effectively and the immediate and long term impacts of the research funded. Especially the Ministry of Industry and Trade and the Ministry of Oil and Energy raised the issue of improving knowledge about additionality.

2.3.5 Uptake of evaluation results in RCN programmes

Evidence collected during this study, both through desk research and interviews, suggests that RCN fairly consistently takes action to follow up on evaluation results and knowledge gathered throughout other activities into subsequent generations of programmes and strategies.

The list of examples is too long to reproduce in this report. Interviewees mentioned the following

- The minimum grant sized has been increased to NOK1M per year and the maximum to NOK3.5m in response to evaluation studies concluding supported projects are too small in size (e.g. the 2010 FUGE evaluation)
- Nanomat began as a basic research programme, but that has evolved over time. One of the conclusions of the old bio evaluation[33] was the need for strengthening of the functional genomics capacity in Norway. This led to the FUGE initiative
- The mid-term evaluation of the Large-scale programmes also noted that humanities and social sciences had little involvement in the programmes. There is especially a disconnect between the humanities and technology disciplines. The SAMKUL programme is intended to increase the supply here
- Through the interviews, there is also the reflection that on the programme side, evaluations are now feeding forward to subsequent programme design. In FUGE, for example, evaluations have led to moving programme resources into the free arena and a greater focus in the programme.

The Large-scale programme RENERGI provides a good illustration of how evaluations, foresights and roadmaps feed into programme design.

The chapter on the Norklima programme illustrates the breadth of analysis that constitutes the background for, in this case, the mid-term revision of the work programme.

[32] Kunnskapsbaserte råd, virkemidler og møteplasser - Policy for Forskningsrådets arbeid med kunnskapsgrunnlaget – med fokus på det tverrgående kunnskapsgrunnlaget, RCN, 2011

[33] Research in Biology and relevant areas of Biochemistry in Norwegian Universities, Colleges and Research institutes – Report of the Principal Evaluation Committee, Research Council of Norway 2000

RENERGI

Following up on an evaluation funded by RCN, the foresight exercise Energy 2020+ was launched in 2005. This exercise was implemented by an independent project team consisting of external experts and RCN employees and involved more than 60 experts in the research and industry communities as well as public authorities

With the intent to expand on the Energy 2020+ results, RCN run in 2007 three / four parallel foresight exercises focusing on solar, biofuels, bioenergy, and wind energy. In 2008, the Energy 21 forum started its activities. According to RCN, this was initiated, organized and driven by the Research Council in close consultation with the OED who took ownership, appointed the steering committee and adopted the terms of reference.

In 2009, RCN requested a consultancy service for the development of the "R&D roadmap for offshore wind". The roadmap describes the necessary technological, industrial and socio-economic development up to 2030 for wind farms in deep water will help with energy production that makes a difference. The roadmap also points to what specific progress must be achieved by 2014 in order to achieve development.

The roadmap is based on information collected in the fall of 2009 by leading companies in Norway and abroad; the RENERGI project "Balance Management in Multinational Power Markets" and other relevant sources also contributed.

NORKLIMA

NORKLIMA is a ten-year program at the Research Council with a focus on improving understanding of the causes and effects of climate change in a holistic perspective. The programme was launched in 2004 and will run until 2013. At mid-term, in 2008, a revised programme plan was published, specifying the priorities and perspectives for the remainder of NORKLIMA program period, ie 2008-2013.

In this document, the programme board indicates that for its revision of the programme, it took into account changes in economic conditions, experience from the first part of the period, an analysis of the achievement made in late 2007 (mid-term evaluation), contributions to the program from the research community and changing needs for knowledge. From a knowledge and research strategy perspective, also the IPCC 4th Assessment and Climate agreement constituted a new background.

The revised programme mentions that in the first part of the program period, the programme helped to strengthen and further develop the Norwegian research on climate trends and variability and the development of effective global and regional climate models. The programme board considers that there are still scientific challenges associated with this field and decided to set in the latter part of the programme period more emphasis on research related to social adaptation to climate change. The programme intended to support both applied and strategic basic research that helps to support the programme objectives.

The revised programme highlights the interfaces that the programme will have with several other programmes and initiatives within the Research Council. The programme RENERGI, for example, covers the research that is intended to develop solutions for the reduction of greenhouse gas emissions, along with the means and incentives to get the technology adopted. Also an important part of the basic bottom-up research in relevant sciences include climate change, and make an important contribution to climate research.

2.4 Findings

We distinguish between strategic intelligence and advice. Strategic intelligence – in the sense of the knowledge needed to make strategy but also the deliberate use of evaluation, foresight and technology assessment in policy formulation and implementation – is a characteristic of research and innovation systems that needs to be decentralised, to enable components of the system to work well. It is not enough that one central actor knows everything – knowledge must be developed and particularly shared across the system of actors involved.

Strategic intelligence can be developed at whole-system level, at programme level or at a meso-level, eg institution, problem or theme.

Today, in partnership with others (eg SSB, NIFU), RCN generates a lot of 'systems health' indicators. These are now complemented by KD's 'research barometer'. RCN believes it under-invests in research on research and innovation systems and this idea is supported by RCN's modest expenditure on studies in that area.

In line with the ambitions expressed in its self-evaluation of 2006, RCN continues to be very open in the extent of its consultations with stakeholders. A number of research roadmaps for discipline development have been developed, in which the research stakeholders themselves have played strong roles. Researchers and heads of

research-performing organisations confirm that these are valuable and play a role in guiding events among the research performers.

RCN undertook a number of research foresights from 2004 onwards, which provided input to the new Large Programmes then being developed. The use of foresight studies has since declined to a low level. RCN continues the practice of broad stakeholder consultations for the development of new programmes, but there is an ongoing lack of proper foresight exercises. RCN has in effect reverted to its earlier practice of wide consultation combined with the use of 'meeting places' such as meetings with stakeholders and various boards and committees with outside participation. Stakeholders regard RCN as an important arena for counselling and dialogue on research and innovation policies. However, meeting place participants tend to see participation as an opportunity to learn and to network rather than as a chance to influence RCN policy or practice. This is true both at the level of stakeholder meetings and in RCN's Boards.

RCN's expenditure and activity in evaluation are modest – this is an under-used tool. Field evaluation is an area where RCN does well – it has inherited and improved the NAVF tradition. There is normally followed up, with the evaluated fields being supported to develop a research road map. Where relevant, this can have an effect on future RCN programmes. However, we can see no evidence of work that problematises new fields or that tackles the problems of interdisciplinarity.

Evaluation is otherwise poorly institutionalised. The evaluation strategy dates from 1997 and has never been implemented although there is evidence that RCN uses evaluation findings in developing programmes and instrument designs ad hoc. Evaluation is not embedded in the programme or policy cycle. There is a lack of meso-level studies. There is little interest in impacts, which undermines both accountability and RCN's ability to show that it is doing a good job. However, there is growing use of evaluation in relation to larger programmes.

RCN's use of evaluation has become more useful at the detailed level over the past decade, moving from a mixture of scientific fields evaluations and a narrow economic approach to trying to quantify some of the economic benefits of user-directed research a decade ago to take in more questions about programme design and implementation more recently – especially with respect to the large programmes. However, evaluation is still under-used at the level of smaller interventions and few evaluations address the impacts of interventions. Dropping the evaluations of the institutes means that there is now no institutional perspective on their performance and that their chief source of feedback is instructions from their parent ministries and signals from markets.

3. Advice to the Government

In this Chapter we describe and analyse the value of RCN's counselling activities to the government. We first set out some background then focus on RCN's input to budget negotiations (Section 3.1), advice at the level of White Papers (Section 3.2) and to various national research strategies determined at the level of one or more Ministries (Section 3.3).

Historically, it has been difficult effectively to provide research and innovation policy advice to government in Norway. Before the government set up RCN, a series of national-level advisory councils had little real influence over government policy. Putting responsibility for funding and advice into a single organisation involved the risk that RCN would itself become (or be seen as) a stakeholder with its own interests and therefore illegitimate as a source of 'neutral' advice. However, combining the two also put significant analytic and 'on the ground' resources behind the advice-giving function and RCN had a clear influence on setting national research priorities already in the 1998-9 White Paper[34].

One of the strengths of the Norwegian system is that it is small and people are strongly networked. Many of the people we interviewed in management positions in RCN, the ministries and Innovation Norway have experience from more than one of these organisations and there are also numbers of people who formerly worked at NIFU or STEP. Our interviews suggest there is almost continual dialogue among these people, so ideas are mobile – and it is not always possible to be sure what ideas start where.

3.1 The RCN budget proposals

Budgets for public R&D support are determined on an annual basis in the Norwegian system, so RCN drafts annual budget proposals, at the overall level and for each of the 16 Ministries.

We cover the steering system by the Ministries more in detail elsewhere and consider here only the structure and content of the funding proposals, and the views of the Ministries on their value and potential improvements.

3.1.1 Description of the proposals

Structure

The structure of the budget proposals has remained broadly similar through the years 2003-2010, with an increasing focus from approximately 2006 onwards on explaining how the budget proposal reflects and covers the Governmental priorities.

The 2010 RCN Guidelines say that both the Strategic Priorities and the Final Budget Proposals should have two major sections: a 'general' section presenting RCN's overall budget and covering the activities of strategic importance for RCN's main priorities, including cross-sector activities, and a second section covering the individual Ministries. The guidelines state that the Strategic Priorities proposal is to "present a rationale, description and framework for each priority". The individual priorities should be clearly explained, including a brief account of the research needs, an overview of the current funding efforts, and a larger section indicating the budget growth and measures/actions proposed.

[34] Erik Arnold, Barend van der Meulen and Stefan Kuhlmann, *A Singular Council: Evaluation of the Research Council of Norway,* Oslo: Royal Norwegian Ministry of Church, Education and Research Affairs, December 2001

The 2010 Strategic Priorities proposal, drafted in November 2008, contains in total 70 pages and was structured as follows:

- The first section contains an overview of RCN's proposed main priorities for the year, a section explaining how the priorities fit within the overall RCN strategy for the years 2009-2012, an overview of the overall budget proposed and the sub-division per Ministry (with zero-growth and proposed growth alternatives). The proposal then explains how the proposal reflects the priorities set in the White Paper, providing first an overview of the budgets allocated against each main priority in the Governmental strategy (again with zero-growth and growth indications) and subsequently a description of how programmes and initiative will contribute to each priority. The priorities are structured in priority categories (structural, thematic, and technological priorities. This is followed by a section on the strategy for the Northern Areas and one for the core funding of the Institutes Sector.
- The second sector provides for each Ministry a recapitulation of the research needs and an overview of the priorities of relevance for the specific Ministry is to be provided, indicating how these relate to the Ministries' strategy. Finally, the focus and level of the Ministry's contributions to the budgets are suggested.

The 2010 final Budget Proposal, issued in March 2009, is a document of 227 pages. It is sub-divided into three sections:

- The first section reflects the first section of the Strategic Priorities proposal, going more into depth especially in the description of the different programmes and initiatives as well as the cross-divisional activities. Budget overviews are provided, with zero-growth and proposed growth
- The second section gives an overview of the overall budget and the allocations to programmes and initiatives
- The third section provides the Ministries with the information on the proposal for their individual Ministry. It gives an overview of the proposed budget for the Ministry (eventually subdivided in different Ministry budget lines) and sets the proposal within the sectoral context and the needs for R&D in the sector. It indicates the potential contributions of the programmes proposed to the sectoral strategies and the effects they are expected to have. Budget proposals are detailed, amongst others, against programmes/initiatives, typologies of programmes and initiatives, scientific discipline areas, and the Government priorities.
- Annexes to this proposal include a description of the new programmes

The 2012 Budget Proposal, delivered in March 2011, was the first where the new Management by Objectives (MBO) system was applied. We complemented our view of the effects of the MBO looking also into the 2013 Strategic Priorities proposal, issued in November 2011.

A first effect of the MBO system is that, overall, more attention was dedicated to the description of the alignment of the proposed budget with the Governmental objectives than in the previous budget proposals. The main effect is that rather than detailing the proposed budget allocations at the Ministry level against programme/initiative categories and scientific discipline areas, a view of the allocations against the MBO categories of objectives and sub-objectives is provided, adopting a more streamlined approach.

Content

First of all, we note the trend of an increasing level of detail in the budget proposals - in particular the Strategic Priorities proposal. This is related to the efforts of RCN to improve their proposals, reflecting the needs of the Ministries, but especially from 2008 onwards, the reality of an increasing number of cross-sector programmes and initiatives makes clarity in the communication at the Ministry difficult. This was not alleviated by the introduction of the MBO system as Ministries still say they need –

and increasingly request already for the first phase – more 'reasoned' and specific thematic advice (see further below). We find a first illustration of this in the size of these proposal documents: the 2004 Strategic Priorities proposal was a 30 pages long; the 2008 one ws 50 pages; the 2013 Strategic Priorities proposal was 85 pages.

Throughout the decade, there was an increasing effort by RCN to set its proposed budgets within the context of, on the one hand, the Government priorities, and on the other hand the research and innovation contexts. We also see more attention dedicated to an explanation of the rationale for the proposed budgets, even though the effects are still limited.

The proposals in the first half of the decade seemed merely a communication of actions planned, with limited attention to the underlying rationale. The impression is that these proposals were rooted in previous formal or informal dialogues and were predominantly focused on setting the basis for the upcoming discussions and negotiations. The proposals in the second half of the decade include more detailed information on the rationale for the proposals - especially the more recent proposals. References are made more often to policy agreements (for example in relation to climate), international R&D contexts, European Commission policies or programmes (e.g. ESFRI), and evaluations whenever available.

This said, the breadth of the coverage requested, i.e. the multitude of initiatives and the perspectives of the 16 ministries, clearly implies that recommendations are simply stated rather than the intervention logic being articulated. Below is an illustrative extract from the 2010 section proposing the coverage of the Government priority for Energy, environment and climate.

Low carbon society: The Climate Agreement states that the long-term aim for Norway is to become a low carbon society. IPCC and the Low Emission stressed that all sectors must contribute to reducing emissions of greenhouse gases. This regards particularly the petroleum sector and the transportation sector, which accounts for about 60 percent of emissions, the agricultural and forestry sector, the building sector, the maritime sector and the aquaculture and fisheries sector.

There is a need to develop new policy instruments and new technologies. Improved manufacturing processes and treatment technologies, waste management, development of efficient and sustainable transport solutions and better resource management, etc., are important for the climate and the environment - and for value creation. There are large gaps in knowledge related to the implementation of emission reductions, the instruments that are suitable (in different sectors and across sectors) and the conditions that must be present.

We propose an increase of 60 million to the area funded by NHD, OED, FKD, LMD, SD and FIN. Central programmes are CLIMIT, RENERGI, PETROMAKS, SMARTRANS, MAROFF, the Food programme, NORKLIMA and HAVBRUK.

3.1.2 The view of the ministries on the funding proposals

As part of the analysis of its activities related to strategic intelligence, reported in the 2011 document "Knowledge-based advice, tools and meeting places - Policy for RCN's work in the knowledge base"[35], RCN also asked for feedback from the Ministries on the quality and relevance of its advisory activities in relation to the budget proposals.

The picture emerging is one of at times contrasting needs among ministries, illustrating once again the complexity deriving from the governance system based on sectoral responsibilities in the Ministries.

[35] Kunnskapsbaserte råd, virkemidler og møteplasser - Policy for Forskningsrådets arbeid med kunnskapsgrunnlaget – med fokus på det tverrgående kunnskapsgrunnlaget, RCN, 2011

The Ministries interviewed did not question RCN's capacities in developing *thematic* advice (advice related to the content of research). They considered that the Research Council has competent staff and dedicates considerable resources in providing such advice.

The key issue for the Ministries seems to be the level and depth of communication of the rationale. The Ministries expressed a desire for better *reasoned* advice and informed analysis as a basis for RCN's research priorities.

Despite their positive view of RCN's capacity to set thematic priorities, several ministries had the perception that the knowledge base for the funding counselling is not sufficiently developed. They argue that RCN should improve the justification of its policy choices based on a comprehensive analysis of its overall policy portfolio, as well as an analysis of the needs of the research system in the broadest sense. Others - especially the Ministry of Oil and Energy and the Ministry of Health – considered that RCN should focus its activities on gathering documentation on how the various instruments actually contribute to the promotion of research, rather than on thematic advice, which is an activity done in the Ministry itself. The Ministry of Health expressed little need for advice on priorities because of the characteristics of their sector and the fact that RCN is only one of the channels for research funding.

The Ministry of Oil and Energy requested the detailing of proposals for major initiatives for each Ministry and not just in the overall budget proposal. The Ministry of Health, instead, maintains that they need comprehensive advice on relevant instruments in the whole chain from basic research to innovation, regardless of who is executing / financing. The Ministry of Industry and Trade expressed the same needs.

Both the Ministry of Education and the Ministry of Industry and Trade said that the Research Council's zero-growth budget scenarios are unrealistic. The Ministry of Trade and Industry suggested graded growth proposals - how one should invest given a budget increase of one hundred million, two hundred millions, etc. The Ministry of Education expressed similar wishes and pointed out that it would be an advantage if the budget proposals could be presented more as a menu.

3.1.3 Meetings with the Ministries

RCN employees with responsibility for individual ministries hold formal meetings with them on a semi-annual basis during which all aspects of RCN activities relevant the Ministry are covered. Additional informal meetings are organised. In some cases, for example the Ministry of Trade and Industry, contacts take place on an almost weekly basis. There are also regular meetings between the Research Council's Director General and the Research Department in the Ministry of Education.

In the 2011 document "Knowledge-based advice, tools and meeting places - Policy for RCN's work in the knowledge base"[36], RCN reports that Ministries were in general satisfied with these regular 'dialogue meetings' as arenas for counselling and dialogue. Ministries believe that the formal dialogue arenas work well overall. KD argues that there has been a challenge to get to good agency management meetings, but that this has improved over time. KD also thinks that it would be appropriate to develop a better dialogue at the Intermediate level, including through meetings with the divisions.

Several ministries expressed a wish for an increase in the number of informal discussions, stressing that this is a mutual challenge for the Research Council and the ministries. HOD would appreciate being involved to a greater degree in dialogue arenas where they do not act as funding agency but do however have strong interests.

[36] Kunnskapsbaserte råd, virkemidler og møteplasser - Policy for Forskningsrådets arbeid med kunnskapsgrunnlaget – med fokus på det tverrgående kunnskapsgrunnlaget, RCN, 2011

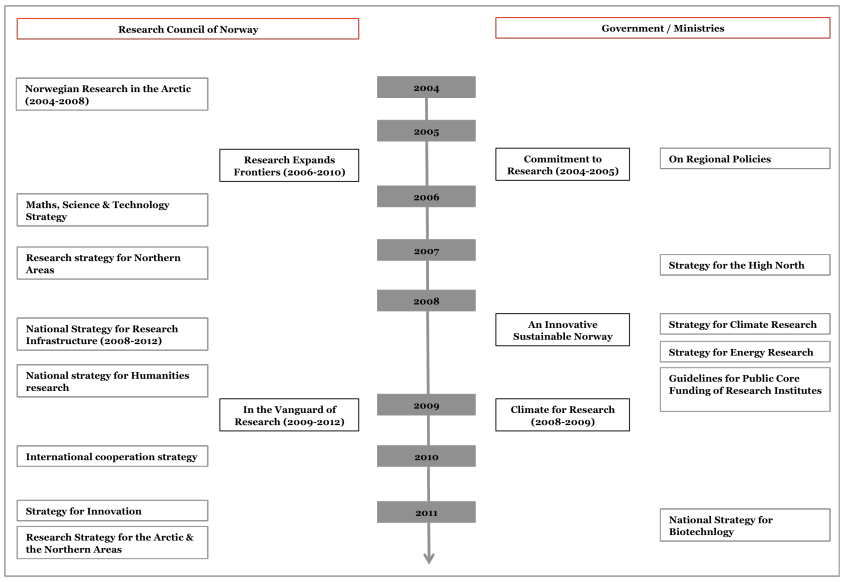
Our own interviews with the Ministries confirm these impressions that different Ministries want different things from the dialogues with RCN and that many Ministries feel that more informal contact would further improve the cooperation between the Ministries and RCN. There seem, however, to be particularly important differences among Ministries in the extent to which they appreciate thematic advice fro RCN and the degree to which they feel RCN's specialists can add value over and above their own internal analyses of thematic and sector needs.

3.2 Advice about White Papers

In this study we are not in a position to second-guess the quality of the strategic advice RCN provides to government. It is often grounded in the research and literatures on research, innovation and the economics of knowledge and backed up with analysis, either externally commissioned or internally performed. Increasingly, in the last 2-3 years, it is also informed by internal analysis of RCN's funding portfolio ('kunnskapsgrunnlaget'), enabled by the use of project funding databases[37]. At the same time, there appear to be significant parts of the advice that are not well justified within the documents where the advice is given – for example, in RCN's contribution to thinking about the last research white paper, discussed below. Given that this kind of detailed advice is embedded in a continuous process of discussion, it is perhaps not surprising that not all the elements are well justified on paper.

Figure 6 is intended to provide an illustration of the interconnectedness of RCN work with policy development in the Ministries. RCN strategies (Research Expands Frontiers and In the Vanguard of Research) are timed to connect with the preparation of the White Papers. Strategy work at RCN provides some of the inputs to national strategy, and in the more recent period RCN has played a role in supporting or providing the secretariats for national-level strategies. It would be naïve – and improper – to expect that RCN should produce a set of ideas that is then translated into policy by the Ministries. However, the evidence is that RCN plays an active and useful role in national research policy debate, consistent with the idea of distributed strategic intelligence discussed at the start of this report.

Figure 6 Some Key Policy Documents in RCN and the Ministries



[37] In our experience, however, more progress needs to be made on cleaning and quality-assuring these data – especially the more historical records

At the more detailed level, a number of clear problem diagnoses can be read in RCN's studies and proposals – such as the recent identification of under-investment in fundamental research in energy and ICT relative to mission-orientated research. Over the longer term, repeated diagnoses of fragmentation within the research community and poor links between universities and industry have been tackled through academic, industrial and environmental centre programmes: SFF; SFI; and FEM.

There is a clear pattern of 'dialogue', too, between RCN research and analysis and government policy, as expressed in the White Papers on research, to which RCN systematically makes substantial inputs. Other important White Papers to which it has contributed include those on innovation, recruitment and research training.

- In its input to the *white paper on innovation policy* the Research Council has emphasised three components in particular: There is a need for long-term instruments that stimulate knowledge investment in industry and promote the transfer of knowledge within the innovation system. There is a need to strengthen infrastructure significantly in order to create satisfactory, efficient and attractive knowledge communities. Public R&D efforts must be increased to promote innovation in companies as well as the public sector, especially within pivotal innovation areas.
- In its input to the *white paper on recruitment and researcher training*, the Research Council has stressed the need for increased recruitment and pointed out that quality and capacity in researcher training must be expanded on the basis of a binding long-term plan. The distribution of growth between the various subject fields should be determined on the basis of needs analyses and reflect national research policy objectives as well as the knowledge challenges facing the private and public sectors. The distribution of funding must take into account that high quality researcher training is resource intensive, and requires adequate infrastructure as well as research communities of a certain size. Smaller research environments would therefore be best served by concentrating their training on a smaller number of disciplines and areas.
- The Research Council was responsible for drawing up the proposal for *regional research funds* that was presented in the white paper on government reform (*Regionale fortrinn – regional framtid* [Regional advantages – Regional future, Norwegian only]). The Council's proposal was submitted in December 2007 and is being circulated for review as an integral part of the white paper. The proposal to introduce regional research funds is designed to foster greater research activity throughout Norway, strengthen the Research Council's presence in the regions and promote the implementation of targeted instruments to increase R&D investment and interaction between important regional players.

We have analysed the 2004-5 research White Paper and RCN's strategy for 2006-9[38], will have been developed in parallel, in order to understand better the interplay between RCN strategy, advice and government policy as expressed in the White Paper.

- Many of the data and analyses used in the White Paper come from NIFU's research and production of indicators for RCN and KD
- The White Paper sets out thematic priorities – largely building on previous ones – and these are exactly mirrored in the strategy
- Based on a meta-analysis of RCN's disciplinary evaluations[39], the White Paper identifies issues of quality and fragmentation in the scientific community. Similarly, the strategy uses the same set of evaluations to focus on the lower publication productivity and bibliometric impact of much Norwegian research

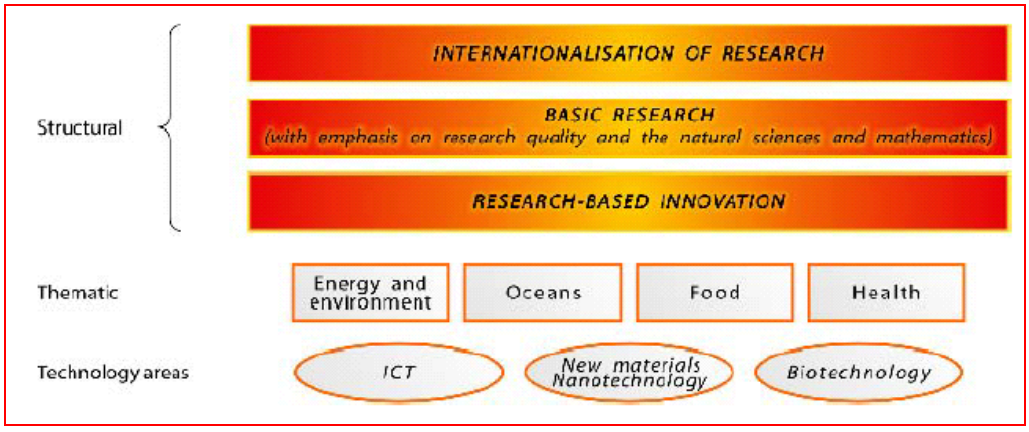
[38] *Forskning flytter grenser – Strategi for Norges Forskningsråd*, undated but valid from 23 March 2006

[39] Brofoss, K.E. (2004): *En gjennomgang av Forskningsrådetsfagevalueringer*. NIFU STEP Arbeidsnotat 7/2004.

compared with that of neighbouring countries and sets out a number of improvement goals
- Similarly, both papers stress the need for increased innovation, focusing on that which involves research and set out a number of funding instruments in use to promote innovation, notably the 'SFI' competence centres recently introduced to RCN's portfolio
- Internationalisation is taken up by the RCN strategy as a single topic. Aspects of internationalisation are incorporated in most parts of the White Paper, since this is together with improved quality in basic research and more innovation set as one of the three structural priorities. It includes: research policy; closer involvement of the ministries in the research policy dialogue with Brussels; active participation in planning the 7th Framework Programme; mutual opening of programmes to researchers from other countries; international recruitment and mobility measures; strengthening bilateral research agreements (especially with N America, China and Japan); exploitation of national natural and information resources; better integration of research into foreign aid policy; and maintaining the strong Norwegian tradition of peace studies. Internationalisation is seen as a way to increase both quality and innovation
- The remaining goal of the strategy – to 'take better care of the talents' is reflected in the White Paper's chapter on researcher careers and recruitment

One of the key achievements of the 2004/5 White Paper was to set and communicate broad priorities – shown in Figure 7. While they were not quantified, they served to structure discussion and inputs to the following White Paper of 2008/9.

Figure 7 Priorities of the 2004/5 White Paper



We have used RCN's input to that White Paper as a convenient case for examining the degree of influence the Council has over national research policy.

RCN produced a collection of policy notes on topics it believed should be treated in the White Paper. These document results of a longer-term dialogue between KD and RCN, in which there is a great deal of informal communication. They are built on RCN's own strategy for 2009-12 *I front for forskningen*. This articulates four challenges for the development of Norwegian research.

- The Capacity and quality challenge [*Kapasitets- og kvalitetsutfordringen*] (competitiveness of the Norwegian research system)
- The social challenge [*Samfunnsutfordringen*] (Research addressing social challenges)
- The structural challenge [*Strukturutfordringen*] (Development of research 'structure' internationalisation)
- The learning challenge [*Læringsutfordringen*] (Research should provide results useful for industry and society as a whole)

RCN aims to increase its input into basic research, internationalisation and industry-oriented research and innovation in these areas. The following are key activities in the strategy[40], which is the 'overarching platform for other RCN strategy documents'

- Increased support to the national theme and technology areas, in particular the global challenges and climate issues
- Increased support to scientific equipment and research infrastructure
- Increased support of thematically independent measures for researchers and industry
- Better conditions to aid internationalisation
- More equal conditions for competiveness in the research system

In its input to the 2008 White Paper, at the overall level RCN advised against an overly detailed specification of research policy that would leave it and the research-performing organisations with little room to play their part in articulating research policy. To the extent that parts of the White Paper specify policy at the level of individual programmes this advice has not been heeded – though KD clearly gives RCN a great deal more strategic freedom than do other ministries. Nor does the White Paper take up the idea of using R&D funding in an anti-cyclical manner, to combat the depressing effects of the economic crisis on R&D expenditures. Table 7 catalogues many of the more specific recommendations RN made and the extent to which they are reflected in the White Paper. (A number of RCN's recommendations appear essentially rhetorical in character. We have omitted these from the analysis.)

Table 7 How RCN strategic advice was reflected in the 2008/9 White Paper

RCN Recommendation	**White Paper**
Set a growth goal for Norwegian R&D: 1% of GDP for government; 2% of GDP for industry, over the very long term	Accepted
Set specific growth goals for: number of researchers and infrastructure; themes and technologies; core funding of universities and institutes	No
Ensure the Research Fund can complement sector-specific strategies so as to create a coherent national research and innovation strategy and long-term stability in public research funding	No
Establish that RCN has a responsibility for increasing business expenditures on R&D	Yes
Focus the national research effort on a combination of bottom-up measures and others aiming to develop areas of national comparative advantage or of opportunity. Set budgetary goals for the national priorities	Extends the list of established national priorities but sets no budgets
Discuss and increase core funding of research institutes	Funding system discussed
Set goals for improved framework conditions and funding for basic research	To set up a committee; no specific measures
University management and strategies need improvement	Accepted but no specific measures
Plan and increase research infrastructure spending; allocate responsibility for basic infrastructure to the research performers	Will earmark Research Fund resources
Change the research infrastructure funding regime from one focused on capital to one that includes operations	Yes
Produce a long-term plan for increased recruitment of researchers	The research performers should make their own plans
Set recruitment targets for research, especially in maths and natural sciences	No
Set clear gender equality goals in research	Mentioned but no quantitative goals
Make researcher careers more attractive	Supports the EU researchers' charter

[40] *I front for forskningen, Strategi for Norges forskningsråd* 2009-2012

RCN Recommendation	White Paper
Allocate the primary role in coordination of national thematic research strategy to RCN	Decision to evaluate RCN
Propose actions for improved coordination of the national research budget and increase the role of the Research Fund in financing across sector (ministry) boundaries	No
Establish 'Cultural preconditions of societal development' as a new national priority	No
Develop a strategy to strengthen research in the humanities	No
Use the combination of core funding systems and competitive project-based funding to develop division of labour within the research system	Evaluate the core funding systems
Fund research performers so as enable them to engage in international competition	Explore full cost principle for universities
Develop clearer strategies for international cooperation based on mainstreaming internationalisation in RCN-funded activities. International research policy should to a greater extent be seen as national research policy.	Agree in principle. No concrete measures. Fragmented list of internationalisation activities
Develop better indicators of the health of the Norwegian research and innovation system	Accepted
Endorse the principles of Open Access	Done
Make greater demands of research performers in relation to dissemination and commercialisation of research results	Done

Sources: *Forskningsrådets innspill til ny forskninsproposisjon* (mimeo), Oslo: RCN, 2008; Det Kongelige Kunnskapsdepartement, *Klima for forskning*, St meld nr 30, 2008-2009

Table 7 suggests both possibilities and limitations in RCN's ability to provide strategic research and innovation policy advice that is implemented by government. As we would expect, as an agency of KD, RCN has greater influence over its parent ministry than others, helping KD articulate and implement its policy through specific instruments such as infrastructure funding. The national research priorities are to a large extent 'emergent' from resource endowments, comparative advantages and sector ministry policies rather than being strongly policy driven, even if Norway is also following the European trend towards emphasising 'grand challenges' that are more societally generated. These broad priorities are clearly sensible, reflecting national interests. RCN has difficulty in adding to or changing them – as is clear from its inability to add a socio-cultural priority to the existing list.

RCN seems to be more able to influence broad, long-term goals (such as the continued pursuit of the Barcelona Goal of investing 3% of GDP in R&D) than short-medium term goals that would involve committing specific ministries to specific budgets. Nor does it appear that KD can influence the other ministries at this level. The sum of 16 ministries' priorities does not necessarily make a coherent whole at the national level. While RCN is better positioned than any other actor to generate the strategic intelligence and interventions needed to give this national coherence, in practice it has too little strategic headroom or budget to do so. Interviewees suggested that this is also partly due to a lack of proactive initiative taking in RCN. Thus, for example, it can identify a deficit in the amount of basic research one for both the ICT and energy sectors but does not have the means to close these gaps by reprioritising resources. Equally, it has limited opportunities to make other parts of policy consistent. For example, in the White Paper there are targets for increasing national investment in R&D but not for recruiting the researchers needed to do this.

Some of these issues are ultimately caused by the lack of a more powerful coordination mechanism in the Norwegian research and innovation governance system. Thus, RCN may suggest system-level interventions to KD but KD does not necessarily have the authority to implement them. Its 'coordinating' role in generating the national research budget remains one of sharing information on research intentions and desired budgets across the ministries. It cannot impose its desires on other ministries; nor can it necessarily allocate budgets to make up systemic deficiencies that arise from the strategies of those other ministries. Nor can it 'ring-fence' the collective research

budgets of all the ministries; each has to negotiate its budget line-by-line with the Finance Ministry, and the research line is as likely as any other to be cut during this process.

The strong sector principle in Norway is indeed a strength. Ministries' sector responsibility for research within their 'sector' of society or their areas of responsibility has five elements[41]

- Maintain an overview of the knowledge needs of the sector
- Long-term responsibility to secure the knowledge the sector itself needs, and by implication the research capacity to produce that knowledge
- Responsibility for securing the knowledge and information needed by the ministry itself, in order to develop policy and perform its regulatory functions
- Responsibility for funding the research needs of the sector
- Responsibility for international research cooperation in the sector

As our five ministry governance cases show [these follow in a separate Work Package], the sector principle results in a high level of interest and responsibility for research in the ministries – an interest that is increasingly well connected to implementation mechanisms at RCN. International experience is that coordination of these diverse interests is most powerful when exercised by a top-level advisory council that includes key figures from government[42]. This appears not to be achievable in the Norwegian system[43].

Recognising this, RCN has started to support strategy processes at the level of individual ministries (see Section 3.3 on the 21-fora) and now at the level of groups of ministries (see the new multi-ministry strategy in biotechnology[44], signed by six ministers, with other strategies to follow, for example relating to nanotechnology). These are not 'RCN strategies' in the sense of RCN being the chief provider of ideas; but they do build on RCN analysis and RCN's role as 'secretariat' while the group of ministries involved becomes a small 'arena' for policymaking within specific themes. In this way, RCN has assumed a variable-geometry policy coordination role that underpins the development of national strategies.

This still leaves a coordination gap in that the sum of the individual strategies does not necessarily make a coherent whole. In particular, because other ministries pursue mission-orientated research goals while KD funds basic research largely bottom-up via researcher-initiated projects, there can be a mismatch in building fundamental research capacity that need to be resolved either by increasing mission ministries' ability to fund this more fundamental work or (preferably) by increasing the freedom and ability of KD and RCN together to fund capacity-building in needed areas over the longer term.

3.3 National Research Strategies

3.3.1 The 21-fora

RCN has started also to support strategy development processes that have been launched at the ministry level in the form of industry-led strategy development initiatives. These '21' strategies (so far in oil and gas, alternative energy, climate, maritime and oceans) have not been launched by RCN but by the responsible

[41] St meld nr 20, *Vilje til forsknings*, 2004-5, p43

[42] Erik Arnold and Gernot Hutschenreiter, *Chile's National Innovation Council for Competitiveness: Interim Assessment and Outlook*, Paris: OECD, 2009

[43] Svend Otto Remøe, 'Governing fragmentation: the case of Norway', in OECD, *Governance of Inovation Systems, Vol 2 Case Studies in Innovation Policy,* Paris: OECD, 2007n

[44] *Nasjonal strategi for bioteknologi: For framtidas verdiskaping, helse og miljø*, Strategi 2011-2012, Oslo: Kunnskapsdepartementet, 2012

ministries. RCN typically hosts the forum secretariat. These '21' fora have a continuing life as advisory councils comprising industrial representatives who advise the ministry on research needs and strategy. In principle, they influence RCN strategy through the steering signals the ministries provide to RCN.

The Ministry of Oil and Energy launched the model for such strategy development stakeholder groupings, commonly called the '21-fora', in 2001 with the OG21 initiative. It currently 'governs' 2 of these 21-fora: Energi21 and OG21.

OG21 - oil and gas in the 21 century is a Task Force established to help the petroleum industry to formulate a national technology strategy for added value and competitive advantage in the oil and gas industry. The objective is to develop a more co-ordinated and focused approach to research and development throughout the oil and gas industry. The initiative has received strong support from the industry.

In the OG 21 national strategy for increased value creation in the petroleum sector, oil companies, service industry, research institutes and the government identified priority areas for technology development and collaboration. Funding for research reflecting the identified priority areas and contributing to the achievement of the strategy's objectives is predominantly organised through the RCN programmes DEMO 2000 and Petromaks. The strategy was revised by the group in 2010, in response to the growing maturity of oil and gas exploitation, especially in the North Sea, and the need to meet the new physical and environmental challenges, especially of the North of Norway.

The **Energi21** initiative, launched in 2007, was a platform for stakeholders in the energy sector that aimed to design a broad-based, collective R&D strategy for the sector. The industry-led strategic committee consisted of 16 members from industry, the research community and the authorities; RCN served as committee secretariat. The strategic committee received input from six targeted sub-committees, each of which dealt with specific topics and then presented a report containing its recommendations. A number of dialogue meetings were held with industry and research groups during the process.

The first strategy, issued in 2008, unified for the first time energy stakeholders behind a shared vision and R&D strategy. Although the strategy was built on industry priorities, it also stressed closer collaboration between the authorities, trade and industry and other players in the research arena. [45]

In 2011, the strategy was revised at the request of the Ministry of Petroleum and Energy as part of the effort to boost value creation, facilitate energy restructuring with the development of new technology and cultivate internationally competitive expertise. It identified six priority focus areas: solar cells; offshore wind power; utilisation of resources using balance power; flexible energy systems – smart grids; conversion of low-grade heat into electricity; and carbon capture and storage (CCS).

The 2011 Energi21 strategy recommended increasing public funding for RD&D activities in the six priority focus areas by a total of NOK 820 million, to be allocated via the Research Council of Norway, Enova, and Innovation Norway. This included

- The establishment of a new Centre for Environment-friendly Energy Research (FME) on flexible energy systems of the future under the Research Council's centre funding scheme.
- An increase in annual allocations to the Research Council's Large-scale Programme on Clean Energy for the Future (RENERGI) and Norwegian RD&D CCS programme (CLIMIT)
- The allocation of NOK 300 million in new funding to Enova for support for testing and demonstration facilities

[45] Energi21 - A collective R&D strategy for the energy sector, Final report, 2008

- Continuing the allocation of NOK 250 million to Innovation Norway for its funding scheme for environmental technology.

Klima21 is a forum for strategic cooperation on climate and environmental research, modelled on the OG21 and Energi21 initiatives, It was established in 2008 by the Norwegian Government as part of the follow-up of the broad-based political agreement on climate policy reached in the Norwegian Storting, which aims to make Norway carbon-neutral by 2030. The forum falls under the responsibility of the Ministry of Education and Research.

The forum's objectives are to draw up a cohesive strategy for Norwegian climate research and to facilitate the application of research findings in a manner beneficial to society. It comprises representatives of research institutions, environmental organisations, public agencies and business and industry. Activities are organised under a central steering group with four working groups dealing with separate areas.

Also in 2008, the Ministry of Trade and Industry launched the **Maritime 21** forum with the objective to develop a maritime research and innovation strategy. The Norwegian maritime industry conducted six workshops across the country collecting comments from around 400 people in more than 100 companies. The results were handed over to the Norwegian trade and industry minister in 2010 in the Maritime 21 strategy report. A goal of the new strategy is to increase the impact of RCN-funded research by supporting a few large projects, rather than a large number of small ones.

In 2011, the Minister for Fisheries and Coastal Affairs launched the first multi-ministry 21-forum, **HAV21**. It invited representatives from the industry, the administrative authorities and the knowledge community to help work on a strategy that should structure and manage the overall marine research effort and provide key input to the Ministry's new White Paper on Seafood, due for publishing in Spring 2013. The Ministry formulated the mandate for the steering group and its composition together with seven other involved ministries, amongst which the Ministry of Industry and Trade and the Ministry of Health. The Research Council will act as the secretariat for this work.

3.3.2 Generic Technologies

The 2007/8 White Paper identified three generic technologies, for which Norway should develop national strategies: biotechnology; nanotechnology; and ICT, of which the first two have now been written. Moving to the generic technology level – as opposed to an industrial branch, ministry mission or grand societal challenge approach, which are the impulses behind the national priorities set out in the White Paper – requires a high degree of horizontal coordination. Ten ministers signed the nanotechnology strategy. Six ministers signed the biotechnology one.

These national strategies build on Large Programmes funded via RCN over the preceding ten years and specific background reports (*kunnskapsgrunnlag*) produced by RCN. In the nanotechnology case, RCN had already developed a strategy in 2006. RCN provided the secretariat for the strategies, which were developed at the level of the ministries. They effectively guide not only RCN's implementation of policy but also policy creation at the level of the ministries. This is an important change and represents a much firmer commitment to coordination than has been possible in the past that should result in better coordination of the instructions the ministries give to RCN.

3.4 Findings

The community of people in Norway that is involved in research and innovation policy is small and highly networked. This means many decisions are effectively made in consensus – but it also makes it very hard to attribute credit or blame for new ideas coming into policy. In effect, RCN plays an important role as a co-operator in the production of strategic intelligence and policy. Since it does not work at the political level of the ministries and since – despite being uniquely well positioned to generate

intelligence and advice – it does not have a monopoly of knowledge, it would be odd if it were otherwise.

The annual budget proposals are argued to be a key source of advice to government and RCN has devoted considerable efforts through the decades to improving them. They result from 16 intimate, parallel dialogues between RCN and the ministries and involve increasing levels of detail, not only in the budget proposals themselves but also increasingly in the outline proposals sent to the ministries a year in advance, the Strategic Priorities proposal. Ministries' needs of, and attitudes to RCN differ widely, not least in the degree to which they need or value RCN advice. It is very complex for RCN to handle this diversity – it therefore acts case by case. Especially from 2008 onwards, the reality of an increasing number of cross-sector programmes and initiatives makes making clarity in the communication at the Ministry level an arduous task.. At the same time, RCN has succeeded in signing up more and more ministries to a declining number of common programmes, so it clearly is able to set or exploit cross-ministry agendas and find synergies in R&D funding.

At the level of national policy, RCN is a big and active participant in a debate that involves many other actors in addition. Its influence is never decisive, and it is hard to attribute impacts on policy in a system where everyone talks constantly to everyone else and where people are increasingly mobile between RCN and other agencies, Ministries and 'think tanks' like NIFU.

However, RCN advice on national policy tends to reflect the fragmented nature of its dialogue with the ministries. It sometimes produces proposals orthogonal to the contents of those discussions but there is not a clear whole-system vision from which RCN generates such advice. We argue that this results at least in part from decentralising the production of strategic intelligence within RCN to the divisions. It appears that RCN would benefit from having a central strategy group tasked with strategic intelligence and advice generation that is separate from the 'line' activities and – crucially – independent of the ministries in the sense that it can tackle issues outside the remit or interests of individual ministries and provide advice that may even contradict the wishes of an individual ministry.

RCN's ability to 'sell' individual programmes to multiple ministries is an important (if labour-intensive) form of coordination. The ministries themselves show signs of coordinating specific strategies, such as those for generic technologies. In these cases, RCN aims to contribute strategic intelligence and secretariat support to the process of developing strategy. We argue that RCN coordination from 'below' to a degree complements inter-ministry coordination from 'above', which is beginning to happen in a growing number of themes. (In other words, the system is itself evolving to cope with the coordination deficit at the highest level.)

At the government level, the sector principle is very valuable. It ensures that RCN at least takes care of the needs of the sectors. While KD has responsibility for coordinating research (not innovation) policy, in practice it has limited authority. A consequence is that there is only in a limited sense a national strategy – that is the strategy that KD can negotiate with the other ministries during the White Paper and budget processes. There is no mechanism for creating a view that goes beyond the individual ministry views or the sum of ministry views where they choose to develop national strategies together, eg in bio- and nano-technology.

This is increasingly problematic as the *locus* of research policymaking in Europe shifts towards Brussels – something that actually **increases** the need for clear national strategy. Norway's inability to prioritise means, for example, that it participated in most ERA-NETs and is doing so in **all** the JPIs.

4. Advice to the Research Actors

In a strict sense, RCN barely provides 'advice' to the research performing organisations in Norway. It does provide strategic intelligence in the form of the field evaluations and its strategic responsibility for the research institutes means that it should in a certain sense 'advise' them. (In practice, it no longer does this – as we discuss in the next Chapter of this report).

However, RCN does provide implicit advice through programming. Programmes effectively inform research performers that specific themes have higher priority than others and that particular structures such as Centres are better than others – at least from the perspective of RCN.

In this Chapter we briefly look into feedback on the effects of RCN funding priorities on their research activities and the research system as such. We cover this topic in more depth in the report for WP3 where we look into the added value of RCN's activities as well as in the in the composition analysis in the WP4 report.

4.1 Governance of the research system

In the beginning of the 2000s, Norwegian policy-makers started tackling systemic failures in the RD&I system, such as fragmentation of research and lack of co-operation within and among the Higher Education (HEI) and institutes sector, as well as an overall need to raise the quality in research and enhance critical mass.

Evaluation studies repeatedly pointed to

- A lack of critical mass. The research system is small in aggregate, lacking many research groups and scientific disciplines large enough to have significant international impact. This problem is increasingly acute as the European Research Area develops, involving efforts to build and strengthen critical masses in research at the European scale. A relatively low production of scientific publications may also be an issue
- A lack of mobility, leading to scientific inbreeding. The lack of mobility of researchers is not helped by the rather traditional way research education is organised. Levels of networking and collaboration have been low within the Norwegian research community and the average age of researchers has become rather high
- Fragmented relationships in the national research system, with higher education institutions operating in traditional ways, often separately from the research institutes, and with limited input or interaction with Norwegian or international industry.

The Norwegian government tackled these systemic issues through two major policy interventions: on the one hand, the public research actors were granted a higher level of autonomy; on the other hand, funding was increasingly set in the context of open competition.

Governance autonomy

Mirroring policy developments in other European countries, governance autonomy of the actors in the Norwegian system was considered a crucial tool for its modernisation and its ability to respond strategically to contextual changes and pressures. This implied a change in the relationship between the HEI sector and the government. Government maintained its ability to influence research directions, steer the research base to align with policy priorities, and ensure performance through the introduction of a new more competitive funding model and shifting the balance towards more performance-related and mission-oriented funding. More open competition for funding based on quality and relevance was expected to lead to a more 'dynamic'

division of labour in the research system. A key objective was to ensure effectiveness and efficiency of the two sectors in fulfilling their roles in the education and research system.

The 2002 Quality Reform of the Higher Education Sector introduced significant changes in the governance system of the HEI sector in Norway. The reform granted the HEIs more autonomy (e.g. for the use and internal distribution of their public funding) and tackled quality in teaching and research by introducing a performance-based funding model (PBRF), fully implemented in 2006. Key objectives were to boost excellence in research and act as an incentive for the HE sector to look for external funding.

A similar model was piloted also for the research institutes sector in 2009, in the context of a broader intervention revising the overall funding model. We discussed this in Section 5.2.

The Performance-based Funding Model for the Universities

The new public funding model[46] for universities and university colleges constituted a move towards more performance- and strategy-based funding. The model split public funding for the HEI sector into 3 components: a 'basic component' or block funding, an education component, and a research component.

The block funding accounted for 60% of the direct government funding in 2007. It ensures stability in the supply of resources and allows for the implementation of specific policy priorities. It is based on incremental changes to historically set levels and, in line with the increase in autonomous decision right for the HEI, there are no detailed specifications to its use. The funding is mainly regulated on the basis of actual activity and covers rent expenses and other basic costs depending on the structural differences between the institutions.

Quality and efficiency in teaching is the focus of the teaching component, accounting for 25% of the direct government funding in 2007. Funds are distributed on the basis of reported student performance, i.e. the number of completed credits and the number of incoming and outgoing exchange students. The budget is 'open' for each institution, i.e. incremental changes are dependent on increase in performance.

Finally, the research component was to enhance quality and cooperation in research. It is divided into a strategic and performance-based component, respectively with a 5% and 10% share in the direct government funding in 2007.

- The *strategy component* is used to fund strategic initiatives in the institutions: earmarked funds are allocated for capacity building in PhD education and scientific equipment.
- The *performance-based component* has a fixed annual volume at the level of the sector as a whole. Distribution is based on a benchmarking of the institutions' performance in relation to the number of PhD students and publication points (each accounting for 3% of the government funding in 2007) and the level of public competitive funding (from RCN and from the EU – 2% each in 2007). Funds are allocated and reallocated annually, since 2006 based on the performance in the year before the fiscal year in order to ensure a clear financial incentive to changes in performance.

The publication indicator covers all disciplines and all scholarly publication forms. A weighting system was introduced to take into account field-specific publication patterns as well as foster publications in high-quality publication channels. There are two dimensions in the weighting system: on the one hand, three main publication

[46] Main source: Evaluering av finansieringssystemet for universiteter og høyskoler, Econ Pöyry AS, Rapport 2008-133,

types are defined and given a different weight (articles in ISSN-titles, articles in books –ISBN, and books – ISBN). On the other hand, the publication channels are divided in two levels; the highest quality level (level 2) consists of publication channels that are regarded as the leading and most prestigious ones in their field by the scientists themselves.[47]

Followed up by other legislative interventions such as the 2005 Act relating to Universities and University Colleges, the Government Acts enhanced the institutions' responsibility for the strategic management of research and granted these public institutions rights to commercially exploit intellectual property developed by their institutes. The Acts also mandated that the universities facilitate research-based innovation through the licensing of technology and spinning off new enterprises. Starting in 2004, the universities responded by establishing TTOs, in some cases jointly with university colleges and other institutions. These include the NTNU Technology Transfer of the Norwegian University of Science and Technology and St. Olavs Hospital; Bergen Teknologioverføring (BTO) founded by the University of Bergen, Haukeland University Hospital, and the Institute of Marine Research; Norinnova Technology Transfer AS (NTT)., a subsidiary of Norut AS, of which the University of Tromsø is the largest shareholder; Prekubator Technology Transfer Office owned by the University of Stavanger (UiS), International Research Institute of Stavanger (IRIS), Nofima, Stavanger University Hospital (SUS), Bioforsk and Rogaland Science and Innovation Park; and Inven2, the TTO of the University of Oslo and Oslo University Hospital.

As a consequence of these policy interventions, universities and colleges started devoting more attention to commercialising research results and cooperating with business and industry, thus to some extent entering an area that was formerly dominated by the institute sector. At the same time, many institutes were to a greater extent reliant on the project and contract market and increasingly were to compete for their R&D funding – nationally and internationally. Norway opted not to have a Danish-style forced merger between the government laboratories and the universities, although there is some merger activity taking place on a voluntary basis, through mergers among the food research institutes and a merger between certain institutes and Oslo University College.

Fragmentation of the research system

Fragmentation of the research and innovation system remained an issue throughout the decade and is discussed repeatedly in the Government White Papers, in particular following the 2004 Brofoss meta-evaluation [48].

The 2005 White Paper[49] called for the creation of conditions to foster cooperation between universities, colleges and research institutes and suggested that universities seek cooperation with existing research institutes rather than establishing new institutes themselves. In its 2008 White Paper Climate for Research[50], the Government opted for a 'bottom-up' restructuring of the research system, adopting open competition for funding based on quality and relevance as main strategy. The Government considered,

> *The structure of cooperation and division of labour in the research system must largely be shaped by means of competition and a market for research, and not through a predetermined plan. The competition*

[47] G. Sivertsen, *A performance indicator based on complete data for the scientific output at research institutions*, NIFU-Step, ISSI Newsletter Vol. 6 nr. 1, March 2010

[48] Brofoss *En gjennomgang av Forskningsrådets fagevalueringer*, NIFU-STEP Arbeidsnotat 7/2004

[49] Vilje til forskning, St.meld. nr. 20 (2004–2005), Utdannings og forskningsdepartementet, Oslo: 2005

[50] Klima for forskning, St.meld. nr. 30 (2008–2009), Kunnskapsdepartementet, Oslo: 2009

> *principle recognizes that the research system consists of many independent organisations that primarily need to be managed indirectly through participation in the different competition venues.*

In its 2009 Strategy Paper[51], RCN considered that the strategy of open competition assumed that it worked to guarantee equivalent conditions of competition in the research system, adequate state support and an incentive structure that supports the features proper to the different institutional typologies. It considered

> *In some areas it is desirable to create an appropriate concentration and specialisation from a national and international perspective. In these areas, more targeted initiatives are needed that can collect resources around specific topics. Centre and programme initiatives and increased size of individual project funding are to ensure the necessary concentration and international visibility.*

While this focus on concentration at the national level is orthodox in science policy, it runs counter to aspects of regional policy. Norway has a strong commitment to settlement, educational, research and industrial capacity throughout the country. RCN therefore finds itself at once promoting national-scale critical mass and supporting the operation of the new regional research funds.

4.2 Steering through incentives

In the context of the Norwegian research and innovation governance system, RCN's influence and contribution to development of the research and innovation system is therefore predominantly indirect, i.e. by means of competitive funding.

In the 2008 White Paper Climate for Research[52], the Government said that RCN was to play a key strategic role in the restructuring of the system. The Government stated, "Better quality, concentration, coordination, and reorganisation of Norwegian research should primarily be a *result* of the Research Council organised competitions."

RCN had already launched various initiatives and new instruments aiming to trigger changes in the research system structure and behavioural patterns. The most often quoted among these instruments are the Centres of Excellence (SFF) and Centres for Innovation (SFI) as well as the Large-scale programmes, which were intended to enhance collaboration between institutions and scientific disciplines. Another programme quoted by interviewees is the Research Infrastructures programme where the funding criteria forced the set-up of national consortia; interviewees also mentioned the increased grant sizes and funding of collaborative research.

The SFF evaluation[53] found that the scheme successfully promoted researcher recruitment, internationalisation and collaboration in research. The need to create a formal centre combined with the long-term funding meant the research groups involved gained critical mass and visibility, allowing them better access to additional funding. There was a significant and positive impact on university research management; the effect was smaller at the institutes involved, whose research management practices are already more developed than those of the universities. On our reading of the evaluation, the SFFs have had a significant structuring effect that should reduce fragmentation and enforce a better division of labour within the Norwegian research system.

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[51] In the Vanguard of Research - Strategy for the Research Council of Norway 2009 –2012, RCN, 2009

[52] Klima for forskning, St.meld. nr. 30 (2008–2009), Kunnskapsdepartementet, Oslo: 2009

[53] Liv Langfeldt, Siri Borstad Borlaug, Magnus Gulbrandsen and Hebe Gunnes, *SFF Norwegian Centre of Excellence: Evaliation of Added Value and Financial Aspects*, Oslo: RCN, 2010

The mid-term SFI evaluation[54] says that the centres are generally successful in meeting their objectives. However, just as in other countries, the universities need to go through a significant learning process in order to deal with internal competence centres. This includes allowing the centres to establish clearer identities, better communication (in English) and to be allowed more autonomy by the universities, which tended to regard them as projects rather than as groups with their own identity.

Our interviewees mentioned sustainable effects of these programmes and instruments on research practice and research management– in addition to effects of the research priorities in the programmes on the research directions in their institutions. These programmes and instruments fostered a change in behaviour towards more collaboration in research, within and among the institutions. The Centres were considered to start having effects in relation to an increased horizontal collaboration within the universities; the research infrastructures programme forced universities to collaborate which led to the creation of longer-term networks for collaboration; the bigger research projects drove the trend towards bigger research groups; the strong incentives linked to internationalisation spurred the institutions to set up international collaboration networks. These effects are broadly confirmed in the composition analysis reported in the WP4 report.

The scientific discipline evaluations very often provided recommendations related to systemic failures and have had encouraged the universities increasingly to recognise the importance of research management. One interviewee argued that SFF and YFF have had an indirect effect on expectations about the expected abilities of researchers. These programmes make greater demands on candidates' skills – no longer uniquely focusing on scientific capacity but now also requiring communication skills, the ability to write proposals and to communicate scientific results.

Research actors responding to the survey complemented this input from the interviewees, giving a very positive view of the effects of RCN-funded activities on their personal skills and capabilities, research practice and strategy in their research groups and the research system as a whole.

- Effects included the improvement of research and innovation capabilities, with strong impacts on the researchers' career, as well as improvement of research and innovation management skills
- RCN activities allowed the research groups to explore new research areas that they said were "of significant importance for their future research or innovation activities" and half of respondents claimed that there had been effects on the constitution of a new research group as a result of their project. RCN funding also influenced internal research practice, fostering a change towards larger collaborative projects
- Effects related to internationalisation were slightly more modest and included a strengthening of long-term international cooperation links and improvements of international standing and excellence

A large proportion of respondents said that RCN schemes constitute an integral component of their units' strategic activities and that RCN research and innovation programmes influence the focus of universities' and other research performers' strategies, supporting the development of new research and innovation capacity.

The respondents also confirmed the effect of enhanced collaborations in research. Half of the respondents agreed that RCN facilitates the creation of partnerships between the research/higher education sector and industry; a third saw similar effects in relation to the public sector.

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[54] Per Stenius and others, *Mid-way Evaluation of Centres for Research-Based Innovation (SFI),* Oslo: RCN, 2010

4.3 Findings

RCN and others have identified needs for structural change in the research system, notably to tackle fragmentation, lack of mobility and the need for greater internationalisation. Government policy has been to make the research performing organisations more autonomous. Hence, the 'advice;' that RCN can give them has to be given at least in part through providing incentives. The three Centres programmes (SFF, SFI and FME) provide clear signals about building critical mass, training researchers and better international exposure. Other measures such as the research infrastructure plans developed in 2006 and subsequently similarly promote de-fragmentation and a better division of labour in the research system. More generally, RCN influences research performers through its thematic and non-thematic programmes.

5. RCN's handling of the research institute sector

In relation to its strategic responsibility for the research institutes, RCN considers itself as a 'dialogue' partner for the institutes but focuses its activities specifically geared towards the institute sector predominantly on the steering of framework conditions via the institute PBRF. In this section, we first address RCN's mandate in relation to the institutes. Next we look at the new funding system in the form of the institute PBRF and the Strategic Programmes. We then look at RCN's other activities in relation to the institutes and how the stakeholders view these. Finally we compare key aspects of the Norwegian system of funding and governance for research institutes with those in four other countries.

5.1 RCN's mandate

The statutes of the Research Council of Norway indicate that one of RCN's main tasks is to work to achieve a constructive distribution of tasks and cooperation among research–performing institutions and to take strategic responsibility for the research institute sector. It is not further specified what exactly this 'strategic responsibility' entails.

In the 2005 White Paper[55], the Government asked RCN to clarify its strategic role and responsibilities towards the research institutes. It also advocated a strengthening of the role of RCN: the Research Council was to have greater "latitude" to fulfil its strategic responsibilities. The Government considered that there had to be a "correlation between the formal responsibility and opportunities to take this responsibility through concrete measures."

Part of RCN's mandate for the research institutes was to ensure that they provide high-quality research and constitute an effective and appropriate part of the Norwegian research and innovation system. It was to help ensuring that the institutes provided support to government, industry and 'community life' and it was to contribute to an increased internationalisation of the institute sector. Institutional funding and public competitive funding were to act as complementary instruments for support to the research system. Through the allocation of the institutional funding, the Research Council was to contribute to long-term capacity building and the revitalisation of the national priority areas; it was to ensure that the other instruments provided a competitive arena for fostering the quality and relevance of the research and a 'dynamic' division of labour. The 2005 White Paper[56] considered that RCN's strategic responsibility also involved designing sectoral, interdisciplinary initiatives, cooperation and division of labour between the institutions, and the cooperation between institutes and universities and university colleges.

In its proposal for the revision of the institutional funding system[57], RCN considered that the new institutional funding (PBRF) model clearly positioned its responsibilities for the institutes sector within the context of the institutes' total funding and financing system. It was no longer responsible for evaluating the institutes' individual performances and administering the SIPs, as was previously the case. It saw its role as indicator-based monitoring of the institutes' performance and assessment of the knowledge related to challenges in broad specific sector areas, making the necessary interventions whenever needed through the Strategic Initiatives. Most important, it

[55] Vilje til forskning, St.meld. nr. 20 (2004–2005), Utdannings og forskningsdepartementet, Oslo: 2005

[56] Vilje til forskning, St.meld. nr. 20 (2004–2005), Utdannings og forskningsdepartementet, Oslo: 2005

[57] Nytt basisfinansierings- system for instituttsektoren - Forslag fra Norges forskningsråd, oktober 2006

saw its role as defining an appropriate mix of policy initiatives (at institutional and national level) and in promoting a unified policy for the institute sector.

The New Guidelines themselves[58] list the "administrative responsibility" of RCN as a set of administrative tasks related to the new institutional funding system

- To follow up and ensure that the institutes that receive basic funding, meet the basic requirements
- To take the necessary steps to ensure that funds are used in accordance with the purpose and the applicable rules
- To require separate accounting for the use of basic funding, and require that the accounts should be documented so that there is no cross-subsidization from core funding to the institute's economic activity
- To demand that all public expenses (rent, scientific equipment, administrative overhead costs, etc.) be fully distributed between the economic and the non-economic activity, so that economic activity covers all variable costs related to the economic activity and a proportionate share of the department's fixed costs

In the 2010 Overview report on the research institutes[59], NIFU detailed the responsibilities of RCN as

- To ensure that the institutes provide high-quality research and constitute an effective part of the Norwegian research and innovation system
- To help ensuring that the institutes provide support to government, industry and community life
- To contribute to increased internationalisation of the institutes
- To provide general policy advice and recommendations to the ministries. The Council shall propose an annual budget for the departments and provide advice on which research institutes should be in or out of the scheme.
- To collect and ensure the quality of annual figures for the ministries as the basis for the basic funding
- To conduct other performance assessments and report on developments in the sector

The research institutes show very different levels of dependence on government funding, depending on their 'mission' in the system. Industry contracts and research on the international markets take up different shares in the overall R&D funding. Figure 8 shows that in 2009

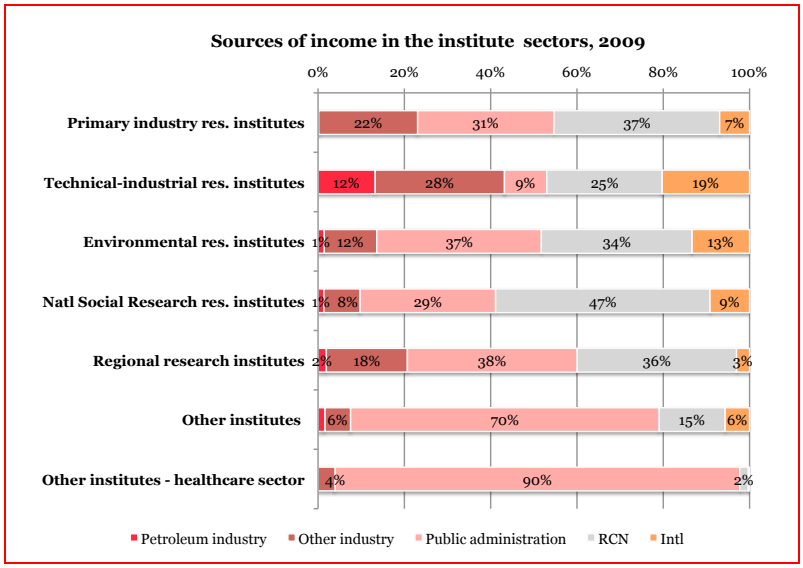
- *Primary industry institutes* are heavily funded by ministries, in particular the Agriculture & Food and Fisheries ones. One fifth of the R&D expenses (20%) is covered by industry
- More than 40% of research in the *technical-industrial institutes* is commissioned by industry, the petroleum industry sector accounting for 12%. These institutes also successfully operate in the international market (20% of their funding)
- *Environmental institutes* mainly deliver expertise, advice and assistance to the public sector, in particular the Ministry of Environment. Industry contracts and international research account for about 15% of their funding
- The *social science institutes* are strongly focused on the public sector (75% of the funding); the *regional ones* have a strong link also to the industry (20% of the funding)
- The *other institutes* rely heavily on government funding (85% of the total). The ones targeting sectors other than healthcare have 6% of their expenses covered by industry

[58] Retningslinjer for statlig basisfinansiering av forskningsinstitutter, Fastsatt ved Kongelig resolusjon av 19. desember 2008

[59] Årsrapport 2010 Forskningsinstituttene - Samlerapport, Norges forskningsråd, 2011

In the last decade, R&D in the research institutes subject to the New Guidelines was to an increasing extent funded through commissioned research and research-based services, while the share of core funding has decreased.

Figure 8 Sources of income in the institute sectors, 2009



Note: the 'thematic' institute categories include data on expenditures in research institutes subject to the Guidelines only. 'Other institutes' therefore includes data for the other research institutes and for the institutes 'with research', with exception of the institutes in the healthcare sector (excluding university hospitals) which are depicted separately
Source: NIFU R&D statistics, 2011

5.2 Restructuring the research institute sector

The 2005 White Paper[60] stated that one of the Government's prime objectives was to maintain a strong institute sector that could provide business, industry and the public sector with relevant knowledge and research services at an internationally competitive level. One of the measures to achieve this objective was the creation of conditions to foster cooperation between universities, colleges and research institutes. It launched a revision of the funding mechanism, opting for a partly performance-based model and putting RCN in charge of the development of a proposal. The intention was to tackle what was considered to be a 'fragmentation' of institutional funding[61], where the ministries used different funding channels (through RCN or direct) and rules to fund the institutes within their sectors.

Institutional funding was previously based on history and judgment within the annual budget process. There was no competition for core funds but through RCN it was possible to obtain Strategic Institute Project funding, intended to build capacity. However, these SIP projects were small and were awarded in competition. Often an institute would receive funding from multiple ministries; in the case of the Social Research institutes, 4 of the 7 funding ministries provided core funding directly to the institutes while the other 3 channelled it through RCN. Some ministries also earmarked the institutional funding channelled through RCN, providing detailed

[60] Vilje til forskning, St.meld. nr. 20 (2004–2005), Utdannings og forskningsdepartementet, Oslo: 2005

[61] A common overall framework for governmental core funding of institutes has been in place since 1993. Institutional funding was based on a two-tier system: part of the funding was a core grant, decided upon based on historical facts and judgement, and part was funding for strategic institutional programmes (SIP), based on competition.

guidance. The White Paper considered that this lack of uniformity hindered a "comprehensive and satisfactory" fulfilment of RCN's strategic responsibility for the institute sector and referred to a conclusion of the 2001 evaluation of RCN stating that the Council was not given room to fulfil its strategic responsibility for the institutes sector.

The new *Guidelines for the public institutional funding of the research institutes*[62] aiming to introduce a more coherent, partially performance-based (PBRF) funding model for all research institutes were approved by Royal Decree of 19 December 2008, and introduced in 2009. The new model confirmed the preceding dual-tier system of basic funding plus separate funding for strategic institutional programmes. RCN introduced the PBRF in two steps: a pilot phase from 2009 to 2011; followed by decision-making on the final system after an evaluation (which was in progress at the time of writing this report).

In its final guidelines, the Government said the purpose of the institutional funding was "to ensure strong independent institutes that can offer private and public sectors relevant expertise and research services of high international quality". *Core funds* were to be used for the development of long-term knowledge and expertise, including

- Multi-year and long-term research projects that are expected to be of future importance to the institute's users and support the institute's objectives and strategy
- Networking / internationalisation, skills development and training of the research staff
- Quality assurance of research results
- Publication and dissemination
- Development of their own competence, including doctoral degree programmes related to research in the institute's area of activity

A key principle guiding the model is that the funding for the different institute sectors was to be defined based on their 'market' realities and – most importantly, their function in society (e.g. their strategic importance for government services). A first step in the process for the development of the new funding guidelines was therefore the definition of the 'competition arenas'. This principle guides all components of the institutional funding system, including the core funding, the part determined by the PBRF, and the level of funding for the strategic initiatives.

The competition arenas

The research institutes sector in Norway comprises a varied group of private and (semi)-public institutes. The common denominator is that they perform R&D on a non-commercial basis and are legally outside of the Higher Education system. They provide services to industry and public administration. From a governance perspective, no distinction is made between 'independent' private and semi-public institutes and public research institutes – including in relation to the public funding.

An important element of RCN's proposal for the revision of the institute funding system[63] was the review of the categorisation and grouping of these institutes. This was triggered by the fact that the institutes would compete for the PBRF-determined part of their funding. In order to ensure fairness in this competition, more homogenous 'competition arenas' were to be defined.

In its proposal for the new guidelines, RCN mentions that initially, it suggested three 'thematic' arenas: one for technical and industrial institutes, one for social science

[62] *Retningslinjer for statlig basisfinansiering av forskningsinstitutter, Fastsatt ved Kongelig resolusjon av 19. desember* 2008

[63] Nytt basisfinansierings- system for instituttsektoren - Forslag fra Norges forskningsråd, oktober 2006

research institutes and one for institutes focusing on research related to natural resources and environment.

Opposition from the ministries, in particular in relation to the third arena, led to the final decision of four competition arenas adopting sectoral criteria. The proposed arena for 'natural resources and environment' was split into one for the environmental institutes and another one for the 'primary industry' institutes, the latter with joint funding responsibilities of the Ministry of Agriculture and Food and the Ministry of Fisheries and Coasts. The regional institutes were pt into the same arena as the Social Sciences institutes, under the funding responsibility of the Ministry of Education. The Ministry of Industry and Trade has funding responsibility for the technical/industrial institutes.

The 'funding responsibilities' for the competition arenas attributed to specific Ministries applies only for the core funding. The Ministry of Environment, for example, funds strategic institutional programmes also in Bioforsk (a primary institute), while the Transport Research Institute (an environmental institute) receives funding for its strategic institutional programmes from the Ministry of Transport.

The 'sector' categorisation of the research institutes implied that some institutes (the SINTEF Foundation and the Northern Research Institute) have divisions belonging to different arenas.

There can be big differences among the institutes within a single arena - in terms of level of financing structures, relationship to government agencies and industry, and characteristics of the research. Table 8 shows the composition of the competition arenas applying the international categorisation criteria of RTOs serving the industry sector, government labs serving the public sector, and 'scientific institutes' with no specific key focus. This categorisation was based upon data the data provided in the 2010 annual reports of the institute sectors[64].

Table 8 Categorisation of the research institutes

Sub-sector	Government Labs	RTOs	Scientific Institutes	Grand Total
Environmental	5		2	7
Primary Industry	7	1	1	9
Social Science – Nat'l	10	2	4	16
Regional Institutes	8	2	2	12
Technical-Industrial	2	8	2	12
Health	1			1
Grand Total	33	13	11	57

The funding model

The principle of sectoral characteristics guiding the new funding model implied the definition of sector-specific limits and percentages for all components of the institutional funding.

- A *maximum level of institutional funding* is defined based on a percentage of the total annual turnover, upon discretion of the responsible ministry. This is on average about 15% of total annual turnover but ranges from 24% for social science/regional institutes to 11% for technical-industrial institutes.

[64] Årsrapport 2010 Forskningsinstituttene - Delrapport for primærnæringsinstituttene, Delrapport for miljøinstituttene, Delrapport for de teknisk-industrielle instituttene, Delrapport for de samfunnsvitenskapelige instituttene, Norges forskningsråd, 2011

- For each sector (distribution arena), upper limits were set for the *shares of the strategic initiatives component* in the institutional funding budget, ranging from 40% in the environmental sector to 10% in the Social Sciences one

In its accompanying note to the New Guidelines, the Ministry of Education indicated that it intended the PBRF components to govern 10% of the institutional funding for all institute sectors. The shares of the various Indicators would be as follows:

- Scores for *scientific publications*, along the principles defined for the HEI – 3%
- Collaboration with universities and university-colleges - 1%, subdivided into
  - Number of completed PhDs – 0.5%
  - Shared positions of researchers in institutes and the HEI – 0.5%
- Revenues from competitive funding – 6%, subdivided into:
  - Revenue from RCN competitive funding initiatives – 1%
  - Revenue from international contracts/projects – 1.5%
  - Revenue from other national sources – 3.5%
- The overall score is weighted in proportion to the share of each Institute's revenue from competitive research (the "relevance" component).

Current data show that only the Ministry of Education and the Ministry of Industry and Trade apply such 10% share, respectively for the Social Sciences/Regional institutes and Technical/Industry sectors. For the moment, the PBRF governs only 5% of the institutional funding in the Environmental institutes sector and 2.5% in the Primary industries one.

Combining these figures with the limits set for the institutional funding as a proportion of the total income, the percentage of non-competitive funding in the institutes' total income ranges from 6% for the technical/industrial institutes and 8.3% for the environmental ones to 19% for the social science/regional institutes.

Coverage of the new funding system

The original intent of the Government was that all institutional core funding for the research institutes would be channelled through RCN and made subject to the new Guidelines.

Some ministries, however, doubted that government labs that performed a particularly high level of research for the benefit of the government services could adapt to the new performance-based system. The Government accepted these objections and ruled that the new system would govern the core funding of 51 out of the 60 research institutes. The institutes that were exempted from the New Guidelines and continued to receive their core funding directly from the respective Ministries, were most often public agencies or agencies "with special powers" and included:

- In the Primary Industry arena, the IMR - Institute for Marine Research and NIFES - National Institute of Nutrition and Seafood Research
- In the field of Social Science, SIFO - National Institute for Consumer Research and SIRUS - State Institute for Drug and Alcohol research
- In the field of Healthcare, STAMI - State Work Environment Institute

The Government also put RCN in charge of providing advice about the inclusion of new research institutes in the PBRF. As a result and following RCN's indications, as of 2011, the New Guidelines were extended to apply to the following institutes, all of them included in the Social Sciences arena.

- The Ragnar Frisch Centre for Economic Research, a research foundation established by the University of Oslo
- The NTNU Social Research institute, a research Ltd. wholly-owned by the NTNU
- The Stein Rokkan Centre for Social Research, which is a department in the Uni Research AS, an independent research company, where the University of Bergen is the main owner

In 2010, RCN also recommended that the Nansen Environmental and Remote Sensing Centre (NERSC), a non-profit research foundation affiliated to the University of Bergen, should receive core institutional funding. This was not granted for 2011.

The institute strategic programmes

In contrast to the previous SIP programme, the new Institute strategic initiatives (SIS) are intended uniquely to help institutes develop long-term knowledge and build capacity in research areas of sectoral interest that cannot be built using other funding mechanisms. These funds can no longer be used for the delivery of services to ministries or to ensure coverage of policy priorities. Only in exceptional cases can the sector ministries allocate funds directly to an institute.

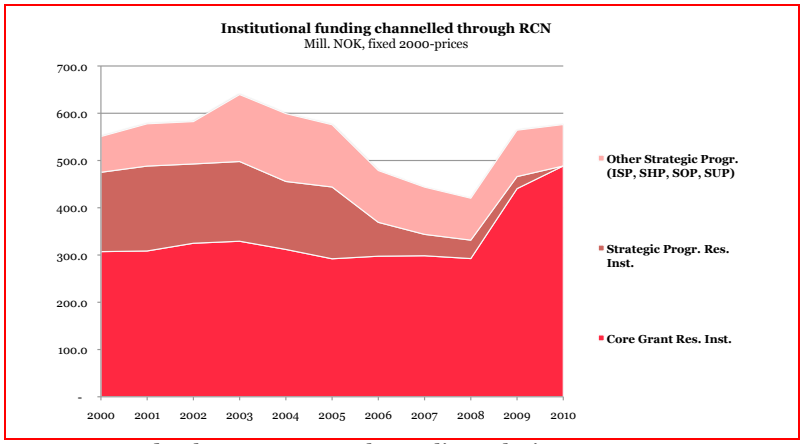
In its proposal, RCN firmly set the focus for these strategic programmes on long-term knowledge development, the base for the institutes' sustainable competitiveness and durable capacity to deliver high-quality research - in contrast to the previous system. The Government endorsed this principle. Institutional funding in the form of strategic programmes could no longer be used to "secure research in relation to national priority thematic areas and in some cases also the ministries own knowledge".

In the transition between the "old" and "new" funding system, the existing contracts for the strategic institute programmes (SIP) – of an average duration of 4 to 5 years – ran their course. Until the new SIS system entered into force, the institutes kept the funds from completed SIPs to use for self-selected strategic activities.[65]

So far, only the Ministry for Environment has developed and introduced the new institute strategic initiatives, replacing the SIPs (in 2010). RCN reports that the scheme was developed in the spring of 2010 in consultation with the institutes and the Ministry of Environment. It covers 25% of the institutes' institutional funding. This may later be increased to 40%. The institutes submitted sketches in April, and these were assessed for relevance. At the application deadline in October, RCN had received 21 applications that were quality controlled by two panels. During the spring of 2011, 22 new strategic initiatives were launched in the environmental institutes.[66]

Figure 9 provides a view of the trend in institutional funding governance. It is important to bear in mind that this does **not** indicate the level of institutional funding provided; it merely pictures the increased use of RCN as a channel for distribution.

Figure 9 Institutional funding channelled through RCN, 2000-2010



Source: RCN database, 2011 – Technopolis analysis

[65] Årsrapport 2010 Forskningsinstituttene - Samlerapport, Norges forskningsråd, 2011

[66] Årsrapport 2010 Forskningsinstituttene - Delrapport for miljøinstituttene, Norges forskningsråd, 2011

5.3 Overview of RCN's activities

RCN considers itself a 'dialogue' partner for the institutes and focuses its activities specifically geared towards the institute sector predominantly on steering that sector's framework conditions. This is reflected in its role in developing and maintaining the institutes' PBRF. It has also tried to maintain a level playing field in the competitions for research project funding by agreeing to fund institutes' full costs in RCN programmes. Further, it tops up Commission funding for Framework Programme participation to 75% of the full cost, compensating for the high Norwegian cost level.

RCN repeatedly addressed the funding needs of the research institutes in its budget proposals, arguing for funding of strategic programmes in the institutes or the increase of institutional funding for certain institute groups, generally with little success. It supports the institutes in their international cooperation efforts, providing them with information and launching programmes that give them economic incentives for internationalisation through the funding of the positioning and preparation of FP proposals.

Part of the responsibilities of RCN towards the institute sector are also the **professional follow-up activities**, ie to conduct performance assessments and report on developments in the sector, as well as to carry out evaluations of research institutes that participate in the funding base.

RCN annually monitors the research institutes - predominantly those subject to the New Guidelines. In line with the administrative tasks stipulated in the New Guidelines and in collaboration with NIFU and the Ministries, RCN has developed a financial reporting system for the institutes, establishing definitions and clarifications for the different funding sources in order to ensure consistency and comparability among the institutes and the various institute sectors. It also quality assures the information provided by the institutes. RCN's annual institute reports list and aggregate the financial data and provide information on research results, institutional strategic programmes, and other relevant developments at the level of the institute arenas and at overall sector level.

In relation to the institute evaluations, on its website RCN says that it has been a requirement that the institutes are evaluated every six years or so and that efforts to devise a new follow-up model are currently underway. It states that the aim of these evaluations is to gain an overview of the status of research and to identify the potential for improvement in the institutes' research activities. In practice, RCN has stopped doing institute evaluations in a systematic manner (see Section 2.3.3 for our analysis on the evaluations of the research institutes).

Interviewees appreciated RCN's operational support to the institutes, but criticised the overall lack of an institute policy and the instruments that would be needed for the implementation of such a policy. They agreed that RCN should focus on framework conditions but considered that there should be more attention for the strategic use of instruments that could help developing the system. The failure to transition to the new SIS strategic project mechanism in all the arenas is a deficit. As mentioned in Section 2.3.4, many interviewees active in the sector criticised the lack of evaluations of institutes.

5.4 International practice in the governance of research institutes

Denmark chose a few years ago to integrate many of the government laboratories into the university system. This leaves nine 'GTS' institutes, which correspond to the technical/industrial institutes in Norway operating as a free-standing group – with a common network organisation that maintains a dialogue with the state about the role and portfolio of the institutes. Each institute is, however, a separate legal entity. The GTS institutes receive core funding from the state on the basis of

- Being approved by the Council for Technological Service, appointed by the Ministry of Science, Innovation and Higher Education, as meeting the required criteria for an institute supporting Danish industry
- Signing a performance contract with the Council and performing satisfactorily against that contract. Performance is reviewed every three years
- An evaluation of the institute done every three years

The GTS institutes are not subject to a PBRF system.

The Netherlands maintains several institute systems: those under the national research council (NWO); some under the Royal Netherlands Academy of Arts and Sciences (KNAW); the TNO system (similar to SINTEF) under the Ministry of Education and Science; and various other large government laboratories under other ministries. While TNO very actively manages its portfolio of technical/industrial institutes, the NWO and KNAW systems are not centrally steered. Institutes monitored annually and are subject to periodic evaluation, on the basis of which their principals decide what consequences there should be for funding. However, there is no PBRF that makes an automatic connection from past performance to future funding. The applied institutes get most of their core funding via a mechanism that uses societal stakeholders including the ministries to set overall thematic priorities for their development of new capacity.

Germany has four large research institute systems: Max Plank for basic research (there is no counterpart in Norway); the Fraunhofer Society for technical/industrial research; Helmholtz for large-scale facilities-based research; and Leibniz, which is a rather diverse collection of 80 institutes across basic and applied research and innovation.

Fraunhofer is the most interesting from a Norwegian perspective. It has very high core funding (typically about one third); a further third tends to come from industry and the rest from competitive state funding. Internal funding rules encourage the individual institutes to maintain roughly this balance. There is no PBRF and Fraunhofer does not evaluate individual institutes (though it has as a whole been subject to a 'systems evaluation'). Each of the 80 or so institutes has been allocated by the central administration to one of seven thematically based marketing alliances. However, the individual institutes are highly autonomous. They have annually to present and defend their budgets to the central administration, but provided they reach their budget targets, the centre has little real power over them. Its main influence on the portfolio is to set up new institutes. The Society's agreement with the funding ministry is very general – the Society itself manages the portfolio of institutes. The Society controls the quality and relevance of the individual institutes through the budget negotiation process.

Mrs Thatcher largely privatised the UK government labs and abolished subsidies to the Research Associations that used to play the role of technical/industrial institutes in the UK. What remains in the state sphere is the set of institutes owned and operated by the UK research councils, which mainly do scientific research in the domain funded by their respective Research Council. Six of the seven Research Councils have specific thematic responsibilities; the seventh handles large research infrastructure. They all spend a significant minority of their budgets through their captive institutes an the majority through eternal competitive grants. The legal status of the institutes varies, as does their form of governance. All receive a mixture of core funding and competitive funding; many also get direct ministry funding. Only the Medical Research Council's institutes are fully founded by their parent Council. The UK research councils plan in five-year periods. Once an institute budget is approved, it has considerable freedom during the next five years. Councils assess institutes' plans using a common set of criteria. They are evaluated every four years in the peer-review-based Institute Assessment Exercise, which tackles quality and relevance of research, achievements and future plans, training and science communications. These exercises are used in setting the core funding for the next four years, but there is not a mechanical link between performance and budget.

On this basis, we can say that the use of a PBRF in the context of institutes is unusual – though not unique; it is done in the Czech Republic, where the institutes and universities share a common PBRF. It is more normal to use a mix of monitoring, evaluation and judgement. Active institute evaluation provides explicit feedback to the institutes at the institutional level.

Markets play quite a big role in the steering of technical/industrial research institute systems. Through the imposition of societal objectives in the Dutch system and the GTS approval criteria in Denmark, we can see a process of societal steering – coupling core funding to meeting social needs while leaving the bulk of the institutes' activity to be determined by the interaction with users. The Norwegian idea of having a single organisation with 'strategic responsibility' for all the institutes is also unusual, at least outside countries with a Soviet-style academy system. On the other hand, the use of 'umbrella' organisations that look after particular parts of the institute system is quite normal and is particularly clearly developed in Germany, where the current division of labour is the result of a series of reforms aimed at tidying up what had become a rather messy system.

In the comparator countries, we can see that evaluation and funding decisions are normally done at the same level in the system. Where portfolio management is attempted, it is done by an umbrella organisation that plays an active role in institute management.

5.5 Findings

RCN has always had 'strategic responsibility' for the research institutes – a responsibility it has been difficult to fulfil, given its lack of authority over them and lack of control their over budgets. RCN's main steering instruments have been its programmes. In line with the government's policy to make research-performing institutions more autonomous, RCN developed a new performance-based system for reallocating parts of the core funding among four clusters or 'arenas' of more or less similar institutes. It also revised its programme for providing 'strategic' funding to institutes, to help them develop capacity. (Logically it is hard to develop new capacity in a funding system that is wholly performance based, since initial performance in a new area is almost by definition poor.)

It is clear from our interviews that the PBRF has affected the behaviour of many of the institutes – causing increased focus on scientific publication and more generally increasing attention to research management. Not all the ministries have been prepared to transfer core funding into the PBRF-based part of their funding arena and only one area has so far implemented the new strategic programme. There has been little restructuring in the institute sector.

RCN has abandoned its former practice of doing regular institute evaluations, and begun to treat the institutes within the field evaluations. Many directors see this loss of feedback at the institutional level as a disadvantage. Institute directors confirm that their relation with RCN is increasingly distant, with the FFA association becoming the communication channel with RCN.

Internationally, the use of a PBRF in the institute sector is unusual but not unique. In developed countries, it is similarly unusual for **all** the institutes to have a single owner, but they are often grouped under umbrella 'owners' (like the Fraunhofer Society) in order to give common management to common categories of institute. But evaluation and funding tend to be done at the same level, so that evaluations have consequences. And where there is a need to steer the portfolio of institutes, it is done by active management rather than using indirect incentives such as PBRFs.

6. Conclusions

In as complex an evaluation as this, overall conclusions must rely on input from the full range of work packages. Conclusions at the level of this report are therefore partial. Here, we discuss what this report can tell us about RCN's achievements in the area of strategic intelligence and advice, and then discuss some problems and weaknesses.

First, however, we have to consider the overall governance context. Norway lacks an effective national research and innovation council in the Finnish style – a style that is increasingly imitated in various ways around the world. While KD has lead responsibility for research coordination across the government and for RCN, its ability to coordinate is constrained by the sector principle and the lack of a higher-level 'referee' such as a research and innovation council. Thus, when RCN or anyone else offers to advise 'the government' on research policy, it is talking not to a single intelligence but to a crowd. The sector principle has many advantages but enabling national priority setting or the creation of a holistic national strategy is not among its strengths.

On the other hand, one of the strengths of the Norwegian system is that it exhibits distributed strategic 'intelligence' in both senses of the word. Both knowledge and the ability to use it are distributed about the system. This report shows that RCN has a substantial list of achievements to its credit. In many cases these cannot solely be attributed to RCN because they are produced in partnership with others. The ones we mention here are nonetheless ones where RCN has at least played an important role – and our list is not exhaustive.

- RCN produces or co-produces a very large volume of strategic intelligence at the level of indicators and surveys. These range from the Indicators Report to detailed monitoring of the research institutes. They are of general interest for making and implementing policy
- Strategic intelligence and policy are developed in the context of large-scale stakeholder consultation. This is difficult to benchmark but is certainly towards the most consultative end of the spectrum of policy development internationally
- Field evaluations are regularly conducted and provide information that is valuable to participants and their organisations as much as it is to RCN itself. These have consequences for participants' strategies and for RCN programmes
- Evaluation is to a growing extent informing RCN programming beyond disciplinary research (to which the field evaluations are primarily relevant)
- RCN plays a significant role in helping sixteen ministries plan a large and growing part of their research expenditure. The budget is a key process for doing this. While there are two parts to this discussion – one on the next year and one on the following year – a longer-term element might be beneficial
- RCN is an active and well-informed partner for ministries responsible for writing White Papers. The main interaction is with KD for the research White Paper, but there are also others
- RCN supports the coordination of sectoral research needs by developing and implementing research programmes of interest to multiple ministries. In this way, a declining number of programmes is satisfying the needs of a growing number of ministries (in the sense that the mean number of ministries per programme is increasing)
- Ministries are, singly and in groups, preparing thematic national strategies on research. RCN is increasingly providing coordination by supporting these with strategic intelligence and by providing or hosting secretariats
- These two coordination mechanisms appear to be evolutionary adaptations to the lack of an overall 'referee' in the policy system

- RCN is playing a significant role in the development and deployment of programmes that tackle structural deficits in the research system, including the Centres programmes (SFF, SFI and FEM), research infrastructure and the regional research funds. These systemic interventions tend to lie outside the interest of individual sector ministries and have been tackled using money from the Research and Innovation Fund. This underscores the importance of RCN as a change agent and the need for 'strategic' resources to be available to counterbalance the tendency of sector-driven funding to cause lock-in
- RCN has made a major contribution towards strengthening the institute sector by designing and implementing the new performance-based funding system, even if that system has by no means been fully rolled out at this stage

Issues and problems raised in this report include the following.

- RCN made use of foresight for a short period but seems since largely to have dropped it. Foresight is a useful component of strategic intelligence because it helps you move away from consensus to explore disruptive possibilities and counteract the tendency of research agendas and programmes to lock in to existing ideas and trajectories
- Equally, we were not able to identify much strategic intelligence about interdisciplinarity or new and disruptive directions in reseah
- Evaluation is not properly embedded in the programming cycle at RCN. While we are cautious of the idea that everything has always to be evaluated, formally deciding whether to evaluate before, during or after a programme and in relevant cases doing such evaluations ought to improve the quality and efficiency of intervention
- Nor does evaluation adequately tackle impacts. As a result, RCN lacks evidence for accountability and to demonstrate the value of what it does
- The European and global context means it is increasingly important to have a clear national strategy in relation to quality, thematic focus, internationalisation, etc. Without this a small country easily becomes irrelevant in the international research system and resources are wasted on sub-critical and fragmented efforts. Given the lack of a 'referee' in the system, such a strategy is hard to make truly national in Norway
- Advice giving to government appears overly embedded in RCN's interactions with the ministries. RCN needs the capacity to develop strategy and advice that is not captive to the ministry agendas and that therefore has greater potential to induce disruptive change
- The availability of strategic resources in the form of the Research and Innovation Fund has been key to RCN's ability from time to time to act as a change agent. Replacing the Fund with a line in the KD budget exposes it to the short-term budgeting process and therefore political risk
- The reform of the research institute system is unfinished business. Neither component of the new funding system is fully implemented. The incentives for restructuring the system remain rather weak and the interest of a number of ministries in addressing institute policy seems limited. The end of evaluation means there is no rounded view of the individual institutes as organisations. International experience with performance-based funding systems suggests that strongly formula-based steering leads to perverse behaviour and lock-ins. We therefore would prefer to see a mix of measurement and judgement by one or more competent owners of clusters of institutes rather than treating the institute system as a quasi-market. But whichever view one takes, the institute system currently hangs between an evaluation-based system that had no 'teeth' and a performance-based system that is only partly implemented. This is clearly not satisfactory.

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