The Research Council of Norway

Midterm Evaluation of Eight Centres of Excellence (SFF-II)

Evaluation
Division for Science

Norwegian Centres of Excellence

The Research Council of Norway

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Executive summary

The Centre of Excellence scheme of the Research Council of Norway (SFF) has been set up to further strengthen the quality of Norwegian research and promote interaction between research groups with complementary expertise within Norway and also with international teams. This is the second group of eight centres that have been evaluated after around three to three and a half years of activity. The first group of 13 centres was evaluated in 2006.

The purpose of the midterm evaluation is to assess the scientific quality and performance of the individual centres in absolute terms and relative to the centres' research plans. The evaluation will provide data to support the decision of the Research Council of Norway as to whether the funding and status as SFF of individual centres are to be continued for an entire 10 year period, or will be ended after 5 years.

The midterm evaluation has been carried out in accordance with the terms of reference and procedure established by the Research Council of Norway, and involves the preparation of an extensive background material, including self-evaluations prepared by the centres and their host institutions, an assessment of each centre by three international experts, and an overall evaluation made by an interdisciplinary, International Evaluation Committee set up by the Research Council. The Evaluation Committee has based its judgment on the written background material, the experts' assessments and Hearings with each centre and the host institution. The present report sums up the considerations and conclusions of the International Evaluation Committee.

The Research Council of Norway (RCN) is to be congratulated for the success of the second set of Centres of Excellence. All centres have developed an interesting and productive research programme and have substantially enhanced the visibility of their research area from a Norwegian and international perspective. Furthermore, the formation of a CoE in itself creates new possibilities for interaction within the centre, but also provides leverage for obtaining support from other sources. Indeed, for many centres the CoE funding itself represents only a minor part of their total funding, but it has helped them increase their funding from other sources significantly during the CoE period of around three years. The different CoEs have in general engaged in interdisciplinary training of PhD and MSc students and promoted research training in the broad area of each centre.

Our overall ranking of the different CoEs was based on their research achievements, the research plans for the next five year period, and the organization and leadership of the CoE. The different CoEs were evaluated and ranked, using the description of terms defined by RCN. Most centres were evaluated as exceptionally good, whereas a few were ranked, somewhat lower, primarily due to concerns regarding the organization of their CoEs.

The formation of CoEs has provided a strong and positive stimulation for the different research environments, in which they are active. They have promoted interaction between subdisciplines, departments and faculty borders. Important features of the most successful centres were:

- Scientific vision and a clear strategic focus
- Strong and dynamic leadership in terms of both scientific direction and an understanding of the importance of team management

- Ambition to define new territories of research at the interface between different disciplines which may be referred to as transdisciplinary research
- Ambition to involve the very best scientists at all levels and from all parts of the world

A very important aspect of a centre that has a lifetime of ten years is that both the centre and the host institution must have a clear exit strategy developed well in advance. Some centres have a very large budget with the CoE contribution from RCN representing only between 10 and 20% of the overall budget. In these cases it is obviously easier to handle the exit problems than in centres which are much more dependent on the CoE budget. It is clear that the host institution should plan for taking care of the most successful scientists of the CoE and their competence. One out of many possibilities is to form positions within the new areas developed by the CoE (e.g. in connection with retirement) and thereby utilize the new competence developed. The strategy varied between the universities from providing a lump sum of 20% of the CoE budget after termination of the CoE to universities that were committed to take over and develop the new areas of the different CoEs.

1. Introduction

The Norwegian Centres of Excellence scheme (SFF) was established in 2001 and is designed to stimulate Norwegian research institutions to set up centres devoted to long-term basic research. The intention is to raise the quality of Norwegian research and bring more researchers and research groups up to a high international standard. The scheme is open to long-term basic research without immediate application or social relevance, as well as to research with such relevance. The centres may receive funding for a maximum of ten years. The CoE scheme is administered by the Research Council of Norway and funded by the yield on the Fund for Research and Innovation.

After a call for proposals in 2005, followed by an application and evaluation process divided into two phases, eight Centres of Excellence were selected (SFF-II) and started their activities in 2007. The Norwegian Centres of Excellence scheme requires that each of the centres be evaluated under the auspices of the Research Council of Norway after approximately 3 ½ years. The purpose of the midterm evaluation is to assess the scientific quality and performance of the individual centres in absolute terms and relative to the centres' original research plans. The evaluation will provide data to support the decision of the Research Council of Norway as to whether the funding and status as SFF of individual centres are to be continued for an entire 10 year period, or will be ended after 5 years.

2. Terms of reference for the midterm evaluation

The terms of reference for the midterm evaluation of the eight centres (SFF-II) were announced by the Research Council in June 2010, and provide a framework for the evaluation and a mandate for the Evaluation Committee. The document giving the terms of reference is presented in Attachment 1.

3. The Evaluation Process

The midterm evaluation has been carried out in accordance with procedures announced by the Research Council in June 2010 (Attachment 2), and is based on the following documents and background material:

- A fact sheet and a self-evaluation providing information on each centre in a standardised form, prepared by the Research Council and by the centre and its host institution. The self-evaluation should give an analysis of the research performed, scientific achievements, publication records, researcher training and recruitment and organizational aspects including governance, national and international collaboration and important industrial, social or cultural dividends, if relevant.
- An assessment prepared by the host institutions summing up the experience gained from hosting a CoE, both scientifically and from an administrative point of view.
- A plan presented by the centre and host institution providing a project description for the second five year period, including exit strategy.
- An expert evaluation in a standardised form made by a panel of three international experts (virtual panel) judging the scientific achievements of each centre.

- An overall evaluation of each centre made by an interdisciplinary, international Evaluation Committee set up by the Research Council. The Committee is not supposed to address the question of prolongation or winding up of individual centres in its final report.

A description of the terms used to rank the level of quality by the international experts as well as the Evaluation Committee is presented in Attachment 3.

Based on the report from the International Evaluation Committee and recommendations from the Board of the Science Division, the Executive Board of the Research Council of Norway will make the final decision as to whether the individual centre is to continue for the entire 10-year period or not.

4. The International Evaluation Committee, SFF-II

The interdisciplinary International Evaluation Committee was appointed by the Research Council of Norway 18 October 2010. The members are:

Professor Sten Grillner (Chair)	The Nobel Institute for Neurophysiology, Karolinska Institutet, Stockholm, Sweden
Professor Paul Madden	Queens College, Oxford, UK
Professor Marja Makarow	European Science Foundation, Strasbourg, France
Professor Barbara Romanowicz	Berkley Seismological Laboratory, University of California, Berkeley, USA
Professor Yvonne Rydin	Bartlett School of Planning, University College London, UK
Professor Matti Sintonen	Departement of Philosophy, University of Helsinki, Finland

In accordance with the procedure adopted for the evaluation process, the International Evaluation Committee received the background material for the evaluation prior to a meeting of the Committee in Oslo 15-16 March 2011. During this meeting the Committee conducted Hearings with representatives of the centres and their host institutions. The program for the Committee's meeting is given in Attachment 4.

5. Evaluation of the centres

5.1 Centre for Immune Regulation CIR

Research achievements at the time of evaluation

The **Centre for Immune regulation** (CIR) hosted by the University of Oslo has had a Centre of Excellence (CoE) status since late 2007. The objectives of CIR are to unravel the mechanisms of immune dysregulation by studying three models of autoimmune and allergic diseases and to discover and implement new therapies.

CIR has excelled notably in the area of coeliac disease research by pushing the frontiers of knowledge on the mechanisms of the pathology. Technology development has been very successful, and this has had an immediate impact on the quality of fundamental research. Technology development has generated intellectual property protected by patenting and start-up companies based on the innovations. The progress of asthma and allergy research has been slower, but according to the Hearing is now progressing well.

The publication record of CIR since 2008 is very satisfactory in quality and volume. Notably, all CIR PIs have contributed to publications, demonstrating strong and productive interactions between them. The expectations for a CoE in terms of outside collaboration have been fulfilled well, as demonstrated by the joint publications with international collaborators.

The recruitment goals have been met, and a quarter of scientific positions are held by foreign researchers. The instruments that have been put in place to strive for gender equality are a mentoring plan for female postdocs, female guest speakers and dedicated technical assistance to female researchers with caring obligations. Two female postdocs were promoted to researcher and associate professor, but only 2 out of the 17 PIs listed as principal members of CIR are female.

The collaboration between the basic research groups and the technologically oriented groups has paid off very well, and the collaborations with the clinic have been very successful. CIR has generated and protected intellectual property, and created two spin-off companies. Thus, translation of basic research findings into clinical practice, new technologies and industrial applications is progressing.

Organizational and administrative aspects

The governance and organization of the CoE appear to work well. The physical proximity of one of the two applied technology groups with the basic research groups has apparently had an unexpectedly important positive effect. While the above groups have issued joint publications, the sole group that remains on another campus, appears not to have achieved such synergy.

The Director of the CoE has achieved an internationally respected quality stamp, an ERC Advanced Grant. He has authored almost two thirds of the high impact publications and has demonstrated very strong scientific leadership. The key core facilities (sorting, imaging, sequencing, microscopy, proteomics, mouse facility) as well as access to clinical samples appear to be in place.

Research plans for the future five-year-period

The scientific research plan for the remaining period of the CoE status is essentially the same as proposed in the original application. A technical change is proposed by re-organizing work into packages based on the research topics rather than group-specific packages. The developed technologies also are proposed to be used in a transversal fashion, tightening the collaborations within the CoE. Further development of technologies should offer the consortium new possibilities to push itself to the international elite.

CIR is generating important scientific findings and novel technologies. At its best, the application-oriented work leads to new questions for fundamental research, which in turn feed problems to be solved by applied research.

The guest speaker and visiting scientist program feature high profile scientists, who serve as a great international network for the entire CIR consortium. CIR should be able, with an ERC advanced grantee as Director and with an international co-publication track record, to attract also senior researchers from outside of Norway.

Exit strategies

The University of Oslo has committed to funding CIR at the level of 20% of the CoE resources. Whether this contribution will continue should be confirmed well before the expiry date of the CoE status. The exit strategy proposed by CIR, to continue to operate at a quality level expected from a CoE, is not an exit strategy but a self-evident obligation for a consortium that has held for 10 years a CoE status with the attached resources.

Summary and recommendations

CIR has delivered frontier research and applications at a very high level. The fundamental and application-oriented groups have found a very fruitful way of working together, augmenting in a reciprocal way each other's research agendas.
The publication output is impressive, as well as technology development and generation of intellectual property. CIR has succeeded in domestic and international recruitment, and the visiting scientist program has been a success as demonstrated by the high number of internationally co-authored publications.

The Committee agrees that the research over the next 5 years should be based on the original plan and goals, and welcomes the restructuring of the work packages to be based on immunological models, in order to further promote cross-group collaboration. Applications emanating from fundamental research findings should be further developed, and collaboration with biotech companies intensified.

The Committee strongly recommends full integration of the Cellular immunology-group into the activities of the consortium. The CIR Director should make this issue one of his priorities.

The Committee recommends that CIR builds a network with international institutes, in addition to the networks already established by one of the individual scientists; this will provide access to technologies not available in CIR or in Norway.

The senior group leaders should try to strike a balance between co-authored intra-CoE publications and independent publications by young PIs.

CIR lacks an exit strategy. It should look into international resources, Nordic, European and others, and into possibilities to participate in international consortia. Attraction of international fellows coming with their own funds would not only be a token of success but should also serve to diversify the income sources beyond the CoE status. A strategic plan should be put in place to replace part of the public funds with income from the immaterial property and start-up companies, especially in the form of research contracts with biotech companies.

Overall assessment: **Exceptionally good**

5.2 Centre for Cancer Biomedicine CCB

Research achievements at the time of evaluation

The **Centre for Cancer Biomedicine** (CCB) at the Norwegian Radium Hospital (NRH) and Oslo University Hospital (OUH) has had a Centre of Excellence (CoE) status since late 2007. The mission of CCB is to use a multi-disciplinary systems biology approach in cancer research, focusing on translation of fundamental research findings into diagnostics and therapies based on the concept of personalized medicine.

The research quality of the centre is internationally forefront. The consortium has been able to step up its quality work by strong internal links, the main objective of a national CoE. The multi-faceted approach from cell biology through systems biology to clinical research has led to excellent outcomes, and the infrastructure from technological platforms to bio-banks serve the consortium well.

The CoE has been extremely productive when it comes to publications in top-tier journals and specialized ones. The internal links have resulted in joint publications, demonstrating the strengths of the individual groups, as well as the added value of the consortium of excellent groups with complementary competencies.

One of the milestones, cancerome analysis of 800 tumour samples was delayed due to technical reasons. However, the Hearing showed that the work is now in progress, as competencies had been developed and exon-based high-resolution microarrays adopted.

The CoE has created an impressive network of international and national collaborators and attracted international grants. Several out-going and in-coming visitors fertilize the research with new ideas. The core CoE funding of the Research Council of Norway appears to have provoked the desired domino effect, as more than 80% of funding is from other sources.

The CoE is engaged in researcher training, the PhD degree output appears to be good, and international postdocs from prestigious institutions have been attracted. The CoE has paid serious attention to the gender issue, and attracted excellent women group leaders.

Translation of fundamental biomedical research findings into clinical practice is a very straight forward form of societal benefit of research investment. The CoE has several patents and patent applications, demonstrating a sense for utility of research findings, whereas concrete effort for sustainable industrial collaborations are still anticipated.

Organizational and administrative aspects

The collaboration between the Director and the Co-director has resulted in a laudably efficient linkage between fundamental and translational research, feeding in research questions and solutions for both domains. The Director continues to deliver at a very high level, as evidence by the ERC Advanced Grant and the Hans Krebbs medal.

The majority of the groups are working in the same facilities, the new building of the Radium Hospital. The clinical environment evidently is key for a translational medicine approach. The research infrastructure is up-do-date and appears to have served as a hub for the collaborations, training and attraction for foreign researchers.

Research plans for the future five-year-period

The research plan continues to build on the strengths of the individual scientists and their complementary research interests. The goals of the subprojects are ambitious and form a continuous evolution of the successful approach so far. As it should, the ambition level of the milestones is higher than before, but the accomplishments of the CoE hold a promise of future success.

The proposal is based on a cell biology and imaging approach, bridging to translational research requiring access to cancer samples and development of cancer makers. The proposal covers in a comprehensive fashion gene regulation, chromosomal organization and epigenetics, in the context of intracellular signaling, transport and cell cycle progression. The proposal is ambitious and feasible taking into account the previous success of the consortium.

Exit strategy

The national CoE status should be exploited as a stepping stone to participation in internationally funded consortia. A long-term plan of how resources of the European Union, the US, the up-coming research powers in Asia, and the private sector could be attracted would constitute a sustainable exit strategy.

Summary and recommendations

The CCB is delivering, at a very high level, what is expected from a national CoE - clear international scientific impact combined with a societal impact in the form of better cancer patient care. The challenge is to continue the activities to reach an even higher international level, *via* a more integrated effort in computational systems biology and investigator-driven translational research. The CoE has accomplished remarkable work in teaching, training, gender equality issues and in internationalisation of the Norwegian scientists' base.

The possibilities provided by the development of sequencing technologies has become evident only in recent years, and this has catalysed revision of the research plan for the second half of the CoE status. The Evaluation Committee fully endorses the revised plan.

International networking, in addition to the NIH-network, should be intensified. The access to clinical material and patients should be an attraction for international collaborators.

The CoE provides dividends to the host university in the form of teaching. The CoE has voluntarily and enthusiastically engaged in teaching activities, even putting resources into Masters level courses. The Evaluation Committee strongly supports these activities and recommends systematising them and feeding teaching into the university's curricula.

Commercial microarray developments may contribute to the exit strategy of the CoE.

Overall assessment: **Exceptionally good**

5.3 Centre for Ecological and Evolutionary Synthesis CEES

The CEES is directed by professor Nils Chr. Stenseth with Dr Eli Rueness as Deputy Director. The CoE is attached to the Department of Biology at the University of Oslo and operates with an administration that overlaps the CEES and the department. The Centre is very pro-

ductive. The Director is one of Norway´s most cited scientists, and he is also the vice-president of the Norwegian Academy of Science and Letters.

Research achievements at the time of evaluation

The CoE has been in operation since October 2007, and the CoE report was issued 3 years later. The first part of this 3 year period has clearly been devoted to developing the Centre both with regard to organization and hiring of new staff. The CoE now has 19 core members that are active in a broad range of areas within the field of "Ecological and Evolutionary Synthesis" such as population ecology, immunogenetics and genetics of hybridization and speciation.

The Director Nils Chr. Stenseth is exceptionally productive and has co-authored no less than nearly 50% of Centres production of 110 publications per year. Stenseth´s own production includes Science, Nature and PNAS. During 2011 he has already published 8 articles including one in Nature and another in PNAS on widely varying topics. The remaining 18 core members have a more varied productivity level down to two.

In order to coordinate the work of the CoE with its wide research interest, it has been organized around three themes:

- The role of population structuring in adaptive evolution
- The potential for adaptation
- The evolution of reproductive isolation

Moreover a series of three year colloquia in different target areas are being organized to achieve interaction within the CoE and their colleagues in the Biology department. The first in the series focussed on conceptual, statistical and theoretical issues of quantification in biology with special emphasis on evolution. This is an important area, but in the report it is noted that only part of the CoE was prepared to take part.

In 2008 CEES was awarded funding for an "Ultra-high throughput sequencing platform", which with additional support from the RCN have allowed them to clone the entire cod genome. This is important from within the area of marine functional genomics, but also from the perspective of the cod being an economically important fish species, and the dominating role of Norway in the area of aquaculture.

Without doubt the Centre has reached its original goals.

Collaboration, research training and recruitment

The core members collaborate extensively within the Centre, but there is also interaction with the Oslo university, Biology department, and a number of international collaborations. In 2009, one third of the research staff was from abroad as compared to 10% in 2007, and more than one third of the PhD students and postdocs in 2009.

The PhD training is reported to be of high quality.

Gender equality

In the senior staff 23 out of 61 are women, for PhD students 14 of 28, and for postdocs 7 of 26. The figures for PhD students represent the target value!

Industrial, social and cultural dividends

Although the CoE represents primarily fundamental research, it has several areas of translational character, the cloning of the cod genome represents one aspect, but it also applies to for instance the microbiology section.

Organizational and administrative aspects

Governance and organization

The Governing board of the CEES is appointed by the Department of Biology, the host institution. The CEES Director reports to the board, in which he also is a member. He also reports to the Board of the Biology department. The interaction with CEES is handled primarily by the Director and the CEES head of administration. The leader group meets weekly with the biology administration.

The CEES board meets twice a year to discuss budget issues, annual reports, and strategic issues. The Director implements the decisions of the board. This is reported to function well according to the host institution.

The scientific advisory board meets once year, and reports to the CEES Governing board.

The organization thus appears to operate in a satisfactory manner, but it is noted that the host organization (the Biology department) suggests that a better collaboration can be achieved with regard to administrative and strategic matters.

Leadership

From the above it follows that Nils Chr. Stenseth is a very dynamic scientific Director of the CEES, and that the Centre is very productive. It also appears that his administration operates in a satisfactory manner. It is not clear from the report how the administrative routines are divided between the Director, the deputy Director and the Head of CEES administration.

Premises and equipment

The premises appear to be excellent and the infrastructure to be cutting edge.

Research plans for the future five-year period

The CEES appears to be in a very dynamic and positive phase of its development, and has acquired new important technologies during the first 3 year, which should have a very positive effect on the next five year period.

The original 3 major themes presented in the original proposal have now been complemented with six “action groups” to achieve more focus, but also with the ambition to foster contacts across traditional borders, like genetics or molecular variations and its impact on evolution and ecology in both the sphere of microbiology and in the mammalian perspective. It appears that the CEES is quite successful in this respect and has developed an internal active strategy for how to promote a broader perspective among the CEES members and make them step outside their sub-speciality to take part in interdisciplinary activities and form “transdisciplinary” projects.

These six impact groups are the following:

- Ecological and evolutionary significance of individual variation
- Impact of climate variation on behaviour, ecology and evolution

- Harvesting ecological and evolutionary consequences
- Ecological and evolutionary dynamics of microbial ecosystems
- The ecology and genetics of evolutionary diversification
- Coevolution, community dynamics and the Red Queen

Whereas colloquium 1 has been completed during the first period, the remaining three colloquia have just started or are going to start in the near future. Due to the added impact and the extended capacity of the "high throughput sequencing", the direction of the colloquia have been adapted to this achievement.

The socio-scientific atmosphere appears to be very positive with daily common tea – coffee breaks, and a late Friday Happy hour! There are weekly internal lunch seminars, and a Friday seminar with invited speakers. The scientific environment is international with up to 20 nationalities working in the CEES.

All in all the future plans for the CEES appear very promising.

Exit strategy

The CoE funding to the CEES represents around 10% of the total funding of the centre. Therefore it would seem that it will be possible to retain the main features of the CEES at the end of the 10 year period. University of Oslo will in addition contribute with 2 MNOK annually after the 10 year period.

Summary and recommendations

From the documents available to the committee, the review of the expert panel and not least the Hearing, it appears that CEES is developing along a very good trajectory. The Committee was impressed with the vision, to form a synthesis of how living organizms respond and adapt to environmental changes – bridging the areas of ecology and evolution with an analysis on different organizational levels from genes to ethology. The CEES has been very successful in creating a collaborative spirit and in making the different researchers interact across sub-speciality borders, and it has provided extra funding for transdisciplinary projects.

The economy of the CEES is also very impressive, and the CoE contribution from the RCN represents only around 10% of the total budget. This implies that the main scientific activities of the Centre will be able to continue even after the CoE grant will have finished. The Director is a very dynamic leader for the CEES and his vision of the scientific directions of the centre has been central for the development of CEES. His position as an international leader has no doubt been important in this context.

The Committee notes that the CEES publishes not only many articles, but also in the very best journals. The ambition is to promote the visibility of all aspects of the activities of the CoE. Without doubt the Director plays an important role in this context. He had published 140 papers in 3 years from the CEES. The question was raised as to what a degree the Director should provide advice to different projects rather than actually being a co-author. For younger researchers it is often important to demonstrate independence, for instance at ERC or when applying for positions. In the long-term perspective, it is important to foster new scientific leaders to further develop the central visions of CEES, beyond the duration of the CoE.

Overall assessment: **Exceptionally good**

5.4 Centre for the Study of Equality, Social Organization, and Performance ESOP

Research achievements at the time of evaluation

ESOP aims to explore the links between equality, social organization and economic performance in high and low income countries using the tools from political economics, new institutional economics and behavioural economics rather than just classical economic analysis. This is a bold and important challenge to tackle, from the perspective of both the social sciences and public policy.

ESOP has undertaken a considerable body of research and reported interesting and original findings. The Centre has produced research outputs between 2007 and 2010 amounting to 211 refereed journal articles, 50 books, 390 international conference presentations and 253 other outputs from scholarly fora. Members have also been involved in broader dissemination with 226 activities aimed at the public, 211 aimed at other target groups and 3772 items in the news media. This is an outstanding performance.

The self-evaluation document makes it clear that some of these are activities and publications that were already in the pipeline in the Department of Economics by staff members who became associated with ESOP once it was established; authors who are associated with ESOP rather than wholly based within the Centre have also been counted in these data. At the Committee Hearings it was debated whether the Centre had, therefore, really added to activities already occurring in the Department. Clearly the research direction has already been established. However, it appears that the creation of a Centre has built collaboration between individual researchers where it was not present before and has influenced the research culture in the Department through seminars, reading groups and co-publication. Thus the Centre has been effective at drawing people within the Department of Economics into its ambit and has been able to capitalise on pre-existing strands of research in developing its own activities.

There is strength in both the quantity and quality of the publications from ESOP, with some papers being widely cited after only a few years. The Centre has two members in the top 3% of publishing economists in the world, with an additional four in the top 10%. There is particular strength in the work linking the analysis of social insurance and wage-setting institutions and integrating the study of income inequality with that of government behaviour.

The Centre has exceeded its goals with regard to the recruitment of PhD students and postdoctoral fellows. The original plan was to employ 15 research students in total but the final number is likely to be nearer to 35 with the benefit of non-RCN funding. Four PhD theses had been completed on projects within the Centre by end of 2010. A number of research students have gone on to publish in prestigious journals and the Expert Panel concluded that through its seminars series, etc. ESOP has ‘greatly contributed to a culture of research that will benefit the PhD students for years to come’.

The Centre has fostered a degree of international mobility. 28 Centre personnel have undertaken visits abroad of one month or more amounting to 10.76 person years during 2007-2010. The total number of visits abroad was considerably larger: 33 during 2007-9 only. Counting only visits of one month or more, the Centre has hosted only three international visitors. The emphasis has instead been towards the substantial number of visitors staying for less time;

2007-2010 ESOP recorded 118 visitors in total. This requires some attention in the next period with a solid plan for attracting more long term international visitors.

By 2010 there were four international project collaborations. This indicates a very high level of international engagement by ESOP over a four year period. The growing connection with India was particularly appreciated but there is the danger that some of this collaboration may pull the Centre away from its core focus on the Nordic model. This reinforces the point about a clearer intellectual agenda for the next period discussed below.

Organizational and administrative aspects

Since 2007 the Centre's staffing has increased from 27 to 58 including 19 research students, 5 postdoctoral fellows and 34 professors, researchers, etc. The situation of ESOP is conditioned by being wholly based within the Department of Economics at University of Oslo, and receiving a considerable amount of funding directly from the Department, effectively doubling its RCN grant. They are also co-located with the Department. This has been to the financial advantage of the Centre and has also eased the administrative burden. However, there is a possibility for a conflict of interest between ESOP and the Department of Economics should budget problems arise; therefore, there should be formal ESOP representation in the governance of the Department.

ESOP does not operate with its appointed board but rather governance has been delegated down the chain to the Department of Economics. On all main decisions the Centre's Director is consulted and the Director then works within a leadership team comprising the Director, Deputy Director and the Centre's Head of Administration. This team meets at least weekly. All administration is further delegated to the Head of Administration who has administrative support and can consult with the Department's administration. This arrangement is highly efficient.

The self-evaluation document notes that the Centre used to have fortnightly meetings but that these have been suspended in favour of meetings with individual members of staff instead; this may impact on collective decision-making within the Centre. No information was provided on how discussion occurs within the Centre on maintaining the balance between different research themes. The Director clearly provides strong leadership but this raises the question of whether there is sufficient buy-in from all members of the Centre to the strategic direction decided by the leadership team.

There does not appear to be any mechanism for external guidance to ESOP from either the academic community or external stakeholders. This is a significant concern as such connections can be very helpful in providing a 'critical friend' to the Centre and assisting with international connections, dissemination and the future positioning of the Centre in academic and policy debates. The Centre uses the overview from within the Department to cover their activities, but this cannot be a substitute for external international advisors and stakeholders.

The Centre takes the importance of improving the gender balance across the different levels of researcher seriously. Although they are some way from parity overall, they have a much higher level of female representation among research students than is the case in economics departments in the USA; the majority of research students are female. The Centre is taking some interesting gender-related initiatives in terms of a conference, public lectures and a Master thesis prize on gender issues.

Research plans for the future five-year period

Given the considerable success with which ESOP has pursued its plans in the first five year period, there is no reason to assume this will not continue in the next five years. The Centre intends to focus on the viability of the welfare state in conditions of fiscal austerity and this is clearly an important issue to address.

However, if the added value of the Centre is to be fully realised, the multiple disparate research activities need to be pulled together not only in terms of subareas or themes but also in terms of an innovative and distinctive theoretical framework. Given the level of investment in ESOP it is desirable that the Centre not only produces empirical research on its core concerns but also delivers an advance in economic theory. Looking across the reported research results, it would seem that ESOP has the potential for doing so but it needs a strategy to deliver this within its next phase. The Centre needs to consider how to integrate across its multiple individual projects and findings to develop the conceptual basis for its distinctive form of economic analysis. In this regard it is helpful that it is planning both a major conference (with subsequent journal special issue) and a book on the experiences of the Nordic model. It is to be hoped that both these activities will go beyond the report of empirical findings to address theoretical issues.

Exit strategies

The position of ESOP in relation to the Department of economics means that ESOP can plan for future (re)integration into the Department rather than exit/closure. In addition it has funding assured from Department of Research Administration, which means that the activities of ESOP will have a continued life although not at the same scale. ESOP is planning in the next five years to reduce its rate of research student enrolments but at the same time to add to its roster of postdocs in order to provide for high quality research training in remaining period. This seems appropriate and realistic. However ESOP needs to consider now how to transition to a smaller scale after five years.

Summary and recommendations

Overall ESOP has been a highly successful Research Centre for its first five years. It has produced outstanding outputs in quantity and quality and created a strong research culture for its young researchers. ESOP has the potential to create a transformation in the research agenda on welfare states and has long term plans to ensure its legacy. There are a number of issues which should be addressed now to maximise on this potential.

1. The distinctive research focus of the Centre should be maintained but, at the same time, the Centre should give priority to synthesising across its multiple individual projects to generate a distinctive body of economic theorisation in addition to significant empirical research results.
2. International collaborations should be expanded and the Centre should develop a plan to encourage more long term overseas visitors to the Centre.
3. An international Scientific Advisory Board should be established to provide critical guidance to the Centre.
4. ESOP should have representation in the governance of the Department of Economics.
5. ESOP should plan now for a transition to a smaller scale after five years.

It should be noted that the Centre's presentation at the Hearings was not considered of a standard commensurate with a Centre of Excellence and that insufficient attention had been paid to a thorough SWOT analysis. The Centre needs to give more consideration to its strategic direction, to actively revisiting and reassessing their research plan and to accessing critical external guidance; it should take advantage of an International Scientific Advisory Board to do this. Taking this into account, together with the outstanding performance in delivering outputs in the form of publications and research culture during the first period, the overall assessment is: **Very Good to Exceptionally Good**.

5.5 Centre for the Study of Mind in Nature CSMN

Research achievements at the time of evaluation

CSMN set out to establish an internationally recognized centre on three related themes crucial to man´s self-understanding, viz., rational agency, linguistic agency and moral agency. The Centre also had a vision of the way it proposed to approach these themes: the N-E approach combines normative and empirical aspects of inquiry into these themes.

The task of setting up "joint studies" on these "varieties of normative structures" is a highly ambitious one: the envisioned outcome is an integrated and conceptually coherent way of aligning normative philosophical discourse with empirical study. This is a tall order. The results so far, the publications in particular, but also the various symposia, workshops or participation in conferences in Norway and elsewhere speak for excellence. There have been studies on normativity in all these areas, and there have been attempts to make use of empirical studies. But the N-E approach of CSMN – to make the sub-communities talk with one another, and hence to work towards a genuinely interdisciplinary and naturalistic account of normativity, is a laudable one.

CSMN has without doubt achieved the milestones of the initial contract in many or all of the fields. There is, for instance, the cooperation on weakness will and motivation, both with the area of rational agency. The members of the group clearly show that input from e.g. neuropsychology (such as the role of emotions) increases our understanding. This goes also for the other topics, linguistic and moral agency. The Evaluation Committee unanimously agrees that the quality of the results, including books and articles in highly esteemed journals, counts as success.

Organizational and administrative aspects

As regards collaboration, research training, recruitment and gender equality, CSMN has lively contacts not only with the Philosophy Department (or rather IFIKK) at the University of Oslo but also with other departments. It has also established close working relationships with outstanding scholars and leading institutions in the UK, continental Europe, the US, and Australia. It is clear that in CSMN has managed "to make a significant contribution to the academic community in Norway, as well as internationally, by building up a research environment of the highest academic standing". The centre contributes to the training of a significant number of early stage researchers – relative to the number of senior members – including its 6 recruitments and 12 affiliated students. Three of the six PhD recruitments and four of the five postdocs were foreigners; and the centre attracts senior researchers of the internationally most renowned places to its different activities or as short- and long-term visitors. The centre also makes an effort to fulfil requirements of gender equality, and the proportion of women among its staff and participants in different activities is above 40%,

higher than in many other centres in philosophy. The centre appears to have used adequately the special funding provided by RCN to that effect.

Although CSMN is first and foremost geared to humanistic and social-scientific fundamental research, it is sensitive to the possible impacts its research has on applications in industrial, social and cultural realms. Cases in point are research on distributive and political justice, on poverty, and on conflict resolution. Separate mention should be made of the work on Health Impact Fund which is being considered by WHO. Similarly, the work on respect has important social implications and is not confined to purely academic interests. Practical consequences also accrue from the Rational Agency branch where issues of health care, addiction, and drug and substance use are examined in the light of philosophical considerations of moral agency and responsibility.

Research plans for the future five-year-period

CSMN will continue studying the three initially outlined areas, viz., rational, linguistic and moral agency, although it will open some new sub-lines of inquiry, such as intentionality and representation in cognitive ethology. These are welcome refinements or ramifications and they clearly enrich the original naturalistic programme by expanding towards empirical study of primate behaviour. The proposal of CSMN to focus on the foundations of action theory, and hence to subject an intensively debated area within the sciences of man to a N-E reappraisal, is a welcome one. There are also concrete questions, such as the distinction between wanting and liking that obviously may profit from input from current cognitive neuropsychology

Overall, the plan for the remaining five years is an exciting one – and clearly testifies to the ability CSMN to find new more detailed questions that could be subject to the N-E approach. The methods and equipment are appropriate ones for studies such as these, the recruitment policies and gender aspects have been given a careful thought. Most importantly, the Centre will continue its strong cooperation with the leading groups and institutions in the field. The Centre no doubt will continue to be an attractive place for excellent international researchers for short- and longer term visits. Its international postdoc calls, its programs for members and visitors, its workshops and conferences, will no doubt also continue to be successful. The list of collaborating international individuals and institutions is an impressive one, and the fact that intellectual collaboration shows signs of continuity and expansion, goes towards showing that CSMN has managed to provide an exciting research agenda – and a flourishing academic environment. The Evaluation Committee thinks that the plans of CSMN are ambitious but viable, given the resources of the Centre and its past record.

Exit strategies

As to the future organization, the recent changes (the addition of a new governing board including the three previously appointed internal referees, and the appointment of a co-director to support the director) will result in even more efficient governance. The exit strategy seems fully operational, with strong support from the IFIKK Department at the University. The centre has plans for filling up positions in the Department, with joint appointment at the centre while it exists, and with members of the Centre participating in the recruiting committees, thus making the positions internationally appealing. In this way, the Centre has well-founded expectations that its very important contribution to the philosophy now being produced in Norway will continue when the CSMN concludes its period of existence. It also seems reasonable to expect that PhD students and postdocs trained at the Centre might continue the line of research initiated by CSMN.

Summary and recommendations

Research in the three main fields of CSMN has traditionally been conducted by philosophers or scientists with highly specialized perspectives and disciplinary commitments. One of the Centre's important achievements has been to provide a model for long-lasting interdisciplinary research between philosophers and scientists working on issues of normativity in fields such as rational agency, language and morals. To carry out that plan, the centre has managed to attract an impressive team of first-rate philosophers, working in some of the best research institutions in the world. The Evaluation Committee unanimously thinks that CSMN has been highly productive, publishing in the best of journals and with top publishing houses. The Centre has also been active in producing excellent workshops and conferences, carrying forward in important ways the intended research plan.

One concern of the Evaluation Committee has to do with the great number of themes to be covered within the remaining five years. It would also be advisable to cut down on the number of events so that CSMN members, both senior and junior, would have more time to focus on the most important problems in the N-E-interface. Another concern is the integration of those researchers who have their main affiliation elsewhere into CSMN activities: it would be important for the dissemination of the results as well as for the continuity of the newly created research practices that these researchers would integrate sufficiently closely to the rest of the CSMN community so as to improve in a permanent way the philosophy produced in the country, beyond the 10-years duration of the centre.

The documents that we have been given, in particular the host institution assessment, dissipate some of the concerns over a viable exit strategy, and the Evaluation Committee finds that the investment in the Centre will produce long-term benefits. To secure the Centre´s continued influence after the ten-year period the Committee recommends partial restructuring of doctoral training to better suit the Centre´s unique profile: close collaboration between philosophical and empirical approaches in the problem areas. The Committee encourages the Centre to continue to integrate scientists into their work where fruitful, and to look for parallels between their various lines of investigation where this might lead to new insights.

Overall assessment: **Exceptionally good**

5.6 Centre for Biomedical Computing CBC

Research achievements at the time of evaluation

CBC aims at developing computational methodologies for simulating complex physics that arise in the heart and other human body systems, with a goal of monitoring and improving human health. It brings together experts in a wide range of disciplines in the physical, computational and medical sciences.

CBC is a perfect example of the benefits of the Centres of Excellence, in that the establishment of the Centre has created the opportunity for developing a much broader vision than originally planned (tools developed have wide-spread applications to coupled multi-physics problems) so that the Centre has already exceeded its original ambitions, and, in the process developed unanticipated new national and international collaborations.

They have expanded their original competence in numerical methods to include a leading group in biomechanics and another one in flow physics and turbulence.

One of the notable products so far is the development of a number of flexible software components integrated into the FEniCS software suite, scheduled to be released in early 2011. The expert panel expresses concern about the lack of a "*more vibrant and spontaneous user community*". However, this takes time, especially as the software has not yet been released. It should be a reasonable expectation for the next five years of the Centre. The Director points out that the FEniCS software has already attracted wide attention: e.g. "*the paper on the core FEniCS technology was the second most downloaded paper in the prestigious journal TOMS in 2010*".

Overall, CBC has reached the milestones defined in the original proposal and has made progress in several areas that are poised to have a direct impact on clinical practice (spreading of salmonella/aerosols; improved ECG's). Publications are on track, although the expert panel points out that the Centre should increase its visibility in the biomedical literature. However, in his rebuttal to the expert panel report, the Director points out that there are indeed a number of biomedical papers published in highly recognized medical journals and that CBC has started a new activity "biomedical flows", with which it had limited experience when CBC was established, and for which there are now accepted papers in "acclaimed clinical journals". There are more activities in the biomedical field than planned in the original proposal.

Strong collaborations have been developed within Norway (e.g. biomechanics group at the NTNU in Trondheim - experts in blood flow and flow physics, and turbulence group at the Norwegian Defense Research Establishment). This allowed the Centre to create a broader research environment, with expertise in the biomedical field and the computational modelling, and to increase the funding to 4 times that obtained directly from RCN. In particular, CBC has been instrumental in winning the competition for the Centre for Research Based Innovation (SFI), that will focus on cardiac applications.

There are also opportunities for the application of the computational methodologies developed at CBC to problems in the oil industry (Statoil) and in particular, in pursuing the development of a novel framework for the modelling of transport of particles in fluids and in heterogeneous poroelastic media with strong material contrasts.

Organizational and administrative aspects

CBC is tightly integrated in its host institution, Simula, and its organizational structure follows from it. As a result, there is substantial interaction between the different Centre research projects. CBC has been successful in attracting and training graduate students and postdocs and has achieved an impressive gender ratio among those, in spite of very few women in senior ranks in this field, which is typical. CBC has implemented aggressive measures and is continuing its efforts to recruit women, in particular, by developing a program to attract young women into the bachelor's program in this field. Notably, half of the PhD and postdoctoral candidates employed in 2009-2010 have been women.

Research plans for the future five-year-period

CBC's research plans for the next 5 years are, as expected, in continuity of the previous work, as well as are the numbers of research staff planned.

Exit strategy
The exit strategy focuses on obtaining permanent academic positions at Simula (1) and the University of Oslo (2) for the most talented CBC senior researchers, in addition to the core team of 8 permanent positions at Simula and 3 full time professors at the University of Oslo. In addition, there are plans at the UiO for a new multi-disciplinary Centre for biomedical computing in the time frame 2-5 years, in which CBC is positioned to play an important role. There are also long term perspectives for CBC staff at NTNU. CBC's research is supported 30% by RCN, and, with the planned new permanently funded positions, it expects to be able to continue raising extra-mural funds to sustain its multi-disciplinary activities beyond sunset.

Summary and recommendations
CBC is a relatively small centre, which is building unique capabilities for the development of suitable mathematical models for physical processes in the context of selected biomedical problems, including turbulence in low velocity flows and electrical activity as encountered in the heart and, for instance, in brain aneurysms. CBC has been successful in developing collaborations that provide the necessary expertise in imaging, biomechanics and flow physics. They have also been successful in securing external funding and should be commended for their role in the development of the plans for the recently established Centre for Research Based Innovation, which creates exciting links to clinicians and medical industry, and for their success in obtaining support for applications of their software to other fields, specifically geosciences (Statoil). They have been successful in attracting and training talented graduate students and postdocs and in establishing good links with teaching departments.

- The Evaluation Committee recommends that the Centre put significant effort into increasing its visibility in the biomedical field, and in particular, in expanding its publications in the biomedical scientific literature.
- CBC should also work on building their international profile and ensure the wide use of computational tools that it has created (and will create in the future).
- The Evaluation Committee also recommends that CBC take advantage of the newly funded Centre for Research Based Innovation to build its exit strategy.
- Efforts should continue to provide assistance to the Director so that he can pursue high quality research while managing the Centre.
- The Centre should continue its efforts to establish a training program for a new generation of biomedical researchers with strong skills in fluid dynamic modelling and modelling of cardial electrical activity.

Overall assessment: **Exceptionally good**

5.7 Centre for Theoretical and Computational Chemistry CTCC

Research achievements at the time of evaluation
The central focus of the original proposal was the further development of quantum chemical computational methods to allow calculations on a larger scale and with greater speed and with increased functionality with respect to the calculation of spectroscopic observables and to a unified treatment of nuclear dynamics. Other leading theoretical chemistry groups throughout the world have formulated similar research objectives. In addition an expansion of the application of such methods into various fields of practical chemistry was proposed,

through the incorporation of several experimental groups into the Centre with the intention of developing close collaborations between them and the theoreticians at the core of the Centre. The Centre's proposed activities were grouped into nine work packages.

The development of new methods in quantum chemistry carried out in the Centre has been at the forefront of international activity in the field and has had a major impact. This has been recognised through international awards to the principal investigators in Tromsø and Oslo. The work has been described in a large number of publications in high profile international journals. The developments are being incorporated into computational chemistry codes (Dirac and Dalton) which will allow them to be made widely available. These codes will have unique characteristics amongst available quantum chemistry packages.

There has also been outstanding and highly original work within the majority of the work packages with an experimental emphasis. In particular in the application of quantum chemical methods in spectroscopy and the experimental work in catalysis and bio-inspired inorganic chemistry. Excellent work has also been done on gas-phase clusters. These experimental groups are now doing a great deal more computational work alongside and in support of their experimental studies than they had before the creation of the centre, which has enhanced the quality and standing of their research and allowed the exploration of new research directions. At this point in the evolution of the Centre, the intention of exploiting the *new* functionality in the quantum chemistry packages in support of the experimental studies has happened to only a limited degree and there are relatively few joint publications between the theoreticians and experimentalists. Nevertheless, it would appear that the necessary relationships and understandings have been created to allow this to happen in the next phase. The activity in these work packages has resulted in a very substantial number of high quality publications in internationally leading journals. The total number of publications from the members of the Centre is over 200 which is a high level of productivity for a group of this size.

The Centre has been very active in building international collaborations, especially with theoretical groups, though the direct evidence in the form of publications and joint activity seems to be limited. There has been a good visitors programme and the international character of the Scientific Advisory Board will have helped to create further good relationships. Without doubt Tromsø and Oslo are now internationally recognised centres for research in theoretical chemistry. The Centre itself contains the two strongest nodes for computational chemistry in Norway, and the collaboration between them is clearly working well and to the benefit of both. Relationships with other Norwegian theory groups, at Bergen and Trondheim in particular, do not seem to have been enhanced by the creation of the Centre.

The Centre has provided an excellent environment for researcher training. It has sustained a high level of research activity with well-selected topics and encouraged a productive ethos. The facilities are excellent. The funds for conference travel and research support provided for young researchers have been generous and appear to be well-used. There has been a lot of activity to bring in research visitors and this will help to create an atmosphere of interaction and exchange of ideas. International networking and a good visitors programme have been put in place.

Researcher recruitment appears not to have been straightforward, especially at the doctoral level, though not from lack of effort to promote the attraction of a research career in

computational chemistry in Norway on the part of the two nodes. The Centre is participating in a Nordic programme of Masters training in computational chemistry which should help in the future. Recruitment of foreign researchers has been good, assisted by the growing international profile, and enabled the centre to meet its hiring targets.

Because of the nature of the research conducted, the opportunities for industrially or socially-linked applications are very limited. The new biologically-oriented work package contains work on cold-functioning proteins which is highly complementary to other activity at Tromsø with a strong potential for finding new sources of biologically active molecules. The work on Metal-Organic frameworks has substantial potential in catalysis and gas-absorption. The production of reliable computational packages with novel capabilities (as in Dirac and Dalton) can be a very substantial contribution to the infrastructure on which industry depends. These packages would need a substantial amount of work on the user interface to make them generally useful in this way.

Organizational and administrative aspects

The fact that CTCC is a Centre of Excellence (CoE) with two geographically separated nodes might be regarded as a drawback. However, given the strong relationship and excellent communication between group leaders in Tromsø and Oslo the difficulties posed for organization have been limited. It could be said that the geographical separation has inhibited the development of relationships between the theoreticians and experimentalists in the different universities. However, the two node solution has allowed the Centre to reach an internationally visible critical mass in a country where chemistry faculties are small by international standards as well as to span a much broader range of research activity than would otherwise be possible. It has greatly strengthened the role of the theoreticians in both Universities. The two node solution has also forced the participants to create functioning collaborations across the country, with potentially substantial long term benefits, especially in a coordinated approach to training.

The relationship between the CTCC nodes and their host universities seem to be excellent. Both nodes are (or will shortly be) located in excellent premises close to the experimental chemistry groups, as a consequence of the initiatives which the universities have taken. In the Tromsø case this was a consequence of the creation of the CoE. The experimental groups in both nodes are in well-equipped and well-furnished laboratories. The host institutions have gained very substantially from the enhanced size and prestige of the nodes and have built the enhanced strength in computational chemistry into their strategies for future development. The effect is particularly marked at Tromsø. The Centre has enabled joint research opportunities to be developed between researchers in the centre and in other faculties in the university and has underpinned a development in High Performance Computing which is of general benefit. It is clear that the CTCC is an attractive partner for international collaborations, though none of these collaborations is yet so extensive as to merit detailed examination.

The Director, located at Tromsø, has clearly managed the Centre extremely well, and has meanwhile continued to perform scientific research at the highest level in a very productive manner. In particular, he has overseen the negotiations for a vastly improved infrastructure for the Tromsø node in its university, and developed a substantial activity which will have a lasting benefit for computational chemistry in that University.

The Centre has worked very hard on the issue of gender equality and has done everything that might reasonably be asked of it to attract applications from females to its available positions. This is a subject area where the number of women researchers is very limited, so that these efforts may not be well reflected in the numbers actually in the Centre. The appointment of female adjunct professors to act as mentors and to stimulate workshops is an imaginative step which has been pursued successfully.

Research plans for the future five-year-period

There have been significant changes in the work programme due to retirements and the low level of activity of one researcher due to heavy administrative commitments. The management team has responded well to these altered circumstances, and the Scientific Advisory Board has been engaged in the revised planning. One work package has been cancelled and the remaining activity in two other work packages has been transferred to on-going ones. Overall, this represents a sensible rationalisation as the "lost" work packages have been among the less active parts of the centre and the chance to redirect resources creates the opportunity to develop new themes. The introduction of the new work package in biomolecular modelling is a particular positive development which has involved the appointment of a new associate professor at Tromsø. It is strategically placed to influence important experimental work in biological and structural chemistry at Tromsø. The second new package is on approaches to the many-body problem and will build upon expertise in Oslo in Coupled Cluster methodology. It is clear that the new work package leader is outstanding and very active, and that the potential for scientific advance is substantial.

Except for one of the remaining work programmes, which is concerned with a research direction of high novelty and potential high reward in the use of wavelets, all those to be supported in the next stage have a proven history of success. The publications demonstrate developing relationships between theory and experimental groups which indicate that the basic objectives of the CTCC are being realised. The experimental groups are using computational methods with increasing confidence and are increasingly using the new techniques which are being made available through the technical part of the research effort. The synergy between the experimental and theoretical work has created the prospect of major advances in a number of the research areas and the Committee anticipates research at the internationally leading level. All groups appear to have the excellent experimental and computational facilities necessary to achieve this. High quality postdoctoral researchers have been recruited and placed strategically across the groups within the Centre.

Overall, an excellent infrastructure has been created to allow the Centre to achieve its objectives. It would be good to see a concerted effort to provide a pedagogical training effort in quantum chemistry across Norway, perhaps through the exploitation of videoconferencing methods. This might facilitate a greater progression of Masters students into doctorates.

Exit strategies

The prospects for maintaining the current level of research activity beyond the termination of the Centre's RCN funding is considerably limited by the difficulties, in this area of fundamental research, of securing research funding through routes other than the Research Council or European Agencies. Indeed, the tapering of the RCN funding in the second phase of the project is already being presented as a threat. The high quality of the work being done, and the strong relationships which are being created between the theoreticians and experimental groups pursuing objectives with the potential for applications gives hope that, by the time the Centre ceases to exist, the senior researchers will be well-placed to secure

funding through these competitive routes. This ”strategy” is being implemented best at Tromsø where the orientation of much of the work is towards biological chemistry which is a particular strength of the host institution which should facilitate successful funding bids in an environment where ”impact” will become an important criterion for success. In Oslo, the link between the theory group and the very strong materials chemistry effort could be greatly strengthened by an appropriate appointment to the faculty.

The Centre has identified the continued maintenance of the national and international networks as an important objective and one that cannot be handled by the individual researchers. It has asked the Universities of Tromsø and Oslo to provide financial support for networking over a 5-year period.

Summary and recommendations

The CTCC has been responsible for a substantial body of innovative research at an internationally leading level. This has been reflected in a large number of publications in high quality journals, invitations to speak at international conferences, and international awards to Centre members. Substantial progress has been made in integrating theoretical methods into the tool kit of a number of the experimental research groups and the quality of their research has been substantially enhanced. Strategic decisions have been made to refocus some of the research effort in very positive directions. The Centre has created a strong international network of collaborators and visitors which has substantially raised the profile of the activity in theoretical chemistry at Tromsø and Oslo on the international stage. This has allowed the appointment of numerous high quality researchers to positions in the Centre and created a vigorous visitor programme which has contributed to the quality of research and to the training environment. The Centre has engaged well with network activities in the Nordic region which have the potential to improve the research training programmes in theoretical chemistry and to increase the number of PhD students attracted to this area of research. The Centre has attacked the gender issue, which is a particular problem for this area of science, in a highly imaginative way – by the appointment of female professor IIs and by holding focussed workshops and visitor programmes – and this has had some success. The management of the Centre has been extremely effective; an excellent Scientific Advisory Committee has been appointed and this has played a role in strategic decisions. The fact that the Centre is located at two well-separated universities has meant that some of the potential collaborative relationships have been inhibited but, overall, it has allowed the Centre to reach an externally recognisable critical mass in terms of the volume and scope of the research it can sustain. The relationships with the two host universities have been very good and high quality and lasting infrastructure has been created as a consequence of the Centre’s existence.

The Centre should continue with its research plans in their current form, which are resulting in very positive developments. The exit strategy is weak, but the two universities should recognise the benefit of the networking arrangements which have been created for their international profile and future researcher recruitment and plan to support this activity after the RCN funding ceases. In likely future funding scenarios the ”relevance” of fundamental research is likely to be a key criterion for success and the development of the nascent collaborations between experimental groups and theoreticians should be a focus of the second phase of activity. This direction could be greatly helped by strategic appointments at the University of Oslo in particular. The Centre should also examine the possibility that the appointment of suitably trained expert would help to get the codes Dirac and Dalton into a form where they could be disseminated in a self-sustaining way. These could be regarded as key outputs alongside the published work. The Centre should continue its engagement with

collaborative training activities for young researchers in the hope of increasing the flow of doctoral students in the future.

Overall assessment: much of the activity is **exceptionally good** with the remainder **very good**

5.8 Centre for Geobiology CGB

Geobiology is a rapidly developing multi-disciplinary field in geosciences, addressing questions spanning from modern times to the very oldest tectonic and biological processes on Earth. This Centre of Excellence was developed from the combination of several disciplinary groups at the University of Bergen to foster interdisciplinary and integrative research focused on understanding of the Earth as a biogeochemical system.

Research achievements at the time of evaluation

At the time of evaluation of the Centre's activities, significant effort has gone into developing new tools and methodologies for data acquisition, and extending national and international collaborations to complement in house capabilities, in order to establish the Centre as a leader in cutting-edge research at the interface of geological and biological science on extreme environments and processes active in archean times.

The achievements so far are impressive. The unique facilities developed range from state of the art age-dating and stable isotope facilities, molecular biology and geochemical capabilities, to the upgrade of a scientific vessel, and the construction of an AUV for deep marine research. Along the way, CGB has organized or participated in 15 major sea expeditions, made several important discoveries, and produced 270 papers in peer-reviewed journals, with a marked increase of productivity with time.

While CGB is a basic science centre, unexpectedly, some of the work during this first period is directly relevant to social and political issues: helping define the western boundary of the Norwegian EEZ, discovery of potentially abundant natural resources (e.g. sulphide deposits), procedures for monitoring sub seafloor CO_2.

Organizational and administrative aspects

Overall, CGB has met the milestones established at the beginning of the agreement, and has been successful at developing an interdisciplinary training program across different specialties and two faculties, and has attracted a significant number of foreigners to the Centre (~30). Gender ratios are particularly impressive. The matrix organizational structure seems to work well and the fact that both the Director and Deputy director are actively involved in Centre research is an important strength of the Centre. The Centre is extremely well integrated with the University departments, which is to be commended but also creates some problems with overloading of Centre staff that need to be addressed. The University seems to be aware of that and is working on improving the situation. In particular, a new administrative staff member will help off-load the current research and administrative staff of the Centre.

Research plans for the future five-year-period

The Centre is now well poised to glean the benefits of its recent infrastructure development efforts to acquire and interpret unique data during the next 5 years. There is no major change

in the original themes to be addressed, but the initial results and technologies now available have made it possible to refine, add or slightly reorganize the original objectives. These are now organized around four principal themes: seafloor geodynamics, water-rock-microbe interactions in deep biosphere, roots of life, vent and seep bio-signatures. Notably, the Centre will add a subsurface fluid modelling component which is partly made possible through new funding related to subsurface CO_2 sequestration. This will allow them to slightly increase the number of postdocs and graduate students over the next 5 years, although the overall size of the CGB will remain stable.

During the Hearing, the Centre Director has clarified the leadership role of the Centre in the development of the Norwegian Marine Robotics Facility. It is now clear that when the facility is established, the Centre will play a role in its steering structure, but will not be burdened with the practical aspects of its operation.

Exit strategies

Because the Centre is well integrated within the University structure and has significant funding beyond that received from RCN, which currently represents only 20% of its support, the exit strategy seems well planned. Notably, the departments are committed to taking over the Centre at the end of 10 years, and prioritizing their recruitments in the near future so as to retain the best researchers currently employed by the Centre, in order to be able to maintain the forward looking integrative inter-disciplinary structure developed within the Centre.

Summary and recommendations

CGB has developed unique facilities and is conducting multidisciplinary research at the frontiers of an important field, with an impressive breadth of topics and well developed national and international networks of collaborations. It is well funded and is poised to take advantage of new funding opportunities, with, in particular, unexpected applications in the field of carbon sequestration, and the plans for a Norwegian deep sea observatory. The clear commitment of the University of Bergen to take over the Centre at the end of its 10 years RCN lifetime is to be commended. The Centre's needs for sequencing are being addressed within the more general plans of the University of Bergen.

- The good integration with the University departments is exemplary, but carries some drawbacks. Overload of CGB staff with tasks in the Departments is an issue which is well recognized on both sides. It has been partially addressed with the expansion of the Centre and the addition of new staff. However, it is important to continue to find ways to address it. It is also important to continue to seek ways to ensure career development opportunities for young researchers beyond the postdoc level.
- The Evaluation Committee recommends that the Centre continue its efforts with the departments to develop a multi-disciplinary training program in geobiology.

Overall assessment: **Exceptionally good**

6. General observations and recommendations

The Evaluation Committee concludes that the eight Centres of Excellence (SFF-II) in their respective fields have provided an important contribution to the development of Norwegian research. The centres have fostered and inspired a dynamic interaction across faculty and departmental borders and made an impact on the organization of the institutions within which they are located. The formation of a CoE with a novel, often international, research environment and additional funding has stimulated a dynamic development and in many cases outstanding research, published in high profile journals. The creation of CoEs has led to an enhanced visibility and attention to their field of research. This has resulted not only in novel research, but also in an ability to attract funding and support from other sources that had previously not been available. This includes support from the host institution, foundations, and/or industry. And additional funding has been larger than what has been contributed directly by RCN to the CoEs. We therefore congratulate the Research Council of Norway on the introduction and development of a funding scheme that has had fundamental and beneficial effects on the research environment in Norway.

Below we summarize some general observations and recommendations in the following points:

- A strong leadership with a focus on both scientific vision and team management is of critical importance. At the same time, the directors need to promote the independence of young researchers. The scientific environment and the team management were found to be of critical importance for creating an atmosphere conducive to interaction and creativity.
- A strong international CoE Advisory Board has had a great impact on several centres and should be mandatory. The board should meet at least once a year and be updated on progress as well as future plans.
- Most centres were located within larger departments like e.g. Biology, and they appeared to function very well. The CoEs were in many cases operating like a somewhat independent section of a department that shared resources and administrative capacity. In other cases they represented several departments, but the possibility for the members of a CoE to work in close association was still a distinct advantage.
- In a centre that develops well, an increased interaction over the borders between different sub-disciplines will take place. New possibilities will emerge. In the second phase of a CoE there may therefore be reasons to modify the original plans of operation to develop a different, and more integrated conceptual framework.
- In a good research plan there must be room for the unexpected. An interesting new finding needs to be followed up, advances in new technology should be used, and false avenues should be avoided as soon as realized. This means that a research plan needs to be dynamic, and milestones anticipated as an application is formulated may not be as relevant years later.
- Many centres have extensive international contacts, while others have had primarily a Norwegian network. Building an international profile has great importance, and it was noted that Nordic networks could serve as launch pads for a more extensive interaction with researchers in Asia, Europe and the Americas.
- It appears very valuable for the CoEs to maintain links with teaching at the graduate level, in terms of both MSc and PhD programmes. Many centres that bring together several disciplines to form inter- or trans-disciplinary research efforts, should also

convey the resulting new directions to the students through, for instance, PhD courses. The universities in Oslo and Tromsø have taken advantage of these possibilities.

- It is important to maintain and use the human capital nurtured by the centres. The career structure of younger researchers appears to be perceived as a problem in practically all CoEs, but it is apparently also a problem that is discussed extensively outside the CoEs. Models like tenure-track have proved to be efficient in many countries. It provides some stability, in that researchers who do well will then be promoted to full tenure.
- All centres have worked to create a better gender balance. It takes time for gender initiatives to have an impact on senior positions. The increasing number of young female researchers needs further encouragement and opportunities for their career paths.
- Most CoEs appear to have an appropriate infrastructure with access to research equipment, IT and administration. Some cases of failure to invest sufficiently in administrative and technical support were observed and should be adequately planned for.
- Visiting professor programmes have proved to provide inspiration and interaction at all levels from the students to the directors. It provides new expertise which can introduce new concepts and research techniques and lead to collaboration. The visitors may also serve to show different ways to conduct science and even act as role models for female researchers as well as men. It may also facilitate interaction with postdocs and PhD students over periods of weeks or years
- Exit strategies after the ten years of activity are important and must be planned from the start as a joint responsibility of the CoE and the host institution. Some CoEs have extensive funding from many sources, and the exit strategy may then be less difficult then in centres which depend critically on the CoE funding. Some universities plan actively for an exit strategy, and are prepared to create positions for parts of the CoE staff, while others provide limited funding. It should be advisable that the Departments to which the CoEs are closely associated, should take part in the planning, and for instance create professorships in areas central to the CoEs (when possible). Institutions should consider allocation of funds to the centres' research fields after the ten year period to make use of the new competence developed in the CoEs.
- Outside the evaluation of CoEs, it was noted that a national coordination of very expensive infrastructure may be important to consider.

The Centres of Excellence have thus each provided important development in their respective area of research and in addition have had positive effects on the research environment at the faculty level. It is therefore recommended that RCN continues to support and extend the CoE program. We would like, nevertheless, to point out that it is important to have a balance between support to centres and independent project grants. The latter type of grants to individual researchers provide the fastest way to pick up and support new cutting edge discoveries and have them scrutinized by review committees. Such project grants must be available to provide adequate support for individual researchers and their groups. Many outstanding discoveries, particularly in some but not all areas, are made by scientists with small research groups dedicated to a specific problem. The two types of research programmes complement each other.

7. Signatures

Oslo, April 15th 2011

Sten Grillner (Chair)

Paul Madden

Marja Makarow

Barbara Romanowicz

Yvonne Rydin

Matti Sintonen

Attachment 1 - Terms of reference

The Research Council of Norway
Division for Science
26 May 2010

Midterm evaluation of eight Centres of Excellence (SFF-II)

Terms of reference

1 Framework for the evaluation

1.1 Introduction

The *Norwegian Centres of Excellence (CoE) scheme* is designed to stimulate Norwegian research groups to set up centres devoted to long-term basic research of a high international calibre. The scheme is intended to raise the quality of Norwegian research. The goals for the CoE scheme are to:

- promote and award scientific quality in Norwegian research;
- promote cutting edge basic research through long-term, generous funding;
- strengthen internationalisation of Norwegian research;
- create added value by establishing centres in host institutions;
- build strong research groups;
- promote researcher recruitment.

The scheme is open to long term basic research without immediate application or social relevance, as well as to research with such relevance.

The CoE scheme is administered by the Research Council of Norway and funded by the yield on the Fund for Research and Innovation. Each of the centres may receive funding for a maximum of ten (2 x 5) years. The scheme has had two calls for proposals (SFF-I and SFF-II).

Selection of the centres is based on an open competition. The application process was divided in two phases. A prequalification round, based on a less formal application, received 98 applicants. Following a thorough scientific assessments, 26 applicants were invited to submit a final application. Eight new CoEs were established in 2007

1.2 Purpose of the evaluation

The Norwegian Centres of Excellence scheme requires that each of the centres be evaluated under the auspices of the Research Council of Norway after approximately 3 ½ years. The purpose of the evaluation is to assess the scientific quality and production of the individual centres in absolute terms and relative to the centres' original research plans. The evaluation will provide data to support the decision as to whether the individual centre is to continue for the entire 10-year period, or not. The Executive Board of the Research Council of Norway will take the final decision on prolongation.

1.3 Organization

The evaluation will be performed by an international Evaluation Committee. The Committee will evaluate the individual centres based on a common scheme. To support the Evaluation Committee, a number of panels of experts will be set up to carry out detailed scientific assessments of the individual centres, according to criteria given in 1.4. The Evaluation Committee will present its findings and evaluations in a written report that should be made available to the Norwegian Research Council no later than 15 May 2011.

1.4 Conditions and basis for the evaluation assignment

1) The basic reference for the evaluation is provided for by the criteria on which the centres were originally selected.

2) The assessment will primarily focus on the scientific quality and scientific production of the centres, including the generation of original scientific ideas and the promotion of these ideas. Publications, impacts of publications, establishment of (international) networks and output of doctoral candidates and postdocs are important criteria.

3) The scientific achievements and activities will be compared to that presented in the original plans, cf the contract. It should be emphasised, however, that well-founded adjustments in the plans as related to scientific findings in the project period will be accepted and even endorsed.

4) The plans for scientific activities for the centres' final five-year period will be evaluated. The assessment will include the plans for the centres when their CoE status and RCN funding expire.

5) The relations between the centres and the host institutions, the value added for the host institutions, as well as plans for preserving the value generated by the centres at the end of the CoE-period will be focused upon.

6) The research at some of the centres addresses fields in which the research results can produce substantial industrial or social dividends. However, research not explicitly aimed at such a target may also result in important industrial or social dividends. Where this is the case, the evaluations should point out such effects.

7) The evaluators will assess how the centres have achieved the gender equality objectives they set up. They will also evaluate the success of the additional gender equality measures allocated through special funding from the Research Council.

8) The evaluators will be asked to compare the different ways in which the CoEs have been organized and managed. Observations in this context, however, will not be used in any decisive manner for the evaluation results of the individual centres, but will provide information for the use of the individual center and for future CoE planning processes.

To avoid giving a premature indication of the Council's decisions to prolongate individual centres, the Evaluation Committee is asked ***not*** *to comment specifically on this issue.*

1.5 Background material for the evaluation

The following written material will form the point of departure for the evaluation:

- *Self-evaluation* according to a standardised outline, from the individual centre featuring relevant information, including:
  - research plan for the first five-year period;
  - revised research plan for the second five-year period, including a plan for the winding-up period;
  - a list of research results achieved up to the midterm evaluation, supplemented by a list of publications and any bibliometric data that illustrates professional activities;
  - an overview and justification for changes, if any, in the research plan;
  - a list of the publications the centre considers to be its most important;
  - an overview of researcher training and recruitment up to the midterm evaluation, specifying the number of employees, their nationalities, age and gender;
  - an overview of achievements related to gender equality measures and action plans;
  - key financial and administrative figures and factors associated with the center;
  - important industrial or social dividends, if relevant.

- *Centres of Excellence. Requirements and guidelines* (English version)
- *Centres of Excellence. The call for proposals 2005* (English version)

2 Mandate for the Evaluation Committee

The evaluations of the individual centres are to emphasise the following elements:

Research achievements at the time of evaluation

The evaluation is expected to assess whether:

- the centre's research has been at the forefront of developments in its field, leading to outstanding research results and a new understanding that has affected national and international research in the field;
- the centre's publications have been satisfactory, both in quality and scope;
- the centre has reached its original goals and milestones;
- the centre's national and international collaboration has strengthened the research performed at the centre;
- the centre's researcher training has been sufficient and of an international standard;
- the centre has been able to attract good foreign researchers, doctoral students, postdocs and senior researchers;
- in addition to their scientific value, the centre's research results may also open opportunities for important industrial or social dividends;
- there have been changes in the research relative to the plan, and whether these changes have led to better research.

Organizational and administrative aspects

Further, the evaluation should assess whether:

- the centre's form of governance and organization has contributed to the efficiency and quality of the research;
- the relationship between the centre, the host institution and any partners has functioned smoothly, and whether the centre's research has led to mutual enrichment of the overall research environment;

- the head(s) of the centre has/have done a satisfying job, both as a researcher(s) and a manager(s);
- succession planning is integrated in the centre's personnel/recruitment plans;
- the premises and equipment have been satisfactory;
- the perspective of gender equality has been adequately taken into account in the centre's recruitment policy;
- the centre has followed-up its plans and targets for gender equality improvements.

Research plans for the future five-year-period

Further, the evaluation should assess whether:

- all segments of the research plan have original, ambitious, though realistic goals;
- the proposed methods and the equipment used are adequate and necessary;
- the centre's future research will have a chance of producing innovative findings, and whether the centre will continue to be an international leader in its field;
- the centre's researcher training is sufficient in scope and quality, and whether measures have been instituted to the recruitment of younger researchers;
- measures have been instituted to ensure the gender perspective in recruitment;
- the proposed international collaboration is sufficient in scope and quality;
- the centre will be in a position to attract good researchers from abroad;
- the organization of the centre will continue to translate into a high level of efficiency and good relations with the host institution and partners.

Exit strategies

Finally, the evaluation should assess whether:

- The host institution and centre have made adequate plans for what will happen to the centre when the CoE-status and RCN-funding expire;
- The investments and values generated through the CoE-period will be taken well care of.

Attachment 2 – The evaluation process

The Research Council of Norway
Division for Science
June 2010

Midterm evaluation of the Centres of Excellence (SFF-II)

The evaluation process

1. Introduction

The Norwegian Centres of Excellence scheme requires that each of the centres be subjected to a midterm evaluation under the auspices of the Research Council of Norway. The evaluation will provide data to support the Research Council's decision as to whether the funding of the individual centre is to continue for the entire 10-year period, or will be wound up after 5 years.

The purpose of this document is to provide a more detailed description of the evaluation process, with particular emphasis on the self-evaluation performed by each centre, the host institution assessment and the appraisals made by the expert evaluators and Evaluation Committee. Furthermore, an approximate timeline for the process is given. The terms of reference for the midterm evaluation will be published on the homepage of the Research Council of Norway.

2. Background material for the evaluation

The midterm evaluation will be based on background material provided both by the Research Council and by the individual centres and host institutions. A list of documents is given in Appendix.

3. The evaluation process

3.1 Introduction

The purpose of the evaluation is to assess the scientific quality and performance of the individual centres in absolute terms and relative to the centres' original research plans as outlined in the terms of reference. The evaluation involves the following activities:

1. Preparation of background material, including self-evaluations worked out by RCN and the centres
2. Assessment made by the host institution of each centre
3. Assessment of each centre by three international experts
4. Assessment of each centre performed by an international, interdisciplinary evaluation committee, including hearings with the centres
5. Assessment and recommendation on the question of prolongation or winding up made by the Board of the Science Division of the Research Council of Norway
6. Final decision by the Executive Board of the Research Council of Norway

The Executive Board has to make its decision not later than by the end of June 2011. The time line for the evaluation process has been established with this fact in mind, and requires that all background documents, including the self-evaluations, should be dispatched to the experts and the Evaluation Committee by December 2010.

3.2 Documents prepared by the centres and host institutions

Each centre should submit a fact sheet, a self-evaluation and plan for future research in accordance with the terms of reference. The documents should provide factual information in a standardised form, including key financial, administrative and organizational data, a list of publications up to the midterm evaluation and a list of academic staff with brief CVs, and should give an analysis of the research performed and planned, scientific achievements, publication records, researcher training and recruitment, gender perspectives, organizational aspects including governance, national and international collaboration and important industrial, social or cultural dividends, if relevant.

The host institution should sum up the experience gained from hosting a CoE, both scientifically and from an administrative point of view. In addition, the host institutions and centres should present plans for how the CoE investments will be followed-up when the CoE-status and RCN funding expire. In order to allow sufficient time for the subsequent parts of the evaluation process, both the host institution assessment and the self-evaluations should be submitted not later than 1 December 2010.

Templates for the fact sheet, the self-evaluation, the plan for the second five-year period and the host institution assessment, together with guidelines for preparing the documents, will be available on the SFF homepage by 1 July 2010.

3.3 The expert evaluation

Three international experts will be asked to make individual assessments of each centre according to the terms of reference and the information given in the documents listed in Appendix, applying the same criteria for judging scientific quality as those employed when assessing the CoE-applications in 2006. The experts are expected to work as a “virtual panel” (no physical meeting) and submit a written panel report for each centre. The deadline for submitting the expert panel reports will be 10 February 2011.

The centres have been invited to propose names of experts considered qualified to make an assessment. Based on an overall judgement, the Research Council will make the final appointment of the expert evaluators. The evaluators selected may include experts who took part in the original evaluation of the applications to obtain CoE-status.

3.4 The Evaluation Committee

An interdisciplinary, international committee with broad scientific representation will be set up by the Research Council to evaluate each centre based on a common scheme provided by the Research Council. The Evaluation Committee will base its judgement on the terms of reference and information given in the documents listed in Appendix, as well as the expert assessments. The background information will be made available to the committee in December 2010, and the expert evaluations not later than 15 February 2011, as pointed out above.

The committee is expected to hold only one meeting, which will be organized in Oslo in March 2011 and last a maximum of 3 days. In conjunction with this meeting, the committee will arrange individual hearings with each centre and host institution. Apart from this meeting, communication between the committee members is expected to take place mainly by e-mail. The final report of the committee should provide an overall assessment of the achievements of each centre in accordance with the terms of reference of the evaluation. The committee is **not** supposed to address the question of prolongation or winding up of the individual centres. The committee should submit its report not later than 15 May 2011.

The centres have been invited to propose members of the Evaluation Committee. The number of committee members should not exceed 6. The members may include individuals who participated in Scientific Committee that assessed and ranked the CoE-applications in 2006.

3.5 The Research Council

Based on the material submitted by the centres, the host institution reports, the expert assessments and the report of the Evaluation Committee, the Board of the Science Division in the Research Council will make an overall judgement and recommendation as to whether the individual centre is to continue for the entire 10-year period or not. The final decision will be made by the Executive Board of the Research Council in June 2011. The decision will be communicated to the centres forthwith.

3.6 Publication of evaluation results

The final decision of the Executive Board, the recommendations of the Board of the Science Division and the report of the Evaluation Committee will be published in its entirety both on the web and in the form of a printed evaluation report.

3.7 Timeline

The evaluation will be conducted according to the following approximate timeline:

June 2010	Terms of reference approved by Science Division
1 July 2010	Terms of reference, evaluation process and documents announced on the web
September 2010	Members of the Scientific Committee appointed
December 2010	Experts appointed
1 December 2010	Deadline for self-evaluations and host institution reports
15 December 2010	Experts and the Scientific Committee receive background material
10 February 2011	Deadline for expert evaluations
March 2011	Evaluation Committee meets in Oslo, hearings with centres and host institutions
15 May 2011	Evaluation Committee submits evaluation report
June 2011	Recommendation on prolongation by Division of Science
June 2011	Decision on prolongation by the Executive Board
June 2011	Decision communicated to the centres
July 2011	Evaluation report published

Appendix

List of documents supporting the midterm evaluation of the Norwegian Centres of Excellence.

General background material supplied by the Research Council:

1. Centres of Excellence. Report on a Norwegian scheme. The Research Council of Norway, Oslo 2000 (English summary)
2. Centres of Excellence. Requirements and guidelines. The Research Council of Norway, Oslo 2005
3. Centres of Excellence. The call for proposals. The Research Council of Norway, Oslo 2005
4. Criteria for evaluating the CoE applications. The Research Council of Norway, Oslo 2005
5. Contracts between the Research Council and the host institution of the individual centre including the original research plans and budgets
6. Annual reports for the CoE-centres for 2007, 2008 and 2009

Documents prepared by the Research Council:

7. Midterm evaluation of the Centres of Excellence. Terms of reference. The Research Council of Norway, Oslo June 2010. Published on the homepage of the Research Council
8. Midterm evaluation of the Centres of Excellence. The evaluation process. The Research Council of Norway, June 2010
9. Midterm evaluation of the Centres of Excellence. Guidelines for the preparation of evaluation documents. The Research Council of Norway, June 2010
10. Midterm evaluation of the Centres of Excellence. A. Template for Fact sheet. The Research Council of Norway, June 2010
11. Midterm evaluation of the Centres of Excellence. B .Template for Self-assessment. The Research Council of Norway, June 2010
12. Midterm evaluation of the Centres of Excellence. C. Template for Plan for second five-year period. The Research Council of Norway, June 2010
13. Midterm evaluation of the Centres of Excellence. D. Template for the host institution assessment. The Research Council of Norway, June 2010
14. Midterm evaluation of the Centres of Excellence. E. Template for Exit strategies. June 2010

Documents prepared by the centres and the host institutions:

15. Midterm evaluation of the Centres of Excellence. A. Fact sheet (prepared by each centre)
16. Midterm evaluation of the Centres of Excellence. B. Self-assessment (prepared by each centre)
17. Midterm evaluation of the Centres of Excellence. C. Plan for second five-year period (prepared by each centre)
18. Midterm evaluation of the Centres of Excellence. D. Host institution assessment (prepared by the host institutions)

Midterm evaluation of the Centres of Excellence. E. Exit strategies (prepared by host institutions and centres)

Attachment 3 - Description of terms for the level of quality

Description of terms for the level of quality

Exceptionally good – International front position, undertaking original research and publishing in the best international journals. High productivity. Very positive overall impression of research group/centre and leadership.

Very good – High degree of originality, a publication profile with a high degree of international publications in good journals. High productivity and very relevant to international research or to Norwegian society. Very positive overall impression of research group/centre and leadership.

Good – Contribute to international and national research with good quality research of relevance both to international research development and to Norwegian problem solving. Good balance between international and national publications. Acceptable productivity. Positive overall impression of research group/centre and leadership.

Fair – The quality of research is acceptable, but international publication profile is modest. Much routine work in design and publication. Relevance and productivity of research is not exciting. No original contributions to research knowledge. Overall impression is positive but with a distinct degree of scepticism from the evaluator.

Weak – Research quality is below good standards and the publication profile is meagre. Only occasional international publication. No original research and little relevance to problem solving. No overall positive impression by evaluator.

Attachment 4 - Program for the Oslo meeting

Program for the Oslo meeting of the Committee 15 and 16 March 2011

Tuesday 15 March 2011

Centre	Time	Program	Representatives from Centres and Host institutions
-	0830 - 0950	Committee meeting	
-	0950 - 1000	Coffee break	
CIR (UiO)	1000 - 1040	Centre hearing and discussions[1]	Ludvig Sollid, Director Inger Sandli, Deputy director Anders Sandvik, Adm.coordinator Bjørn Haugstad, Director of Research
	1040 - 1100	Committee discussions	
CCB (UiO)	1100 - 1140	Centre hearing and discussions	Harald Stenmark, Director Ragnhild A. Lothe, Co-director Anette Sørensen, Adm.coordinator Bjørn Haugstad, Director of Research
	1140 - 1200	Committee discussions	
-	1200 - 1300	Committee Lunch	
CEES (UiO)	1300 - 1340	Centre hearing and discussions	Nils Chr. Stenseth, Director Kjetil Jacobsen, Core group member Tore Wallem, Adm.coordinator Prof. Trond Schumacher, Head of Dep Bjørn Haugstad, Director of Research
	1340 - 1400	Committee discussions	
ESOP (UiO)	1400 - 1440	Centre hearing and discussions	Kalle Moene, Director Halvor Mehlum Johannes Elgvin, Adm.coordinator Bjørn Haugstad, Director of Research
	1440 - 1500	Committee discussions	
-	1500 - 1510	Coffee break	
CSMN (UiO)	1510 - 1550	Centre hearing and discussions	Olav Gjeldsvik, Director Deirdre Wilson, Core group member Ulla Heli, Adm.coordinator Bjørn Haugstad, Director of Research
	1550 - 1610	Committee discussions	
University of Oslo (UiO)	1610 - 1630	Host institution hearing and discussions	Ole Petter Ottersen, Rector Bjørn Haugstad, Director of Research Mari D. Bergseth, Adviser
	1630 - 1700	Committee discussions	
-	1900 - 2200	Dinner	

[1] The hearings will start with a SWOT-analysis presented by the centre (20 min), followed by a discussion between the centre representatives and the committee members (20 min). After each hearing the committee members willgather for 20 min of discussion. Total time reserved per centre: 60 min

Wednesday 16 March 2011

Centre	Time	Program	Representatives from Centres and Host institutions
	0830 - 0930	Committee meeting	
CBC (SIMULA)	0930 - 1010	Centre hearing and discussions	Hans Petter Langtangen, Director Joakim Sundnes, Co-director Tom Atkinson, Adm.coordinator Are Magnus Bruaset, Director Simula
	1010 - 1030	Committee discussions	
	1030 - 1040	Coffee break	
CTCC (UiTø)	1040 - 1120	Centre hearing and discussions	Kenneth Ruud, Director, UiT Trygve Helgaker, Co-director, UiO Stig Eide, Adm.coordinator, UiT Tore Guneriussen, Research Adm.coordinator
	1120 - 1140	Committee discussions	
	1140 - 1230	Committee Lunch	
CGB (UiB)	1230 - 1310	Centre hearing and discussions	Rolf B. Pedersen, Director Dag Rune Olsen, Dekan Anne Fjellbirkeland, Adm.coordinator
	1310 – 1330	Committee discussions	
-	1330 - 1340	Coffee break	
	1340 – 1700	Committee discussions. Drafting of report	
-	1700	Departure for Garderrmoen	

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