



VINNOVA REPORT
VR 2009:23

MID TERM EVALUATION OF THE INSTITUTE EXCELLENCE CENTRES PROGRAMME

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Title: Mid Term Evaluation of the Institute Excellence Centres Programme

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Series: VINNOVA Report VR 2009:23

ISBN: 978-91-85959-80-8

ISSN: 1650-3104

Published: October 2009

Publisher: VINNOVA - Swedish Governmental Agency for Innovation Systems/Verket för Innovationssystem

Case No: 2005-00569

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by

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SWEDISH FOUNDATION *for*
STRATEGIC RESEARCH

Preface

In this report The Swedish Governmental Agency for Innovation Systems (VINNOVA), the Knowledge Foundation (KK-stiftelsen) and the Swedish Foundation for Strategic Research (SSF) present the midterm evaluation report of the Institute Excellence Centre programme.

The Institute Excellence Centres programme is to run for up to 6 years. The Centres are funded in two stages: for 3 years based on the initial application and for an additional period of 3 years based on evaluation and renewed application. The partners of a Centre are industrial companies and research institutes in collaboration with a University/Institute of Technology. The parties contribute jointly to the centre's research programme, financially or in the form of active work.

A first evaluation was carried out less than 16 months after Centre start up. Its primary purpose was assessment of the ways Centre organisation and performance had been established. Thus, the objectives of the first evaluation were to serve as a reference for forthcoming evaluation(s) and to comment and counsel the Centres on their performance.

This midterm evaluation also included assessment by scientific expertise, and took place during year 3, before stage 2. This was an opportunity for evaluators to give advice and recommendations on how each centre can be even more efficient and effective. On a programme level this is also valid for the financing agencies.

At present there are 8 Institute Excellence Centres running. Although each of the centres has a formal name, centres are often commonly referred to by an acronym. In this report the following Institute Excellence Centres were reviewed:

- FOCUS - FOI Centre for Advanced Sensors, Multisensors and Sensor Networks
- EcoBUILD - Centre for eco-efficient and durable wood-based materials and products
- CNS - Centre for Networked Systems
- PRISMA - Center for Process Integration in Steelmaking
- CIC - Casting Innovation Centre
- CODIRECT - Controlled Delivery and Release
- IMAGIC - IMAGIng Integrated Components
- AFOC - Acreo Fiber Optic Center

On behalf of VINNOVA, the Knowledge Foundation and the Swedish Foundation for Strategic Research (SSF) we want to express our appreciation to the evaluators. They accomplished their hard work with great enthusiasm and professionalism. Their reports will be of great value for further development of the Institute Excellence Centre programme.

Stockholm in September 2009

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Director General
VINNOVA

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Chief Executive
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Contents

1	Overall comments and Recommendations	7
1.1	Introduction.....	7
1.2	Overall impression.....	8
1.3	Comments and Recommendations for VINNOVA, the Knowledge Foundation and the Swedish Foundation for Strategic Research.....	11
1.3.1	Comments.....	11
1.3.2	Recommendations	13
2	Assessments of the individual Centres	14
2.1	Evaluation of the FOCUS Institute Excellence Centre at FOI	14
2.1.1	Long-term strategy and progress of the Centre	14
2.1.2	Scientific and technical achievements and their impact.....	15
2.1.3	Build-up of a concentrated research environment.....	18
2.1.4	Leadership and management	19
2.1.5	Conclusions and Recommendations.....	21
2.2	Evaluation of the EcoBuild Institute Excellence Centre at SP Träteknik.....	23
2.2.1	Long-term strategy and progress of the Centre	23
2.2.2	Scientific and technical achievements and their impact.....	24
2.2.3	Build-up of a concentrated research environment.....	26
2.2.4	Leadership and management	28
2.2.5	Conclusions and Recommendations.....	29
2.3	Evaluation of the CNS Institute Excellence Centre at SICS	31
2.3.1	Long-term strategy and progress of the Centre	31
2.3.2	Scientific and technical achievements and their impact.....	32
2.3.3	Build-up of a concentrated research environment.....	34
2.3.4	Leadership and management	35
2.3.5	Conclusions and Recommendations.....	37
2.4	Evaluation of the PRISMA Institute Excellence Centre at Swerea MEFOS	39
2.4.1	Long-term strategy and progress of the Centre	39
2.4.2	Scientific and technical achievements and their impact.....	39
2.4.3	Build-up of a concentrated research environment.....	41
2.4.4	Leadership and management	42
2.4.5	Conclusions and Recommendations.....	44
2.5	Evaluation of the CIC Institute Excellence Centre at Swerea SWECAST	46
2.5.1	Long-term strategy and progress of the Centre	46
2.5.2	Scientific and technical achievements and their impact.....	46
2.5.3	Build-up of a concentrated research environment.....	48
2.5.4	Leadership and management	49
2.5.5	Conclusions and Recommendations.....	51

2.6	Evaluation of the CODIRECT Institute Excellence Centre at YKI	53
2.6.1	Long-term strategy and progress of the Centre	53
2.6.2	Scientific and technical achievements and their impact.....	54
2.6.3	Build-up of a concentrated research environment.....	55
2.6.4	Leadership and management	57
2.6.5	Conclusions and Recommendations.....	59
2.7	Evaluation of the IMAGIC Institute Excellence Centre at Acreo	60
2.7.1	Long-term strategy and progress of the Centre	60
2.7.2	Scientific and technical achievements and their impact.....	61
2.7.3	Build-up of a concentrated research environment.....	63
2.7.4	Leadership and management	65
2.7.5	Conclusions and Recommendations.....	67
2.8	Evaluation of the AFOC Institute Excellence Centre at Acreo	69
2.8.1	Long-term strategy and progress of the Centre	69
2.8.2	Scientific and technical achievements and their impact.....	70
2.8.3	Build-up of a concentrated research environment.....	72
2.8.4	Leadership and management	74
2.8.5	Conclusions and Recommendations.....	75
Appendix A		77
	Guidelines for the midterm evaluation of Institute Excellence Centres	77
	Background.....	77
	Evaluations of IEC	78
Appendix B		81
	Evaluation programme	81
Appendix C		82
	The Evaluation Team	82
Appendix D		83
	List of participants at the interviews	83
Appendix E		91
	List of acronyms.....	91

1 Overall comments and Recommendations

1.1 Introduction

The aim of the Institute Excellence Centres (IEC) programme is to "create environments for research, development and innovation of internationally competitive standing within areas of great importance to the future competitiveness and growth of Sweden, managed by research institutes in collaboration with universities and industries".

This is a report on the second evaluation of the eight IECs financed by VINNOVA, the Knowledge Foundation and the Swedish Foundation for Strategic Research (SSF). The first evaluation, which was performed in March 2008, was to look at the way in which each Centre had established its organisation and started up its research programme. The outcome of this evaluation is also a reference for forthcoming evaluations.

This second evaluation took place in August/September 2009 or about 32 months after the startup of the Centres. In this midterm evaluation also their scientific and technical achievements have been evaluated as well as their performance from a more general point of view. The main focus has been to form an opinion of the approach and measures taken so far by each Centre, to assess the potential for its long term development towards a successful IEC and to give recommendations to each Centre on how its performance could be improved.

The evaluation team was composed of two generalists, who participated in all the eight evaluations, and two international scientific experts. The scientific experts changed between the different Centres for obvious reasons, since the eight Centres are active in different scientific and application areas. For this reason it is important to understand that the evaluation result, from a scientific point of view, to some extent is dependent on the background, the experience and the expectations of the scientific experts for each Centre. Since the generalists were the same at all Centres a more uniform evaluation should be expected regarding other aspects of the Centres' performance than pure scientific and technical matters.

The evaluation took place in the form of on-site hearings and discussions based on presentations of the present status and future plans for each Centre. Before the hearings, the evaluators were supplied with annual reports, research and activity plans for the coming three year period (2010 – 2012)

and overall table of performance indicators from the Centres. The report from the first evaluation was also available.

The evaluation team consisted of Kaj Mårtensson (external evaluator and chairman of the evaluation team) and Heikki Kleemola (external evaluator), who together took care of the general aspects of the Centres performance. In addition the following scientific experts participated in the team at each Centre:

- FOCUS – Prof. Hugh Griffiths, UK, and Dr James Ferryman, UK.
- ECOBUILD – Dr Salme Koskimies, Finland, and Prof. Joris Vanacker, Belgium
- CNS – Prof. Stephen Hailes, UK, and Dr Craig Partridge, USA
- PRISMA – Prof Veena Sahajwalla, Australia, and Prof. Ragnhild Aune, Norway
- CIC – Prof. John Campbell, UK, and Prof. Doru Stefanescu, USA
- CODIRECT – Prof. John Ralston, Australia, and Prof. Helmuth Möhwald, Germany
- IMAGIC – Prof. Uzi Efron, Israel, and Prof. Tim Ashley, UK
- AFOC – Professor Roel Baets, Belgium, and Prof. Anders Bjarklev, Denmark

Elisabeth Bergendal-Stenberg, the Knowledge Foundation, Olof Lindgren, the Swedish Foundation for Strategic Research (SSF), and Bengt Johansson, VINNOVA, were all participating as observers at all hearings. When questions regarding programme wide issues and recommendations to the financing agencies were discussed at the hearings, the three observers were not present. The Centres were represented by the Centre management, representatives of the Centre board, the participating companies, partner universities and the management of the hosting institute. Some researchers and PhD students were also present in most cases. The evaluators found the hearings to be very open and informative.

1.2 Overall impression

The overall impression of the evaluators is that the IEC programme has been of great value not only to the research institutes involved, but also to the participating universities and companies. Comments like "The Centre has forced the institute to a new way of thinking and working", "This programme has facilitated the cooperation between professors at different universities", "The IEC has been an excellent meeting point for different companies and linked them together" etc. have been made by the Centre partners. In addition there is no doubt that many projects would not have

been started without the support from the Swedish Foundation for Strategic Research, the Knowledge Foundation and VINNOVA.

It is quite clear that the IEC programme has contributed significantly to the build-up of competence in some areas of great importance to the Swedish industry. Through the IEC-programme the participating companies have invested additional resources into collaborative research between institutes, universities and industry. The evaluators are convinced that many of the projects and cooperative initiatives will continue even after the six years of IEC-funding.

All Centres have clearly improved since the first evaluation in March 2008. New companies have joined and few left for various reasons. In total, more companies are involved in the IEC programme today, compared to the status at the first evaluation 18 months ago. More universities and other institutes have become partners of the Centres.

Many of the recommendations made at the first evaluation have been followed and a lot of earlier weak points are not there anymore. Even if the time since the start of the Centres is still rather short, a lot of new interesting results have been produced and implemented, many patents have been filed and even some start-up companies formed. We have seen examples of achievements where the industrial impact is already clear. There are probably even more useful results which for reasons of secrecy were not described to the evaluators.

Although all Centres have improved since March 2008, the evaluators noted differences between the eight Centres in their evolvement towards an IEC which would meet all the criteria set up by the financing agencies. Centres like AFOC at Acreo and CODIRECT at YKI are examples of Centres which have developed in a very positive way and meet already today most of the requirements for a well functioning Institute Excellence Centre. Not surprisingly, both these Centres have perhaps the most enthusiastic and committed Centre Directors.

It is quite natural that each Centre has its strong and weak points. The financing agencies arranged in 2008 a benchmarking meeting between the Centres where good examples were presented from each Centre. The evaluators believe that this can be worth doing again in the beginning of 2010 when the new three year funding period starts. This type of benchmarking can be of great help to the Centres and will probably increase the interaction between the Centres.

All the Centres have built up an organisational structure which is relevant, with an active Centre board where people from industry are in majority, with a Centre management involving more than one single person, with an

international scientific advisory board, with a well functioning project organisation etc.

Many Centres have also created a generic part in their research programme, which is open to all participants and which facilitates the cooperation and learning process between the industrial partners. All Centres have a communication plan and an efficient technology transfer is also established. In some Centres we have noted that IPR, competition and confidentiality issues to some extent restrict the collaboration and the Centres have to find new ways of promoting the interaction between the participating companies.

The identity of the Centres within the hosting institute has been strengthened in most cases. The Managing Director of the institute has in all cases clearly declared a support of a strong Centre identity. This is e.g. the case in the big institutes like FOI and SP, which is excellent. In general, more work has to be done in order to give the Centres a visibility on the international arena.

The cooperation with the university partners seems to work in an excellent way. Agreements have been made regarding IPR and the university partners have expressed their satisfaction with the cooperation. Many PhD students are also involved in the Centres. Some mobility between academia, institute and industry has been observed but this can be further strengthened in the future. However, in some cases the evaluators have encouraged the Centres to establish more cooperation with international, well recognised centres of excellence in relevant areas.

Some industry partners explained that during the recession they have taken the opportunity to let their people spend more of their available time at a Centre. It was also stated that due to the recession some of the projects related to energy savings and environmental effects will become even more important in the future. In a few cases the recession has caused some delay in specific projects and hindered industrial partners to participate in seminars etc

Many of the institutes, but not all, have a quality assurance system like for example ISO 9001. This should be reflected in the Centres' way of working. The evaluators have seen some Centres which have a very good quality system with working processes for continuous improvements, regular evaluations of the customer satisfaction and a very good reporting system. On the other hand this is an area where other Centres can improve in the future.

Most of the Centres have been very successful in acquiring additional funding from EU, industry and regional or other types of public sources, to the Centre activities. In one case as much as over 14 MSEK has been added

to the already existing annual Centre money, which has made it possible to significantly extend the Centre activities. On average 6.5 MSEK has been added during 2008 to the earlier existing financing of a Centre from the IEC programme and the involved partners.

Many of the Centres have started to think about how to organise and finance the Centre activities after the six years of public IEC funding. However, for most Centres a clear strategy including economic predictions and actions, on how to reach a long term continuation remains to be developed.

It is important to stress that an Institute Excellence Centre has to show excellence in two completely different ways. On one hand the Centre has to show a unique competence in a specific area which is internationally recognised. This requires the Centre to have a critical mass of experienced researchers, publications in peer-reviewed first class journals and to be able to cooperate with other first class groups in the world etc. On the other hand the Centre has to be excellent in bringing knowledge into innovations in the industry.

This means that the people at the Centre have to establish good working routines regarding IPR, secrecy matters, etc., and develop well functioning cooperation networks with companies. They should be well informed about and understand industrial problems and be able to assist the companies to implement the results in an industrial environment. To summarise, they should be skilled both from a scientific and from an innovation point of views. In this respect these IEC are to some extent different from university based EC and have to be judged partly by other criteria than those normally used for the evaluation of university based Centres.

The evaluators think it is of importance for the Swedish institute system to show that these IEC will create a new, excellent way of strengthening the innovation system in the country and that the Centres will have enough strength to reach a long term continuation. We strongly believe in these Centres and would like to wish all of them success in the future.

1.3 Comments and Recommendations for VINNOVA, the Knowledge Foundation and the Swedish Foundation for Strategic Research

1.3.1 Comments

At each Centre hearing, the evaluators asked the persons present to make spontaneous comments about their impression of the IEC-programme, possible problems they have had and suggestions for the future in order to

improve the programme construction. Below you will find some of these comments.

All of the Institute Excellence Centres highly appreciated the IEC Programme initiated by VINNOVA, the Knowledge Foundation and SSF. The initiative was considered to be of great importance not only for the participating institutes but also for the cooperating universities and companies, and in more general for strengthening of the Swedish innovation system.

The important role of the Programme, in developing new knowledge in the Centres and strengthening their research collaboration, was acknowledged by the Centres. Questions were raised about the IEC's shorter duration (6 years) compared to that of the University Excellence Centres (10 years).

The Programme has promoted collaboration between large and small companies and given, particularly for the smaller ones, a channel for exploiting the knowledge and services of the Centres and partners.

The Centres have found the Model agreement for the handling of the Intellectual Property Right issues, created in the Programme, very useful. The agreement has also promoted collaboration between such partners which earlier due to IPR problems were hesitant to participate.

In the planning of the second three year financing period, a few Centres had faced some difficulties. The partner companies did not want to sign binding agreements with the Centre until they were sure that the Centre activities would continue. On the other hand the financing agencies wanted binding agreements from the partner companies before approving the application for funding.

The reporting practice was found to be rather demanding by many Centres. There is a need to find simple but accurate, measurable criteria regarding important criteria like achievements, relevance and their industrial impact.

Additional visibility for the Centres in the publications and other media coverage of VINNOVA, the Swedish Foundation for Strategic Research (SSF) and the Knowledge Foundation would be very much appreciated by some Centres.

The training programme for the management group of the Centres, arranged by the financing agencies, was highly appreciated. New such initiatives would be very welcome. A training course in "tools for increasing the efficiency and quality of research- and management processes" in the Centres, was suggested as an example.

The participation model in which larger companies pay more in cash than SMEs was considered inequitable by some companies in one of the Centres. In addition, the fact that the Model agreement gives equal IPR to the partners, in spite of their different economical contributions, was also commented upon.

1.3.2 Recommendations

The evaluators would finally like to make some recommendations to the financing agencies in order to improve future evaluations and performance of the Centres.

- In coming evaluations the Centres should, as a complement to the existing reports, be asked to present more specific information related to achievements of the Centre and their industrial and economic impact. The Scientific Experts would further like to receive the most important publications of each Centre and executive summaries of important research which has not been published.
- The management training programme initiated by the financing agencies is highly appreciated by the participants. A new topic for the future could be “How to reach a better efficiency and quality of the Centre performance”. Good experience from existing Centres could in such a programme be used as a benchmarking reference.

2 Assessments of the individual Centres

2.1 Evaluation of the FOCUS Institute Excellence Centre at FOI

On August 24, 2009 the evaluators, Hugh Griffiths, James Ferryman, Heikki Kleemola and Kaj Mårtensson met with the Centre Director Hans Frennberg, the Deputy Centre Director Staffan Rudner and representatives from the Centre Board, the Centre Committee, university, institute management, industry and senior scientists of the FOCUS Institute Excellence Centre. The meeting took place at FOI and the purpose was to perform the midterm evaluation of the Institute Excellence Centres Programme (IEC). Representatives from VINNOVA, the Knowledge Foundation and the Swedish Foundation for Strategic Research (SSF) were also present. We thank the organizers of the meeting for their informative presentations and open discussions.

2.1.1 Long-term strategy and progress of the Centre

The vision of the Centre for 2010 – 2012 is stated ‘... to be the internationally leading Centre for research and industrial implementation of novel sensing solutions and technology, particularly for safety and security applications’. This is acknowledged by the Centre to be ambitious, but is effectively limited by available co-funding. The basis of the research programme is the development of technologies for medium-distance sensing, covering both advanced sensors and multi-sensor systems.

The implementation and progress of the strategy to date has been impressive. We base this view on the number of research projects that have been undertaken, the engagement of the industrial and academic partners, and the volume and quality of the research output. The present research programme is well aligned to the core activities of the Information Systems Research Division of FOI; in particular, sensor solutions for Security and Defence are stated to be a strategic area for FOI. This is reinforced by the position of the Swedish Armed Forces, who encourage coordinated efforts in increasing knowledge through cooperation facilitating spin-in of academic knowledge and civil technologies. However, we would like to see a stronger articulation of the role of the academic partners.

The strategy for the second three-year period and beyond, builds on the success of the first three years. Particular objectives are to prioritise applications for funding for long-term strategic research, joint research

projects especially in the security and safety domain, and to leverage more direct funding from industry. Following the recent workshop and further discussions, seven new projects have been identified to take forward relating to current work in the Centre. Within the wider area of Security a platform will be sought for industrial / academic collaboration, given suitable financial support.

It was stated that peer-reviewed publication will be favoured over internal reports. We agree that this is important, because the peer review process provides a cost-effective means of benchmarking the quality of research on an international scale. The Centre also plans to intensify cooperation with other Centres and Institutes, as well as between relevant Groups at FOI and LiU, Chalmers and UU. Furthermore, it plans to develop the identity/brand of FOCUS as a national competence centre in security research, which will in turn make FOCUS more attractive to external interest.

2.1.2 Scientific and technical achievements and their impact

The research programme within FOCUS is multidisciplinary, covering both military and civil interests, addressing electromagnetic sensors and sensor network technologies. More specifically it includes signal and image processing, technology for high-resolution and proximity systems in the microwave, mm-wave and THz region, and architecture and resource allocation issues in sensor networks and sensor data fusion. The applications for the research are wide-ranging, from medicine (diagnostics), food safety, climate monitoring, through to wide area monitoring CCTV and checkpoint security (people + luggage) and surveillance. The research programme is of international standing, strongly aligned with current research priorities both at national and European level, with an urgent need by stakeholders / end users to adopt the outcomes of the technology, especially in the areas of safety and security. Sensor data fusion and THz face imaging were highlighted as examples of world-class research, and new areas established including surveillance and identification of anomalous behaviour. The annual review and planning workshop allows customers to be consulted on the results achieved and on management of projects, as well as on identifying future needs.

Highlights of achievements in the first three years of the programme include:

- Intelligent surveillance: tracking in multi-camera networks (including reacquisition); technology transfer to Saab;
- Area control by networks of ground sensors with widely different scope; MSc work provided new techniques for gun localisation – will bootstrap future work; technology transfer to the SME Exensor;

- Food safety: improved detection capacity demonstrated for detecting foreign objects; deployment by Heinz in an Italian factory, through the industrial partner Food Radar Systems;
- MMIC radiometers: receiver module technology for radiometer systems; evaluation of several transition designs (50, 100, 210 GHz);
- RF sensor for face recognition behind masking; results show this can be performed in useful time and penetration is acceptable;
- Naval radar: new experimental four stage solid-state radar and Consilium S-band antenna system, validating theoretical work, with good results;
- Control of sparse sensor resources in surveillance scenarios; classification method implemented.

FOCUS is actively engaged in a number of initiatives to acquire new projects (joint where feasible) both at the national and international levels. At the EU level a number of projects have been awarded internal funding for bidding, largely as a participant to projects, however also as a leader, for example in the recently funded project ADABTS. EC priority areas addresses include ICT and Security. Involvement in consortia has increased international visibility as well as building relationships with other partners which will prove fruitful in future grant proposals. In summary, of 27 applications originating from FOCUS environment and evaluated over the period 2007 – mid-2009): 8 were not approved, 19 were approved (14 running, 5 in negotiation), compared to 3 proposals approved in 2006, which clearly represents a substantial increase.

We are pleased to see that a workshop is planned for December 2009 to provide an overview of the ongoing research in Sweden within the National Security Research Programme and projects with Swedish participation under the EU FP7 Security Programme.

The FOCUS International Advisory Board was set up to provide views and recommendations on mechanisms to further strengthen and develop the research activities within FOCUS. We regard this as effective, with a climate of open dialogue and constructive comments made across a range of projects. Feedback is provided on the overall project portfolio, specific projects, and performance and development of the centre. Meetings are held annually (co-located with FOCUS review and planning workshop on dissemination of projects' results). The IAB also provided their impressions and recommendations on FOCUS in a report delivered in January 2009. A key recommendation has been to reallocate effort in certain areas. Additionally, the IAB have played an active role in highlighting larger projects in which the Centre could play a part, as well as providing strategic input in addition to quality assurance, and in reviewing the application for Phase two.

In respect of attracting visiting scientists it was acknowledged that more development is needed. Currently there are occasional visiting foreign research scientists, but this is currently exceptional rather than the norm.

It was stated that commercial or security classification issues did not provide any barrier to publication. Explicit permission does not now need to be sought for publication; rather it is encouraged. The exploitation / commercialisation strategy was stated to be a balance between blue skies and product-oriented, with companies having access to research results, short term to deployment. Intellectual Property is shared between partner organisations with an explicit agreement regulating their rights. For reasons of efficiency, social, legal and ethical issues are handled at FOI level rather than within the Centre.

In addition to the highlights noted above, examples of products include unattended ground sensors, for which the detection algorithms have already been implemented in commercial sensors for personnel and vehicle detection.

We observed an apparent lack of commitment in the university partners, as evidenced by the presence of only one university (LiU) at the review. Furthermore, the benefits of the Centre to this partner were not made clear. On the other hand, the Forum Securitatis doctoral programme has been launched in collaboration with LiU, under the theme of Security and Emergency Management. Five courses have been developed and are up and running, with nine students currently admitted towards a future target of 20. We regard this as a very positive development which is strategic to the development of the Centre and which will provide a resource of scientists qualified to doctoral level. In the future it is envisaged that Security Link, a new LiU – FOI initiative in the area of security and crisis management and including participation from KTH and Chalmers, will further strengthen the core activities.

FOI has expertise and facilities which have been demonstrated to be valuable to industry, particularly SMEs. Industry acknowledges that their short-term interests are different to those of FOI, but they anticipate a long-term gain from cooperation. We regard the use of project managers from industry as a positive factor, but there is a risk when a company is under pressure. However we were reassured that the Centre pays attention to maintaining the momentum on the projects with reporting at Board level and the quantification of the level of effort from both industry and academia.

There are interfaces of FOCUS with a number of Swedish Institutes / Centres of Excellence, Universities with a commitment to regular joint events and to encourage and investigate possible joint projects. We

acknowledge that this is a difficult process, but every effort should be made to pursue this. For example, efforts could be made to utilise more effectively the GHz Centre at Chalmers.

2.1.3 Build-up of a concentrated research environment

The FOCUS centre is well structured and organised and its management functions are logical. The basic twofold idea of the IEC concept is well understood: The main tasks of FOCUS are to create long term collaboration between the Centre, academia and enterprises for developing new products and processes for the benefit of the Swedish companies and society and on the other hand give ideas and impulses to the development of the Institute. The latter task may be, in fact, an important one in the case of FOI. In the process of developing FOCUS towards a more customer oriented way of acting, it can do pioneering work and create models and tools to accelerate changes in the Institute's marketing and priority setting functions.

The safety and security related research and its results have not always been open for the public or for companies outside a project. The area still is somewhat sensitive although the centre is opening up. There is a great potential for safety and security related products and systems. The activities of FOCUS are within the area of safety and security which can be foreseen to be very important areas for the Swedish companies in the future. In addition, the area is one of the priority areas of the EU research. This creates good opportunities for increased public funding.

At the moment there are three concepts developed simultaneously: Focus Centre, Forum Securitatis and Security Link. This may be confusing to the staff. It is of utmost importance to inform the personnel about their roles and responsibilities.

The present project portfolio consisting of seven projects, the total volume of them being 11 person years indicates a need of focusing. Several parallel small projects having participants from the Centre and one company only lead to an increased need for information dissemination through seminars, meetings, workshops etc. Larger projects would be beneficial also for improving collaboration between the companies and for decreasing the amount of administrative work. In summary it can be stated that the strategy of the Centre should be focused and larger research projects created to promote more effective use of resources and collaboration between the partners. This process could be accelerated by taking customer representatives into the Centre committee.

As already mentioned above, the total number of man years is 11, being low compared with the average value of all IEC centres. In addition the contribution consists of many persons' work. This means that they have

used a small share of their working time for the centre. A better commitment to the centre can be reached by increasing the involvement of the key researchers and decreasing their number.

The mobility of researchers should be encouraged. In general, more attention should be put on marketing, selling and intellectual property rights functions at the centre and the institute.

The Director and the Assistant Director were found to be committed and motivated. In the future the number of person years will be increased.

Industrial involvement now takes place through participation in Centre projects which are partly publicly funded. The share of industrial assignments (contracts, projects) and above all direct funding should be increased substantially. This is also one of the cornerstones for the development of the Centre beyond the IEC programme period. The number of innovations (in the form of patents and IPR issues) should be increased. This is also important in keeping up the interest of companies. The value of innovations can be improved by developing them further at the centre or institute.

The policy on the formation of spin-off companies and moving IPR to companies should be defined clearly and informed to the staff. This may require hiring of some experts competent in product development, marketing and IPR agreements. The exploitation of the university resources should be improved.

2.1.4 Leadership and management

The Centre Director, Hans Frennberg, and the Deputy Centre Director, Staffan Rudner, from FOI, are both well experienced and have a professional and enthusiastic approach to the leadership of the Centre. The annual report, their presentation and the discussion during the meeting gave a very good impression. They seem to have managed the Centre successfully so far. FOCUS is directed by a Centre Board with one representative from each of the participating companies and one person from the FOI management. The board meets regularly, approximately four times a year. The directors are assisted by a Centre committee, composed of people from FOI and academia, on issues regarding research quality, coordination, dissemination of results and formation of new projects. The international advisory board, consisting of three experts from universities and institutes abroad, has been very active. The board has performed two evaluations during 2007/08 with a quite positive response. Seven projects are managed by a project leader from industry and one by a leader from FOI. Each project has also an FOI internal project coordinator.

The organizational structure is straightforward and the responsibilities are quite clear. The responsibility for new project generation is expected to rely on the Centre committee and/or the advisory board. However, the organisation must also be able to take care of new project ideas from industry. Industry could also preferably be involved in the other type of questions, today handled by the Centre committee. The responsibilities of questions like quality not related to the research, recruiting new industry partners, technology transfer between academia, institute and industry etc also have to be handled in the presence of industrial representatives. The Centre Director pointed out during the meeting that the role of the Centre committee will be revised in the future.

The identity of FOCUS within FOI has been improved since the first evaluation in March 2008. A new logo has been developed and the FOI management is supporting a strong identity of FOCUS. The Centre has a separate site in the FOI facilities, where people from industry and academia can work and get the right “Centre feeling”. However, FOCUS was still described as a project within FOI and not as a defined Centre at the FOI website. It was pointed out that this was a mistake and work regarding a separate and improved homepage has been initiated. There has been an attempt to develop a generic research programme to get more interaction between the Centre partners but it has not been successful so far. We would encourage the further creation of a stronger identity of FOCUS as a Centre, a stable industrial network with more companies involved, more interacting activities between the companies, more developed marketing efforts etc.

FOI plans to maintain FOCUS as a Centre of excellence even after the six year IEC funding period. The future vision is to have FOCUS as a platform for university and industry interaction within the Security Link strategic research arena. Since FOI has limited experience in cooperating with companies on the civil market and especially SMEs the FOCUS IEC is of great importance as an interface to the mother organization. It is a “brain boost” to FOI. The management are working on a plan to guarantee the continuation of FOCUS also after the six years of public funding and a number of ideas have been developed. They have already started to secure substantial new external funding from EU and national research applications, but more is needed.

Through FOI the Centre has set up separate association agreements with LiU and CTH. UU will be a new partner in the second phase of the programme. However, out of the 75 persons working in the Centre today only four are coming from the academia and one from another research institute (VTT). Contacts with academia are also established through the international advisory board, through the Centre committee and in EU projects. During the hearing it was clear that there is an ambition to develop

further contacts and interactions with for example KTH and Acreo, but presently the interaction with other universities and institutes is quite limited.

In the annual report the recommendations from the previous evaluation (March 2008) have been clearly stated. They have been discussed within FOCUS, a development plan has been formulated and decisions on actions in some areas have been taken by the Centre board. An Assistant Centre Director has been appointed, the quality system has to some extent been improved, rules related to IPR have been set up and the recommendations regarding a generic programme, increased university cooperation, planning for long term survival, identity, mobility, start-up companies are parts of the Centre development plan. Another good initiative is specific actions aiming at developing a research environment which attracts an increased number of female scientists. However, it is important for the Centre to realize all the good intentions in the development plan as soon as possible.

2.1.5 Conclusions and Recommendations

In many respects FOCUS has improved since the start of the Centre activities, both on a scientific and on an organizational level. It is on the way to become an Institute Excellence Centre which fulfills the requirements set up by the financing bodies and has a strong ambition to survive after the six year financing period. It plays an important role in FOI and is supported by the institute management. We are also impressed with the range of research activities and initiatives which are being undertaken to enhance the research base. However, there is opportunity to refine and improve the processes and effectiveness. We submit the following recommendations:

- The Centre should seek improved ways of engaging with universities and institutes.
- The Centre should establish a group of end users / stakeholders to act in an advisory role on current issues and capability gaps.
- Marketing efforts should be made to increase the number of participating companies and tools to improve their interaction should be developed.
- Larger projects for improving collaboration between the companies and for decreasing administrative work would be beneficial.
- The identity, brand name and image of FOCUS as **the** national competence centre within its area should be further developed.
- The Centre should develop a plan to increase the mobility of researchers between academia, the Centre and industry.
- The Centre committee should also have industrial partners.

- Actions should be taken and goals set up to realize the development plan for future as soon as possible.

Linköping 2009-08-24



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2.2 Evaluation of the EcoBuild Institute Excellence Centre at SP TräteK

On August 25, 2009 the evaluators, Salme Koskimies, Joris Van Acker, Heikki Kleemola and Kaj Mårtensson met with the Centre Director Magnus Wålinder, the Deputy Centre Director Mats Westin and representatives from the Centre Board, university, institute management, industry and PhD students as well as senior scientists of the EcoBuild Institute Excellence Centre. The meeting took place at SP TräteK and the purpose was to perform the midterm evaluation of the Institute Excellence Centres Programme (IEC). Representatives from VINNOVA, the Knowledge Foundation and the Swedish Foundation for Strategic Research (SSF) were also present. We thank the organizers of the meeting for their informative presentations and open discussions.

2.2.1 Long-term strategy and progress of the Centre

The original objective, strategy and research programme focus were defined as follows:

Objective: Develop innovative and durable wood and bio-based material systems for building and furniture application, also including outdoor environments.

The over-all strategy: to form a centre based on a close cooperation between university-institute-industry. The Centre shall act as an innovation, research and technology development platform for the wood science and technology field, and will mainly include competences from SP and KTH as well as from other institutes and universities, nationally and internationally, with relevant competences.

The research program is focused on the development of innovative eco-efficient and durable wood-based materials and products for building and furniture applications.

Seemingly the research programme and the overall strategy have been launched, but no clear renewed definition was given. During the meeting, terminology was used referring to green chemistry and development of bio-based alternative products based on renewable resources. Redefining the overall scope as well as redesigning the strategy in this respect could be very useful.

To reach the objectives, joint research projects were initiated between institutes, universities and industry. The structure of five project areas seems fine; however a total number of 22 subprojects may be hard to manage. Nevertheless this has created a lot of interaction with several companies and many interactions with university. The projects are very much company

driven and many of them are very specific. It might be useful to identify some of them to focus on, while some smaller projects could be retained as development assessing topics.

A well balanced set of Swedish companies is already involved in the projects, some of them are international. Additional projects from companies even more directly involved in the forestry wood chain could be part of the strategy. Significant effort was dedicated to involve the Centre in EU- funded project proposals. Increasing this is anyhow a strategy for the 2nd phase and beyond. Probably there is a need also for other financial support since EU projects may not be sufficient.

The Centre has been active in promoting their competence through an excellent newsletter and a well designed webpage. However, there is a need to compile in a document the key competences and the focus of the Centre. Such a document should then be used for promotion and also for active management. A clearer description of the competences of the network might be useful to promote EcoBuild as a trademark. In education the main activity was related to PhD students, in addition some excellent courses were arranged with the help of guest professors.

Involvement of many companies, not necessary belonging to the wood sector, is very good and requires a lot of networking activities. The development of a meeting place and create innovation through collaboration is seemingly very important as several subprojects are still in an early stage. However, later on it would be better to organize some larger interactive meetings and not to value the success by the number of project meetings, 40 in total.

Supporting SME's is considered very important, especially in the wood modification area. The idea of setting up spin-off companies has been discussed and might be more important for the 2nd phase and beyond. In general both support for SME's and optional creation of new companies would allow implementing cutting edge technology being developed.

The economic plan for phase 2 is clear and very similar to the first phase except for some partner and project changes. Beyond the 6 year period of IEC public funding there is still some need for further strategy development. The focus is now mainly on coordination of large EU projects. Other options may be required if the intention is to maintain the Centre at the same level.

2.2.2 Scientific and technical achievements and their impact

The research programme within EcoBuild is multidisciplinary, covering technologies related to the development of eco-efficient wood- and bio-

based materials for increased utilization of wood in the building sector, and manufacturing of binders, additives and the final adhesive and coating systems. In addition EcoBuild has a special interest on the development of technologies for Swedish furniture industry due to the success of the IKEA concept. Furthermore technologies related to conversion of pulping mills to e.g. cellulose based textile fibres will be included in the program in the next 3-year period, because production of conventional bulk paper products is losing its profitability.

Achievements in the first three years of the programme include:

- Valuable research and technology development results for the participants were achieved. Some ideas and concepts have already been patented and these innovations have been implemented in the industry, e.g. new formulations for coil coatings with a higher degree of bio-based components. This concept has also successfully been applied on thermally treated wood.
- EcoBuild program is also helping the growth of existing small and medium size enterprises (SMEs). A potentially very relevant application area is Swedish joinery and building component industry (windows, doors, mouldings, sidings, outdoor playground equipment, gardening products and marine and water-front facilities as well as parquet and solid wood flooring).
- In the applied research, the following so-called generic research activities have been initiated for the long-term benefit for participants in the Centre: 1) Improved understanding of the decay resistance of modified wood by applying of new analytical tools based on molecular biology; 2) Development of analytical tools for studies of covalent bonding between wood substance and polymers (adhesives, coatings, binders, modifying agents etc.); 3) Development of tools and models for studies of adhesion phenomena related to wood in general as well as for modified wood; 4) New approach based on UV irradiation as a sample preparation technique for micromorphological studies of e.g. wood-polymer combinations.

EcoBuild Centre has been able to participate in two of the WoodWisdom projects: WinFur and WoodExter (coordination). Also a scientific council has been created. Its impact has not been reported extensively. Several guest professors have joined the Centre and seem to be contributing significantly, but there is still need for further international interaction with leading institutes in the area.

Several young scientists have been employed lately, but interaction with participating universities could be further developed to get more researchers involved in the activities of the centre. EcoBuild also has to find ways to attract the best people when interacting with the participating universities.

There is also a need to increase the number of peer reviewed papers in highly ranked journals published by the researchers of EcoBuild. This will definitely be required to become a European Centre of Excellence.

Industrial involvement in EcoBuild is a strong point of the Centre. Over 30 different companies are involved in the projects, several of them are SME's and many of them are not coming from the forestry-wood sector and hence a lot of separate projects have been started. However, the choice of projects is quite realistic with feasible targets because of the high industrial involvement.

The EcoBuild Centre is dealing with a broad area of activities which are highly innovative, however the impact on the international overall forestry-wood chain can be considered limited at the moment. The BioComposite Centre in Bangor (Wales, UK) was considered an example of a leading centre covering the same activity area. EcoBuild might have no difficulty in reaching the same level of competence; however it might be necessary to reach a higher level to be profitable in future.

In addition to already established interactions from the past, several new collaborative activities have been started or just initiated (e.g. on textiles and extractives). Intercontinental collaboration with research institutes in major forest countries like Canada, US, New Zealand etc. could be included for phase 2 and beyond.

2.2.3 Build-up of a concentrated research environment

The Centre's aim is to strengthen the competitiveness of the Swedish wood and bio-based industries by developing new eco-efficient products and production processes. In this area there is a strong knowledge basis in Sweden and a great potential for new innovations. The centre has been organised to exploit mainly the knowledge and expertise of SP, KTH and companies. The centre is seen as a collaboration and technology platform giving added value to the host organisation.

The consortium is large, 36 parties. This may explain the high number of sub-projects, 22 (originally 23). Some sub-projects have already been merged, but more efficiency could be gained by reducing the number of sub-projects even further. This reduction would also make information dissemination more effective. Then the number of sub-project meetings, coordination meetings, seminars, workshops, internal reporting, etc. can be decreased. This would also promote collaboration between the partners, now belonging to different projects.

Companies have supported the projects well. However, for improving their contribution on the programme level and their collaboration with each other

it is recommended that the research area of the Centre would be more focused and as a consequence of this fewer and larger projects formed.

The institute has an impressive number of senior researchers who together with younger scientists have contributed to the Centre well. However, considering the high number of projects and their small total volume, it is obvious that the share of their working time per project (on average 0.6 person years) is not adequate for creating a strong commitment. Also from this point of view it is strongly recommended to decrease the number of projects. The centralised shared premises (considering the equipment of KTH) are exceptional strengths for the Centre and their visibility should be increased in marketing. The availability of resources should be confirmed by agreements between the Centre and the partners.

Participation of the Centre Director and the Deputy Centre Director in leading the Centre may be influenced by their other roles. Considering the large number of industrial participants and sub-projects it is recommended that the directors can work full time for the Centre. The total number of person years was 14 in 2008 consisting of contributions of 33 persons. It is recommended that the time share of individuals worked in a project will be increased.

The development of the personnel has been rapid: during the last two years 11 highly competent younger researchers have been employed. Their knowledge and experience profiles are well suited for the centre. In addition, six of them have a position at some university which strengthens the collaboration between the academia and the Centre. The affiliated world-leading experts (visiting professors) increase the international dimension of the Centre.

Companies have supported the projects well. However, for improving their contribution on the programme level and their collaboration with each other it is recommended that fewer and larger projects should be formed. There is a lot of collaboration with SMEs, which is a valuable achievement.

Many scientific and technical results have been achieved. However, their visibility in the Annual Report and in the presentation given by the Centre Director was low. Reporting should be developed so that results achieved and especially their industrial impact become more visible.

Several EU projects have been proposed together with partners and universities. Some preliminary contacts have also been taken with potential foreign partners. The institute has activities, outside the Centre, which support the development of the knowledge basis. At the moment there are few cases where innovations or patents have been moved to industry. The Intellectual Property Rights (IPR) have not been mentioned in the annual

report or in the plan, although they must be very essential issues in this type of exploratory research and development work aiming at creating new products and processes. The IPR issues should be kept higher on the agenda.

Quite many universities are involved, also through joint positions of the key researchers. The role of universities in the projects varies and could in some cases still be increased.

2.2.4 Leadership and management

The centre is managed by one Centre Director, Magnus Wålinder, and one Deputy Centre Director, Mats Westin. Both persons have a professional approach to the leadership of the centre, give a good impression, and seem to have been successful so far. They have an overview of the rather complex structure of EcoBuild with 36 participating industrial customers, a range of different projects and sub-projects. The centre management have a vision of the future for EcoBuild even if some work remains to be done before the Centre will have a clear strategy for how to solve the long term continuation.

EcoBuild is directed by a Centre Board with representatives from the participating companies, chosen by a General Assembly, and one person from the SP management. The board meets regularly, approximately four times a year. The partly international scientific council, consisting of three experts from universities, is very active. They are visiting the Centre two times a year and are presenting a written report annually. The Centre has further a Communication Manager facilitating all communication activities. Five integrated projects are managed by one Project Coordinator for each area.

The organizational structure is straightforward and the responsibilities are clear, even if the term “Focus Areas” would be a better wording for the five projects. The number of sub-projects is in our opinion too high and the size of many of them is fairly small.

The management promotes EcoBuild in a good way both within and outside SP, in order to give it a clear identity. It is evident that it is not easy to give a visible identity to this type of centre formation in a well established big institute. However, EcoBuild has been successful in creating a clear own identity. This is also supported by the highest management of the SP Group. The Centre has its own trade mark, logo and profile in all promotion materials, newsletters and an excellent home page on the web with both an open part and another part which is just open to the Centre partners etc. The separate rooms reserved for external researchers from academia and industry within the centre contributes to the development of an “EcoBuild” identity and the creation of a meeting place between all partners involved.

However, it has not been reported to what extent those opportunities have been used so far. It is recommended that the mobility will be increased in the way that the Centre's experts are encouraged to spend longer times at companies and other research institutes as well. Still one challenge described by the Centre Director is how to develop the right Centre feeling within EcoBuild where many people only to a minor part of their available time are involved in the Centre activities.

The Centre has established a good cooperation with researchers at especially KTH but also many other universities and institutes within and outside Sweden. In the presentation connections to YKI, Chalmers, Swerea IVF, LTH, SLU, A&F in the Netherlands and the Ghent University in Belgium were mentioned. They have also developed a good interaction in the form of visiting professors or scientists, PhD students, shared positions etc.

The Centre management has started to think of the long term continuation of the EcoBuild IEC and explained during the hearing that one of the tools should be to further increase the participation in a number of EU-funded projects; another could be to increase the number of people with shared positions between university and the Centre. Also other tools are mentioned in the application for phase two. However, we think that a real strategy, economic plans etc. still remain to be developed and actions should be taken in the near future to increase the probability of the long term continuation of EcoBuild as a Centre of Excellence.

The recommendations from the evaluation performed in March 2008 are mentioned in the annual report and several actions have been taken. Some part of the research today is generic and open to all customers. A quality assurance system has been developed and tested with good results. Additional funding has increased as well as the mobility of researchers between academia, institutes and industry. How to handle start-up companies has been discussed and IPR rules are part of the Centre agreement. One patent application has been sent in and more are expected during 2009. Participation in EU-projects is promoted and two international cooperation contracts are presented. Some areas can further be improved but the management really seems to make use of the recommendations.

2.2.5 Conclusions and Recommendations

The EcoBuild Centre has improved during the last years and it is on the way to become an Institute Excellence Centre which fulfills the requirements set up by the financing agencies. The Centre idea is supported by the SP management and the EcoBuild IEC has a strong ambition to make a longtime continuation possible after the six years of the IEC financing period. However, some improvements can still be made:

- It is recommended to redefine the objectives, strategy and research projects with a focus in line with green chemical engineering, bio-based materials from renewable resources etc. The project portfolio should also be reorganised to achieve a more manageable project structure.
- There is a need to follow research and development activities on natural fibres, bio energy, pulp & paper and bio refineries. Not only will there be a continued competition for renewable resources but some common or complementary research activities can be envisaged.
- Adding new research projects or altering some of them, e.g. the project on textiles and the use of bark extractives, could fit very well with a renewed definition of objectives and strategy, but a balanced overall approach towards available knowledge within the Centre must be taken into consideration.
- More interaction between the participating company partners should be developed in the project work.
- Reporting should be developed so that results achieved and especially their industrial impact become more visible.
- The IPR issues will become more important when results will accumulate and the IPR issues should be kept on the agenda.
- A real strategy including economic plans etc. should be developed and actions should be taken in near future to increase the probability of the long term continuation of EcoBuild as a Centre of Excellence.

Stockholm 2009-08-25


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2.3 Evaluation of the CNS Institute Excellence Centre at SICS

On August 26, 2009 the evaluators, Stephen Hailes, Craig Partridge, Heikki Kleemola and Kaj Mårtensson, met with the Centre Director Bengt Ahlgren, other representatives from the Centre management team, representatives from the Centre Board, KTH, institute management, industry and senior scientists of the CNS Institute Excellence Centre. The meeting took place at SICS and the purpose was to perform the midterm evaluation of the Institute Excellence Centres Programme (IEC). Representatives from VINNOVA, Knowledge Foundation and the Swedish Foundation for Strategic Research (SSF) were also present. We thank the organizers of the meeting for their informative presentations and open discussions.

2.3.1 Long-term strategy and progress of the Centre

For the first three years the Centre chose to focus its research on two areas: *networking of information* and *self-management of networks and systems*. This decision was taken in collaboration with the Centre's industrial and academic partners.

Both areas of focus are of tremendous importance for the future (and, indeed, would make a difference today). The Centre has defined a coherent set of research projects in each of the two areas: two projects in each of networking information and self-management. We summarize the key achievements in each area in the next section. Here we simply observe that the achievements are strong and reflect a coherence of research program and the allocation of sufficient resources (to achieve critical mass) to each project.

For the second three years, the Centre proposes to add an additional area of focus on *security for systems and platforms*. This addition reflects a realization by CNS researchers and industry participants that they needed to strengthen their platforms if they are fully to realise the potential benefits of programmable systems and field reconfigurable devices such as networked embedded systems and software-defined radios.

While recognizing that a focus on security is needed, the evaluation panel feels that the current effort is insufficiently well scoped in the documentation we have, though there is some evidence from the presentations that consideration has indeed been given to this. Security, even constrained to platforms and systems, is a very broad and complex problem. We recommend that CNS takes the time to work with its partners to define the specific types of security threats they wish to protect systems and platforms against, and to refine the focus based on those threats.

The Centre lacks a credible plan for its continued impact after the second three years end. The current plan appears simply to be to close up shop unless more public funding is made available. This plan is overly conservative. At minimum, the Centre should have a plan for an orderly transfer of winning practices, processes and research thrusts to the parent institute.

2.3.2 Scientific and technical achievements and their impact

In this section we evaluate the Centre's standing and competencies compared from an international perspective, we evaluate the quality of individual research projects within the Centre, and we discuss the Centre's interactions with industry, academia and other institutes.

Assessing the Centre's relevance and international standing independent of its parent institute, SICS, is somewhat difficult. SICS is widely established as a leading international research centre and many of the project activities overlap. As we evaluated the activities within the Centre it is clear that they are credible efforts on programs of recognized importance and are conducted with the expertise consistent with the international standing of SICS. We would like to applaud the practical stance taken within the projects, most of which aim to construct and test or deploy realistic prototypes.

The one area of concern that we noted is that the Centre (and, implicitly, SICS) is falling behind in international norms for the use of standard processes (e.g. ISO 9001 or CMMI) to ensure effective management of research efforts. The use of standard processes is somewhat controversial as some researchers infer that it detracts from the effort allocated to research or the flexibility to change based on experience. But there is an emerging realization that standard processes can be used to ensure both that research efforts achieve their goals in a timely way and that change is managed explicitly and effectively. It is in this area that we believe the Centre can and should act as an example effort for SICS and other institutes in Swedish ICT.

Application scenarios and communications paradigms for networking of information. This project seeks to create a vision for networking of information, influenced by emergent international efforts to focus on delivering data rather than managing bit pipes. This vision is practical, in that it should enable far more efficient delivery of video, and it also has theoretical implications as it changes the way we view many networking problems (e.g. it removes reliance on standard addressing and data transport protocols).

The project, to date, has been focused on scenarios and theoretical implications of networking of information. The project is rapidly moving to the point where the evaluation committee believes that prototype implementations will be needed.

Predictable performance and scalable security for resource-constrained networked embedded systems. The focus of this project is industrial system monitoring and automation, which presents particular challenges, especially in performance assurance, for wireless sensor networks.

The project's results to date are outstanding. The work on security issues in wirelessHART (a new industrial wireless monitoring standard) is particularly notable, but we also welcomed the project's willingness to explore new technologies as requested by the industrial members. The industry-research link in this project was particularly strong. Moreover, the project has produced strong publications, showing that the conventional wisdom that industrial projects lack research gravitas is not always true.

Resource management. The central problem addressed by this project is measuring and controlling transmission in overlay and virtual networks that share a constrained underlying network infrastructure.

The project has a strong industrial focus. One of its central efforts was evaluating the BART method for measuring available bandwidth at an industrial site. Another effort is focused on estimation of network load.

The project has been productive; it has produced published papers and a patent application.

Monitoring and disruption management. This project aims to develop mechanisms and tools to monitor and respond to anomalies such as faults, misconfigurations and intrusions into the network.

The project's results to date are extremely impressive. The project uses real data from an industrial partner's network to test algorithms for identifying anomalies and algorithms to better interpret alarms (which may represent system failures). The results are so good that industrial partners are looking to deploy the system in operational networks. Simultaneously the project is publishing strong research papers on their results. The Centre has close ties to academic institutions and several of the projects' most notable results have been incorporated into or followed from masters theses or other publications by students.

From the perspective of typical academic productivity, the Centre is publishing regularly and in high quality venues.

The Centre has been successful at integrating industrial needs with strong research projects. We have noted above multiple cases where projects are both solving industrial problems and producing high quality research publications.

The evaluation panel did not have sufficient information to comment on cooperation with other institutes.

2.3.3 Build-up of a concentrated research environment

The Centre is well structured. The board consists of the representatives of the partners: this is an appropriate structure for a centre that has a limited number of partners. In addition, there is an active scientific advisory board that includes prominent members from abroad. For day-to-day leadership there is a management team comprised largely of project leaders and senior researchers. The roles and responsibilities of the administrative bodies are clearly defined and known to the staff members.

The advisory board and the external evaluators have previously recommended the strategy and objectives of the Centre to be clarified and focused. In addition, they wanted to strengthen the identity of the Centre. The Centre responded to the feedback and started actions for improvement. The recommendations and development needs should be kept in mind also in planning and starting new projects.

The management of the Centre sees its functions *“as a vehicle for competence development of industry researchers and developers through their participation in the centre projects, workshops and seminars”*. This can be seen as information and knowledge dissemination. However, the Centre also benefits from the industrial partners’ views in strategic planning and from their participation in projects. Moreover, it actively seeks to facilitate contacts between researchers from the institutes and companies: *“The centre serves as a marketplace and channel for contacts with researchers, locally and globally, and with other companies”*. This approach provides opportunities for effective marketing to the end users of the knowledge and results of the Centre and of SICS; indeed, a great number of seminars and conferences are supported by the Centre. This provides opportunities for marketing and selling. Collaboration with SMEs has started well. In particular, they appreciate the Centre’s “short term” and “hands-on” services. Consequently, continuation and widening of collaboration with SMEs is encouraged by the evaluation panel.

A functioning quality system would be beneficial for developing the quality culture of the Centre. Project plans with clear milestones and realistic, measurable, objectives are needed for more effective implementation and management of projects. More systematic project plans also make a more

transparent evaluation of project outcomes possible. In the longer term, a quality system that includes guidance for making project proposals, running a project and reporting will be needed. Project results and, in particular, their industrial impacts are difficult to find in the present documentation; it is advisable to make them more visible in all future reporting. This will have additional value in marketing and selling.

Plans for the second period show that the current work will be continued. The commercialisation of activities will also be enhanced. In addition, the licensing and spin-off functions will be developed. The plans should be made more concrete and the goal setting more measurable. We note that founding a spin-off company is not always the most effective way of benefiting Sweden. Consequently, a plan for exploiting the innovations and patents should be created and strategies for funding and marketing should be included in such plans.

There are five commercial partners, of whom four are large companies and one is an SME. The number is low compared to that of the other centres. Whilst this offers the potential for closer collaboration, the impact of the Centre may remain limited outside these partner companies. There are plans to increase the number of partners by three new SMEs and we support this action. However, customer satisfaction surveys must be instituted for all Centre participants, in line with the recommendations from the previous review.

Deliverables of the projects will undoubtedly include innovations and patents protected by IPR. So far some patents have been applied for

From the university point of view collaboration with the Centre has been beneficial, especially in creating and acquiring new technologies, and also in creating relationships with companies. Mobility of PhD students and researchers to industry is beneficial for the Centre to a certain extent. A clear policy should be defined.

2.3.4 Leadership and management

The Centre is directed by a Centre board with one representative from each of the participating companies: KTH, UU, Mdh and SICS. The chairman, Olle Viktorsson, comes from industry. The board is appointed by the General Assembly where all parties are represented. During 2008, seven board meetings were held. The leadership is composed of one Centre Director, Bengt Ahlgren, together with one coordinator, one Business Manager, four project leaders and two senior researchers; collectively they form the Centre management team. The coordinator is also assistant manager of the Centre. The Centre Director participates at the board meetings. There is, in addition, a scientific advisory board, with six experts

from universities and research institutes, four from abroad (USA, Germany and France) and two from Sweden (Chalmers and Karlstad University). The advisory board has met once a year and has given advice to the Centre.

Two focus areas have been described and all research is organized in five projects, of which one includes common activities for all industrial partners. Each of the projects has a project leader from SICS and between three and four companies involved. All generic activities take place in the project called "Common activities". There is also a plan for communication which so far has taken place in the form of an open house, a networking day, several workshops and project meetings, scientific and popular publications, and through the web site.

The organizational structure is logical and the responsibilities clear. The Centre Director has a good approach to the leadership of the Centre and gives a good impression. The Centre management team has used the scientific advisory board to improve the future performance of the Centre. However, tools to further increase the interaction and learning between all industry partners remain to be developed. This may be a future challenge for the management, remembering that there might be limitations due to requirements for secrecy, differences in company size, business activities and culture. SICS as an institute has a quality assurance system but CNS has not yet developed working procedures in this vein. No customer satisfaction index has, for example, been reported in spite of the recommendations at the evaluation in March 2008.

A stronger identity for the Centre and a stronger Centre feeling was something which also was stressed at the same evaluation. Some steps have been taken in that direction but more could be done. A logo has been produced; the Centre has its own space at the SICS Website; and the Centre has available room space where people from industry and academia can work and get the right "Centre feeling". However, it is not clear to what extent these rooms are extensively used for that purpose. It is obvious that it is not easy to give a clear and visible identity to a small and new centre formed in a well established institute like SICS and within the Swedish ICT group but we are pleased that the creation of a strong identity for CNS was declared to be supported by the SICS managing director and would like to encourage the Centre board and management to continue to strengthen the profile of CNS.

The Centre is cooperating with three academic partners – KTH, UU and Mdh and special agreements have been formulated between the Centre and the academic partners. All three universities are represented in the Centre board. A small number of PhD students from the academic sites (3 man-years together in 2008) have been involved in the research. Contacts with

university and institute partners have further taken place through the advisory board. Cooperation with international institutes and universities is also established in EU projects. The mobility from people into SICS seems to be handled in a good way but it seems that there is more work for CNS to do in encouraging mobility of people in the other direction.

CNS has shown some examples of patent applications and even of a spin-off company from the Centre activities. Rules for handling IPR are there and, even if CNS does not have a clear ambition to create further spin-off companies, they have experience in the field to do so.

In the application to the IEC programme, a number of clear future goals and a vision for the Centre 2012 were established. Most of these goals are still valid and CNS is clearly headed in the right direction. However, the management should start to plan for the long term continuation of the Centre after the six years of public IEC funding have expired. Some thoughts about this have been discussed but a real strategy remains to be developed, including economic predictions etc.

In the annual report it was difficult to see in what way the management had handled the recommendations from the previous evaluation. From the hearing it became clear that some actions have been taken but more can be done, especially regarding interaction between the partner companies and the quality assurance system of CNS.

2.3.5 Conclusions and Recommendations

The evaluation committee was delighted to see that the Centre has successfully balanced cutting-edge research with work on industrially derived near term problems.

- The evaluation committee felt that the Centre would benefit from using a more efficient process management to ensure the most effective use of research resources.
- The Centre must implement a quality assessment system so that feedback from all partners is transformed into actions aimed at continuous improvement of the Centre performance. CNS should be able to report a customer satisfaction index.
- We would recommend the Centre to further strengthen its identity within and outside SICS, to create a Centre feeling.
- It is recommended that the Centre develop mechanisms and processes to further increase the interaction and learning between all participating companies. Continuation and widening of collaboration with SMEs is encouraged.

- The Centre's future beyond the IEC funding must be planned over the coming years. A clear strategy, including economic predictions and actions, on how to reach a long term continuation after the six years of IEC public funding period must be developed.

Stockholm 2009-08-26



Kaj Mårtensson



Stephen Hailes



Heikki Kleemola



Craig Partridge

2.4 Evaluation of the PRISMA Institute Excellence Centre at Swerea MEFOS

On August 27, 2009 the evaluators, Ragnhild E. Aune, Veena Sahajwalla, Heikki Kleemola and Kaj Mårtensson met with the Centre Director Jan-Olof Wikström, Deputy Centre Director Christer Ryman, representatives from the Centre Board, LUT, industry, a researcher and a PhD student of the Prisma Institute Excellence Centre. The meeting took place at Swerea MEFOS and the purpose was to perform the midterm evaluation of the Institute Excellence Centres Programme (IEC). Representatives from VINNOVA, the Knowledge Foundation and the Swedish Foundation for Strategic Research (SSF) were also present. We thank the organizers of the meeting for their informative presentations and open discussions.

2.4.1 Long-term strategy and progress of the Centre

Concerning the strategy and research planning for the first three years of PRISMA, it is considered that they have made significant progress. PRISMA has established itself as a unique program within Swerea MEFOS and it has taken the existing collaborations with industrial partners and university to a new level. For example, the PhD student involved in PRISMA has his regular job in Swerea MEFOS but is financed by the program. However, at this stage, the overall goals must be made more visible and for the next stage a clear strategy on how to implement the outcomes within industry must be identified. It is important to emphasise that clear goals need to be formulated for the coming three-year period and a systematic approach identified to secure the attainment of these goals. PRISMA also needs to attract more PhD students and young researchers for succession planning. Also, they need to develop strategies to expand the involvement of senior researchers in PRISMA, and within industry who can drive the research forward and implement the outcomes from the research.

Strategic planning for the activities of PRISMA beyond the second three-year period has not yet been communicated. This is a matter of urgency and must be given the highest priority.

2.4.2 Scientific and technical achievements and their impact

The research conducted within PRISMA has extremely high relevance to the steel industry. It is believed that they could also be adopted in other process industries, which will make the program stronger and more visible on an international arena. Within the field of Process Integration in Steelmaking, they are highly competent. However, they need to broaden their horizon to seek possible collaborations with other groups in and outside of Europe, both on an academic level and on research centre levels. It is strongly recommended that efforts are made to identify possible

partners with significant competence/achievements in the field. This will lay the foundation for future collaborative activities.

At present the scientific achievements of PRISMA have not been clearly explained. However, the main achievements related to program 4 were provided by the Centre Director who strongly emphasised the relevance to the future central project for processing steel plant waste from various sources in Sweden and Finland. It is strongly recommended that the research leadership of each of the other programs are actively involved in communicating the achievements and securing the outcomes of the individual programs. This will then ensure that the Director is able to communicate all of the key scientific achievements of PRISMA.

The activities within PRISMA are closely related to other ongoing activities internationally. EU PACT participation is on the horizon for PRISMA, and the previous collaborations that they have had are also providing opportunities for further involvement in future projects.

The overall structure and organisation of PRISMA, with both a Centre Board and a Scientific Council, is very well organised, and this provides a strong foundation for the success of the program. This is in accordance with the manner in which Swerea MEFOS has given the basic platform for its structure. The board is very active and it meets regularly.

The visibility of PRISMA has been made stronger by giving priority to having their home page on the web, and using it from the early stages of establishment. In addition, they host education seminars, have newsletters, and are presenting papers at conferences. They hold an annual Process Integration Forum for the steel industry which has the potential to generate new ideas and increase contacts as well as stimulate new industrial interests within PRISMA activities. They could monitor and measure the level of success that they are having through these activities. For example, the number of visitors that they have on their website, and the number of companies attending their seminars and forum (both members and non-members) could be monitored and used as an indicator of customer interest. In addition, tools need to be developed for quality assurance purpose as well as a detailed activity plan with clear milestones and deliverables.

For PRISMA to attract international researchers, they need to provide a collaborative environment, and broaden their opportunities for collaborations with international researchers. Mechanism for sharing knowledge across the collaborators needs to be established. It must be strongly emphasised that maintaining industrial contacts is important for future implementation of research results and need therefore be pursued.

PRISMA needs to keep enhancing their exposure globally by attending conferences and giving presentations. They would be able to reach a wider audience if they also gave priority to publishing in internationally reputed journals, which would further enhance their profile and opportunities for collaborations.

The holistic approach of PRISMA is considered to be innovative. They are incorporating economics along with a process-related approach, which in the long perspective is necessary and extremely valuable. It is anticipated that this will take their programs to a higher level and thereby distinguish them from others having a similar approach of process integration.

At present the participation and commitment of researchers from universities others than LTU and other institutes is too limited and it is believed that the program could definitely benefit from increasing the involvement of other academic partners and centres. It is strongly recommended that priority is given to pursuing collaboration with other groups at all levels.

2.4.3 Build-up of a concentrated research environment

The Centre and its activities are closely tied with Swerea MEFOS. The added value of the Centre lies in introducing and developing a new research area, process integration in steel making, to MEFOS and the steel industry. The IEC funding also gives possibilities to carry out more scientific long-term research and to participate in international (EU) research programmes. An important outcome is the close collaboration started with the Finnish “Green Steel” programme funded by the companies and TEKES, the Finnish funding agency. This is important for the development of the whole Nordic steel industry.

The Centre is well organised and has a Centre Director, an Assistant Director, a Board, a Scientific council, and project managers and leaders whose roles and responsibilities have been defined. Project managers come from industry which strengthens the industrial relevance of the projects and improves implementation of results.

The first period was started with rather general goals. Correspondingly, the annual report gives more information on intentions and working processes than results. However, in the discussion the Centre’s participants named some achievements. It is recommended that in the future reporting the results achieved will be made more visible and their industrial impact explained in more detail.

The plan for the second period is general and waiting for the guidance from the industrial partners. The overall goals of the Centre must be developed

and communicated. Consequently, a more detailed and focused working plan must be available by the end of the year. A quality assurance system could be beneficial in improving the project process. More attention should be paid to planning the future role of the Centre and especially to its funding after the IEC programme. Preliminary plans, special emphasis on funding and marketing should be prepared already in the beginning of the second period.

The Centre acts as platform for the projects of a new research area. Its role in marketing is not as important as in many IECs. The main task is collecting new ideas and openings to Swerea MEFOS. In addition certain practices developed at the Centre may be adopted by the Institute. However, in this case many of the processes (marketing, internalisation etc.) are already in use at the host organisation. It is an established practice to invite industrial researchers to work at Swerea MEFOS. This mobility should be started also in the other direction. LTU is satisfied with the collaboration in the Centre, and there are plans to continue and widen the PhD programme.

The total amount of person-years was 12 in 2008, slightly decreasing from the previous year. The high number of full-time researchers is a sign of commitment and is also promoting the identity of the Centre. Recession has not so far reduced the company funding significantly. The director uses an adequate share of his working time for the Centre considering also the full-time researchers' contributions.

The IPR issues have not been mentioned in the report or the plan. However, it can be assumed that Swerea MEFOS which has a long experience on collaborative research also has an established practice for these issues. IPR has also been regulated in the model contract. The Centre prefers moving innovation to existing companies and not starting spin-off companies.

2.4.4 Leadership and management

PRISMA is directed by a Centre Board, with representatives from three of the Partner companies, and one person from each of LTU and Swerea MEFOS. The board meets three to four times a year. There is a Centre Director, Jan-Olof Wikström, and a Deputy Centre Director, Christer Ryman. They both participate at the board meetings. There are four Programme Areas, each led by a Project Manager from industry and a Project Leader from Swerea MEFOS. All project managers and leaders form a project management team with monthly or bi-monthly meetings. They are also responsible for communication activities. A Scientific council with three persons, from Finland, Norway and Sweden, has been formed and has performed one audit so far. A second audit is scheduled before the ending of 2009. Further a stakeholder group with persons from industry "Process

Integration Forum for the steel industry” has been formed with the responsibility to recruit new members and create new projects and related activities. The group is meeting once a year and also companies outside PRISMA are invited.

The organizational structure and the responsibilities are clear. The directors both have a professional approach to the leadership of the Centre, give a good impression and seem to be successful. They have a communications plan including seminars, publications, newsletters, workshops, web site, etc. The industry partners feel that the cooperation between the present partners is working in a good way. Two new partners have been successfully recruited during 2008 and one more company has joined the Centre from 2009. PRISMA is planning to approach also SME partners in the future, which is strongly encouraged.

PRISMA has been established within MEFOS with a very clear own identity. The Centre has its own trademark, logo and profile in promotion materials and the home page on the web. The web site is excellent and includes some parts only open for the PRISMA partners. The Centre has been located in a separate part of the building since the start in the end of 2006.

At the first evaluation of the Institute Excellence Centres in March 2008 it was recommended to PRISMA to develop a strategy and make economic predictions for the future beyond 2012, when the IEC public financing will end, in order to guarantee a long term continuation of the Centre. No such strategy has been developed. We strongly recommend the management to plan for the Centre’s future beyond the IEC funding. A clear strategy, including economic predictions and actions, on how to reach a long term continuation must be developed.

Swerea MEFOS as an institute has considered starting to introduce a quality assurance system. This was something which was recommended at the first evaluation for PRISMA. However, the Centre has not yet developed working routines along that line. Tools have to be developed in order to transform feedback from all partners into actions aiming at continuously improving the Centre performance. No customer satisfaction index has for example been reported. This should be improved in the future.

LTU participates actively in the Centre and is represented in the Centre Board. PRISMA has financed two PhD students, who are employed by LTU but involved in the Centre activities at the Swerea MEFOS location. One of the PhD students got a new job in industry and decided to leave the Centre after one year. PhD courses have been offered to all Centre participants. Contacts with universities are also established through the scientific council

and in EU projects. However, no academic researchers from other universities than LTU are strongly connected to the Centre so far, although there is some interaction on a project basis with e.g. LiU and Chalmers. An increased interaction with both other academic partners and other internationally leading research organizations in the field of Process Integration, which could be beneficial to PRISMA, are worth considering during coming years.

In the annual report it was difficult to see to what extent the management had handled the recommendations from the previous evaluation. From the hearing it became clear that some actions have been taken regarding the recruitment of new members, but more can be done, especially regarding the quality assurance system, increased interaction with leading universities and research organizations in relevant areas and fully exploiting the IPR within PRISMA.

2.4.5 Conclusions and Recommendations

PRISMA has set up an effective organisation, created a clear identity and established a close cooperation with the partner companies. The research area of the Centre is very relevant to the industrial partners and will be even more important in the future. However, some areas have to be further developed and we wish to submit the following recommendations:

- The Centre has to implement a quality assessment system in order to continuously improve the performance. PRISMA should, for example, be able to report a customer satisfaction index.
- In the future more concrete objectives should be defined, the reporting of achievements made more visible and their industrial impact explained in more detail. The research leadership of each of the projects should be actively involved in communicating the achievements.
- The potential of the IPR within PRISMA should be fully exploited.
- PRISMA should seek collaboration with other groups in and outside of Europe, both on an academic level and research centre level. It is strongly recommended that efforts are made to identify possible partners with significant competence/achievements in the field.
- To attract international researchers, a collaborative environment is needed. In addition this will broaden the opportunities for collaboration with international researchers.
- The Centre should give priority to publishing in internationally reputed journals, which may further enhance its profile and opportunities for collaborations.
- PRISMA also needs to attract more PhD students.

- The Centre's future beyond the IEC funding must be planned during the coming years. A clear strategy, including economic predictions and actions, on how to reach a long term continuation after the six years of IEC public funding period must be developed.

Luleå 2009-08-27


Kaj Mårtensson


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2.5 Evaluation of the CIC Institute Excellence Centre at Swerea SWECAST

On August 31, 2009 the evaluators, Doru M. Stefanescu, John Campbell, Heikki Kleemola and Kaj Mårtensson, met with the Centre Manager Rikard Källbom, the Deputy Centre Manager Stefan Gustafsson Ledell, the Scientific Leader Ingvar L Svensson, the Chairman of the Centre Board Christer Davidsson from Volvo, the Managing Directors of JTH and Swerea SWECAST and a researcher from industry. The meeting took place at Swerea SWECAST and the purpose was to perform the midterm evaluation of CIC in the Institute Excellence Centres Programme (IEC).

Representatives from VINNOVA, Knowledge Foundation and the Swedish Foundation for Strategic Research (SSF) were also present. We thank the organizers of the meeting for their informative presentations and open discussions.

2.5.1 Long-term strategy and progress of the Centre

The present research program seems to be derived mostly from industry perceived needs. As such, the long term goals are difficult to ascertain. However, the clear path from computational modeling to laboratory experiment to industry implementation, which is currently advocated by the IEC is indeed the general frame that should be followed.

A positive aspect of the strategy for the second three-year period is the clear project clarification in terms of short term development projects (0.5-3 years) and long term research projects (PhD 3 years). However, the strategy for the second three year period will benefit from the development of an unambiguous short term/ long term plan with specific research goals and milestones. This will also result in the crystallization of a centre vision.

2.5.2 Scientific and technical achievements and their impact

The report as presented to the reviewers was not very helpful in describing the depth of the current research efforts at the institute. Appendices summarizing the work performed in greater detail (or/and published papers) would have been helpful. In the absence of such details the reviewers were unable to evaluate the intrinsic value of the research work. Graphic presentations of such success measuring parameters as yearly publication record, student production, and number of projects implemented in industry are also highly desirable.

The one clear success story seems to be the SSM technology. Also, interesting results have been produced in the visualization of dendritic microstructure in cast iron. This has the potential of becoming transformational research and should be part of the long term objectives of

the IEC. Pursuing higher strength in gray iron seems to yield possible rewards for diesel engine manufacturers. However, implementation of such techniques as early shake-out have been attempted before and are still yet to be adopted by industry.

The effort in stress prediction and measurement is commendable. According to one of the reviewers residual stress is one of the two major causes of failure in aluminum alloys (the only other major cause being oxide bifilms produced by poor casting techniques) . Using local rather than bulk properties for modeling has the potential of significant improvement in casting performance. This research should be pursued.

The research developed by the IEC has been successfully disseminated through participation in conferences and publication in international journals. Professor Svensson is a recognized authority in casting, and at least two of his university collaborators have now achieved some degree of international reputation. A more significant effort should be made to publish fundamental work in the top scientific journals in materials sciences (*Acta Materialia*, *Materials* and *Metallurgical Transactions*).

A notable effort has been made to attract international presenters. The list includes some famous names. Nevertheless, the current involvement of international researchers is limited. More emphasis should also be put on developing joint projects with other EU entities.

The educational component of the program is another success area. It has been instrumental in the support of a significant number of PhD students trained in metal casting, a certain benefit to the industry. We also note that the center is a success story from the university perspective.

The industrial partners of the institute show a good balance between casting producers/users (14) and suppliers (4). The high degree of cooperation with small and medium size companies is a positive.

According to the presentation, the research test-castings were produced in industry. While this approach at research offers some benefits, it precludes the design of experiments, a required ingredient in laboratory research. As design of experiments is an important tool for alloy design and the like, it may be beneficial that the institute invests in a laboratory size melting facility.

In principle, every research should be initiated by a comprehensive literature review. There is no evidence that this is the case at least for some of the tasks (work packages). The current mechanism of prioritizing the research subjects is unclear. It is strongly suggested that international experts be consulted at the initiation stage of any and all new research projects. This

will avoid reinventing wheels and will dramatically shorten the path to success. New subjects should be carefully selected and include high risk/high reward themes such as ablation in aluminum castings and dendrite control in cast iron.

2.5.3 Build-up of a concentrated research environment

The Centre had a very slow start in 2007. One of the reasons was the difficulty to define the Centre's identity, strategy and role. The identity discussion showed that the added value created was not clear. In fact the roles of IEC and CIC were too close. In the evaluation carried out in the beginning of 2008 "a clear joint identity of the IEC and the CIC" was strongly recommended. This recommendation is still valid. Otherwise the Centre cannot be developed to exploit all possibilities of the strong casting research environment located in Jönköping.

The Centre has 18 partners who have different areas of interest. In such a situation the objectives of joint projects tend to be compromises and it is very difficult to create a synergistic programme. This can be seen from the Centre's present project portfolio which is fragmented and lacks synergy; there are altogether 14 (as in the written report; 20 was mentioned at the presentation) subprojects. Their goals are covering many material groups and a large part of foundry technology (modelling of solidification, mould filling and predicting residual stresses and developing performance properties of castings). On one hand this demonstrates "the width and volume of the foundry technology in Jönköping" as stated by two members of the Scientific Advisory Board. On the other hand the project structure in 2008, being without focus and showing a limited synergy only, indicates that a clear strategy with an overall vision and joint goals for the Centre must be defined.

In the new plan for the remaining programme time the work has been focused on three areas. This is a step forward on the upper level, but to reach more real synergy the goals on the subproject level must be further focused and their number decreased. This is not clear from the application of the second period. We strongly recommend further focusing of research and decreasing the number of projects for creating a world class Centre.

There is a general need to improve reports and applications. The objectives have to be clear and measurable and more emphasis should be put on presenting results and their impact. The quality assurance system has to be developed accordingly. The Centre reported that there were no patents pending, no spin-off companies started, no new international projects proposed and no organised mobility of researchers. There are plans to improve mobility, the commercialisation of results and international

collaboration. We recommend that immediate measures on the exploitation of results, internationalisation of research and mobility of researchers are taken.

A strong support from industry is one key factor in the way towards the world class Centre. Advanced castings are very important for the Swedish vehicle and machine building industries which form the backbone of the country's manufacturing industry. Industrial involvement in all projects is adequate. At the moment the Centre has 18 partners which guarantee the industrial relevance of projects. However, this has led to a fragmented project portfolio. An effective dissemination of results to SWECAST's 200 member foundries is organised through the institute's magazine and homepage. The industrial involvement could be strengthened by giving project leader tasks to the representatives of partner companies.

Swerea SWECAST (former Gjuteriföreningen) and JTH have collaborated and exploited each other's equipment and resources for a long time. This has created a strong regional knowledge environment on casting research. Knowledge basis should be strengthened further through a more intensive collaboration with KTH, Chalmers and leading international research organisations.

2.5.4 Leadership and management

The Centre is directed by a Centre Board with representatives from six of the participating companies, JTH and SweCast. The board is appointed by the General Meeting where all parties of the Centre are represented. The chairman, Christer Davidsson, comes from industry. The board has during 2007 and 2008 met five times a year. The Centre leadership (Centre Manager, Rikard Källbom, Deputy Centre Manager, Stefan Gustafsson Ledell and Scientific Leader, Ingvar L Svensson, from JTH) participates in the board meetings. The Scientific Leader is responsible for the research programme, which has three focus areas and is organized in five Work Packages (WPs), each managed by a person from either Swerea SWECAST or JTH. There is further an International Scientific Advisory Board where the Scientific Leader takes part together with three representatives from institutes and universities in UK, Germany and Austria. The Scientific Advisory Board has met once.

The organizational structure is logical and the responsibilities clear. Rikard and Stefan have both a good approach to the leadership of the Centre and have been successful so far. The 18 partner companies are involved in at least one project and some are involved in a couple of the 14 projects. The interaction between the companies is mainly taking place inside the projects. Some communication between the WPs has been initiated. In addition the

external communication is based on publications, the web site, some workshops and seminars as well as the participation in conferences. No generic programme open to all partners has yet been formulated, even if there are plans to do so in the future. The interaction between all industry partners can be increased.

The IEC-CIC is described as a project in the already existing CIC, which started two years before the IEC-CIC initiative. The identity of the IEC-CIC within Swerea SWECAST and within the CIC is confusing not only outside the Centre but also internally. Also, the relation between the roles of IEC-CIC and CIC in the cooperation with JTH was not fully clear. In the presentations given during the evaluation it was difficult to follow in which organisation the activities were performed.

It was recommended in the first evaluation of the Centre and it is still a very strong recommendation to find a clear, joint identity of the IEC-CIC and CIC.

A new logo for the Centre has been produced but its use is unclear due to the confusion between CIC and the IEC-CIC. The long term vision is to merge the two Centres, CIC and IEC-CIC, but in the short term it has been suggested to rename the IEC-CIC to CASTINN, which could be even more confusing with the long term vision of a merger between the two Centres in mind. There is a website, including a partner specific “log in”. The website is a part of the CIC website, which in turn is a part of the Swerea SWECAST website. It was not obvious to the Centre management how to market the Centre as such. It is also very difficult to create a “Centre feeling” within the IEC-CIC as long as the Centre does not have a clear identity.

IEC-CIC has a strong cooperation with JTH, which is a formal partner of the Centre and has closely cooperated with Swerea SWECAST for many years. There are some PhD students involved in the CIC Centre but it is unclear whether these are connected to the IEC-CIC or not. The Centre was strongly encouraged at the first evaluation to further develop cooperation with universities and institutes, not least with the centres in Australia, USA and UK mentioned in the research plan. This has to some extent been done and today the Centre is mentioning cooperation with Chalmers, KTH, HTH, SP, DTU in Denmark, University of Queensland and CAST in Australia as well as IFG in Germany. More contacts with people from academia and institutes is taking place in the Scientific Advisory Board.

Some plans for the long term continuation of the Centre after the six year IEC financing period have been presented. A merger between the CIC and the IEC-CIC is planned and it will be organized in a similar way as the

present IEC-CIC. Additional financing through public and private sources both within and outside Sweden will be applied for. Industrial partners will have to sign contracts directly with the specific projects.

At the first evaluation in March 2008 some recommendations were given to the Centre. A number of improvements have been made, especially regarding development of external cooperation with other institutes and universities, planning for the long term continuation of the Centre and involvement of the companies in the research projects. However, more should be done. A joint identity between CIC and IEC-CIC must be developed, which also will further strengthen the Center identity. An increased use of the Centre Intellectual Property Rights potential is encouraged.

It was claimed that a quality assurance system is used by the Centre and that the relatively low value of the customer satisfaction index has been analysed and certain actions has been taken to increase this figure in the future. The questionnaire developed for this index should be included in the annual report.

A generic programme and other tools to improve the interaction between the industrial partners could be of great value. One of the reviewers concludes that the IEC-CIC underestimates the influence of filling system design in its own research and in interaction with industry. Similarly, industry is in general ignorant of the importance of this aspect of casting production. The emphasis on filling system design would integrate and focus interest across all industrial partners and provide immediate benefits to such subsidiary projects as 'sand defects' and 'surface finish', and strengthen IEC-CIC's role in leading the research, rather than acquiescing to trouble-shoot industry's latest problems.

2.5.5 Conclusions and Recommendations

IEC-CIC is solidly supported by industry and university and activities have been planned in depth. The research activity has gained momentum and the institute has achieved international recognition. Together with CIC, IEC-CIC would be well on its way to fulfill the visions of functioning as an Institute Excellence Center in cooperation between university, institute and industry. We wish to submit the following recommendations:

- An overall vision must be defined and a more concrete strategy for the second three year period established. They will benefit from the development of unambiguous short term/ long term plans with specific research goals and milestones.
- Formulation of a generic programme containing more research of general interest to all participating partners is suggested in order to get


an active involvement and increased interaction and learning process.
We strongly recommend further focusing of research and decreasing the number of projects for creating a world class Centre.

- A joint identity of the IEC-CIC and the CIC must be established.
- We recommend that concrete measures on the exploitation of results, internationalisation of research and mobility of researchers are taken in the beginning of the second period of the Centre.
- The potential of protecting the IPR within CIC and development a policy with regard to the establishment of start-up companies based on Centre results should be considered.
- The knowledge basis should be strengthened further through a more intensive collaboration with KTH, Chalmers and leading international research organisations. More emphasis should be put on developing joint projects with other EU-entities.
- The quality of the reports and applications needs to be improved, the objectives have to be clear and measurable and more emphasis should be put on presenting results and their impact. Appendices of reports and/or publications are necessary to provide detail.
- A more significant effort should be made to publish fundamental work in the top scientific journals in materials sciences (Acta Materialia, Materials and Metallurgical Transactions).
- The Centre's future beyond the IEC funding must be planned in more detail over the coming years. A clear strategy, including economic predictions and actions, on how to reach a long term continuation after the six years of IEC public funding period must be developed.

Jönköping 2009-08-31



Kaj Mårtensson



John Campbell



Heikki Kleemola



Doru M. Stefanescu

2.6 Evaluation of the CODIRECT Institute Excellence Centre at YKI

On September 1, 2009 the evaluators, Helmuth Möhwald, John Ralston, Heikki Kleemola and Kaj Mårtensson, met with the Centre Manager Ulla Elofsson, the Deputy Centre Manager Mikael Kjellin, the Chairman and another industry member of the Centre Board, university representatives from KTH and SU, the President of YKI, one project leader and two PhD-students at the CODIRECT Institute Excellence Centre. The meeting took place at YKI and the purpose was to perform the midterm evaluation of the Institute Excellence Centres Programme (IEC). Representatives from VINNOVA, Knowledge Foundation and the Swedish Foundation for Strategic Research (SSF) were also present. We thank the organizers of the meeting for their informative presentations and open discussions.

2.6.1 Long-term strategy and progress of the Centre

The vision of CODIRECT is to become a leading Centre within the area of controlled delivery and release, both with respect to scientific excellence and industrial applications, and to strengthen the competence and competitiveness of its partners. CODIRECT has established four technology platforms (“base block areas”) dedicated to i) sustained release, ii) triggered release, iii) perception delivery, and iv) printed functionality. Within each base block area one to four integrated generic projects and a number of projects working more directly with applications have been initiated (the printed functionality area has no applied project). The technology platforms and the projects cover the whole value chain from idea generation to implementation. Based upon the documentation provided and the formal interview, the projects have progressed and some of them already show very interesting and promising results. In Phase 2, there has been a change, indeed an evolution, and the new research areas will be

- carrier materials;
- responsive systems;
- loading and release strategies;
- perception delivery.

Several projects are directed by representatives from the industry, covering a broad range of companies. The academic partners are from the Royal Institute of Technology (KTH) and Stockholm University (SU). In particular, the cooperation with the psychology group at SU represents excellent added value. The collaboration between KTH in basic surface science, YKI in development and the team at Stockholm led by Prof Berglund is original, promising but as yet unproven in terms of understanding. Professor Bergström and his materials activities are of basic

importance to the success of CODIRECT. New types of carrier materials and responsive systems all benefit from the synthetic expertise of the Bergström team.

Our concern is that the research plans for Phase 2 are not properly developed at the present time and certainly not in the documentation provided. Clear objectives are essential for each project with well-thought out implementation strategies, coupled to clear outcomes that will enable the industry partners to develop new products or processes.

The Centre has become a meeting place for the partners involved, yet we could not detect that this has materialized into collaborative projects. There is no doubt that this Centre is on the right track with respect to the overriding objectives and goals of the IEC. The creation of CODIRECT has had synergistic effects within YKI and was reported to have generated substantial additional direct funding, which otherwise would not have come about.

The internationalization aspect of CODIRECT has not yet developed, which is surprising after 2.5 years of frequent contacts and visits. The type and number of international partners require clear definition and we note, from the interviews, that moves are now being made to do this.

After the second phase of CODIRECT, there is a plan at YKI to create a separate arm of the Institute to accommodate the IEC as a department or section. This will require bridging funding if the scientific and staffing momentum is to be maintained.

2.6.2 Scientific and technical achievements and their impact

The Centre has assembled internationally well-known and nationally outstanding academic partners, which are essential for the introduction of new ideas and concepts. The research conducted is certainly relevant from an international perspective, and provides Sweden with the opportunity of becoming an international centre of expertise. For this opportunity to be capitalized upon, CODIRECT will need to substantially increase its academic profile, partner with key strong players internationally and focus on several key areas. CODIRECT is scientifically relatively weak at present. However it has established an early connection between ‘friction and feel’. This ‘perception’ area should now be critically examined to see whether or not CODIRECT has a real international ‘edge’. If so, this sensory friction area could be extended to include odour, taste and so forth. This matter requires urgent attention with an outcome decided within the next six months.

The number of scientific publications is low at this point, without substantial impact. It is unclear how the IEC-programme support has directly benefitted the scientists involved, whether the support is formally acknowledged and if an intellectual property screen is involved. As noted above, the international links are weak. The Scientific Council, in our view, requires strengthening and should act as a genuine scientific 'inquisition', constructively examining the CODIRECT personnel quality and outputs on a regular, perhaps annual, basis. CODIRECT does not at this point act as a magnet for visiting scientists and top international researchers. It may do so in the future provided that the present deficiencies are addressed.

The documentation contained only a small amount of information regarding patents. However during the presentation and interview, a pleasing number of new patents and innovations were announced. Members of the CODIRECT Board strongly endorsed these technical achievements and also mentioned how their own company staff had been energized.

The University staff have enjoyed the CODIRECT collaboration, with the caveat that they had relinquished some of their prized academic freedom. The impact of the University staff has been high, as has the general level of support from each participating University partner.

This appears to be strong; however there was a distinct lack of information and transparency in the documentation provided. We would have liked to have seen at least an Executive Summary of each industrial report, together with information as to whether or not the work had been successful. The advantage of this form of information is that, while it does not breach company confidentiality, it can act to stimulate other researchers and lead to excellent cross-fertilization between projects and researchers.

A scheme needs to be swiftly developed which identifies key research institutes that CODIRECT can cooperate with, both nationally and internationally.

2.6.3 Build-up of a concentrated research environment

The Centre is very well organised and the roles and responsibilities of the director, general meeting, board, scientific council, advisory group and project management groups are clearly defined. There is a majority of industry representatives in the Board which guarantees the industrial relevance of the research. The scientific quality of the research is reviewed annually by the Scientific Council consisting of two prominent international scientists. The need to reach industrial relevance and scientific quality of the research at the same time is well-reflected in the project portfolio; there are two categories of projects, base block and applied projects. The results of the scientific base block projects are open to all participants and they are

also published in scientific journals. The applied projects are more industry oriented and aimed at developing new products and processes. Consequently, their results are mainly reported to partners in the project. Their publication is decided by the project steering committee. We encourage also the publication of the applied results together with the participants, perhaps after a certain delay, for improving the visibility of the Centre.

A functioning practice for selecting the best project proposals has been adopted. This process was criticized by the companies for restricting their participation in planning. In the future the companies can participate from the very beginning. The strategic planning process was also considered to be too much a top-down one and some problems were seen in interacting with the companies. An extensive reorganisation and streamlining of the project portfolio and administration systems has started. This should be better reflected in the plan for the second period which, at the moment, is still at a rather general level. We recommend that the Centre's interaction with companies and also the interaction between the industrial partners should be further improved. However, this should be done without too heavy an administrative burden (avoiding an excessive amount of meetings, seminars, sessions, minutes, internal reports etc.).

The industrial orientation of the Centre was criticized to be too weak in an earlier evaluation. This has been improved as stated above. A better industrial relevance will also help in acquiring funding for the Centre after the end of the IEC programme. Then, in addition to public funding, much more direct industrial funding for projects and contracts is needed. For that purpose the visibility of the results in industry and media should be increased. Especially their industrial impact should be emphasised. Publication intensity was criticized in the evaluation and, as a response, a special budget was created for the scientific dissemination of results. This arrangement gives senior project leaders a greater chance to publish.

The project management processes are good; the projects have clear, measurable objectives and the milestones and deliverables have been clearly defined. Although neither the Centre nor the Institute have any formal quality assurance system, the practices developed can satisfy the present needs. A questionnaire for measuring customer satisfaction has been developed and used during the first two years. The results indicated for instance that the project steering groups should be more involved.

In this kind of research, innovations and new products and processes are anticipated. In fact some patents have already been filed. A process for handling the IPR has been adopted. The owner of the results from base block projects is YKI, which is responsible for their further development

and exploitation according to their IPR policy. In most cases YKI does not file for patents on its own unless there is significant net revenue to be obtained. Maybe more resources should be allocated to the further development of innovations and their marketing to potential customers.

The plan for the second period of the Centre is at a too general level. It should be improved after the Board meeting. In addition the Centre should have its own vision for the future. A plan is also needed for the time beyond the end of the IEC programme. The plan discussed during the evaluation aims at continuing the Centre as a new research section at the Institute. We recommend that plans with clear objectives for the remaining period and for the time beyond the end of the IEC programme should be developed.

2.6.4 Leadership and management

CODIRECT is directed by a Centre Board with a majority of representatives from industry and one person from each of YKI and KTH. Six board meetings have taken place during 2008. The Centre leadership is handled by one Centre Manager, Ulla Elofsson and one Deputy Centre Manager, Mikael Kjellin. Furthermore there is a Centre Advisory Group, with one representative for each partner and one from each academic collaborator. The General Meeting consists of one member from each of the Centre partners. They have only had one meeting, at the end of 2006. There is a leader of each of the four base block areas and a project leader and a steering group with representatives from the partners for each of the ten projects within the blocks. The Centre has also a Scientific Council with two professors from abroad (United States and France), both with industrial experience.

The Centre Managers gave a very good impression and demonstrated a professional and so far successful approach to the leadership of the Centre. Centre management seems to be very open to customer feedback and is taking action based on earlier experiences. Good procedures for generating and ranking projects, organizing follow-up meetings with project leaders etc are established. Some of these procedures will be implemented for the whole institute in the future. There has been an exchange of three persons in the board during the last year for different reasons. In addition there have been several changes in partners and personnel in the Centre. Four companies have left the Centre during 2007-09 and two have become new partners. Presently there are 10 industrial partners, six of whom are based outside Sweden. All industrial partners are rather large companies. More SMEs should be encouraged to become partners in CODIRECT, a goal for the next three year period.

The organisation is fairly complex with many people and meetings involved. On the other hand, involvement of people from all participants is crucial for this type of Centre and it also contributes significantly to technology transfer between the parties. All changes in partners and personnel as well as the leadership of this complex organisation seem to have been handled in an efficient way by the Centre management.

The identity of CODIRECT is well established within YKI and the Centre is fully integrated with other activities in the YKI line organisation and research strategy. The Centre has its own trade mark, logo and profile in promotion materials and a home page on the web. The management has contributed in giving the Centre a clear identity by promoting CODIRECT in a good way, both within and outside YKI.

YKI has for a long time been cooperating with academia and especially with KTH. The Centre has established a good cooperation with researchers at KTH (Surface and Corrosion Science), SU (Physical, Inorganic and Structural Chemistry, and Psychology) and the Karolinska Institute (Environmental Medicine). Three out of the ten projects have project managers from academia. So far no other institutes are involved in the research even if a stronger collaboration with SP, the Swedish Technical Research Institute, is foreseen. A number of PhD students from the academic sites (four person-years together in 2008) have been involved in the research. Contacts with university and institute partners have further taken place through the Scientific Council. Modest cooperation with international institutes and universities is also established in EU-projects. There are some examples of mobility from people into CODIRECT but this needs to be further developed and the Centre should encourage the mobility of its own people to the industrial environment.

Some thoughts for the long term continuation of the Centre after the six year IEC financing period were presented. It is claimed to be in line with the YKI strategy to continue to work in the field of the Centre activities. There are plans to form a new section of Controlled Delivery and Release which will become a self-sustained economic unit within the institute. Initially the activities will be sponsored by YKI but additional financing will be applied for through public and private sources both within and outside Sweden in the long term. More detailed plans for the long term continuation of CODIRECT should be developed and actions taken as soon as possible to make continuation a reality.

At the first evaluation in March 2008 some recommendations were given to the Centre. Some improvements have definitely been made, but more can be done, especially regarding the long term continuation of CODIRECT, increasing the mobility of people, getting more SMEs as partners and

increasing the cooperation with other research institutes in, for example, the SP-group.

2.6.5 Conclusions and Recommendations

CODIRECT has developed in a very positive way and is already now a very good example of a well functioning IEC which fulfills most of the requirements of the financing agencies. The Centre has a well structured research programme which is of great industrial relevance and which is given an active support from industry. However, we will submit the following recommendations in order to further increase the Centre's performance:

- The Centre should develop mechanisms and processes to increase technology transfer between all participating partners. The plan to widen the collaboration with SMEs is encouraged.
- The Centre should take further action to increase the mobility of people between the Centre and industry.
- The Scientific Council requires strengthening. The knowledge base could be further strengthened through a more intensive collaboration, both with other research institutes (for example in the SP-group) as well as leading international research organisations.
- The publication of results in conjunction with industrial partners should be encouraged to improve the visibility of the centre.
- To develop the international aspect of CODIRECT, the type and number of international partners require clear definition.
- In order to develop key niche research areas CODIRECT will need to substantially increase its academic profile, collaborate with key strong players internationally and focus its research.
- The Centre's future beyond the IEC funding must be planned in more detail over the coming years. A clear strategy, plans with clear objectives and economic predictions on how to reach long term viability should be developed.

Stockholm 2009-09-01

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2.7 Evaluation of the IMAGIC Institute Excellence Centre at Acreo

On September 2, 2009 the evaluators, Tim Ashley, Uzi Efron, Heikki Kleemola and Kaj Mårtensson, met with the Centre Director Jan Andersson, the Deputy Centre Director Susan Savage, the Chairman and two other industry members of the Centre Board, university representatives from KTH, the Sales Manager of Acreo, one PhD graduate and one PhD-student at the IMAGIC Institute Excellence Centre. The meeting took place at Acreo and the purpose was to perform the midterm evaluation of the Institute Excellence Centres Programme (IEC). Representatives from VINNOVA, Knowledge Foundation and the Swedish Foundation for Strategic Research (SSF) were also present. We thank the organizers of the meeting for their informative presentations and open discussions.

2.7.1 Long-term strategy and progress of the Centre

For the first three year period the Centre has worked on four component-specific topics and two areas of more generic applicability. None of these topics has been examined previously by the partners in the Centre; consequently all include an element of establishing a base position and attempting to catch up with the world state-of-the-art. All have clear potential for commercial applications and thus benefit to the economy, provided that they can be produced in a sufficiently timely manner and at the necessary price to be internationally competitive.

In the second three year period, the Centre proposes to continue with all of the topics, and in addition develop ideas already underway for THz detection based on the bolometers. The evaluation panel feels that there may be insufficient critical mass to take all of these areas to a product, and that therefore a degree of consolidation and focussing may be advantageous.

IMAGIC is doing a very serious and thorough R&D-work on IR detectors and related technologies. However it lacks the capability of generating novel unique ideas and concepts necessary in order to become a competitive, world-renowned Centre of Excellence. In order for IMAGIC to become such a Centre of Excellence, it is recommended to both the Centre and its funding institutions, to set up special funds to be used for novel innovative and exciting research projects that would attract world-class, outstanding researchers and scientists.

The Centre has no clear strategy for its continuation beyond the second three year period, other than an assertion that more public funding will be essential.

2.7.2 Scientific and technical achievements and their impact

Uncooled IR microbolometer imaging. This project is based on the novel idea, patented by a partner in the Centre, of a material with higher temperature coefficient of resistivity (TCR) based on thermal excitation of charge carriers out of a SiGe quantum well in a silicon host material. It is anticipated that, as it is based on a mono-crystalline material, it will have the additional benefit of lower excess ($1/f$) noise. The overall objective is to provide higher intrinsic signal-to-noise ratio, so that a lower cost package may be employed, resulting in a more competitive imaging system for automotive night vision and pedestrian injury mitigation system (PIMS) applications. The work involves partners Acreo and Autoliv. The status is that material has been grown and various metrics assessed for individual components. The Si-SiGe structure has demonstrated a TCR of 3.2%/K – which is within the state-of-the-art. The project leader assured the reviewers that these measurements together with modelling of their response in a system context have confirmed the viability of the concept and its potential advantage – and thus should fulfil the requirements of the partner company Autoliv. As such this system would represent a significant advance on the state-of-the-art. A small, 16 x 16, array for the PIMS application had been fabricated that showed relatively poor performance; however, we were assured that the reasons for this were understood and were not fundamental. Si-SiGe quantum dot structures had also been simulated and grown, and optical (Raman) measurements indicate a high TCR of 4.2%/K. While the results certainly show the potential of these two configurations to yield a high performance detector (bolometer) array, this cannot be demonstrated within the current project owing to insufficient funds to procure a custom Readout Integrated Circuit, so this will remain an uncertainty in the final overall system performance. Several review articles have been published in technologically leading journals, such as SPIE, however no refereed article on this novel technology has been published yet. The roadmap showed system integration commencing in 2010, however no details of plans to progress from the current status to a full array suitable for incorporation in a system were presented and the timescale is considered to be very aggressive.

Next generation high-performance IR imaging. This project concerns antimonide-based photon detectors and includes two routes – i) a conventional type-II superlattice; and ii) a quantum dot based detector. The overall objective is to enable focal plane arrays that will have higher sensitivity and operate at a higher temperature than QWIPs, and the key challenge of the project is to reduce the surface leakage current that has historically been universally encountered in detectors of this type. The work involves partners Acreo and IRnova, with systems input from FLIR Systems

and FMV (not a partner). For the conventional type-II superlattice, the detector material is being procured through a relationship with University of New Mexico. There appears to be little that is novel in this approach, and much progress is required to catch up with groups elsewhere. Results were presented from relatively large mesa structures, which were not passivated, that showed a photo-response in the required LWIR spectral region, however no details were available on diode performance other than “the R_0A was very low”. No progress was reported on structures intended to have reduced surface leakage, either by overgrowth with a higher bandgap material or use of so-called x-B-n structures. The second theme is more innovative, though still not entirely novel, and is based on quantum dots (QDs). Attempts to grow coupled QDs had failed owing to intermixing with the bulk material; however, an alternative route based on dot-to-bulk transitions, for which a patent application had been filed, had shown absorbance in the IR regions of interest. Several papers have been published in peer reviewed journals on the material properties of the QD structures, however overall progress towards achieving a competitive high-performance detector technology by either route appears to have been somewhat disappointing. The roadmap showed system integration commencing in 2011, however, as for the microbolometers, no details of plans to progress from the current status to a full array suitable for incorporation in a system were presented and the timescale is considered to be very aggressive.

X-ray detection – dose monitoring for cancer therapy. This particular application does not require high sensitivity, as opposed to many or perhaps most other X-ray uses. IMAGIC’s unique approach for the Dosimetry application is based on the use of relatively small (1mm), low absorption, Silicon-based cubes in a multiple-face PN- diode configuration, taking advantage of the mature silicon technology usable in this case of low absorption requirements. While this configuration presents a satisfactory solution for the Dosimetry problem, it does not address the main needs of X-ray detection for medical and security applications requiring high sensitivity in the energy range of ~30-120 keV. International standing has not yet been established in this technology area. No publications have been published to-date. Whilst the application was presented as being for dose monitoring for cancer therapy it was agreed that this had little synergy with the other detector array topics, owing to the very large physical dimensions required, and that an application with greater synergy would be, for example, in dentistry.

High-sensitivity ultraviolet detection. The project is aimed at the development of ultraviolet detectors of extreme sensitivity, ultimately capable of single photon detection. The main application is related to

security issues: to remotely detect clouds of hazardous materials, or more general detection of biological materials either suspended in the air or in water. There is also an interest in this part of the spectrum for detection of flames or corona discharges as well as the industrial inspection of surfaces. The work involves collaboration with FMV, which is not an IMAGIC partner. Of the two wide bandgap materials under investigation (GaN and SiC), GaN is fundamentally preferred due to the direct bandgap property allowing a higher sensitivity to be achieved. Furthermore, by suitable alloying to other Group III elements, the bandgap can be varied. The indirect bandgap SiC, however, has the important advantage of being much more mature in terms of both fabrication and use. The sensitivity of both materials can be enhanced by the use of internal amplification in an Avalanche Photo-diode (APD) configuration. In terms of international standing, IMAGIC has drawn on the 15-year Acreo experience with SiC materials for power devices and has demonstrated a stable, large area, high sensitivity UV APD photodetector, a result that has pushed the state-of-the-art in this technology. The GaN APD device, however, is unstable and cannot be operated at the high voltage needed to attain the required gain. In terms of publications, whilst an article in non-refereed conference proceedings (SPIE) has been published, no refereed article has yet been published on this technology.

Fabrication of micro-lenses (generic topic). Photoresist patterns have been demonstrated, and their transfer to Si and quartz substrates has also been demonstrated, however no work has yet been undertaken on their integration with imaging arrays.

Mounting technology (generic topic). No results were presented or discussed.

2.7.3 Build-up of a concentrated research environment

The Centre is organised in a traditional way. The roles and responsibilities of boards and executives were not described in the annual report, but were presented during the evaluation session. According to its strategy, the goal of the Centre is to promote the competitiveness of the partners by establishing a world class research environment. For that purpose a platform for a joint exploitation of the knowledge and skills of Acreo, the partners and collaborating universities was established. This is in line with the objectives of the IEC programme. However, a more precise vision and strategy for management of the activities of the Centre are needed. The commercial potential for the Centre's knowledge is high at least in the following areas: development of diagnostics devices and sensors to be used in safety, security, surveillance, environment and process' control.

The project portfolio is structured into two types of research; generic research on key technologies and technology projects focused on a certain application area. Concrete and measurable goals cannot be found for all projects. This makes the measurement of achievements difficult. The objectives of all projects should be clearly defined and measurable. In presenting the results their visibility has to be improved and their industrial impact clarified. It is strongly recommended that more attention should be given to clarity of the plans and reports.

On the application side (so-called technology projects) the approach is more market oriented and the projects are selected to have a high commercial potential. In 2008 four technology projects were going on with application areas including the automotive industry and instruments for measurement. The participants and their contributions are not presented for all subprojects in the annual report. A complete list of the partners and their contributions to the projects should have been attached.

The Centre and its partners have been active and successful in obtaining EU-funds for projects; two projects were granted. These aim at automotive applications and are strengthening the research environment. The IPR and secrecy issues are very important in the research area developing instruments for the application areas, safety, security (military) and diagnostics. The Centre has an agreement with KTH on handling the ownership of the IPR. In principle, the results of the generic projects can be exploited by all partners.

There is an ISO 9001 quality system at the institute level. However, more emphasis should be put on implementing the quality related practises and processes at the Centre level. On the other hand a valuable result is the support of the Centre in developing the collaboration processes of the host organisation by a "copy and paste" method. This kind of internal improvement is also one of the goals of the IEC programme. Three patents were filed. Mechanisms to develop innovations further before their exploitation by companies would be beneficial. Demonstrators and prototypes, mentioned in the evaluation, are a step in the right direction.

Publication intensity is low compared to other CIE centres, although the research area is rather publication intensive. More emphasis has to be put on disseminating the results outside the consortium in order to achieve a better visibility. This is an important part in building the Centre identity up to a level which can attract international funding and research partners.

The future perspectives presented in the evaluation are based on the continuation of public funding, although the IEC programme is known to end after another three years. The Centre must develop a strategy for

increasing incomes from contractual work and other sources. The participation in EU-projects could give access to a large knowledge pool and, of course, strengthen the economy of the Centre. In addition working in joint European projects helps in the internationalisation which is very important for the future. At the moment the plans for the continuation of the Centre after the end of the IEC programme are very general. During the coming years more precise plans should be made and preparations started for the period beyond the programme.

2.7.4 Leadership and management

The leadership is composed of the Centre Manager, Jan Andersson, and the Deputy Centre Manager, Susan Savage. The Centre Board is appointed by the General Meeting where all parties of the Centre are represented. The Board has representatives from all of the participating companies, KTH and Acreo. The Centre leadership participates in board meetings. Board meetings have taken place about every third month. IMAGIC has further a Scientific Advisory Board with three members, one from Jet Propulsion Lab in USA and one person each from UU and LiU in Sweden. They have met once a year and had some communication in between their physical meetings. Their role has mainly been to come up with new ideas and not to audit the Centre performance from a scientific point of view.

The annual report presented for 2008 is not quite clear regarding meeting frequency, participants in the different technology projects, the size of the projects and the generic programme, the process for starting new projects, how the Centre has handled the recommendations at earlier evaluations etc. The presented written material was not structured well enough and some information was lacking. Similar remarks were made also at the first evaluation but no real improvements have been made in this respect. However, the presentation given at the meeting was quite good and the discussion gave answers to many of our remaining questions. The organizational structure is logical and the responsibilities are clear. Jan has a good approach to the leadership of the Centre and gives a good impression.

The research is organized in a generic programme, open to all companies. This was recommended at the first evaluation and the generic research is contributing to an increased interaction between the participating partners. Further there are four technology projects with just a few industrial partners in each. In three of the projects there is only one participating company. In total five of the ten partner companies were involved in the technology projects so far. There is further a communication project where technology transfer mainly takes place through conferences, seminars, courses, publications, workshops etc. However, it seems important to further increase the interaction between all industrial partners in order to motivate

their participation in the Centre, even if there might be some limitations due to secrecy matters and IPR.

It was claimed that the Centre has adapted the quality assurance system in use at Acreo (ISO 9001). This was another recommendation in March 2008. A customer satisfaction index has been produced and the input from the questions asked to the customers about the Centre performance is said to be used to improve the quality assessment at IMAGIC. However, we think that the quality assurance system could be further implemented in the Centre.

The identity of the Centre in Acreo has to some extent been increased by use of name plates, a laboratory dedicated to the Centre activities, an IMAGIC working room for external people, an own logo and some joint planning activities. The logo produced is still closely connected to the logo of Acreo. The website, which was reported to be well functioning, is closely integrated to Acreo's own website for practical reasons.

IMAGIC has been successful in extending the economic resources of the Centre through EU-funded projects and money from other sources. In total an additional funding of more than 14 MSEK has been reported. They have also filed some patents and more applications are expected in the near future. The IPR is regulated in the Centre contract and the policy seems to work.

It was pointed out at the first evaluation that the Centre should as early as possible start planning for the long term continuation after the six years of public IEC-funding. Some preliminary thoughts have been presented. It was pointed out that IMAGIC will be financed by Swedish ICT Research if the customers are interested in the continuation of the Centre. At the same time it was clear that it will be difficult to run a Centre like this without further funding from agencies like VINNOVA, the Foundation for Strategic Research (SSF) and the Knowledge Foundation. However, it is obvious that the Centre must now start a real planning for the future of IMAGIC after the six year period. The future must be planned much more in detail and a clear strategy, including economic predictions and actions, on how to reach a long term continuation after the six years of IEC public funding period must be developed.

The Centre is cooperating with two academic partners - KTH and LiU. KTH is classified as a partner in the Centre and some collaboration has been established with LiU. One PhD student from each academic site has been connected to IMAGIC. In the reports and during the hearing a few other universities were mentioned as potential collaboration partners including Chalmers, HH, LU, MiUn and the University of New Mexico. The collaborative activities seem so far to be on a limited level. No other

research institutes were mentioned as interesting future cooperation partners. Some more international contacts with other research organisations have been established via EU-projects linked to the Centre. However, we would like to strongly encourage the Centre to continue to further develop the external cooperation with relevant universities and institutes.

Some examples of exchange of researchers between IMAGIC, universities and industry were mentioned, but it seems that this can be further improved.

When looking at the recommendations from the first evaluation in March 2008 improvements have been made regarding for example the Centre identity, a generic programme, quality assessment, internal communication etc. However, more can be done regarding external collaboration, interaction between all the participating companies, planning for the long term continuation of the Centre and the quality of the annual report.

2.7.5 Conclusions and Recommendations

IMAGIC is a Centre working in a very important area with emerging technologies, in close collaboration with the industrial partners. Clear improvements have been made since the first evaluation. We want to submit the following recommendations to further improve the Centre performance:

- In order to provide sufficient critical mass the Centre should consider a degree of consolidation and focussing amongst the projects. Specifically the value added by the X-ray work should be examined as it appears to have little synergy with the other topics.
- IMAGIC should set up special funds to be used for novel innovative and exciting research projects that would attract world-class, outstanding researchers and scientists.
- The Centre should develop mechanisms and processes to increase technology transfer between all participating partners.
- The knowledge base could be further strengthened through a more intensive collaboration, both with other research institutes as well as leading international research organisations.
- The objectives of the projects should be clearly defined and measurable. In presenting the results their visibility has to be improved and their industrial impact clarified.
- More emphasis should be put on implementing and developing the ISO 9001 quality assurance system at the Centre level.
- The Centre's future beyond the IEC funding must be planned in more detail over the coming years. A clear strategy, plans with clear objectives and economic predictions on how to reach long term viability should be developed.

Stockholm 2009-09-02



Kaj Mårtensson



Tim Ashley



Heikki Kleemola



Uzi Efron

2.8 Evaluation of the AFOC Institute Excellence Centre at Acreo

On September 3, 2009 the evaluators, Anders Bjarklev, Roel Baets, Heikki Kleemola and Kaj Mårtensson, met with the Centre Manager, Åsa Claesson, the Scientific Leader, Walter Margulis, one industry member of the Centre Board (the chairman of the board had also the intention to participate but was forced to stay at home due to illness), one university representative from MiUn, the Sales Director of Acreo and one PhD-students at the AFOC Institute Excellence Centre. The meeting took place at Acreo in Hudiksvall and the purpose was to perform the midterm evaluation of the Institute Excellence Centres Programme (IEC). Representatives from VINNOVA, Knowledge Foundation and the Swedish Foundation for Strategic Research (SSF) were also present. We thank the organizers of the meeting for their informative presentations and open discussions.

2.8.1 Long-term strategy and progress of the Centre

The strategy of the Centre is to engage senior researchers in both long-term research and applied research with a high relevance (or future relevance) for industry. This is done in an organisational model of an “industrial membership”, where research knowledge is shared, and a strong collaboration with university partners through joint PhD-students. In a sense the term “Centre” is a bit misleading: the Centre is actually an industrial affiliation program with collective research. The Centre seems to play a relevant role as a “broker” between industry and academia and that role should be elaborated further.

The strategy is implemented rather successfully even if a number of issues need fine-tuning.

One of the key evolutions in the strategy of the Centre is to hire a senior business developer with a strong technical background in the field. This is a very welcome element for the Centre on its way to gain visibility and become self-sustained.

The Centre is hosted by ACREO and builds strongly on the fibre technology infrastructure and the human resources of ACREO (75% of the senior researchers of the Centre used to be members of the ACREO fibre optics department previously). However the Centre is definitely not simply a continuation of the activities of the fibre optic department of ACREO. Through the founding of the Centre a new mode of operation was created in terms of the relationship to industry as well as to universities. This seems to be very fruitful and to have created new dynamics across the walls of companies, institutes and universities.

The fact that the Centre heavily depends on the expensive technological infrastructure of ACREO can be seen as a long-term weakness and indicates that the Centre – even if it has its own Board – is not fully independent. The precise relationship between the Centre and the fibre-optic department of ACREO was not clear from the reports and became clearer during the discussion. This should become more transparent in future reporting.

The relation to universities appears to be running well and builds largely on personal networks. However it is still a fragile relationship, insufficiently elaborated up to the level of framework agreements. There is good intuitive understanding of the added value of the Centre to PhD research (1. Infrastructure; 2. Knowhow of senior researchers; 3. Link to industrial needs) but this understanding has not yet been explicitly formulated at the level of framework agreements as far as the experts can see.

The strategy for the second three-year period includes the strengthening of business development now that manpower for this role is in place but should also more explicitly address the improvement of international visibility and involvement in international research projects (with industry and/or in EU-funded projects).

The strategy for the Centre after the second three-year period is not yet fully clear. The Centre will remain dependent on ACREO for infrastructure and hopes to become self-sustainable somehow. Given the strength of the Centre in (highly) specialized areas of fibre optics the reviewers feel that industrial funding at international level will need to complement the funding by Swedish industry. It remains to be seen whether international companies will be inclined to enter a shared knowledge model (even if there are successful examples of such a model in the world).

2.8.2 Scientific and technical achievements and their impact

According to the reports and interviews, the research programme is formed based on a philosophy of building on own strengths, and selecting topics that the researchers believe in. There is a very careful process in place – involving the Board - concerning the internal evaluation and go-no-go decision of new subjects, and it has been avoided to enter fields that are already very mature through other players. The main drivers for new activities are:

- Areas of interest for industry (whether or not industry realizes it already)
- Research in collaboration with universities (whereby the Centre complements the interests and capabilities of the university groups)
- Addressing certain research needs (eg special coatings) which are not typically covered by universities

The Centre is not leading in today's most important industrial innovation areas in the field of fibre optics (e.g. fibre lasers). However, the Centre is leading in a number of technologies that can be considered to be niche areas today, but which may drive important markets in the future.

Generally speaking the scientific achievements are qualitatively good but not quantitatively extensive (for a team of 16 senior researchers). Publications are made in relevant journals - mostly optical journals and conferences. There have not yet been many publications on applications and we would suggest that this possibility is taken into consideration in the next period.

The visibility as a Centre is still limited and the visibility needs to be addressed more (as the Centre also proposes for the next phase). In this connection more involvement in international collaborative projects would be good (e.g., the Centre could take the lead in at least one FP7 proposal in each major relevant call).

The evaluation committee notes that only 25 % of the senior researchers are new members (i.e., not originating from the institute at the start of the project period). We find no indication that top international researchers were attracted during the first period, and this also points to the need for an increased international visibility – not only as ACREO but clearly also as AFOC.

Looking at the status of the technical achievements and innovations, it is very positive to see that there has been a specific utilization of results from different focus areas of the Centre (e.g., fibre Bragg gratings and coating). The annual report from the Centre provides surprisingly little detail on the patents (and the associated patent exploitation strategy). The evaluation committee also finds that a group of 16 senior researchers should produce several patents per year. However, it should also be noted that the strategy on the financial picture of patents is not clear.

Concerning the university involvement and interaction, it is difficult to judge the exact level, although the university partners obviously have taken part in the work in the Centre board and equally important in the development and supervision of common PhD projects with direct relation to the scientific work of the Centre. Actually one can argue that the Centre plays a key role to bring university research in contact with industry and vice versa. If this is indeed correct then the Centre fulfils a very important societal role.

The evaluation committee is impressed by the number of industrial companies involved in the Centre, even if a few of them are “sleeping” partners. The involvement model probably needs fine-tuning given the

diversity of interests of the various companies. The original idea probably was to focus on generic research and technology development, for which there is an interest from many companies, but this may prove unrealistic (certainly in a self-sustainable model) given the diversity of applications of interest to the different companies and the involved researchers.

When it comes to cooperation with other institutes, the evaluation committee finds that the Centre shows a very satisfactory list of international collaborations, but they mostly seem to be informal collaborations rather than solid project-level collaborations (involving funding). In the next phase, it would be recommendable to work towards more formal project-oriented collaborations.

2.8.3 Build-up of a concentrated research environment

The Centre serves an important area in the Swedish economy. Optical fibres are extensively used in telecommunication, laser technology, medical instruments etc. New applications are emerging with the development of the fibre technology, since it is an enabling technology by nature. The area is developing fast and new materials, products and processes are created all the time.

The Centre collaborates with 20 industrial partners and several research organisations (KTH and Karolinska Institute among others). In addition it has a contact network with foreign research organisations. The structure of the Centre is clear; the basic technology development projects are organised to a technology platform and industrial solutions are developed in application projects. The reports and proposals are well written; the objectives are measurable and the corresponding results described. Economical and industrial impacts could be made more visible. The administrative structure, having a Centre Board, Scientific Advisory Board, Scientific Leader and Centre Managers is well defined. A clear Centre feeling has been created and the staff is committed. The Board has a central role in strategic planning in a good collaboration with the Centre management. To reach an international level the activities may have to be focused further. The good administrative practices created could preferably be spread also to other parts of Acreo.

The project groups are interlinked, and although the application projects are confidential, information is exchanged effectively. The partners have also exploited the platform in finding technology and knowledge they need in their other fields of activity. Acreo's ISO 9001 quality assurance system should be implemented more effectively. One initiative to measure the Centre's role in the regional innovation system will be started. This may lead to a more common use of performance indicators in a longer run. The

collaboration was considered to be beneficial by the partners. This is reflected in their willingness to continue the partnership. The staff of Acreo has also found the collaboration positive. For them the Centre is a platform assisting in contacting companies and marketing services and knowledge. This learning should be spread to the other parts of Acreo.

The Centre has a high level of expertise and knowhow which together with the industry makes new products and processes possible. In such a situation a clear IPR policy is needed. So far the model contract has been used. However, in the future new practices may have to be developed to solve e.g. the issue of whether all partners should have equal rights, in spite of very different contributions. Another question concerns the precise terms for transferring an innovation to a company outside the consortium. One option for the Centre is also to develop innovations further; demonstrators and pilot productions have been proposed by the companies. In the future the Centre contract may have to be modified to create a more flexible way of working.

The Centre is closely tied with Acreo and its identity should be developed in accordance with the host organisation. Visibility abroad can be increased through publications and conference presentations and networking. However, a small centre has limited resources for this kind of profile rising. The internationalization plan is rather general and without a clear focus. A more realistic strategy having also a funding plan being in accordance with the human resources available should be established. The number of target countries could not be high. Some mobility (1-2 researchers) from the Centre to industry and universities and vice versa has taken place. The mobility of researchers outside the present collaborators should be planned taking into consideration the available resources.

From the institute level the Centre is seen as a long term impact so that the structures should be maintained after the end of IEC. Although it is expected that industrial partners fund a significant part of the centre's turn-over, public funding will be needed for the development of technological basis of the platform. The plan for the second period is still rather general. A more detailed plan will be elaborated during the fall. The Centre's vision should be updated together with the Board. It is predicted that incomes from partners and perhaps from other companies can become "a significant part of the funding". To reach that position it is important to show that public funding received so far has been money well spent. For that purpose visibility in scientific publications, but also in public media should be increased. Also other measures attracting talented young scientists and helping to acquire additional funding to the Centre should be taken.

2.8.4 Leadership and management

The Centre is directed by a Centre board with representatives from four of the participating companies, KTH, MiUn and the Acreo board. The chairman, Stefan Ekman, comes from industry. Four board meetings have taken place during 2008. The board is appointed by the General Meeting where all partners of the Centre are represented. The operational management group is composed of one Centre Manager, Åsa Claesson, and one newly recruited Deputy Centre Manager with experience in Business Development. In this group there is further one Scientific Leader, Walter Margulis, who is responsible for the research programme. All three persons in the management group participate at the board meetings. There is further an international advisory board with three university professors from Canada, UK and Spain. They have met once during 2008.

The organizational structure is logical and the responsibilities clear. Åsa Claesson has a very enthusiastic and professional approach to the leadership of the Centre, give a very good impression and seems to be very successful. The management seems to be very open for learning from earlier experiences and is planning specific actions in coming years in order to overcome earlier weak points.

AFOC has during 2008 had 20 industrial partners from different industrial sectors, representing resource providers, product owners and product users. One new partner entered the Centre in 2008 and three more companies have recently become new partners. Two of the partner companies will not continue in the Centre during the second phase. The Centre has a generic research programme, open for all partners, and an applied programme, where applied projects are performed together with one or more companies. There are four main projects and six sub-projects in the generic programme. The applied programme is divided into four areas, each with two to three projects and one or more participating companies. The Centre is trying to increase the interaction and learning process between the industrial partners by running the generic programme, creating interest groups, arranging partner days, partner workshops, giving economic support to applied projects with two or more companies. These are excellent initiatives but more interaction can always be developed through new initiatives. We strongly support the plan to approach more SMEs in a systematic way.

The identity of the Fiber Optic Centre within Acreo has been strengthened since the first evaluation. An own logo has been produced which still is closely related to the logo of Acreo. For practical reasons, the web site is closely integrated to that of Acreo. A partner specific "log in" has been implemented. A lot of activities have been performed in order to increase

the “Centre feeling”. We would like to encourage the Centre board and management to continue to strengthen the identity of AFOC.

The Centre has established cooperation with four academic partner groups at KTH, MiUn and KI. There are further some supporting partners of which SP, the Technical Research Institute of Sweden, is one. PhD students have contributed with four person-years to the Centre during 2008. Contacts with academia and research institutes are also established through the international advisory board, other international research contacts and through EU-projects. There are ongoing discussions with UU who might become a partner in the future. We would like to encourage the Centre to further develop the external cooperation with universities, institutes and knowledge centres with relevant skills of importance for the research in AFOC.

The Centre has adapted the quality assurance system in use at Acreo (ISO 9001). This was a recommendation in March 2008. A customer satisfaction index has been produced and the input from the questions asked to the customers about the Centre performance is used to improve the quality assessment at AFOC.

AFOC has been successful in extending the economic resources of the Centre through EU-funded projects, regional support and money from other sources. In total an additional funding of 6.5 M SEK has been reported. They have also filed two patents during 2008 and more applications are expected in the near future. The IPR is regulated in the Centre contract and the policy seems to work. Acreo has recently started a spin-off company, Fibertronix AB, which emanates from the Centre activities.

It was stated by the institute management that the Centre has been of great importance to the institute and that it has contributed to a new way of working which will be implemented and used also by other parts of Acreo. Swedish ICT Research, the mother company of Acreo, has decided that they will secure the continued operation of AFOC after the six years of IEC-funding, provided it continues to be of industrial interest.

In response to the recommendations made at the first evaluation in March 2008 a number of improvements have definitely already been made regarding more senior researchers, increased identity and external cooperation, quality assessment, interaction and learning between companies.

2.8.5 Conclusions and Recommendations

AFOC has developed in a very positive way and is already now a very good example of a well functioning IEC which fulfills most of the requirements

of the financing agencies. The Centre has a well structured research programme which is of great industrial relevance and which is actively supported by industry. However, we will submit the following recommendations in order to further increase the Centre performance:

- The Centre should continue to develop mechanisms and processes to increase technology transfer between all participating partners. The plan to widen the collaboration with SMEs is encouraged.
- To reach the top international level the activities may have to be focused further.
- The Centre should take further action to increase the mobility of people between the Centre and industry.
- We are encouraging the Centre board and management to continue to strengthen the identity of AFOC. The relationship of the Centre to the fibre-optic department of ACREO could be described more clearly in future reports.
- The international visibility and cooperation should be increased through international industrial collaboration and participation in EU-funded projects. The Centre should take a more pro-active role in setting up such collaborations.
- The Centre should encourage more publications in application-oriented journals and presentations at conferences.
- The management and the Board need to think about the compatibility, especially in IPR terms, of a collective research approach and a participation in international research collaborations.
- It is very positive that AFOC is pushing the fibre technology into new application areas, and we recommend that especially the area of minimally invasive technologies is strengthened.
- The Centre's future beyond the IEC funding must be planned in more detail over the coming years. A clear strategy, plans with clear objectives and economic predictions on how to reach long term viability should be developed.

Hudiksvall 2009-09-26



Kaj Mårtensson



Roel Baets



Heikki Kleemola



Anders Bjarklev

Appendix A

Guidelines for the midterm evaluation of Institute Excellence Centres

Background

Purpose and organization of Centres

The aim of the Institute Excellence Centres (IEC) programme is to create environments for research, development and innovation of internationally competitive standing within areas of great importance to the future competitiveness and growth of Sweden, managed by research institutes in collaboration with universities and industry.

The IEC programme is to run for up to 6 years supported by VINNOVA, The Knowledge Foundation (KK- stiftelsen) and the Swedish Foundation for Strategic Research (SSF). The Centres are funded in two stages: for 3 years based on the initial application and for an additional 3 years based on a renewed application and the midterm evaluation. The partners of a Centre are industrial companies and research institutions supported by a University/Institute of Technology. The parties contribute jointly to the research programme of the centre, financially, and usually also in the form of active work. Collaboration and financing are further described in a Model Agreement for Institute Excellence Centres.

Expected results

The expected results and effects at the end of the IEC programme in 2012 are that the programme has substantially contributed to the status of the research institutes by creating:

- Environments that contribute to the profiling of the research institutes and their long-term development
- Internationally competitive environments for research, development and innovation within focused areas
- Attractive environments for top international researchers from industry and academy
- Environments supporting the international competitiveness of the participating industry partners
- Agents of change in industry and society through new knowledge and competence that leads to new products, processes and services
- An increased number of important R&D missions from leading Swedish and international companies and other funders

- Efficient utilization of available resources in terms of research and researchers
- Increased mobility between industry, institutes and universities
- Increased Swedish participation in international R&D programmes, in particular within the EU
- Adaptation and packaging of research results and their dissemination together with other strategic knowledge, in particular to smaller and medium-sized enterprises.

Strategy

General strategies to reach the objectives include

- Initiation and development of joint research projects between institutes, universities and industry
- Concentrated efforts in cooperation with universities to attract more R&D-projects from leading Swedish and international companies and other funding organisations
- Active promotion of competence and education
- Development of meeting places for creative collaboration between companies of all sizes and researchers at institutes and universities
- Creation of environments supportive of the development of high technology companies and start-up of new companies.

Evaluations of IEC

Purpose

A first evaluation was carried out within 16 months after Centre start up. Its primary purpose was assessment of the ways the Centre organisation and performance of the research programme in a Centre format had been established. Thus, the objectives of the first evaluation were to serve as a reference for forthcoming evaluation(s) and to comment and counsel the Centres on their performance.

This midterm evaluation will include also assessment by scientific expertise, and will take place during year 3, before stage 2.

Each of the eight centres will be evaluated by two persons that look on a specific centre from a scientific point of view and two persons that look upon all of the eight centres from a general point of view (i.e. long term strategy and focus, build-up of a concentrated research environment as well as leadership and management).

The main focus of the evaluation is to form an opinion of the approach and measures taken so far by each Centre and to assess the potential for its long-term development towards a successful IEC.

The Scientific experts will pay special attention to the following criteria:

- 1 Quality and focus of the proposed research programme
- 2 Competence of the participating research parties
- 3 The degree of renewal of the centre's research
- 4 Realism and credibility with regard to the organization, strategy and implementation plans of the proposal
- 5 The outlook for the development into a centre with leading international competence within its area

Organisation

The composition of the evaluation team is decided by VINNOVA, KK-stiftelsen and SSF. The team itself decides on the distribution of work among its members.

The evaluation will take place in the form of on-site hearings – discussions at each Centre. During these the evaluators should meet with the following parties:

- The Centre Director
- The Chairman of the Centre Board
- Representatives from participating companies and University
- Researchers active within the centre, including PhD students (if any)
- Representative of the hosting institute

KK, SSF and VINNOVA staff will be present at the site visits. They will not take active part in the evaluation, but can add information during the work sessions.

Basic documentation on each Centre and its new application will be distributed to the members of the evaluation team prior to the evaluation.

Report

The team of reviewers will, for each Centre, write a qualitative report of approximately 4-6 pages. The report will be written jointly by the team and the team has to be unanimous in its conclusions. A draft version of the report will be written immediately after the evaluation has taken place. Before distribution of the final report, it will be sent for checking of factual errors to each Centre.

Although the individual Centres are the main elements to be evaluated, it is desirable that the evaluators also comment on the concept, as well as on structural and other general aspects of the IEC venture as a whole, including possible recommendations to VINNOVA, KK-stiftelsen and SSF.

The report will be delivered to VINNOVA, KK-stiftelsen and SSF. It will also be openly circulated to all Centres and, on request, to any other agencies or person who have expressed an interest in this type of information.

Appendix B

Evaluation programme

November 2008	Invitations sent out to the scientific experts
December	Information regarding the required reporting for the evaluation sent to Centre Leaders
May 30, 2009	Status reports from centres delivered to VINNOVA
June	Evaluation Guidelines and status reports from centres delivered to the Evaluators
August 24	Interviews on FOCUS in Linköping
August 25	Interviews on EcoBuild in Stockholm
August 26	Interviews on CNS in Stockholm
August 27	Interviews on PRISMA in Luleå
August 28	Work session for the “Generalist” team
August 31	Interviews on CIC in Jönköping
September 1	Interviews on CODIREKT in Stockholm
September 2	Interviews on IMAGIC in Stockholm
September 3	Interviews on AFOC in Hudiksvall
September 4	Work session for the “Generalist” team
September 13	Final draft from the evaluation team sent to VINNOVA
September 14	Final draft sent to the centre leaders for comments on facts
September 17	Dead-line for comments from centre leaders
October	Final report ready for distribution

On the evening before each interview session the evaluators were gathered for a briefing about the background of the programme and the evaluation process.

Appendix C

The Evaluation Team

Kaj Mårtensson, Dr, Consultant, Sweden

Heikki Kleemola, Dr, Consultant, Finland

Tim Ashley, Professor, QinetiQ, UK

Ragnhild Aune, Professor, Norwegian University of Science and Technology

Roel Baets, Professor, Ghent University, Belgium

Anders Bjarklev, Professor, Technical University of Denmark

John Campbell, Professor, Campbell Technology, UK

Uzi Efron, Professor, Ben-Gurion University, Israel

James Ferryman, Dr, University of Reading, UK

Hugh Griffiths, Professor, University College London

Stephen Hailes, Professor, University College London

Salme Koskimies, Dr, Technical Research Centre of Finland

Helmuth Möhwald, Professor, Max Planck Institute, Germany

Craig Partridge, Dr, BBN Technologies, USA

John Ralston, Professor, University of South Australia

Veena Sahajwalla, Professor, University of New South Wales, Australia

Doru M. Stefanescu, Professor, Ohio State University, USA

Joris Van Acker, Professor, Ghent University, Belgium

Appendix D

List of participants at the interviews

FOCUS: Participation during the interviews

Centre Representatives

Hans Frennberg	Centre Director, FOI
Prof. Staffan Rudner	Deputy Centre Director, FOI and CTH
Jörgen Ahlberg	FOI
Prof. Martin Holmberg	FOI and LiU
Per Grahn	FOI
David Lindgren	FOI and LiU
Anders Nelander	FOI
Henrik Petersson	FOI
Martin Rantzer	FOI
Jan Svedin	FOI
Niclas Wadströmer	FOI
Prof. Fredrik Gustafsson	LiU
Jing Dong	Acquris
Stellan Jacobsson	Food Radar
Sverker Larsson	Saab AB
Tony Pellikka	Omnisys
Amritpal Singh	Saab Bofors Dynamics
Stefan Steier	Consilium
Martin Kores	Omnisys

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Olof Lindgren	Swedish Foundation for Strategic Research (SSF)
Bengt Johansson	VINNOVA

EcoBuild: Participation during the interviews

Centre Representatives

Magnus Wålinder	Centre Director
Mats Westin	Deputy Centre Director
Per-Erik Petersson	CTO, SP
Finn Englund	SP Trätek
Emma Östmark	PhD, SP and KTH
Prof. Eva Malmström	KTH
Petra Nordqvist	KTH
Peter Herder	Casco Adhesives
Hans Thulin	Chairman of the EcoBuild board, Tanumsfönster

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CNS: Participation during the interviews

Centre Representatives

Bengt Ahlgren	Centre Director
Staffan Truvé	President, SICS
Björn Grönvall	SICS
Maria Holm	SICS
Sverker Jansson	SICS
Janusz Launberg	SICS
Björn Levin	SICS
Martin Nilsson	SICS
Thiemo Voigt	SICS
Prof. Rolf Stadler	KTH
Tallat Shafaat	PhD student, KTH
Jan-Erik Frey	ABB
Olle Viktorsson	Chairman of the CNS board, Ericsson
Ronny Engelin	T2Data

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PRISMA: Participation during the interviews

Centre Representatives

Jan-Olov Wikström

Christer Ryman

Marianne Östman

Prof. Bo Björkman

Samuel Nordgren

Mats Hallin

Anita Wedholm

Centre Director

Deputy centre director

Swerea MEFOS

LUH

PhD student, LUH

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Swedish Foundation for Strategic

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VINNOVA

CIC: Participation during the interviews

Centre Representatives

Rikard Källbom	Centre Director
Stefan Gustafsson Ledell	Deputy Centre Director
Mats Holmgren	President, Swerea SWECAST
Prof. Ingvar L Svensson	Center Scientific Leader, JTH
Peter Olsson	Managing Director, JTH
Christer Davidsson	Chairman of the CIC board, Volvo
Sune Jansson	Arvika Gjuteri

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Bengt Johansson	VINNOVA

CODIRECT: Participation during the interviews

Centre Representatives

Ulla Elofsson	Centre Director
Mikael Kjellin	Acting Deputy Centre Director
Peter Alberius	President, YKI
Anna Fureby	YKI
Prof. Per Claesson	KTH
Lisa Skedung	PhD student, KTH and YKI
Prof. Lennart Bergström	SU
Martin Andersson	PhD student, SU
Magnus Linsten	Chairman of the CODIRECT board, Akzo Nobel
Michael Wahlberg	GEA Niro

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IMAGIC: Participation during the interviews

Centre Representatives

Jan Andersson	Centre Director
Susan Savage	Deputy Centre Director
Mårten Armgarth	ACREO
Leif Bergström	Chairman of the board, ACREO
Lisa Höglund	ACREO
Prof. Gunnar Landgren	KTH
Oscar Gustafsson	PhD student, KTH
Torbjörn Carlén	FLIR Systems AB
Jan-Erik Källhammer,	Autoliv

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AFOC: Participation during the interviews

Centre Representatives

Åsa Claesson	Centre Director
Walter Margulis	Acreo, Center Scientific Leader
Mårten Armgarth	ACREO
Aziza Sudirman	PhD student, Acreo and KTH
Prof. Hans-Erik Nilsson	MiUn
Gunnar Edwall	Member of the board

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Appendix E

List of acronyms

AFOC:	Acreo Fiber Optic Center
CIC:	Casting Innovation Centre
CNS:	Centre for Networked Systems
CODIRECT:	Controlled Delivery and Release
CTH:	Chalmers university of technology
EcoBUILD:	Centre for eco-efficient and durable wood-based materials and products
FOCUS:	FOI Centre for Advanced Sensors, Multisensors and Sensor Networks
IMAGIC:	IMAGIng Integrated Components
JTH:	School of Engineering, Jönköping University
KTH:	Royal Institute of Technology
LTU:	Luleå University of Technology
MdH:	Mälardalen University
MiUn:	Mid Sweden University
LiU:	Linköping University
PRISMA:	Center for Process Integration in Steelmaking
VINNOVA:	Swedish Governmental Agency for Innovation Systems

VINNOVA's publications

October 2009

See www.VINNOVA.se for more information

VINNOVA Analysis VA 2009:

- 01 Svenska tekniker 1620 - 1920
- 02 Effekter av statligt stöd till fordonsforskning - Betydelsen av forskning och förnyelse för den svenska fordonsindustrins konkurrenskraft. *For brief version in Swedish and English see VA 2009:11 and VA 2009:12*
- 03 Evaluation of SIBED. Sweden - Israei test bed program for IT applications. *Only available as PDF*
- 04 Swedish possibilities within Tissue Engineering and Regenerative Medicine
- 05 Sverige och FP7 - Rapportering av det svenska deltagandet i EUs sjunde ramprogram för forskning och teknisk utveckling. *Only available as PDF*
- 06 Hetast på marknaden - Solenergi kan bli en av världens största industrier
- 07 Var ligger horisonten? - Stor potential men stora utmaningar för vägkraften
- 08 Vindkraften tar fart - En strukturell revolution?
- 09 Mer raffinerade produkter - Vedbaserade bioraffinaderier höjer kilovärdet på trädet
- 10 Förnybara energikällor - Hela elmarknaden i förändring
- 11 Sammanfattning - Effekter av statligt stöd till fordonsforskning. *Brief version of VA 2009:02, for brief version in English see VA 2009:12*
- 12 Summary - Impact of Government Support to Automotive Research. *Brief version in English of VA 2009:02, for brief version in Swedish see VA 2009:11*
- 13 Singapore - Aiming to create the Biopolis of Asia
- 14 Fight the Crisis with Research and Innovation? Additional public investment in research and innovation for sustainable recovery from the crisis.
- 15 Life Science Research and Development in the United States of America - An overview from the federal perspective. *Only available as PDF*
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Production: VINNOVA's Communication Division
Printed by: Arkitektkopia, Stockholm, www.arkitektkopia.se
October 2009
Sold by: Fritzes Offentliga Publikationer, www.fritzes.se



VINNOVA's mission is to promote sustainable growth
by funding needs-driven research
and developing effective innovation systems

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