

Notat

**Receiver(s): Denmark's Minister for Science, Technology and Innovation**

### **Annual report 2011 and mid-term evaluation from the UNIK Expert Panel**

The international UNIK Expert Panel reports annually to the Danish minister of science, technology and innovation on the progress of the granted UNIKs. In 2011, the annual report also constitutes the mid-term evaluation as foreseen in the performance description of the UNIK initiative.

#### ***Background***

Currently there are four UNIKs running, all of which were funded in 2009. The annual report 2011 is the second report from the panel to the minister on the progress of the UNIKs. The report is based on the annual reports on progress of research 2010 from the UNIKs and site visits to the UNIKs in May 2011.

The four UNIKs:

- *CASE - Catalysis for Sustainable Energy* at the Technical University of Denmark.
- *MINDLab* at Aarhus University
- *Synthetic Biology* at University of Copenhagen
- *Food, Fitness and Pharma* for Health and Disease at University of Copenhagen

The universities have received approx. DKK 120 million for each of the UNIKs (including a 44 percent overhead) to cover a five-year period of funding.

The four UNIKs were chosen by the former minister from a total of 28 proposals from the Danish universities who were each invited to submit a limited number of applications. The minister's decision was based on an evaluation and ranking of the proposals carried out by the international UNIK Expert Panel.

#### ***Plans for evaluation and final embedment***

Every year, the UNIKs provide a cost statement and a brief progress report in writing. In addition to the progress report, the UNIK Expert Panel carries out annual site visits at the UNIKs. The Danish Agency for Science, Technology and Innovation (DASTI) holds the legal responsibility for supervising the correct use of the funding. DASTI's supervision is based upon the cost statements, the progress reports and the site visits by the UNIK Expert Panel.

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It is stated in the funding agreements between DASTI and the beneficiary universities that the initiative shall be subject to a mid-term evaluation in 2011 and a final evaluation in 2013 or 2014. DASTI shall carry out the evaluations.

The mid-term evaluation is also mentioned in the performance description of the UNIK initiative. The following is stated:

*"The target audience of the mid-term evaluation is primarily the universities themselves. It is a requirement that the successful parts of the UNIK must be embedded in the university's ordinary activities. Therefore, the mid-term evaluation will as a key element point to the level of success in the different elements of the UNIK. Secondly, the mid-term evaluation may be used by DASTI and the Danish parliament in relation to possible adjustments of the UNIK initiative in case the initiative will be continued". [Translation from Danish]*

At present, there are no political plans to continue the UNIK initiative with new investments. Therefore, the mid-term evaluation is aimed primarily at the universities themselves.

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On the issue of embedment, the following is stated in section 5 in the general agreements on funding between the receivers of the grant (the universities) and DASTI:

*"After the end of the funding period, the Applicant is expected to be responsible for ensuring that "the successful parts" of the initiative are embedded in the university's activities and ordinary budget. In the proposal (Appendices 2 and 4), the Applicant has stated any plans for such embedment. It is expected that these plans will be specified year by year in the annual reports.*

*Generally, "the successful parts" are expected to comprise all parts of the initiative. This means that only failed or pointless activities are not expected to be carried out.*

*The final report must include a reasoned account of the identification of the parts assessed to be unsuccessful and accordingly not planned to be carried out. The planned mid-term evaluation will be able to contribute to this identification".*

### **Conclusions and general comments on the UNIK initiative**

Specific comments to the individual UNIKs are stated in separate sections. In this chapter, the panel wishes to address key issues that are general to the UNIK initiative and to all four UNIKs.

All four UNIKs are progressing well. The panel has raised a few minor concerns with all four UNIKs, but all have good structures, dedicated management and have begun a process that will hopefully ensure embedment after the duration of the funding period. The UNIK initiative has provided the opportunity to bring internationally strong teams of researchers together.

### *Science*

The site visits in 2011 suggest that the UNIK grant has allowed the beneficiaries to address questions they would otherwise not have been able to, in part due to their cross-disciplinary character. Also, by integrating different disciplines within one organisational model, the UNIK grant has helped to break down barriers to intra-university cooperation and has established vital networks for researchers.

Common to all UNIKs is that there can be no expectations of great scientific breakthroughs and an increased publication rate as a direct result of the UNIK grant at such an early point in the process. All four UNIKs have already publicised results, but as all UNIKs partly build upon the already existing research excellence of senior researchers, it is difficult to say whether current publications are mainly a result of the UNIK grant or of previous performance. The panel expects the UNIKs to show increased research output as time progresses as a result of the grant. The panel is increasingly interested in evidence of the the difference made by the UNIK grant. Therefore, research output will be a point of attention for future site visits.

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Regarding international cooperation, the panel expects to see increasingly enhanced activity in the years to come. The UNIK grant should provide the possibility for larger international collaboration because of the big investment and cross-disciplinary approach. As research results are produced, these will help to open the doors to the UNIKs to new international partners, both within public research institutions and industry.

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### *Organisation*

The UNIKs have served as an inspiration and a laboratory for cross-disciplinary collaborations at the universities. In this respect, the site visits in 2011 gave a clear impression that the UNIK initiative has had an effect on the culture and organisation of the universities and provided an inspiration for new forms of organisation with a focus on cross-disciplinary cooperation.

### *Embedment*

Concerning embedment, there are already good signs in all four UNIKs, e.g. in the established infrastructures and the recruitment of new researchers. Furthermore, UNIK has been successful as strong research teams are now established who can apply for external funds. Nevertheless, embedment plans in all the UNIKs lack some detail. As it is still a very early stage in the process, the panel finds this understandable to some degree. However the site visits in 2011 suggest that there is a need to raise awareness of the universities obligations to embed the UNIKs after the funding period and for each university to specify the plans and the process further.

Therefore, the universities' plans for embedment will be of increasing concern to the UNIK panel. As it is stated in the general funding agreement: *“After the end of the funding period, the Applicant is expected to be responsible for ensuring that “the successful parts” of the initiative are embedded in the university’s activities and ordinary budget.”*

It is further stated in the funding agreement that “the successful parts” are generally expected to comprise all parts of the initiative. Only failed or pointless activities are not expected to be carried out. How will the university point out these failed activities?

The panel encourages the UNIKs and the universities to begin the development of an embedment process and the establishment of internal evaluation criteria. The panel will raise the question of embedment in coming site visits with increased concern and will expect to see more detailed plans as the funding period progresses.

### *Mid-term evaluation of CASE*

The overall impression of CASE is that it is professional and well managed. This year’s site visit confirmed the conclusions from last year, that CASE could very well constitute a role model for UNIKs both in terms of organisation and research results. There are no major concerns regarding CASE. However, the question of embedment and continuation of CASE after the UNIK grant runs out will be a point of attention in the coming years.

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### *Science*

Research is strong and impressive, consisting of four pathways, six projects and 18 milestones. CASE would probably have a good position in an international benchmark although the field is big and global competition is strong. The group of PhDs and postdocs showed excellent results in particular.

CASE has generated a number of peer-reviewed publications and pipeline papers. Many are truly cross-disciplinary and there is a fine representation of highly ranked journals.

The aim of CASE is to undertake basic but applicable research:

- Improve our understanding of catalytic reactions involved in producing solar fuels
- Use the insight to develop rules of catalyst design
- Design cheap, efficient and stable catalysts

### *Organisation*

CASE has a matrix and project organisation permeated by cross-disciplinary collaboration and thinking at all levels including at student level. The interviews with researchers revealed that everybody knew how their particular part fitted into the larger picture of the UNIK. Although CASE research is highly cross-disciplinary it is all, however, within the field of technical science whereas other UNIKs try to build bridges between very different fields of science such as medicine and humanities. CASE is far more cross-disciplinary than most competing international groups and the CASE-model has now been adopted by the energy department at DTU.

CASE has not already allocated the entire UNIK grant to projects, which leaves room for the management to influence the direction of the UNIK. The funding process of CASE is divided in two steps - each covering a PhD period of three years.

CASE has substantial international collaboration, especially with Stanford. Jens K. Nørskov's move to Stanford, taking young researchers with him, has turned into a win-win situation for the UNIK as he remains involved with CASE.

The panel believes that CASE is highly relevant to industry. According to CASE, students from CASE are attractive to industry, and many companies, including large multinationals, are interested in the research carried out by CASE. As regard to scientific outreach, CASE is a good role model. On the basis of the CASE research, a school book was published introducing "energy" to students in the 8<sup>th</sup> and 9<sup>th</sup> grade.

#### *Embedment*

There are plans for eight new faculty positions, and so far three associate professors have been hired and one professorship and one associate professorship are advertised. Moreover, new computer server rooms and new laboratory facilities for (photo-) electro-chemical and catalyst testing has been established.

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During the site visit, it seemed that CASE receives strong support from the university management. Nonetheless, the message from CASE was that without further external funding beyond the UNIK grant it will be very difficult for CASE to survive in its present form and maintain the CASE brand. The panel finds that the site visit 2011 gives rise to some concern, considering the obligations of the university to embed all succesful parts of CASE in the activities and ordinary budget of the university.

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#### *Mid-term evaluation of MINDLab*

The general impression was one of significant progress since last years visit. The research activities have shown good results and the staff and leaders of *MIND-Lab* have shown good skills in disseminating and communicating their results both to academia and the wider public. Plans for embedment are still not detailed and the issue will therefore be a point of attention at future site visits. Even so, the grass-roots dedication to cross-disciplinarity from researchers, the development of an international reputation – among the wider public as well as among scientists – bode well for the continuation of the UNIK after 2014.

#### *Science*

*MINDLab* only began last year, but already new appointments are well integrated. The management gives emphasis to cross-disciplinarity in the selection of research projects and in the composition of research teams. The UNIK has strong international cooperation e.g. with partners in University of California Santa Barbara and in Canada. Researchers have successfully published in highly esteemed journals and have been successful in attracting additional external funding.

Research is organised in five streams:

- Integrative Neuroscience
- Cognition, Language and Music
- Cognition and Memory

- Cognition and Culture
- New Neuroimaging Methods

MINDLab addresses scientific problems within culture, music, language and memory. It combines this knowledge with research on novel technologies to examine the living brain, and on the most devastating neurological and psychiatric disorders. The aim is to create new means to preserve and recover function and quality-of-life in relation to diseases.

#### *Organisation*

There have been substantial changes in the organisation of MindLab where responsibility has shifted back to principal investigators and the different faculties. While the panel was impressed with the cross-disciplinary projects presented at the site visit, there is a risk that this recent organisational change may jeopardize future synergies. The UNIK budget has been split up in five “streams”, possibly affecting the overall strategy of the UNIK as the significance of the common board decreases. It is a concern whether this new organisation leaves sufficient room for an integrated management of the UNIK.

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Regarding the change in the organisation the site visit gave the impression that there is close cooperation between the head of the UNIK and the deans and that grass-roots dedication to the cross-disciplinary approach of the researchers is strong. Moreover, according to MINDLab, cross-faculty collaborations such as the UNIK served as an inspiration to the recent restructuring of Aarhus University where the cross-disciplinary approach has been central.

#### *Embedment*

It is unclear at this point how MINDLab will be embedded in the university. Researchers at MINDLab are well integrated in faculties, but if no further funding beyond the UNIK grant is received, there will be some casualties. Aarhus University has a substantial strategic fund to which MINDLab can apply. The head of the UNIK is aware that a close relationship with industry is necessary, both in terms of outreach and as a way to increase chances of future external funding for e.g. infrastructure. Furthermore, patents are a focal point for MINDLab in the process of finding an interface between academia and industry.

#### ***Mid-term evaluation of Synthetic Biology***

The general opinion of the panel was that the site visit was far better organised this year compared to last year. Furthermore, Synthetic Biology has handled the issues raised at last year’s visit satisfactorily, e.g. the ethical issues and the risks of a relatively narrow research focus. The UNIK appears to be progressing well. It is still early in the process and major breakthroughs in science cannot be expected at this point. That being said, the panel finds that research is clearly very promising.

#### *Science*

Synthetic Biology contains several potentially groundbreaking ideas and a high level of research excellence. The UNIK addresses a “hot” research topic which

presents many opportunities, but also high risk. At an international level, many research groups are struggling to be in the lead.

Synthetic Biology has extensive international collaboration. An international workshop is being co-organised with University of California at Berkeley in August 2011. Industry contacts are not that pronounced yet, which is to be expected at this early stage. The panel finds that if industry relations can be advanced at a later stage, it will be a very positive development.

A concern last year was that the projects were overly-focused, in the sense that there are no alternatives if the focus of the research is proven to be wrong. The impression given from the second site visit is that Synthetic Biology has expanded its research focus. Moreover, the current management supports a more flexible approach to the research focus that enables the groups to seek and explore their success.

#### *Organisation*

The anticipated change in the management of the UNIK was a matter of concern after the last site visit. This year's site visit proved that the current management is highly capable and has contributed positively to the enthusiasm and professionalism which is clearly present in Synthetic Biology.

There is a vast cross-disciplinary collaboration and collaboration among faculties within the university, which seem to drive the research forward. There are clearly new synergies emerging across different fields of research, and this appears to be highly motivating and educational for all parties, not least for the PhD students.

The implied ethical issues regarding Synthetic Biology has been discussed within the UNIK. Although the ethical issues are not fully resolved, it is reassuring that the matter is being addressed in a timely and professional manner.

#### *Embedment*

Regarding embedment Synthetic Biology has already secured significant external funding and will train a large number of highly qualified researchers. Furthermore, the UNIK is home to important research infrastructure and a university building for a Plant Science Centre at LIFE is envisaged. The UNIK has succeeded with four recent international recruitments, which will support the embedment of the UNIK.

Nevertheless, how the University of Copenhagen intends to continue with identified successful elements from Synthetic Biology after 2014 is still unclear. The University of Copenhagen is currently working on its new strategy and it has been indicated that the UNIK embedment is a part of the coming strategy. Embedment should be a focus point on the agenda for next year's site visit.

#### ***Mid-term evaluation of Food, Fitness and Pharma***

The overall impression is of a well-functioning and successful UNIK with an enthusiastic spirit. Food, Fitness and Pharma is perhaps the broadest or the most complex of the four UNIKs but handles this complexity well.

### *Science*

The site visit revealed interesting and potential research projects and researchers estimated that the UNIK possesses an international competitive advantage because of e.g. new infrastructure, unique cohorts and cross-disciplinary projects. Research has already resulted in several publications in highly esteemed journals. However, comprehensive research results are not expected at this point. Later on the UNIK should be able to present increased publication and major breakthroughs.

The UNIK grant has contributed to financing of four core facilities and 29 projects in total within four streams of research:

- Food, Gut Hormones and Pharma (12 Research Projects)
- Social Sciences and Humanities (5 Research Projects)
- Fitness and Muscles (9 Research Projects)
- Genetics and Epidemiology (3 Research Projects)

Food, Fitness and Pharma aims to identify and understand the interrelated environmental, genetic and epigenetic causes of obesity, diabetes and associated lifestyle diseases. The ambition is to develop new means for preventing and curing these conditions including better, health-promoting food; optimal fitness programmes and recommendations; novel and efficient regimens for changing people's lifestyle; and new and better pharmaceuticals. This ambition is pursued using a cross disciplinary-approach.

The UNIK experiments with co-publications between researchers from social science and humanities and researchers from health science. The UNIK panel strongly encouraged continuation of this work, as the UNIK apparently is breaking new ground here. Different traditions and patterns of publications between the scientific disciplines entail certain challenges to co-publications across disciplines.

Food, Fitness and Pharma encompasses already highly profiled research fields at the University of Copenhagen. The added value of the UNIK grant appears to be mainly funding of core facilities that would not have been there without the UNIK grant and creating networks amongst researchers. Although the merger in 2007, whereby the Royal Veterinary and Agricultural University was merged into the University of Copenhagen, was a prerequisite for winning the grant, the UNIK plays an important role in bringing the parts together. Furthermore, the focus on developing a cross-disciplinary approach makes a unique contribution to the culture of the university.

Last year, the panel was concerned that the entire grant was distributed already from the outset of the UNIK. This year, the site visit suggested that the management is handling this in a very reassuring manner. There appears to be sufficient trust in the principal investigators to allow for changes or redirections of the research projects over time if paths show not to be fruitful.



### *Organisation*

Although the grant has financed 29 separate research projects, the UNIK has managed to create a culture of cooperation within and between disciplines.

Food, Fitness and Pharma has experienced that a project of the size and complexity of a UNIK requires a professional administration. Therefore, administration and management has been strengthened since last year and with good results. There is support amongst researchers for the relatively high level of administration, since it has made new successful initiatives like the Young Investigators Network possible.

The UNIK has not established PhD schools or MA programmes to sustain the cross-disciplinary field of research. However, the young investigators networks have proved very successful in creating both a sense of belonging and good connections between the many young researchers affiliated with the UNIK.

According to Food, Fitness and Pharma, the UNIK has good relations with industry, e.g. the pharmaceutical industry in Denmark. Food, Fitness and Pharma has also engaged in outreach activities aimed at potential future students. Nevertheless, the panel finds that outreach activities could be enhanced, for example with inspiration from CASE.

The researchers have good international relations and the UNIK has close connections to the German research centre IFB based in Leipzig (Integriertes Forschungs- und Behandlungszentrum AdipositasErkrankungen Leipzig). The centre has a similar research profile as Food, Fitness and Pharma. IFB supports the strategic plan of Food, Fitness and Pharma of lobbying for obesity to be integrated into the future EU framework programme for science and innovation “Horizon 2020”. Also in terms of embedment, this would be a vital step for Food, Fitness and Pharma and therefore a point of attention.

One concern is the low level of PhDs in the social science fields. Whereas many young researchers in the ‘wet science field’ contribute to a vibrant research environment and sustainability, there are only few PhDs involved in the UNIK within the social sciences. The lacking development of future generations of researchers within these fields constitute a problem for the sustainability of the research field and the UNIK as such. Therefore, the panel encourages the UNIK to involve more PhDs in the social science fields.

### *Embedment*

Food Fitness and Pharma presents their plans for embedment along two lines or platforms:

1. Buildings, core-facilities, equipment and grants for research
2. Culture and management

The overall objective of the UNIK is that research in obesity and metabolic diseases continues to be a ‘flagship’ at the University of Copenhagen. The fulfilment of this objective demands an embedment of the UNIK into the university.

The panel finds that there are many positive signs in this regard. Investments in core facilities make a good foundation for future development. The UNIK is intertwined with many other centres and activities at the University of Copenhagen. There are also signs that the vibrant cross-disciplinary culture of Food, Fitness and Pharma can have a positive impact on the general university culture. Nevertheless, future site visits should reveal more detailed plans for embedment and specify the embedment of research not only in the Faculty of Health Sciences but also in other involved faculties.

*The UNIK Expert Panel:*

- *Rector, professor Jarle Aarbakke (chairperson), Norway*
- *Professor Geoffrey Channon, UK*
- *Professor Emeritus Helga Haftendorn, Germany*
- *Professor Lennart Hjalmarsson, Sweden*
- *Professor Olli Ikkala, Finland*
- *Professor Martin J. Kropff, The Netherlands*
- *Professor Bart de Moor, Belgium*
- *Professor Pär Omling, Sweden*
- *President, professor Harriet Wallberg-Henriksson, Sweden*

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