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Selling Maps of Uncharted Territory Innovation in Research Organisation

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RESEARCH ORGANISATION – CONCEPTUAL AND THEORETICAL ASPECTS

Networks and centres have become increasingly fashionable in research organisation during the last decades. Consequently, science and technology studies have begun analysing the forces behind this development, its consequences and the characteristic details of these organisational models (Etzkowitz & Leydesdorff 1997, Gibbons et al 1994, Ziman 1994).

One important aspect of networks and centres seems to be their inter- or multidisciplinary nature. An objective with organising research in these forms is to transcend disciplinary boundaries, with the aim of producing broader and more comprehensive knowledge about nature. Another aspect is the tendency for networks and centres to aim for goal-oriented research. In networks and centres scientists often work towards solving a defined problem or explore a specific area. The combination of several competencies within the same organisation working on a common task is attractive to financiers of research in the present politico-economic climate (Slaughter & Leslie 1997). The organisational changes thus reflect a move towards accountability, collectivisation and managerial structuration of the research process, with the ultimate target to increase the cost efficiency, goal orientation and transparency of the research process. Hence, the interest in these new organisational forms comes mainly from research funding agencies and other public and non-public organisation wanting to enhance the predictability of the research process and increase the "value for money" in research funding.

Several scholars have linked the emergence of networks and centres with an increasing influence of market forces on science funding and policy. These authors view the increase in collaborative and goal-oriented organisational patterns in science as a shift towards research that is responsive to demands for 'useful' knowledge on behalf of market actors (Ziman 1994). The phenomenon is thought to mark a shift from a traditional system in which the work of scien-

tists was curiosity-driven and pursued without any considerations for the possible use of knowledge to a situation in which research questions get pursued if their solution bears promise of being useful. Nevertheless, several STS scholars have demonstrated that usefulness and the needs of financiers have been relevant for as long as modern science has been a distinguishable activity (Cf. Latour 1988, Star 1989).

Another way of viewing increasing inter- and multidisciplinary organising in the forms of networks and centres is to understand this development as a move to counter an ever-increasing specialisation which creates more and more barriers for communication between specialised fields in the scientific community. This is often the rationale which scientists present when they argue for the creation of new centers (Ziman 1994, Wallén 1993). Thus, while it seems clear that the reforms of research organisation stem from the attempts of increasing the predictability and accountability of research, there is also a trade-off for the researchers involved (apart from the large sums of money involved in the creation of centers and networks).

The primary aim of this report is to discuss the formation of particular scientific network and centres from the perspective of the researchers/applicants within the Swedish-American Diabetes Research Programme. This initiative is jointly funded by the Knut and Alice Wallenberg Foundation (KAW) and the Juvenile Diabetes Foundation (JDF) under the auspices of the Medical Research Council of Sweden (MFR). In a previous report we mapped the initiation of the programme (Landström et al 1998). In the present study we will trace the activities of the scientists in the process of developing the content and organisation of research. The aim is therefore to understand how the researchers handle the changes in research organisation and what kind of responses they develop.

MATERIAL AND THE OBJECT

In 1997 we were commissioned to monitor the entire Swedish American Diabetes Research Programme. This report is number two in a series.¹ While the first report focused on the activities of the financiers and MFR this one engages mainly with the scientists, and their attitudes and rhetoric. We are interested in exploring how they took on the task of formulating research plans that included the envisioning and description of innovative organisational patterns.

The material we use to address the questions was gathered simultaneously with the realisation of the Diabetes Research Programme and in the early days of its operation. We have had access to the applications (letters of intent and full applications) and material from MFR addressed to the scientific community. We did also send out a questionnaire to the involved scientists and we did interviews with some of them. This material was collected in the period when the selection of applicants who were to be invited to present full applications had been made but before the decision to fund the proposals by Arne Andersson, Leif Groop and Carl-Gustav Groth was made.

We want to emphasise that we have not been privy to the deliberations in the selection process. Conclusions on the selection of one proposal before another are beyond our scope.

The most original aspect of the Diabetes Research Programme from our point of view is that the financiers merged scientific and organisational aspects. The call for research proposals requested that applicants presented their ideas for research and how they would organise in networks or centres of excellence (MFR 28/5/97). Since the terms 'network' and 'centre of excellence' were kept open by the financiers the applicants were free to interpret and operationalise

them in a way that would further their particular research agenda. To succeed with this articulation quite a number of skills are necessary besides being a competent scientist in a field of research. The scientists needed to have the ability to outline trustworthy management models, to pinpoint the scientific benefits of a specific organisational form and to convince other, equally competent, scientist to join in. From our material it is clear that the scientists involved were experienced in collaborating but also that they chose different strategies in compiling networks or centres of excellence within the framework of the Diabetes Research Programme. We are confronted with a process in which social reconfiguration prevailed. The ties between scientists changed, some moved from one network or centre of excellence to another in the period between the letters of intent and the full applications.

In this report we focus on the organisational features of the process of developing networks and centres of excellence. In the following section we present and discuss the scientists' attitudes towards networks and centres as expressed in questionnaires and interviews. The section after that is a close reading and interpretation of the letters of intent. In the third section we look at the full applications with the emphasis on the changes in the constituencies for networks and centres that occurred in the time-span between letters of intent and full applications. The final section is a summary of how the process of articulating a network or centre looks from our STS perspective.

SCIENTISTS VIEWS ON NETWORKS AND CENTRES

In the proceeding section we present and discuss the results of questionnaires to and interviews with the scientist figuring as leaders in the 14 letters of intent and questionnaires to those appearing as partners in the six full applications.

¹ Report No. 1 "Tectonics that Change the Landscape..." can be downloaded from www.sister.nu.

From the outset it was made clear that all of the scientists had experience of collaborating in research and with the notions of networks and centres of excellence before the beginning of the Diabetes Research Programme. This was to be expected since science today is very much a collaborative event, in more intimate ways than has been the case in history. However, experiences differ and may lead to very different opinions and ideas regarding the possibilities of a particular effort like the Diabetes Research Programme.

In the questionnaires and interviews we posed several questions about the scientists experiences with and attitudes towards networks and centres as organisational forms.² In the questionnaire we asked the scientists figuring as project leaders in the letters of intent (from here on called 'the leaders') about the advantages and disadvantages of organising scientific research in networks or centres.

In reply to questions about the positive aspects of networks the majority of the leaders emphasised that scientific work becomes more vigorous when different competencies are brought together; scientist complement each other and research becomes interdisciplinary. Another positive aspect mentioned was that networks enable more exchange of PhD students and that graduate education becomes more comprehensive. A third advantage was that the idiosyncrasies of individual scientists become less dominant in a network.

Regarding the pros of centres the leaders pointed to the benefits of spatial closeness; communication is rapid, competencies are gathered, laboratory space and equipment can be used optimally. Some thought that the spatial integration could result in joint seminars and educational activities. A few viewed the sharing of costs for facilities as a benefit and yet some mentioned the scientific goals may be more clearly defined and that management could be easier.

² Throughout the material the term 'centre of excellence' is used. Despite this we will use the term 'centre' throughout this text, except in direct quotes or explicit discussion of the conceptualisation.

As disadvantages with organising in networks the leaders pointed to co-ordination difficulties that can escalate to conflicts and managerial problems. They pointed to several management problems with networks: more administrative work, time-consuming meetings, and lack of clarity regarding leadership and responsibilities. Some mentioned that geographical distance could cause difficulties. Other cons mentioned were that 'forced' networks could put a unit at disadvantage and that important projects that do not fit into the network agenda do not get funded.

The cons with centres according to the leaders were that they narrowed the research agenda in a way that could hamper individual initiative. Some respondents also mentioned the possibility of strong groups being forced to support weaker. They also thought that important projects not fitting in the organisational format would not get funded.

There were a few respondents who saw no disadvantages with either organisational form.

Several of the advantages and disadvantages of the two organisational forms pointed out by the leaders were the same which indicates that the respondents see similarities between networks and centres. In the questionnaire no explanation of the terms 'network' or 'centre' was given but from the answers it is possible to deduce that the leaders understood "networks" to consist of geographically and disciplinary dispersed research groups who collaborated with regard to a specific project. 'Centres' were given a reference to gathering disciplinary different groups under the same roof in order to address a common research agenda. The major distinguishing feature here is geographical distribution and the second is cognitive organisation. From this it is clear that networks and centres are similar in many ways, for instance the multidisciplinary configuration of research groups, the need for well planned management and the increase in size compared to the ordinary research group.

The questionnaire sent out to the project leaders distinguished between networks and centres, this was not the case with the one sent out to the other

researchers participating in the projects (from here on referred to as 'the partners'). In this questionnaire network and centres were collapsed into a singular category whose pros and cons the respondents were asked to present opinions on.

The partners discerned the same advantages as the leaders: that research gets more comprehensive and that scientists complement each other's competencies in interdisciplinary work. The benefits for PhD students and graduate education were also mentioned. A novel positive aspect mentioned was that basic research gets linked more closely with clinical research. Also mentioned by the partners but not by the leaders was that technological resources may increase, as could the possibility to get financed. A few thought that these organisational forms would prove interesting with regard to collaboration with industry and that they could reduce the vulnerability in the area of resources.

Also with regard to disadvantages the partners seemed to be in agreement with the leaders. The main con mentioned was the managerial function: increased administration, bureaucracy and time-consuming meetings. Second in importance was the narrowing of the research agenda and the hampering of individual initiative. Some thought that networks and centres give no room for ideas not agreeing with the establishment view. Several partners mention that conflicts may arise. A con not mentioned by the leaders but by a few of the partners was that 'unnatural' collaborations - assemblies of scientists only for the purpose of applying for funds - could arise. One person feared that the emotional engagement in research would lessen with these organisational modes.

The distinction between a 'natural' and an 'unnatural' formation of collaboration is interesting. It can be interpreted with reference to thoughts about whether the organisation of scientists are best left to the scientists themselves or if it can benefit from societal intervention. What is lost and what is gained by not leaving scientific organising to the scientists? The issue can also be thought of as concerning whether organisational form should be 'pushed' by the research agenda or if it should 'pull' scientific question towards a solution.

The idea that the epistemic development should push social organisation is old and well established in science as well as society but since the US Manhattan project in the 1940s the idea that organisation can push the epistemic agenda ahead has gained ground. The interest of the two financiers of the Diabetes Research Programme can be interpreted as a wish to increase the possibility to improve the scientific work by organising research in well-defined collaborating constellations.

The slight differences in the answers of the leaders and the partners regarding benefits and difficulties are most likely an effect of the questionnaire and the number of respondents, not the responding population. With regard to background factors such as career situation, research experiences and so on the leaders and the partners are indistinguishable. Most are senior scientists with their own research units, solid scientific reputations and excellent track records.

As mentioned both leaders and partners had prior experience with working in these collaborative forms. Only three of the project leaders claimed to have had no previous experience with work in networks or centres. Nine had been involved in formal networks and six in informal. Three of the leaders had worked in centres before. Most of the networks these scientists had been in had received EU funding and very few had encountered any industry involvement. In comparison with other initiatives the leaders found the Diabetes Research Programme to be of longer duration and financially more extensive.

Of the partners answering the questionnaire 81% had previous experience of work in networks or centres; 70% had participated in informal networks, 53% in formal networks and 14% in centres. Networks appear to be a popular thing with the EU because 66% of the scientists said that the financing for the networks they had been in came from there, 37% had received money from Swedish research councils but 34% had been in networks with no funding. EU funding have not meant that Swedish scientists collaborate exclusively with

researchers in other countries because 69% of our respondents said that they had participated in networks with both national and international groups.

Co-ordinating science within Europe has long been a major task in EU science policy. Making scientists collaborate within Europe is viewed as a way to strengthen European science and technology in relation to USA and Japan. The forceful European science is in turn supposed to have positive consequences for the economic development in the EU countries.

The prior experience of the scientists is likely to be the backdrop for the answers to the questionnaire and for the answers given in interviews when the leaders were invited to talk more extensively about networks and centres of excellence. The interviewers asked the questions with the Diabetes Research Programme as a clear point of reference.

In the interviews the topic of creating networks and centres was central. The interviewees (all of the leaders) expressed a certain degree of suspicion towards financiers incorporating requests for certain ways of organising as a condition for receiving funds. This was viewed as an incentive to form 'unnatural' collaborations, which was deemed as a bad thing. Several interviewees said that scientific collaboration is a 'natural' process that cannot be optimised through advanced planning. One interviewee said about the process of creating a network/centre of excellence in response to the announcement of a grant:

If the process begins when the announcement comes, then - one, two, three - you try to make it excellent. Then it is too late. The idea is to have an infrastructure and a beginning. And these [the networks of the interviewee] was natural networks, existing networks and collaboration pathways, so there were no problems.

Another interviewee argued that networks create themselves as research requires collaboration if all the aspects of a scientific problem are to be addressed. Yet another supported this view and said that it is sometimes motivated to work in networks but sometimes not:

The problem is what questions one is addressing really...Some questions do not need natural networks to be addressed. Other questions do need networks.

A few interviewees thought that the request to organise in networks or centres to get funds from the Diabetes Research Programme gave them the incentive they needed to develop networks from their numerous loose collaborations.

The interviewees also gave some more opinions on the advantages and disadvantages of these organisational forms. One interviewee mentioned the security for PhD students in a centre:

The most dangerous thing for a university is to have an activity that depends on one professor or someone who suddenly get in their head to move somewhere else. Then he leaves and cannot bring along everybody... A centre of excellence is less vulnerable, if one leaves there are enough weight left. This clearly creates security for the other PhD students.

Interviewees also elaborated views presented in the questionnaire, one compared networks and centres and regarded the former as short-lived, project centred and more problem oriented - the advantages were the gathering of many specific competencies and that project results come quickly, disadvantages were travels and struggles over resources. Advantages with centres were the long duration and the broad knowledge base, which enable the creation of a new generation of PhDs with interdisciplinary expertise in diabetes research. According to the same interviewee centres also produce a feeling of community. While this scientist clearly distinguished between networks and centres and favoured the latter not all interviewees saw these sharp differences, one said:

What's the difference between centre and network? Of course a physical centre means to be in the same place. And of course that can have advantages concerning the use of space and equipment, which becomes easier. But at the same time, in the projects we have now the things to do are well defined which means that if it would be necessary to share specific equipment this can be arranged anyway. All right, one has to travel and

do it on a special occasion but in this situation I see no disadvantage with not being in the same place. One could say that an advantage with not being in the same place is that one has greater potential in using auxiliary resources. We can use resources in [the name of a Swedish city], [the name of another Swedish city] and [the name of a third Swedish city].

In the interviews aspects of networks and centres asked about in the questionnaires were both elaborated and complemented. We assume that the interviews gave more room to express personal views based on experience and that they were more explicitly linked to the Diabetes Research Programme.

In the questionnaires we asked the respondents what effects organising in networks or centres would have, an issue drawing on both experience and attitudes. This question was presented in the form of statements, with which respondents could agree or disagree.

Taking all the questionnaires together (57) the statement most respondents disagreed with was that networks and centres would increase the possibility for creating ties with industry (42 respondents). In this our population differs sharply from the STS scholars linking these forms of organisation with industrial need. To us this could indicate that the STS discussion has a 'blind spot' for the motivation of scientists to enter new organisational forms.

By assuming a perspective relying on highly aggregated figures of research funding, development of scientific fields and bibliometrical data STS researchers have linked the growing share of industrial financing, the growth in applied research fields and the growing number of co-authored papers together and ended up with an image of how science becomes more collaborative, applied and industry financed. Our limited but consistent material defies that picture. Assuming the perspective of our responding population instead indicates that closer collaboration may be viewed as a way to further basic science by illuminating crucial questions through many disciplinary perspectives.

On the other hand, it could also reflect a prevailing attitude among the researchers that the influence of industry on academic research could be detri-

mental to quality standards. Many of the applications highlight the possible applications in the form of new drugs, which means that the researchers clearly view their research not only in terms of basic discoveries but also in terms of applications. Many of the researchers are also engaged in clinical work and in clinical testing of new drugs.

The seeming contradiction between these views may be an effect of the conflation of inter- or multidisciplinary research with applications. We think is very important to distinguish between changes in disciplinary configurations and work with applying existing knowledge in order to avoid misinterpretations of changes in organisational patterns.

While the scientists rejected the idea that networks or centres would please industry they found the most agreeable statement in our questionnaire to be that networks and centres give research the benefit of size (49 agreed). On the issue of whether more administrative work follows from networks and centres opinions were split, a majority of 42 agreed but 13 strongly disagreed. That interdisciplinarity increases, that integration between clinical and pre-clinical research increases and that the conditions for PhD studies and postdoctoral work improves were also agreed with by a majority.

Looking at the questionnaires at large the 57 answers can be clustered according to topical areas in a positive and a negative field and one that can be either advantageous or disadvantageous.

Figure 1: Advantages and disadvantages with organising research in networks or centres of excellence

Advantages	Disadvantages
<ul style="list-style-type: none"> • interdisciplinarity • PhD education 	<ul style="list-style-type: none"> • narrowing scope • marginalisation
<ul style="list-style-type: none"> • orchestration 	

To cross-disciplinary boundaries is definitely considered a positive feature of networks and centres. Another area thought to benefit is PhD and post doc training. The practical aspects of running a network or centre are more ambiguous. There can be co-ordination and planning advantages but there can also be more time-consuming and difficult managing. Hence, orchestration has to be placed as an area that could be both advantageously or disadvantageously affected. A disadvantage is also the way in which such pre-planned collaborations may narrow the scope of investigation. It is difficult to re-orient an entire network or centre agenda even if that should be a good idea. A related issue is the way in which such large initiatives marginalise ideas and projects that do not fit into their agendas. With so much resources bound up in one effort it is difficult to find financing, facilities and people to do something that contrasts with its aims.

That we can discern shared opinions on the advantages and disadvantages of networks and centres among the scientists does not mean that there is clarity with regard to what these terms refer to.

Although the financiers required networks or centres the vagueness of these terms left scientists a lot of freedom even within these models of pre-planned collaboration. It is to explore how this freedom was used by the scientists applying for grants that we turn next to the networks and centres envisioned in the letters of intent.

PLANNING AHEAD

In this section we will look at the way in which networks and centres were presented in the letters of intent that were the first step in the procedure of applying for funds within the Swedish American Diabetes Research Programme. Our understanding of the issues is partly built on what we have learnt about the scientists' attitudes in the previous chapter but we also draw on the body of STS knowledge concerning scientific collaboration.

The literature on scientific collaboration is extensive. The earliest work in STS took notice of scientific research being collaborative work in several ways (Cf. Price 1963, Kuhn 1962, Merton 1973, Crane 1972). Using bibliometrics, STS-students have revealed a growing number of collaborations and co-operations, between countries and between disciplines, in different areas of science (E.g. Melin & Persson 1997). During the 1980s STS work of a constructivist inclination linked the interaction among scientists with the content of research (Cf. Collins 1985, Latour 1987, Knorr 1981). In the 1990s the interplay between actors outside the scientific community and the socio-cognitive organisation of science has been illuminated (Cf. Fujimura 1996).

One way in which contemporary STS affects us is our predisposition to approach the letters of intent as traces of actions undertaken in a construction process. What the letters of intent did (besides possibly winning their authors a chance to get funding) was to contribute to the stabilisation of the meaning of the terms 'network' and 'centres' within diabetes research and science at large in Sweden. The authors of these documents were entering into an unknown territory (cognitive and organisational) and had to produce some sort of plan for how to go about if they were to become recipients of support from the financiers. At their disposal they had prior and current research relevant to diabetes in different disciplines, ties with other scientists and rhetorical repertoires. These resources were mobilised in order to present networks or centres that were promising enough to entice interest from the sponsors. There was no fixed model for how the envisioned future should look, the call for applications said:

The research programme shall briefly (at most 4 pages) present the scientific questions the applicants intend to explore, a plan for the carrying out of research over time and a division of research tasks between participating groups. It should be clarified what possibilities and gains, scientific and collaborative, that the chosen organisational form (centre or network) may lead to. A budget overview shall be included. The present financing and existing infrastructure shall be described briefly (MFR 28/5/97)

There were 14 letters of intent with a length of 3 to 6 pages depending on whether the author/authors had chosen to include the budget and selected references within the 4 page limit or not. Since there were no style sheet for the applicants the letters are organised quite differently. Most (11) begin with a letter with formal letterhead addressing the research council, five of these state the name of the project and five also tell where the centre is, or the collaborators in the network are, located. Three letters of intent begin directly, two with lists of the principal investigators and one with a project description. Of the letters of intent with a front leaf all but one start on the first numbered page with the project outline and the remaining one with the participants.

The project descriptions are, as can be expected, quite similarly organised (writing outlines of proposed projects is a task every scientists become familiar with over time) but in the more unfamiliar area of sketching an organisational framework variation is considerable. Some link the organisation very closely with the scientific work in describing the centre or network through the work of the participating groups. Others add on the participants at the end without linking them to particular tasks. Most letters of intent lies somewhere in between but two do not mention anything about collaboration. The suggested research span a broad area of questions and disciplines, we find molecular medicine, clinical physiology, transplant surgery, cell biology, paediatrics, microbiology and many others.

Every letter of intent has the author (sometimes authors) as the leader of the suggested network or centre and they list between 2 and 22 partners. Some also list all the collaborators in the groups for which the partners speak, hence a letter of intent may encompass more than 100 people involved in the research. From the questionnaire we have learnt that the scientists listed as partners are people that the leaders already knew and in many cases already collaborated with. 86% of the leaders had this relationship with the scientist listed as first partner, 57% with the second and 43% with the third. The part-

ners were also familiar with each other although to a lesser degree 77% knew the first partner since before, 51% the second and 28% the third. The difference between leaders and partners on this point suggests to us that those trying to think up and formulate proposals for networks and centres were scientists with well developed social and scientific ties in the field of diabetes research. While partners in scientific disciplines far apart may not have known each other the leaders knew and knew about people that could be recruited to diabetes research.

About 110 scientists figure as leaders or partners in the letters of intent, several appear in more than one letter, i.e. have promised to collaborate in different networks or centres. This is an interesting feature that deserves some reflection. An economical interpretation would hold that this was a way to ascertain that one would get funded by this programme. This is not a reading that should be dismissed, in science it is important to find money for research and the Diabetes Research Programme offered new funds over a, for this system, long time. This would be of value to most research groups since many other financiers have tended to cut down the size of their grants and fund projects for short periods (Sandström 1999). To be able to fund, for example, a PhD student in a laboratory over four years with a grant from the Diabetes Programme would be beneficial.

However, economics do not exhaust the phenomenon of the 'multi-linking' of scientists there are several other important factors that do not conflict with the economic, or with each other, but each can be thought to add impetus.

One aspect is that Sweden is a small country with a limited number of scientists that work in, or can orient their work towards, diabetes research. One must not forget that when MFR sent out their invitation to a meeting with the relevant scientific community they invited 30 participants that they had knowledge of through their project-registers and 29 scientists came to the meeting (MFR 26/3/97). If this number is an indication of the size of the community it is not surprising that scientists figure in several letters of intent since there

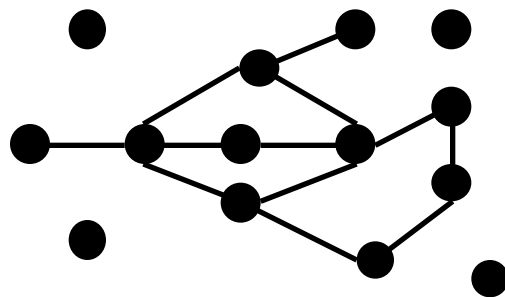
are hardly enough diabetes scientists around to envision 14 independent collaborations of any size.

Another aspect important for understanding the overlaps is to consider the competencies compiled in the networks or centres. From the perspective of someone thinking up this kind of research proposal it ought to be crucial to figure out what research tasks need to be done and to find out who is most likely to be able to do them. This would mean that scientists with crucial assets like a technique, or access to a specific patient material, or highly specialised skills are interesting to several project leaders.

Interpreting the ‘multi-linking’ or ‘overlap’ with these three aspects in mind highlights that there are several motivations and different rationales involved. This is important since we do not know anything about the scientist’s intentions besides what is stated in the letters of intent, in the questionnaires and interviews.

We try to capture the phenomenon of multi-linking in this map of the fourteen suggested projects where the dots are proposed networks or centres and the lines represents the connections between them as presented in the letters of intent. We note that the lines represent people that are listed in more than one letter of intent and that they are aggregated so that one line may stand for several people shared among two projects.

Figure 2: Connections between the networks/centres proposed in letters of intent.



Two of the applications in the first round do not mention anything about the shape of or the participants in envisioned collaborations but of the remaining twelve letters of intent seven proposes networks and five centres. Some appear to be looking for reinforcement of already established collaborations, the money applied for is to strengthen ties and develop more focused research strategies. Others apply for the grant to extend already existing collaborations; the money would allow them to bring in new collaborators to address research questions more effectively. Yet some proposes novel collaborations with scientists that they may know but have no stable interaction with, in these cases the research appears to be fashioned according to the trajectory of the applicant.

The applicants all mention collaborations with scientists in other countries but it seems like all but two reckoned that since this was a Swedish programme the actual network or centre should consist of Swedish groups. In most letters of intent foreign collaborators are added on more like a bonus effect than a central resource. However, two applicants listed the majority of collaborators abroad.

Regarding content there are quite a range of different issues that are covered in the letters of intent. A few examples are: studies of the genetic mechanisms involved in the onset of diabetes, studies of the metabolic processes involved in diabetes, studies of the prevention of diabetes, studies of xenotransplantation treatments. Several of the applications target the disease in ways that transcend the distinction between type I and type II diabetes but if interpreted through this distinction we find that six applications target type I diabetes (IDDM) that most commonly affects children and younger persons but can appear at any age. Five proposals target type II diabetes (NIDDM) which is most common among overweight people over 40 years of age. Three of the applications seem to span both types, claiming that the kind of study proposed makes the difference lack relevance.

As was discussed in Report no 1 some of the interviewed scientists were critical of what they perceived to be a favouring of research on type I diabetes when the grants were decided on. Although such a preference was not visible in the material from the initiation phase of the programme it can be argued that such a bias were present in that more letters of intent with type I in focus were invited to present full applications. However, it is not likely that this was the only factor since the requirements for organisational outlines seems to be quite difficult to fulfil for the applicants simultaneously with the financiers placing great weight on these aspects.

One of the most difficult points in writing the first application appears to have been to articulate which 'synergy effects' organising in this way would result in. Three applicants did not even try, two had not described any collaboration and one was a centre already established. The rest of the authors of letters of intent (8) at least tried to come up with something and a few managed to do so in a more comprehensive fashion. To point out the positive synergy effects of collaborations not yet established seems to be a demanding task indeed. Synergy effects are most commonly seen with hindsight as unintended positive consequences of unexpected combinations of competence (Atkinson, Batchelor and Parsons 1998). They are thus in a way emergent. Planning for emergent effects to occur seems somewhat contradictory (Ziman 1994). But in the present science funding climate the thought that this is possible have gained ground. One symptom of this in the Diabetes Research Programme was the expression 'centre of excellence' used by the financiers.

Although not visible in the present text the term used by the financiers and the scientists were 'centre of excellence'. One would think that 'excellence' is a quality denominator given after the work done in a particular centre had been judge to be first class. It seems possible to plan for centres but very much harder to plan for excellence. Gathering 'excellent' scientists doing 'excellent' work in a centre may still not result in a 'centre of excellence' unless something occurs that adds value to the activities. It is most likely that all the in-

volved in the Swedish American Diabetes Research Programme knew this and that the issue of synergy effects and excellence served mainly to display an intellectual commitment to the collaboration and expectations.

CONSOLIDATION

In the previous section we explored how the community of diabetes scientists articulated networks or centres at short notice and in brief, in the present section we will move deeper into this articulation process as it progressed into fully developed applications.

Seven of the letters of intent passed muster and were selected to compete further; six of them did so. The documents presented as full applications are extensive (over 125 pages each) and in them research proposals, organisations and budgets are spelled out in full detail. The collaborators are presented, the research tasks specified, time-schedules and management plans provided.

Even though only three of the proposals were funded we choose to interpret all seven as equally possible realities. Staying within the scope of the present report our focus is on the way in which organisational form were linked to research objectives. We will not elaborate on the scientific content in this report but hope to return to this issue in subsequent reports.

Interpreting the applications we are inspired by a study by Greg Myers of the creation of research centres in the UK (Myers 1993). The institutional origin of a proposal shaped its content regarding direction and organisation of research. Furthermore, there seems to be a frequent use of 'strategic vagueness' in the application process. Research topics were defined in ways that could include everyone regardless of internal competition, conflict or animosity. Finally, scientists tried to write potential users of research results into the proposals.

Seven letters of intent were chosen to take part in the second and final round of application for funding within the Diabetes Research Programme. There was

an initial reduction to six full applications since one of the original project leaders choose to become partner in another application rather than present one.

The first feature of the transition from letters of intent to full applications that stand out to us is the reshuffling of scientists along with their projects. We understand this as signifying a consolidation process in a small community. Scientists who had tentatively signed on with one or more networks or centres had to make a more firm commitment as there was a much stronger possibility of a five year engagement for the applications that had moved on to the second stage. Because of this a main feature of the transition from networks and centres outlined in the letters of intent to those presented in the full applications is disconnection. Of the 14 networks and centres in the letters of intent ten were linked via one or more scientists. Of the seven proposals that passed the first selection six had links with others and one was separate already. One of the linked proposals was subsumed in another and the remaining five were more clearly separated. In the full applications only two scientists were listed as partners in more than one network or centre.

We can speculate that the scientists appearing in more than one application would stand a small chance of getting funded to do work in two collaborations. Would that have happened two options seem possible. If the tasks to which the scientist were committed were different in the two applications it is possible to think of a group participating in two collaborations with some research staff working for each. Another possibility would be to withdraw from one collaboration, which does seem like the more likely option.

Of the full applications three proposed networks and three proposed centres. The suggested networks spanned three different institutional environments: university hospitals, university departments, and hospitals. The centres suggested were located in universities or university hospitals and spanned several departments each, for example medicine, microbiology, cell and molecular biology.

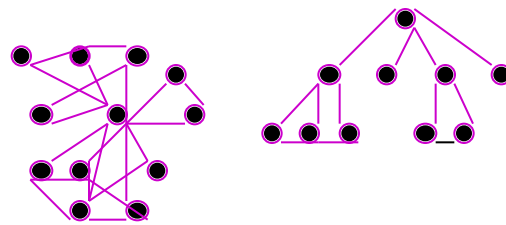
A very interesting feature is that only one proposed centre is spatially contained in one geographic area, the other two include research groups in different places. This contrasts with the way in which the scientist distinguished between networks and centres in the interviews and questionnaires. However, if we interpret it with help from Myers we realise that it would be quite unfeasible to aim for the construction of new centres. The scientists who are partners in the networks are well established in their respective departments where they head units involved in research and teaching. To start relocating research groups and their equipment would be complicated and risky. The Diabetes Research Programme grants could not cover such a refiguration of researchers and equipment nor would it be defensible to upset existing local collaborations in teaching and research for the, in this perspective, short time of five years. The compromise in the spatial integrity of centres should be read as a negotiation of novel organisation within a stable institutional structure. In line with this we understand why the only suggested centre with geographic delineation involves groups that are already there but previously without closer collaboration.

However rational the abandonment of spatial proximity among collaborators is it tends to further blur the boundary between centres and networks. Especially since the geographical distribution of collaborators in the applications proposing networks are no greater than that of centres.

The size and organisation of the proposed collaborations are also stabilised in the full applications. This is probably partly a function of the style sheet, which provides a limited space for listing leaders, and partners and requires that certain things be spelled out. We find that several scientists listed as partners in the letters of intent appear as collaborators with partners rather than with the leader in the full applications. Although required by the layout we think of this not only as a point of stylistic interest but also with organisational consequences. By organising the networks and centres hierarchically with clearly defined leaders and partners and collaborators a clear chain of command is es-

established, spokespersonships and accountability are distributed and management authority defined. One can see why financiers would prefer such internal organisation of research rather than a more flat alternative like those suggested in the letters of intent regardless of whether it represents actual patterns of communication and work.

Fig 3: Internal ties as suggested in letters of intent and in full applications respectively.



Another shift from the letters of intent is the change in the roles of foreign collaborators. In the full applications some international collaborators had disappeared completely, some were mentioned more as an add on and some had got a new role as reference panels. This is not odd considering that it was a call for a Swedish programme with the intent of creating national collaborations. What is interesting is the strong presence of foreign collaborators in the letters of intent. We speculate that this was a phenomenon of application rhetorical habit. Scientists collaborate formally and informally across national borders and scientists applying for grants have learnt that, in Sweden and Europe at least, financiers appreciate international contacts. Hence, it is usually important to mobilise one's international contacts as a resource when writing applications even when collaborations involves no financial commitments or formal agreements. It is likely that this strategy has become such an

integral part of application rhetoric that if not explicitly discouraged in guidelines no one dares to leave it out.

The six full applications were for networks/centres with, in principle, the same titles as appeared in the letters of intent. Title changes appear to be more in syntax than semantics. This correspondence appears self-evident considering that the letters of intent were the original proposals that were agreed on to be good enough to be allowed to proceed but it deserves some thought when we look at proposals with extensive reshuffling of partners and projects.

In one suggested network three sub-projects disappeared with their scientists and another one with new people was added. To this network the transition from letter of intent to full application meant a move from seven sub-projects to five, the exchange of one sub-project for another, the reduction of named collaborators from 25 to 20 and a budget cut almost in half.

The departure of research groups could be linked to the demarcation of networks and centres from each other; scientists had to decide in which application they would appear and the groups departing from the project mentioned above are to be found in another application in another constellation. The new group to join was in the same research area as one of those that left.

The budget reduction can probably be traced to the guidelines provided by the financiers since five of the applications tended to adjust to a figure between five and eight million SEK per year. For some there was an upward adjustment and for some a reduction but nowhere as great as in the example above (one proposal stands out with a requested support of 15 to 17 MSEK per year).

The application in this example included a paragraph concerned with the changes occurring between the first and second proposal. In this the focus is on that parts of projects are merged or added. There is nothing about the major reshuffling of scientists. If one of the reasons for winning support is the qualification and track records of the involved scientists they ought not to be inter-

changeable without comment, but on the other hand they may all be equally good.

At the other end of the spectrum of changes there was one proposal for a centre that apparently were fully developed already when the letter of intent was submitted. Here nothing changed – title, research, organisation, collaborators and budget is the same but spelled out in full detail.

Overall, what seems to be most flexible is the constellation of scientists in the networks and centres. The research appears to be more fixed from the beginning. The same could be said about the organisational form.

The applications encompasses a considerable number of researchers if we only count leaders and partners there is about 50, including the collaborators in the clinics and laboratories would mean that quite a large number of people are involved. In many cases it is hard to figure out exactly how many people are concerned but as an illustration we find that there is one network in which over 100 names are given and a centre mentioning 70. Of course, the money from the Diabetes Research Programme is not meant to cover all the involved researchers but it is to be used in a way that ties their work together and in this process lead to new things that would not have happened had this not been done.

Actually, looking at the budget proposals it looks like the main part of the funding is going to be spent on post doc researchers, PhD students, technicians, equipment, animals, consumables, supplies and running costs for research work. We find it intriguing that only one of the partners in one network has applied for travel expenses. Considering that the organisational form outlined in the proposals require extensive interaction: meetings, conferences, exchange of PhD students and technicians we would have thought that applications would request money for these activities. We would also have expected applicants to ask for money to manage the centres and networks. Considering that the scientists claimed to think that managing centres or networks would be time demanding we would have expected that they would want to cover the

cost for this. We would also have expected requests for funds for arranging PhD courses. These also seem to involve travel and work that would have to be paid for.

We are stuck with a paradox here. KAW and JDF wanted to spend money on research in new collaborative forms but the scientists do not seem to think that new and more formal collaboration costs anything. If this is the case there is no reason not for every science funding body to require that collaborations are as well articulated as in these applications since it does not bring any extra costs.

There are other, less comforting ways of thinking about this. It is possible that the institutions in which the collaborating researchers work will be expected to finance travels, administration and courses. In the worst case this scenario ends with leaders and partners meeting a few times of year in connection with other events. Hence, funding agencies must be aware of the costs involved in research collaboration and must be prepared to cover for these costs if collaboration should be realised.

NEW TERRITORIES IN AN OLD LANDSCAPE

In this report we noted that although the Swedish American Diabetes Research Programme is an effort to create novel collaborative patterns within Swedish diabetes research the changes it produces must negotiate established realities.

Regarding organisational novelty this negotiation resulted in centres and networks becoming almost identical in their geographical distribution. While networks were from the beginning understood to link together research groups in various locations centres were pictured as assembling research groups in one place. This apprehension was modified in the applications for funds in which centres were also geographically dispersed with research groups in different

locations. This can be read as a way to negotiate established institutional organisation. While some novel collaboration patterns could be established the funds from the project in no way allowed the uprooting of research groups and creation of new laboratories. The scientists commit to close collaboration over a shared research agenda and they know from the start with whom their scientific exchange should take place.

Another stable feature was the scientific content. It seems like research groups already were well under way in the research. In all the reshuffling of scientists in the period between letters of intent and full applications the scientific objectives did not change. (Some promises of results that were made in the letters of intent were downplayed but otherwise research agendas stayed the same.) This holds both at network and centre level, despite changes in constituency, and on sub-project level, despite reassignment from one centre/network to another. This indicates that the research outlined in the applications was already taking place, which leads us to refocus our research questions. The Diabetes Research Programme is maybe not important as an arena for establishing new projects and lines of research, but as a vehicle for setting up more efficient, larger and broader projects. The funds were applied for to add post docs, PhD students and technicians to research groups, to cover running expenses and buy some new equipment. In some cases, it might be possible that this would have happened anyway, but with other funds. If the case is that the science proposed in the programme is in line with a long trajectory of diabetes research then our interest for 'effects' will have to be directed towards certain aspects of the programme, aspects that usually is termed 'synergy effects'.

We find a most intriguing feature of the process studied in this report to be that the scientists did not attempt to counteract the disadvantages they feared from organising in networks or centres. Although the full applications presented well-developed management plans and meeting schedules these were not backed with specifying economic resources to these ends.

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