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Dynamism and innovation at danish universities and sector research institutions

**An analysis of common characteristics in
dynamic and innovative research environments**

ENGLISH SUMMARY

**Summary of report 2002/1 from
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9. English summary

Research is most significant for the Welfare State and is the basis of knowledge society. Without research there shall be no knowledge-based society.

In many fields Denmark's research capacity is at the highest level internationally. The precondition for Denmark to retain and improve its position as one of the leaders in the fields of research, technology and development is that research environments are dynamic and innovative, and can take up new challenges within the framework of increasing international competition. Research environments should be transparent, open, internationally oriented and internationally competitive.

Dynamism and innovation are not new terms in research or in the context of research policies for that matter. Dynamic, innovative and well functioning research environments have been the frameworks for excellent research carried out in Denmark. The central question in the present report is what characterises these research environments? The analysis of these dynamic and innovative research environments aims to identify the characteristics common to these research environments, and subsequently examines what can be deduced from their experiences, and what can be used to further the efforts of developing more dynamic and innovative environments.

The study takes its reference point from fifteen university and public sector research environments identified by The Danish Council for Research Policy as being good examples of dynamic and innovative environments.

The fifteen research environments represent all areas spanning from basic to applied research. Some are small, others large. Some comprise whole institutes; others are departments, while some are either centres or networks. Naturally, the selected research environments comprise only a part of the dynamic and innovative environments and should be regarded as examples of such research environments existing in Denmark. The experience gained from the analysis of these environments can nevertheless provide a basis for research policies in an effort to promote dynamism and innovation in research environments.

The following analysis – and study of dynamic and innovative research environments to be found at Danish Universities and sector Research Institutes – has demonstrated the complexity of research processes and the substantial differentiation that characterises research activities. However, a raft of common features has also been identified relating to: the organisation of research, leadership in research environments, communication and dialogue (both within given environments and in relation to the recruitment and personnel policies,

working environment, research conditions and financing, as well as other specific circumstances. These characteristics are summarised in the following sections.

9.1 Factors that characterise dynamic and innovative research environments

The study revealed that the characteristic features of the selected dynamic and innovative environments are that they have: clearly formulated research strategies and objectives, well-defined profiles, and that they predominantly work in research areas that are unique to Denmark. The environments focus on research, quality and competence development, and are also result-oriented. Strategies encompassed planning and the coordination of activities, formulation of target areas, and prioritisation between research areas and research projects.

These dynamic environments have active, transparent and competent leaders with modern personnel leadership qualities. Leaders are active within the research environment, in relation to the political system, and also in other important contexts. They have defined their roles and work within the research environments, and they endeavour to live up to these roles.

As the study reveals, dynamic and innovative environments are often shaped against the backdrop of inspiration from abroad, in as much that foreign research environments are templates for environments at home. Typically, leaders have experienced these foreign environments via research postings. Inspiration is greatest in the physical planning of environments and research organisation. In many instances inspiration from abroad influences cognitive processes too, that is to say influences research areas and subjects. Without doubt, interaction with international research environments is obviously highly important for dynamic environments. Not surprisingly, most of the studied environments were internationally well known and respected. Building up comprehensive international networks is a decisive consideration with a view to acquiring new knowledge and results that have been produced abroad. Knowledge transfer is considered to be a precondition of innovation.

Dynamic and innovative research environments that have excellent uniform research frameworks generally attract adequate financial support – as demonstrated by the empirical evidence advanced in the study's various sections. Without doubt these environments can draw on substantial external resources, which contribute to the environments' innovatory dynamism. External resources stimulate interdepartmental cooperation in the form of teamwork and cooperation with other environments in Denmark and abroad. These reinforce inter-disciplinary initiatives and assist in the process of recruiting new colleagues and staff. Most of

the environments chosen rely substantially on external funding, without which the existing levels of activity (including quality assurance) could hardly be maintained.

Dynamic environments build on flexible research organisation with internal cooperation based on highly specialised fields or projects, where expertise is collected and where the work is targeted in the direction of some well-defined goals. In many instances environments have developed over such a long period that a second generation of researchers has taken over. In a few cases the environments are so new that the organisations have not evolved into finalised forms.

Dynamic and innovative research environments have well defined and transparent staff policies, which set out to encourage, support and assist the process of creating professional contacts, often in the form of networks – especially international networks. These initiatives set the framework for researchers' professional development. Staff policies are based on the principal of research autonomy. Freedom is generally greatest during research activities but less in the choice of research subjects, because the environments often build on distinctive research profiles.

All dynamic research environments boast professional elite, which ensures quality and helps young researchers – both in the socialization process and in relation to the different markets surrounding them such as publishing and resource markets. The system rewards well-performed research using incentives and reward mechanisms. The system aims to make research environments attractive for both Danish and international researchers.

In addition, dynamic and innovative research environments have a clear and transparent recruitment policy that is built on a solid core of senior competences and young researchers. Leaders focus on identifying and recruiting energetic, enthusiastic and committed researchers. The recruiting of young researchers and the co-existence of researchers with different backgrounds and age – with several generations under the same roof – is clearly promoting innovation. Recruitment policy is a significant factor for innovation and dynamism in research environments.

Dynamic environments have typically an excellent working climate. They have norms and traditions for conducting research tasks. At the same time a pluralistic approach prevails that contributes to openness to new ideas and research traditions. Furthermore, this takes place in an ongoing dialogue on research tasks, research theories, research methods as well as publishing aspects. This dialogue and openness contributes to innovation in the research environments.

The research environments featured in the study have an organisation that is flexible – also in relation to external factors. This is characterised by an ability to adapt to external influences, and an ability to work with and adjust to changes in the surrounding society. Dynamic environments are good at promoting research groups' interest in society. The environments are also open to society and the majority of them maintain good connections to the corporate sector and the political establishment. This does not unequivocally imply that all research environments in the study have close contacts with the corporate sector. In some environments researchers are working on subjects that cannot be specifically used by business in the short-term. In addition, some of the leaders of the dynamic environments in the study were of the opinion that the corporate sector was not interested in cooperating with the research environment in question.

9.2 Organisation of research in innovative and dynamic research environments

Focusing on the organisation of research more closely, the following is apparent: dynamic and innovative research environments are organisations without clearly defined boundaries. Furthermore, the study reveals that these environments are open, somewhat fluid, and usually are non-conformist. They comprise a core group, and a group of sometimes closely connected colleagues that is more or less different (eg, PhD students, guest researchers, and project staff). The environments do not place great emphasis on defining their outer boundaries. Instead they prefer to concentrate on defining internal factors such as collaboration and professionalism, which amongst other things come into play in the recruitment and employment of new researchers. Research environments' organisation influences the units' own research content and development. In principle the organisation structure emphasises leadership and the significance of the research group.

Research environments have clear research strategies and well-defined goals. Nevertheless, it is primarily the leadership that puts goals and strategies in perspective. Additionally, it is not always the case that all employees are acquainted with the goals identified. These vary in the different environments from overall goals to very specifically formulated objectives. As a general rule the leadership of dynamic research environments works on the basis of well-formulated priority fields.

Research environments' internal organisations are open to new traditions and methods. This implies that while simultaneously preserving research traditions they are prepared for changes as well and in this way have the best innovative potential.

The activities of the studied research environments have usually as a starting point demands and needs in the surrounding society. Researchers combine these with their own professional interests. This increases the potential for obtaining external funding from several sources. To a large extent research environments are dependent on external resources and they have developed mechanisms and procedures that allow them to deal with funding issues. Conditions in research environments' frameworks – such as the researchers job market and research policy initiatives – are highly important for recruitment and financing of research activities, and ultimately for the growth and development of research.

The informal structure of dynamic and innovative research environments – namely dialogue and communication, network building, norms, values, traditions and the social environment – leaves its mark on research content, research quality, international visibility and productivity. The environments' demography and staff composition have a significant influence on the organisation of research, on leadership styles and on the research activities.

The organisations in the environments studied emphasised communication with international research and international network building. Research specialisations imply that reference groups and potential networks are to be found abroad. Consequently there is an ongoing intensive dialogue with foreign researchers.

9.3 The leadership of the dynamic and innovative research environments

The study reveals that:

Leaders in the environments studied are, or have been, active researchers with great leadership qualities and considerable impact in relation to colleagues. Additionally, the majority of leaders have been instrumental in both creating and shaping the types of research environments. All the leaders are found to have significant possibilities for influencing and changing research environments within the existing organisational frameworks.

Leaders consider it essential to have clearly-formulated research strategies and well-defined research goals. These vary with respect to the level of detail. Some strategies are global.

Leaders map out the research framework and research environment. They secure the resources, prioritise the research tasks, formulate the target areas, encourage cooperation and teamwork, use different incentives and remuneration systems, and attempt to stimulate and develop employees by offering them new challenges.

Leaders of dynamically innovative environments consider it important to formulate a clear and transparent personnel and recruitment policy. The majority also report that they use a non-authoritarian leadership style enshrined in the principle 'freedom based on responsibility'. In short, leaders attempt to promote dialogue, communication, and openness to new ideas, development of knowledge, trust, and a well-functioning social environment. Leaders place great emphasis on identifying and recruiting energetic, enthusiastic and committed researchers.

Leadership focus on the quality of research, quality assurance and cooperation with international environments. They regard this as extremely important, especially in relation to young researchers' professional development. Additionally, the majority of leaders are committed in the environments' productivity and efficiency. Leaders from the humanistic and social science research environments that took part in the study specifically stress the need to focus on research and the fact that this shall not come second to other tasks such as teaching and supervising.

Leaders present and emphasise the work of their research environments, both internationally and in relation to the corporate sector and the society as a whole. These issues are extremely important for the dynamic development of the studied research environments, not simply because of their impact on funding (The Matthew-effect), but also because these are related to the promotion of innovation via international 'networks of excellence'.

Additionally, the majority of leaders report that they have opportunities of influencing research policy through their research work and participation in different advisory and steering committees and councils. This suggests that leaders are well represented in the research policy-making system.

9.4 Communication, innovation and quality assurance

There is an intensive communication and an ongoing dialogue in dynamic and innovative research environments, both internally and externally. Research environments present results at international conferences, act as conference hosts, publish research relatively frequently and have transparent communication within their research field. They run web sites featuring projects and staff members, and the larger environments publish internal journals and magazines. Most of them issue their own 'working papers' series.

They work actively and systematically with internal communication, both professionally and socially and view these dual types of communication as being intrinsic parts of the same equation. They regularly host internal seminars where

both results and partial results are presented, and where publication issues are discussed. They place considerable emphasis on both the physical and psychological aspects of the working environments, including: joint coffee rooms, dining rooms and social events – all of which can be integrated with professional activities. Ways of communicating are influenced by international experience and by the presence of relatively large numbers of foreign researchers in most environments. Many of the environments are just as much part of the international research world as they are part of the Danish research environment.

This high level of external communication and knowledge transfer is a precondition for both innovation and quality assurance in the environments. Presentation of results, for example by way of papers submitted at international conferences, and the possible subsequent publication of articles in internationally refereed journals, function as quality assurance for the research. In addition, the professional research elite ensures that publication conforms to the highest scientific standards. Young researchers also gain the opportunity of publishing with more experienced researchers.

9.5 Researcher recruitment, human resource policy and working environment

What counts for most environments is attracting considerable number of researchers, including postgraduate students. This provides research leaders with options when recruiting new researchers. When it comes to appointments/recruiting, research leaders emphasise three criteria: professional qualifications, interest in the research area and social skills. It is considered vitally important that the appointment/recruiting of new staff brings new knowledge to the environment and furthermore that these researchers can function socially in the environment. Employees are apparently unaware that social skills evaluation already occurs in connection with recruitment, when ostensibly the sole consideration appears to be the professional potential of new employees.

Some environments experience problems attracting PhD students. This is quite clearly due to the fact that employment conditions (both economically and professionally) are poor for PhD students at universities and other public research institutions than for employees in other sectors – and this also includes employment conditions in the public sector.

Many leaders actively work to recruit foreign researchers – for example at international conferences. Some environments have found that Danish employment conditions pose a problem when recruiting abroad – especially in two areas: lack of job security and poor payment levels.

Considerable activity takes place on the human resources front at all staff levels. Leaders are thus very aware that technical administrative personnel and senior staff groups make up the core of research environments. The study reveals that working environment and human resources management feature in leadership strategies.

9.6 Research funding in dynamic and innovative environments

Funding of public sector research in Denmark comes from a number of different sources, with 62 per cent of total funding stemming directly from the Finance Act in the form of basic grants. External funding makes up the remainder, and this comes from both public and private sector sources. Overall, the amount of outside funding varies considerably between sectors and subjects.

Despite environments having very different administrative frameworks – ranging from networks on the one hand to well-defined departments on the other hand – there are many recurring common factors with regard to funding, including where:

- The studied environments have received a major grant from the public sector at some time (research council grant, specific programme-oriented grant, grant from The Danish National Research Foundation)
- Leadership uses considerable energy to secure external funds
- Dynamic environments have relatively many external funds when compared to other public sector research environments
- Grants come from many different sources – both from the private and public sector

While dynamic and innovative research environments that have existed for many years have secured successful funding for many of their projects, these funds have not materialised overnight. Leaders have spent, and continue to spend considerable time on securing funding and these efforts take place at many levels.

Leaders are a driving force in personally seeking out funding. They consciously use their professional positions to secure funds, participate in meetings with Foundation Boards of Directors and private sector companies. Leaders of dynamic research environments are, or have previously been actively involved in policy-making bodies.

Some leaders work actively to get other members of research groups to seek out funding. By being encouraged to independently seek out funding, researchers quickly become accustomed to the view that fund raising is an integral part of research activities. Some members of staff express the opinion that the pressure to secure funding is very high. They basically believe that this is a management task, and thereby express the opinion that they would like to avoid spending time applying for funds. Others believe that leaders spend too much time on fund raising rather than working on research strategies.

However, in dynamic environments the basic funding situation is good and the perception of both leaders and staff is that with sufficient funding research can take new directions.

9.7 Research policy initiatives

In a research policy context the designated research environments are partly successful due to the research policy undertaken. The right people in the right network have been in the right place at the right time, with the right aim or objective. What this refers to is that research environments have adapted themselves to existing research policy by help of the existing research and funding conditions system. In the final analysis the terms under which research environments operate in public sector research are determined by the context of the research policy under which they operate.

As stated, research environments in the study are well represented in the consultancy and funding areas of the research policy council system. Many leaders regard it as a duty, as well as a strategic decision to actively participate in formulating research policy aims and advising decision makers. This arises from their prominent research positions; positions that commit them to cutting-edge research and thereby set the research policy agenda. The strategic element arises from the requirement that environments are able to adapt to the research policy agenda – before actual changes are introduced. Insight and influence ensures the continuity of research environments, and their development and ability to survive in the long term. Short and long-term success – secured through knowledge about actual and future research policy initiatives – is safeguarded through participation in the formulation of these policies.

Leaders and research staff have stated many reasons and arguments why 'their own' research environments are – and continue to be – dynamic and innovative.

It is generally accepted that external funding from sources such as the Danish National Research Foundation and the Research Councils creates dynamically

innovative research. Programme funding is less good at creating dynamic research environments, as this type of funding is typically only available for short-term periods. Creating and developing new research environments takes time.

Leaders in the studied research environments are aware that focused and specific research management is not synonymous with applied-orientated or controlled research. Some researchers express though scepticism about the prioritisation of applied research, which they believe will reduce the future successful opportunities of research environments.

Nevertheless, research environments indicate that it takes time to develop unique research. External funding is often time limited and 'impatient', meaning that this type of funding assumes that 'mile stones' have already been achieved. Before these areas can benefit from external funding, research environments need basic funding from the public sector in order to experiment in new research areas. Successful external funding therefore requires that top-quality research environments already exist. As the study shows, researchers in dynamic environments are of the opinion that research subjects that attract political attention should not be over-financed to the detriment of other research environments with medium to long-term potential.

9.8 Putting research policy into perspective

The analysis of these dynamic and innovative research environments has focused on what the environments share in common, but the analysis has furthermore illustrated the fact that what really characterises them is their diversity. The study has identified the characteristic conditions that are vital to the development of dynamic and innovative research environments. These characteristics are not only present in research environments' organisations, but also in their frameworks.

At a research policy level the study results can be used as a starting point for building dynamic and innovative research environments. Consequently the following three points should be taken into account: organisation and leadership, framework and conditions – and resource allocation policy.

Organisation and leadership:

- Organisation and leadership should be flexible and present a broad operational canvas for both research leaders and researchers in the environments. This should be underpinned by intensive communication and dialogue, both internal and external, between researchers and other interests in society, including the corporate sector.

- The organisation should provide research leadership with increased opportunities for altering strategy and aims, adapting the environment to external events, changing resource priorities and recruiting new talents. Leaders should similarly be able to extend projects and appointments and use other necessary measures to manage the ongoing research process.
- It is important to ensure that the corporate sector is sufficiently aware and informed about options and perspectives for cooperation with public sector research. Tangible incentives for cooperation should be considered. Not all research is of immediate use to society, nor can it always directly match the immediate requirements of the corporate sector. This should be considered a priority otherwise the risk of overlooking innovative research would be too great.
- External dialogue and cooperation with other national and international research environments should be intensified and given high priority with respect to both networking and exchange of researchers. This external dialogue is a precondition for ongoing innovation in research environments.

Organisational frameworks and conditions:

- Frameworks and conditions should be adapted to differentiated research requirements. Identical conditions and terms for all fields and disciplines are not always optimal solutions.
- Organisation development at research environmental level should be strengthened. Dynamic research environments have either successfully created or adapted their frameworks as a stimulating leadership tool. The precondition for an innovative and dynamic research environment when developing these types of frameworks is the local knowledge of research` conditions and needs.
- The organisation framework should allow room for new constellations to emerge both as a way of ensuring innovation and to increase interdisciplinary initiatives. Research leaders should be in possession of the necessary management tools so as to be able to decide and implement new initiatives locally.
- Research leaders must have time and space to act as efficient leaders so as to be able to focus on research strategies and targets. Upgrading management skills should also be an option and an integrated part of

organisations development. The role of research leaders should be given higher priority in this process.

Resource allocation:

- Composition of funding types should vary between the different research environments and fields. The more uncertain the research task, the harder it will be to attract external funding. In many cases basic funding is a necessary precondition for subsequent research success. Ultimately this success will attract external funding for continued research.
- Research environments should have a greater scope for introducing varying types of incentives during the research process specially group collegiate incentives and access to direct or indirect remuneration systems.
- Research policies should be differentiated in such a way that areas with well-defined paradigms receive different treatment in policy making compared to areas where paradigms are not as yet firmly rooted. Research policies can prioritise research fields in the former area, while the latter should be allowed considerably more scope and freedom, both in terms of choosing research subject, funding and productivity.

Public and corporate sector research forms the basis of the knowledge society. This is the reason why there should be increased awareness about the interaction between different research fields and research environments. Dynamically innovative research is built on the exchange of ideas and inspiring dialogue between researchers from different research environments, organisations and countries. Researchers with varied backgrounds from the university world, sector research and corporate sector are therefore facing a challenge crucial to the future development of society as a whole – a compelling challenge they need to take up.