RESEARCH STRATEGY 2012-2016

Research Board, IT University of Copenhagen[1]

1. Introduction

This document describes the IT University's research strategy from 2012 to 2016. The research strategy is part of the overall strategy of the university for 2012 – 2016 which is based on a number of sub-strategies including the education strategy, the communication strategy, the globalisation strategy, and the IT strategy. Though the research strategy will be made publicly available, its primary intended readers are current and potential employees, students, advisory panels such as the Foresight Panel, and the Board of Directors.

The strategy is intended as a tool to be used by everybody across the organisation when making decisions regarding research. It provides guidelines enabling synergy and consistency in both daily and long-term decisions, yet leaves room for everybody to use their creativity, personal strengths, and common sense to make what they believe are the right choices in specific situations.

The baseline for this strategy is the growing importance of Information Technology (IT) in a wide variety of domains and the potential of IT research for addressing many of the big challenges to modern society within health, energy, social life, culture, etc. This is both a tremendous source of inspiration, opportunity, and obligation. The research strategy thus has a number of ambitious goals aimed at contributing excellent research that creates value, not only financially, but also via engagement in arenas like education, culture, democracy, globalisation, and social life.

The process of creating and writing the document has been based on input from the entire organisation. The Research Board of the IT University, made up of both management and faculty members, has been responsible for soliciting feedback from various parts of the organisation and, ultimately, the final wording of the strategy.[2] In the spring of 2011, various meetings were conducted amongst faculty regarding the nature of a strategy document, possible goals, and some of the key elements. Similar feedback was solicited from administrative departments, the Foresight Panel, and the Board of Directors. During the fall of 2011 a first and a second draft was circulated internally for feedback. A large number of valuable comments were received from students, staff, and faculty leading to substantial changes from the first to the second draft.

The document should be read as a specification; in order to illustrate the concrete steps to be taken when implementing the strategy, this document contains a number of sections labelled "Possible indicators" that suggest concrete measures of progress towards the strategic goals. These sections should be considered a first approximation that will be elaborated and detailed in the coming years.

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[1] Approved by the management (direktionen) on December 22, 2011.

[2] The members of the research board (as of fall 2011) are: Lars Birkedal, Iben Bruhn, Jens Chr. Godskesen, Peter Kamph, Carsten Schürmann, and Jørgen Staunstrup (chairman), and T.L. Taylor. In addition, Thore Husfeldt (representing the PhD Study Board during Carsten's absence) has participated in the discussions and writing of the first draft.

Although the vision and direction are the main elements of a strategy, it must also be read in a particular context for organisational development - one that traverses economics, politics, global trends, and internal principles. This is the underlying framework of the strategy (see Appendix A for more details).

2. Strategic Goals

This section provides an overview of the strategic goals of the IT University's Research Strategy. These goals are to be reached by 2016 and are elaborated and discussed in more detail in subsequent sections.

1. **Move up the reputation spiral.**
    The reputation of the people and their research at the IT University is the capital that, to a large extent, determines the chances of success in reaching the other objectives of the strategy. However, in order to increase this capital and gain recognition, the research must be supported, visible, and have impact.

2. **Increase externally funded research and research collaboration.**
    The IT University has already demonstrated a strong ability to attract external funding and establishing successful research collaborations that supplement base funding for research. However, significant more is needed to meet the demands for IT research from society.

3. **Contribute with valuable research.**
    In accordance with the mission of the IT University, the institution (in both teaching and research) should contribute to making Denmark exceptionally good at creating value with IT. The nature of research makes it impossible to promise results, in particular on a short time-scale. However, as a Danish university the IT University should take on some of the challenges for Denmark, the Danish economy, and the continued welfare of the population.

4. **Identify and further develop a small number of strategic areas.**
    During the strategy period, the IT University will initiate and carry through a transparent, bottom-up process aimed at identifying, and in some cases further developing, a small number of strategic research areas with broad impact.

5. **Stimulate strong research culture.** The IT University considers it crucial to stimulate and facilitate faculty growth, development and encouraging a common culture of collaboration and innovation.

6. **Strengthen the PhD school.**
    Since the PhD school is a key element of the research at the IT University and the graduates are an important contribution to the value created by the institution, continuous development of the PhD program is important.

3. Reputation

The research capital of a university is largely based in the cumulative impact, insight, experience, and results of its researchers and staff. This research capital is primarily assessed subjectively by people outside the university,

for example, research peers, partners in various sectors, students, government institutions, and international organisations. In the following, the term *reputation* is used to short hand this complex quantity. Part of the complexity is due to the fact that different stakeholders have different perspectives and their overall perception may not be the same. A challenge we thus face is developing reputation in spheres that are often diverse. This section is therefore divided into subsections discussing reputation as perceived by peers, by the general public, by political actors, and by collaborators. The overall objective is to obtain a balance where the IT University improves its reputation among all its stakeholders.

3.1 Reputation among peers

For a university, a good reputation among peers is the prerequisite for almost any other activity related to research. For example, finding new partners, getting invitations to the best groups, meetings and workshops, recruitment, career advancement, and funding are all directly related to peer reputation. Such a reputation is earned by disseminating the results for scrutiny (public and peer). This may take many forms: publication through the best channels is a must; but appearing at conferences, in workshops and in review- and program committees is also necessary. In addition, the research is most often communicated through people, for example via graduating students (who know the research), getting the research applied, or collaborative projects. Ultimately, achieving a good reputation both requires producing good research, disseminating it, and making sure it has impact.

Strategic direction

The IT University must make substantial advancements in its reputation among peers in the coming years. This is a prerequisite for being able to attract the right new faculty, students, and partners, as well as create value for our stakeholders. There will be competitors who will have much more abundant resources available to them; hence, it is of key importance to be innovative in the way research is done (for example through global interaction and finding those initiatives where our resources will maximize our advancement on the reputation spiral).

The IT University should continue developing new, ground-breaking ways of doing research and refine efficient key processes related to research like recruitment, funding, communication, operating equipment, and project management.

Possible indicators

In order to decide whether the IT University is improving its reputation among peers, we identify a small number of indicators and commit to improving these substantially:

- *Publications*: where the indicator should emphasize quality over quantity and be relevant for all research areas present at the IT University.
- *Invitations*: to program committees, research consortia, keynotes, and visiting professorships.
- *Quantity/quality of job applicants*: receiving job applications from good researchers.
- *Artefacts:* demonstrations, exhibits, software, prototypes, and the like that become reference points and are recognized as breaking new ground in showing how IT influences design practices, culture, or social life.

- *Funding*: being able to convince third parties to invest money in research or research collaboration is a very tangible measure of reputation. An indicator should preferably also have a qualitative element.
- *PhD graduates first job*: a number of PhD graduates find their first job through the network of their advisor/university. Hence, the reputation of the organisation hiring PhD graduates is an indicator of the reputation of the university from which they graduated.

3.2 Reputation among the general public

As discussed above, a significant portion of a university's capital resides in the work and reputation of its faculty and staff. While much of this is built within the framework of academia (amongst professional peer networks, for example) how the university connects with, and is thought about, in the broader public holds real importance. Voters, aspiring students, parents, and other members of the public all come to understand the value of the university in part through its connections with its employees (either via education or research).

At the same time, the university in general and faculty in particular, have an obligation to share and disseminate valuable knowledge to the general public, for example, by taking on the role as public intellectuals and contributing to keeping current debates in society informed and qualified by updated, valid, research-based knowledge. The value of visibility in this respect is symmetric, however. Researchers often acquire valuable input through participating in a close dialogue with the "real world."

Strategic direction

The IT University supports faculty engagement with the public and this kind of work will be recognized and institutionally valued. Work with the public is considered an important component of the university's capital and notable achievements in this domain will be recognized as such. The university will also facilitate these opportunities by providing an infrastructure that is well suited for facilitating visibility to the public.

Possible indicators

There are a number of ways faculty do important work bridging to the general public. Below is a list of indicators to measure if we are moving up the reputation spiral toward the general public:

- *Interviews:* in popular press articles, television programs, or documentaries where scientific findings are communicated or expert opinions are sought.
- *Talks and panel presentations:* in public venues such as library lecture series, lectures and presentations for administrative staff, trade union meetings, primary educations, non-academic conferences, or to non-profit organisations.
- *Research dissemination activities:* that fall outside traditional publishing and are intended for a broader audience (for example, short form video via YouTube or documentary film productions).

3.3 Reputation among political actors

Another important group of stakeholders for the IT University, beyond peers and the general public as discussed above, are the political actors (primarily in Denmark but also in the EU). This includes politicians, the central administration, lobbying organisations, research councils, and international organisations. Many decisions taken by these stakeholders will, to a varying extent, influence the future of the IT University, so visibility and good relations with these actors are of utmost importance. It is therefore an important task to engage in a dialogue with

these stakeholders to ensure a common understanding of the strengths and value of the university and its interpretation of IT.

Strategic direction
The IT University needs to continue the dialogue with political actors concerning the importance of IT which underpins education and research carried out at the institution. This means that we must continue explaining what we internally call the "IT triangle"[3] and the importance of all parts of the triangle for the continued development of society.

Possible indicators
The following can help assess whether we are attaining our strategic direction for maintaining visibility to key political actors:

- *Committee membership*: tenured faculty and management should when possible be members of central or relevant committees which are agenda-setting or have influence with political actors.
- *Advocacy*: management and the board will be proactive in continuing to "translate out" to various actors and agencies the work undertaken at the institution and the value created.
- *Research initiatives*: in order to be visible to political actors we must have some clearly visible research initiatives, of a size comparable to basic research foundation centres, or bigger.
- *Being efficient*: being among the four best universities in terms of bibliometric points per base funding.
- *Being agile and unconventional:* original initiatives in which the IT University engages should be an inspiration to other institutions, to the point of copying them.

3.4 Reputation among collaborators

One of the fundamental principles of the IT University is to engage in collaboration with external partners. Such partners should, of course, be sought both in the public and the private sector. A large number of them will most likely be international partners, due to the limited number of companies in Denmark that carry out research related to IT. The challenge here is to make sure that the impact and visibility of IT University is clear to potential collaborators so that we will be an obvious or even preferred point of contact whenever they have a research challenge to be dealt with. When we are in need of external partners to help carry out our research we should also be known for being worthwhile to collaborate with.

Strategic direction
It is important to make sure that we maintain a good reputation among potential collaborators who carry out IT research but, even more importantly, that we also maintain visibility to collaborators who belong to the non-IT sectors that are ready for research collaboration.

Possible indicators
Several developments can signal improvement in visibility to potential collaborators including:

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[3] Explained in the appendix as the first of the fundamental principles of the IT University

- *Strategic areas*: in order to be visible towards potential collaborators we develop a few strategic areas, illustrating the multi-disciplinary and crosscutting recognition of what constitutes IT within certain non-IT sectors.
- *Funding*: the amount of money that external partners are prepared to invest in IT research at the IT University is a very tangible indicator of the visibility and reputation of our research
- *Communicative initiatives:* developing and measuring the visibility of communication efforts such as research newsletters, films, and websites.
- *Requests for collaboration:* perhaps the most direct indicator of visibility and important is the number of requests for collaboration and advice.

3.5 Continuing to move up the reputation spiral

Reputation is not a static property, but a constantly changing position on a spiral where advances lead to further advances (and where, similarly, movement in the opposite direction is always a risk). Hence, moving up the reputation spiral is an important strategic objective. The current reputation of the IT University has been earned through a combination of top-quality research, innovative steps, an open, friendly and collaborative environment, the good use of resources, and strong support from stakeholders.

For example, our approach to IT as a multidisciplinary area reaching into almost all traditional academic disciplines (often illustrated with the IT triangle) is a notable intervention into how IT research can be under taken. Combined with the organisation's careful use of resources and agility, we've built a solid base to grow from. In the future, experimenting with and gradually implementing global interaction in key education and research processes will be an important way of improving the reputation of the IT University by being at the forefront of the globalisation of the academic value chain. These points, and many others, have all contributed to earning the IT University a good reputation in a short time-span. Though as a small public institution the IT University faces special challenges in terms of securing a spot amongst the most reputable international universities (as well as situating us in comparisons with other Danish universities), our ambition is to continue to build a high-quality internationally competitive institution.

4. Research Culture

In this section we discuss possible ways of fostering a strong research culture within the IT University. Around the world different models are used to organize researchers. At the IT University, we are not fixed on a particular model for all faculty members, because we recognize that members can contribute to the goals of the university in many different ways and develop their own best practices for their specific research conditions. A key focus of the strategy is, however, to help faculty grow, developing their research profiles, and overall career goals, thus contributing to the overall success of the university. To move towards being a globally interactive university, the IT University encourages collaboration between researchers with complementary competencies and across cultural and geographical barriers.

As a publicly funded organisation, the IT University is expected to deliver value back to society within the areas of education, research, participation in the public debate on IT related matters, dissemination, and developing and maintaining an international network. Some of the ways in which the university and its faculty create value for society are very tangible and have quantifiable measures: education (ECTS/STÅ), publications (bibliometric

measures), and external collaboration (funding). However, other equally important forms of value creation (network building and maintenance, public service, etc.) are more difficult to measure quantitatively, yet also play a crucial role and must be stimulated in equal measure.

As an institution we believe that for some areas more can be done in linking up individual research agendas and facilitating strong collaboration among faculty (both within and across disciplinary backgrounds). The IT University wants to facilitate collaboration (both among faculty, across disciplines and among all types of employees) and stimulate the formation of teams with all the needed competences to make great results and meet the ambitious goals for education, research, outreach, and dissemination. How any given team or project is organized will vary, and there will likely be some amount of specialisation or division of labour (e.g. some do more dissemination than others, teaching is not necessarily divided equally among all members of a team, etc.).

At the IT University, matters of professional and research ethics have been so far addressed in a rather ad hoc manner, delegating responsibility to researchers and staff involved in particular issues that posed ethical challenges. However, increasing local and global demands have also broadened the scope and importance of the ethical issues professional researchers face. While we acknowledge the Scandinavian tradition of self-responsibility and delegation, we believe that a modern, globally competitive academic institution must address research and professional ethics in a systematic way. The institution should thus formally attend to this during the next strategy period, both through explicit training of new PhD students in ethical forms of scientific inquiry and also through a commitment to fostering the university as an ethically oriented workplace.

We also note the growing critical interest within the academy and research community more broadly to the nature of the dissemination of scholarly work (for example via open access publications), as well as considerations of offering broad access to teaching materials and, in some instances, even raw data sets. The IT University sees this as an important conversation to be involved in going forward.

We finally want to highlight that some consideration should also be given to the relationship between the student population, faculty, and the overall research culture. Strong, ambitious faculty will want access to ambitious and excellent students. Hence, there must be opportunities for such students to participate in research. As a public institution the IT University is committed to broad educational initiatives, however, there must also be challenging opportunities for the students to get involved in research.

Strategic direction

The IT University wants to be known for its strong and innovative research culture. Therefore, we want to stimulate and foster faculty growth/development. It is the responsibility of management to ensure that there are ambitious career paths for each faculty member regardless of their seniority and to ensure progress along this path. The IT University will continually try to improve the working environment and infrastructure to stimulate research, and form policies on key processes related to career development (for example via clear promotion paths, mentoring, competence development, sabbaticals, administrative support for researchers to apply for funding, etc.). It is understood that the needs of researchers may vary substantially among the large variety of faculty from many different research disciplines and traditions. The university is committed to supporting research diversity in line with the research strategy.

A goal of this strategy is, then, the commitment to support researchers, helping them develop their professional goals in conjunction with the values of the IT University as an ethical workspace and research environment capable of handling the challenges that modern, global research interaction creates.

Possible indicators
The indicators are capturing the essence of the strategic direction discussed above, encouraging a collaborative, ethical, innovative, and multidisciplinary research culture that allows all faculty members to develop both as educators and teachers.

- *Research collaboration:* growing number of interdisciplinary projects.
- *Efficiency:* develop processes that encourage collaboration between administrative staff and faculty to effectively use their distinct competencies.
- *Infrastructure development*: making sure faculty and staff have the tools they need to carry out top-quality work (everything from library access to technical capabilities to work space).
- *Career development:* set up processes, incentives, programs, tools, resources and management to ensure that all faculty will develop their competences and achieve their professional goals in both education and research throughout their employment at the IT University.
- *Ethical orientation*: Develop an instrument to raise the awareness of ethical issues among staff and faculty, as well as provide sufficient training to PhD students.

5. Strategic Areas

This section describes how the IT University will develop a small number of strategic areas covering a significant part - but certainly not all - of future education and research at the university. A strategic area is characterized by a set of ambitious goals (discussed in section 5.2). These goals define the state of the areas at some point in the future. A process for developing such areas is outlined, aiming at developing a few (1-3) strategic areas by 2016. In order to be long-term sustainable the strategic areas encompass both education and research. A strategic area may, however, start out as predominantly a research effort, and in this document the focus is on the research aspects of the areas. This strategy document (finalized during 2011) does not identify the strategic areas themselves.

5.1 Motivation

The mission of the IT University is to contribute to making Denmark exceptionally good at creating value with IT. IT is a powerful tool for making changes and is the only factor that has over the past many years consistently contributed to better utilisation of resources, economic growth, new media, new cultural offerings and innovation in general. In addition, IT is also a very powerful tool in developing social life and relations. Hence, in line with its mission, the IT University has the possibility (and therefore the obligation) to engage itself in the significant changes needed nationally. This may be done by identifying a few strategic areas where the IT University contributes significantly (through research and education) to making Denmark exceptionally good at creating value. At its meeting in May 2010, the Foresight panel of the IT University expressed it in this way, "Identifying and developing a small number of strategic areas of strength will enable the IT University to 'demonstrate the long-term value created by the ITU investment.'"

In recent years, for example, several teams of researchers at the IT University have gathered around important themes that cut across the traditional disciplinary boundaries, for example, the Global Interaction Research Initiative, Algorithmic Intelligence, Pervasive Interaction Technology Lab, and the Center for Network Culture. Such initiatives provide some early examples of how bottom-up activities can provide vibrant research collaborations and possibilities. Identifying and developing strategic areas also contributes significantly to the IT University's move up the reputation spiral by offering opportunities to support focused communication about areas that develop strong recognizable profiles.

While some projects will be able to build capacity with modest resources, for many in order to grow and achieve impact they will need access to substantial resources and support. The IT University will invest in supporting groups of faculty who wish to work towards the ambitious goals set for strategic areas. Substantial external funding must be raised to make the strategic areas sustainable. Ultimately the goal of strategic areas is that they significantly leverage the expertise of a group of faculty and provide high impact/high visibility research.

5.2 Characterisation of strategic areas

The key idea in this section on the process for developing strategic areas is that it fosters bottom-up initiatives and makes decisions transparent. This will be done by having clear goals and incentives for developing the areas, leaving the responsibility to form new strategic areas mainly to the researchers themselves. This is intended to ensure engagement and that the areas truly reflect the strengths, visions, and interests of faculty. The process is well in line with the overall approach of the research strategy that it should enable everybody in the organisation who works with research to use the strategy to facilitate reflection on how their daily decisions are consistent with the overall direction of the university.

One can envisage several strategic areas to co-exist and develop in parallel. A number of potential strategic areas will develop from their current position towards meeting the goals described below.

> *Strategic areas* are strong, recognisable research initiatives that aim at creating extraordinary value by addressing long-term challenges faced by society. They must have significant impact, for example, by addressing areas with high-risk and a large potential for value creation. They must be academically, thematically, and financially sustainable (a variable factor based on the specificities & needs of any given project). Because of need for sustainability, strategic areas must include a sufficient number and mix of competencies to address the challenges of the area and they must attract a substantial part of their own funding. Because of the very nature of strategic areas, they will serve as showcases for the IT University and must strengthen its position to a point where key stakeholders (from Danish to strong international actors) consider them indispensable. Furthermore, strategic areas must have an exceptionally high academic level in terms of publications, PhD graduates, and peer recognition. Strategic areas must be reflected in the educational programs of the IT University and hence be attractive to a significant number of students. Strategic areas will be an integral part of the IT University's future and will play a role in resource allocation (for example, on research and administrative staff) and development.

The university will provide seed funding on a "by need" basis, offering resources to invest in and grow the strategic areas. The resources provided may be of financial nature, for example, scholarships for PhD students, new professorships, salary for post-doctoral researcher, salary for administrative support, equipment, lab space,

and travel. A strategic area must have a well-defined leadership (not necessarily a single person) that can take on the responsibility for the research goals, the resources, the impacts and visibility of the area.

5.3 Incentives for developing strategic areas

Towards 2016, the IT University will develop a small number of strategic areas meeting the goals described above. No a priori selection of areas is made. Any team of faculty may decide to collaborate on developing an area they believe has the potential to become a strategic area. Significant resources will be made available to support and accelerate this development in the form of incentives. Initially these teams must make a plan for how to meet the goals. The characterisation of the strategic areas reflects the mission of the IT University. Along with the incentives an evaluation system must be developed to judge progress. Since enabling Denmark to create value with IT research is a goal, in addition to internal review some external stakeholders must be involved in the evaluation, and some of these must take a Danish perspective.

6. Relationship to Education

The university prides itself on the fact that all faculty are not only engaged researchers, but active teachers as well. At the IT University, researchers are expected to participate in the educational programs and are discouraged from using external funds to achieve significant reductions in teaching obligations. Another key principle at the IT University is a tight coupling between research and education by ensuring that the IT University's areas of active research support the academic level and contents of its educations. For the PhD program, this means that PhD students are only admitted in areas where the IT University has research activities. At the master- and bachelor levels, the university is committed to research-based education to maintain an academically and financially healthy environment[4]. We additionally recognize that faculty and excellent students to be mutually interested in working with one another. Hence, it is important to establish courses, specialisations, or other visible educational offers with extraordinary ambitious teaching goals. This is expected to have a stimulating effect both on the level and contents of related undergraduate programs, to improve the recruitment situation for research education, and to provide a rich and vibrant environment at the IT University with a clear commitment to academic excellence.

6.1 PhD education

PhD education is a key element of IT University research. Our PhD graduates are an important contribution to the value created by the IT University, as well as an important indicator of its reputation. The strategy for the coming years therefore proposes several aspects of development of the PhD program.

The IT University wants to increase its palette of PhD programs, including a 3+5 model in which candidates are selected after a bachelor's program to complete a 5-year PhD program. Such a program would be a strong supplement to the related masters educations, and may help bridge the gap between the IT University's undergraduate educations and current research. At the time of writing this strategy, there are still major unknowns concerning the legal and financial framework of a 3+5 model. These uncertainties have to be addressed before it can be decided whether to start a 3+5 program.

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[4] The definition of research based education is discussed in the ITU Education strategy 2012 to 2016.

Funding challenges remain an important issue in the development of the university's PhD program. A large part of the IT University's PhD students are funded through external grants and tied to specific projects. In fact, it is likely that this part of the composition of the financial resources available will increase in the coming years. The number of industrial PhDs will also increase. The IT University, however, remains committed to supporting a small number of PhD scholarships fully financed from internal funds. Despite the various funding models it is important that all PhD students are treated according to the same high academic standards and receive the same support. The PhD School is responsible for the recruitment of excellent candidates and relies on faculty to be invested in those tasks. Grant applicants and research administration are responsible for making well-motivated choices about using PhD students as project personnel.

Amidst the financial challenges, it is important that the IT University contributes significantly to the education of PhD's in Denmark and therefore it is a goal to raise the number of PhD students admitted significantly (without sacrificing quality). A first target is to admit enough new PhD students every year to enable every tenured faculty member to always supervise at least two PhD students. However, the long-term goal is to raise the admission even further.

The IT University is aware of a joint responsibility for PhD education beyond individual supervisor obligations. This includes involvement in and administrative support for a solid offering of PhD courses, research seminars, reading groups and the like, that offer both breadth and depth. IT University researchers are expected to be actively involved in administrative services (PhD School board and various committees), including faculty assessment of potential candidates, hiring, evaluation, and graduation.

Possible indicators
- *3+5 program:* By 2016, it has been analysed whether a 3+5 model can be introduced and if it can, the first steps have been taken.
- *Funding:* A number of industrial PhD students and several internally-funded PhD students are active.
- *Number of PhD students:* There is an average of two active PhD students per tenured faculty member.
- *PhD courses:* A catalogue of PhD courses is advertised also to students in the greater Copenhagen area.
- *Special offers to excellent students:* Well-aligned courses on early master's level in strong research areas and a track or even a separate program that allows excellent IT University students to participate in graduate education.
- *PhD School:* The interests of all faculty members are well represented in the PhD School and PhD hiring process.

7. Summary

The goal of the research strategy for the IT University is to provide a guide that helps shape the everyday working life of the organisation, and the decisions it takes along the way, during the years 2012-2016. Ideally the research strategy will serve to foster individual faculty growth, research collaborations, and overall organisational development. The central goal of the research strategy is to contribute with research that makes Denmark exceptionally good at creating value with IT. There are six objectives enabling this value creation:

The first is that the IT University should *increase the reputation* of the researchers and their research (move up the reputation spiral).

Second, *externally funded research and research collaboration* should be increased. This will allow the IT University to do more research and hence increase its visibility and impact.

Third, the IT University will continue to *contribute valuable research* and additionally, fourth, identify and develop *a small number of strategic areas* where education and research are particularly strong, important and visible.

None of the strategic goals can be achieved without having strong faculty and staff at the IT University. Therefore, the fifth goal is to *support a strong research culture*   while encouraging a culture of collaboration and innovation.

Finally, the sixth goal is to *develop research focus and capacity within our educational programs* at the Bachelors, Masters, and PhD level.

Through pursuing these strategic goals for research, the IT University will be well prepared for our next stage of development and new challenges. Keeping in mind the crucial external and internal factors that shape how we can move forward, these proposed goals highlight the centrality of, and commitment to, the best research possible. At the heart of the intention behind the goals is also a belief in the core value of people - the faculty, staff, and students - to make such ambition achievable. By supporting and developing our researchers, fostering bottom-up initiatives that capture the enthusiasms and expertise of our faculty, we can build the strongest institution possible.

Appendix A: Context

This appendix gives an overview of the context in which research at the IT University may develop in the years 2012 – 2016. It traverses economics, politics, global trends, and internal policies and is the underlying framework of the strategy. The context has two parts. Forces that are beyond the direct control of the IT University define the external context. The other part is the internal context, which is already established and largely defined by decisions taken by the IT University in the past, for example, our definition of what IT is, values, and principles for education and research.

External Context

The external context is determined by forces that are in many ways "a given" and can only very indirectly be influenced by the IT University. The three most important aspects of the external framework are: international trends, national politics/finances, and the EU.

International trends: The most significant international research trend is the growing importance of IT in all research fields (and in some complete dependency), economic sectors, and social life/culture. The mapping of the human genome, study/development of network culture, and economic modelling are examples of research areas that are not only deeply dependent on IT, but which also create interesting challenges for research in that domain. This integration of IT into a wide variety of research areas, as well as broad aspects of modern society, is a tremendous source of inspiration and opportunity. Rather than relying on narrow, technological formulations of IT, we increasingly see the necessity of an expansive one that involves a range of approaches, both disciplinary and methodological. Although there is a growing realisation of the importance of IT, not just as a tool, but as a rich area of research itself, there is still a long way to go before the importance and indispensability of IT research is widely recognized among politicians, in the board rooms, within public administration, and even the universities at large.

National politics and finances: The Danish economy is strongly influenced by the international financial crisis, and by a long period where the growth in GDP and productivity has been weak combined with a large deficit on the state budget. The IT University will continue its efforts to place IT research high on the Danish national research agenda and to increase the awareness of the importance of IT research for development and growth in almost all research fields, economic sectors, and social life/culture. Research in IT at the other Danish universities has also been strengthened in recent years. The IT University is happy to be in close collaboration with strong research groups at these other universities. At the same time, competition from these must be expected (and welcomed) for the limited resources available for IT research.

EU: The significance of funding from the EU is expected to increase in the coming years. It is very likely that the European Union will gradually take over some of the roles played by national research politics and the Danish research councils. The first steps in this direction have been taken with the "integrated platforms" introduced by the EU. There is a strong push from the commission to coordinate research in and amongst the member countries. Another important development at the EU level has been the creation of the European Research Council (ERC). By the end of 2011 the EU Commission published its plan "Horizon 2020" that provides many interesting opportunities for IT research.

A significant international economic trend is globalisation. In addition to its economic impact it will also influence research itself. It is, therefore, an important challenge to universities in general and the IT University in particular. Globalisation has led to fundamental changes in production, services, transportation, and finance. Research (both funding and the way it is done) has until now not been affected very much. This will most likely change. The IT University has a globalisation strategy[5]. Although many of the concrete steps in this strategy relate to education, the first sections cover research as well.

Internal Context

This section contains a short summary of the internal context within which the research strategy must position itself.

Mission and Vision: The mission and vision statements of the IT University are:

>**Mission:** The mission of the IT University of Copenhagen is to deliver internationally leading teaching and research which enable Denmark to become exceptionally good at creating value with IT. Teaching and research in information technology include all academic activities that involve computers.

>**Vision:** The IT University of Copenhagen is an outstanding example of how a small university by being innovative and globally interactive can achieve a ranking among the best in the world, both in terms of academic standards and in terms of creation of value.

Fundamental principles: IT research and education at the IT University are based on these three fundamental principles:

>**A unique view on IT:** Information Technology is about handling mental constructions with digital technology wherever they appear: in arts, in science or business. This very inclusive view on IT is often illustrated with the IT triangle. It is further illustrated in the short film "A Unique View on IT"[6].

>**Education:** All educations at the IT University strive to meet all the following three criteria: attracting a large number of well-qualified students, world class academic contents, and giving students the competences needed for the future job market. This is further illustrated in the short film "That which distinguishes the IT University's Programmes[7]".

>**Research:** All research at the IT University is expected to be motivated by *both* the search for fundamental insight *and* consideration of use (Pasteur's Quadrant[8]). This is further illustrated in the short film "Expectations for research[9]".

Interdependence of education and research: There is a tight interdependence between education and research at the IT University. In addition to the traditional relation between the two found at all universities worldwide, in Denmark there is also an additional tight financial coupling between them. All faculty have to divide their time

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[5] http://itu.dk/en/~/media/2A4ADE532DA04561B984E773E5543AD8.ashx
[6] http://www.itu.dk/en/Om-IT-Universitetet/Grundprincipper/Unik-definition-af-it
[7] http://www.itu.dk/en/Om-IT-Universitetet/Grundprincipper/karakteristika-ved-vores-uddannelser
[8] Donald E. Stokes, *Pasteur's Quadrant - Basic Science and Technological Innovation*, Brookings Institution Press, 1997
[9] http://www.itu.dk/en/Om-IT-Universitetet/Grundprincipper/karakteristika-ved-vores-forskning

between education and research. However, education and research are financed very differently. In a static situation where the amount of teaching is fixed and the research is covered by base funding and externally funded research projects, it is simple to handle. However, in any scenario with changes, whether it is growth, shift of academic areas or anything else, handling the financing is a challenge; because the income from teaching and research are controlled by very different mechanisms. The accreditation of Danish study programs require that the programs are "research based." Preparing for accreditation of future programs imposes additional constraints on the research strategy.

Organisational values and personnel policy: The values and personnel policy defines the framework for the day to day collaboration at the IT University itself and with external partners/stakeholders. The values of the IT University are: accountable ("ansvarlig"), forthcoming ("imødekommende"), and direction finding ("toneangivende").[10]

Finally, the personnel policy provides a framework for all employees. It also has specific sections related to research, e.g., handling of inventions.[11]

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[10] http://www.itu.dk/en/Om-IT-Universitetet/Organisation/Vaerdier.
[11]

http://intranet.itu.dk/en/~/media/Personale/Politikker/Personalepolitik%20200611%20underskrevet%20engelsk%20pdf.ash x