2017

WHITE PAPER FOR THE ROYAL ACADEMY ANNUAL SCIENCE-POLICY MEETING

UNIVERSITIES IN THE BLUE OCEAN
FOREWORD: FROM THE RED TO THE BLUE OCEAN

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NOTES
‘The Danish Universities’ are the focal point for The Royal Academy Annual Science-policy Meeting 2017. We invite guests to take part in a dialogue on the university as a staple institution of society, as a place of learning for some of the country’s brightest talents, as a creative space for innovation and development. It is our firm belief that these roles for the university are more important than ever. The stakes are high both on a small and larger scale: It concerns foundations, the common good, and socio-economics.

Universities have been some of the most constant and stable institutions in Europe. They have been central anchor points supporting values and ideas throughout social upheaval, wars and revolutions. They have also functioned as a space for technical, social and artistic innovation, which have constantly left their mark on the reality that is our past, present and future.

Universities deal with the long-term perspective when it comes to knowledge production, education, and career paths. It concerns important words such as ‘quality’, integrity’, ‘insight’, and ‘understanding’. But it is
only possible to maintain and develop the long-term perspective if also keeping a constant eye on the real world expanding here and now. What does relevance mean today? Who do we take into account when navigating locally, nationally, and globally? What value and which values do universities create and protect, and should continue to do so?

Universities are required to work constantly, strategically, tactically and meaningfully, to develop a relevance that both keeps up with the times, but also with the tradition that is an integral part of their DNA.

To open this debate, we have been inspired by a strategic metaphor that has proven productive and valuable in other sectors. The idea of the *Blue Ocean* opened many people’s eyes to the fact that competition does not just involve navigating shark-filled waters coloured red by the blood of those that didn’t make it because of ruthless competitors and a merciless environment (Kim & Mauborgne 2005/2015) Successful strategy can instead look at sailing in unexplored waters to discover what it means to be a vessel and what the goal of the journey could be. It means to set sail on an ocean blue with hope, light, and opportunities. If you are in *the blue ocean*, it is because you are sailing under a *blue sky*.

Our analysis shows that in recent years Danish universities have navigated a red ocean with even greater micromanagement, and very little strategic space for action. This is neither suitable for researchers, students, end-users or society in general.

The analysis does not provide simple solutions, but offers proposals for where we can direct our focus and energy, where we can increase and reduce, where we can think innovatively, and what should be abandoned if the universities are to navigate the blue ocean. The guidelines, which we elaborate on in Section 5, make it possible to coordinate, plan and develop in close cooperation between universities, agencies, and stakeholders. They require us all to grapple with established habits, and they affect research, education and career paths. We hope that they can pave the way for a new *social contract* with the universities and for a rethink of their
division of roles and that they may provide a starting point for concrete proposals and initiatives. We believe they can create a Danish university sector permeated by *quality and dynamic diversity*.

Our analysis covers a need to establish a long-term, strategic space of action for universities. They face a challenging situation where a large part of research financing is based on short, competitive funding, which often does not cover the real costs associated with research. Without the opportunity to navigate, it is difficult to reach a blue ocean. This space of action can be established in many ways, ideally in collaboration between public and private sources of funding. It requires however, that we rethink the financing of the research sector (see Section 4).

The development is also undermining the identity of the *faculty*, comprised of assistant professors, and permanently employed associate professors and professors, who make up the backbone of the university. It makes it difficult to commit to value innovation at universities.

Our analysis shows that there is a need for investment if we are to optimally utilise our research potential. The close link between research and education at a university ensures that one can relatively risk-free – and cheaply – invest in seeking out new fields, explore innovation and practice *disruption*. Plus, it also results in good graduates. This investment is necessary for universities to contribute to solving the new challenges faced by society. We estimate that research is currently underfinanced by about DKK 6 billion per year (see Section 4). The analysis shows that the middle layer of *faculty*, *i.e.* have a particular need for financing opportunities.

This year’s theme follows naturally from last year’s annual meeting where the focal point was *The Meaning of Research for Society* (Committee on Science Policy 2016). We examined the characteristics of science across disciplines and fields, and the traces and interactions they lead to. This year’s theme moves the focus to the institutions. Science is not practised in a vacuum. It requires resources, and buildings, people and machines; an institution that can provide a framework and ensure continuity and develop-
ment. Universities are unique places that create a framework for forward-looking research that leaves an impact. Society cannot develop and renew itself without them.

We plan to continue the theme in 2018 by focusing on education. There are a lot of indicators that the magic ingredient in a university’s dynamic is that very close link between research and education, right down to the daily work of the individual, whether they be researcher, student or administrator. This close link ideally ensures that knowledge is not simply a reproduction and tasks are not just written exercises. It guarantees a constant stream of talent, energy, and youth that commits to and renews on all levels. But more on that next year.

In this White Paper we contend that universities are meaningful on both a small and larger scale. They deserve to be taken seriously and to be trusted. They grow by engaging in a broad dialogue on where we are going and how we should do it together. They thrive when given the freedom to explore new waters with Humboldt, Stanford and the Danish Folk High School as important indicators.

Mogens Høgh Jensen
PRESIDENT, ROYAL DANISH ACADEMY OF SCIENCES AND LETTERS

Andreas Roepstorff
CHAIRMAN, COMMITTEE ON SCIENCE POLICY
The blue ocean is often used as an example of freedom, greatness and infinity. It is here where the sky and the sea melt together, and where nature flourishes with all its beauty and power. The image of the blue ocean has been used in film and literature to express the dream of a different future. At the turn of the millennium, the image of the blue ocean was used in the strategic thinking of two professors from the French business school INSEAD in the international bestseller Blue Ocean Strategy (Kim and Mauborgne, 2005/2015). It was used as a metaphor for how organisations can create another and far more growth-oriented future by looking towards the blue ocean - instead of remaining stuck in the ”red ocean” with all the others. Similar ideas were also developed in Hamel and Prahalad’s influential Competing for the Future (1994). The Committee on Science Policy has been inspired this year by the metaphoric blue ocean to rethink the role of universities in society and encourage universities to move away from an even more regulated and crowded red ocean to find the balance between freedom, quality and contributing to social innovation once again.
WHAT IS BLUE OCEAN STRATEGY?

The idea behind the blue ocean is to move away from the classic strategic way of thinking, which has had significant impact in the last decade. The recipe for a good strategy at that time – led by thinkers such as Michael Porter from Harvard Business School – was first and foremost to find a spot in the market that was already defined by a number of different market forces. Companies could choose to pursue a small, highly-specialised area as a niche-business, or a larger area, where they could compete on price. According to Kim and Mauborgne, no matter what they chose, the majority of companies ended up competing to death in an endless hunt for many of the same competitive benefits. This results in competing over even more minute differences in costs, productivity, and operational optimisation – producing the image of the red ocean. In the red ocean, companies have lost the ability to think differently and find themselves in a collective downward spiral, with a risk of an even more conforming market, and more uniform products and services.

Companies should instead focus on creating new markets by looking to the future and listening to the needs that are constantly developing. It requires innovative thinking, or rethinking what the company stands for and how it creates value and growth. It is a parallel to the ongoing discussion on disruption, where existing business models are being reinvented through digitalisation and global sharing-economy, illustrated by the explosive growth in Uber, Airbnb, Tesla and MobilePay. However, the blue ocean is not just about technological innovation. It is also about rethinking the very core of what the company is and how it creates growth. It does not always require a dramatic break from the existing business model as in disruption, but that the company innovatively rethinks how it can develop going forward. There are endless possibilities – also in branches considered to be already developed to their fullest. Who would have thought that a Danish juice chain, Joe & the Juice, would be able to make ambitious in-roads into the American market where there is already a Starbucks on every corner? Simply put, they have achieved this by combining a health club with a night club thereby challenging the accepted impressions of what a juice bar looks like – they added an international lifestyle and sensuality to the health experience.
Joe & the Juice is a reminder of one of the key examples from Kim and Mauborgne: the Canadian Cirque du Soleil. Cirque found itself in the red ocean where they were competing with others for even better artists and funnier clowns, which created increasing spiralling costs. Meanwhile, the public’s appetite for the classic circus continued to wane. This provided the motivation to think outside the box. The result was a completely new experience, where they reimagined the idea of what a circus is, by combining excitement and entertainment from the classic circus with the intellectuality and content from the world of theatre. Cirque du Soleil were first-movers in a completely new genre, which created a global market. Australian wine producer Yellow Tail similarly cemented itself in the American market by simplifying the approach to its wines and thereby reaching a much wider audience.

The cornerstone of both examples is value-innovation whereby new value is created by renewing the existing form of competition. The starting point for value innovation, when value creation risks being too measured and short-sighted, and innovation risks being too futuristic and long-term, is to create valuable renewal in the short-term by maintaining the long-term goal. Hereby combining the long-term diversification with the short-term cost-savings. The approach cancels out the separation between a strategy that focuses on diversification and one that concentrates on low costs.

THE PATH TO THE BLUE OCEAN
To carry out a blue ocean strategy Kim and Mauborgne recommend following a number of different steps – two of which we have briefly described here. The first step is to understand and analyse which factors characterise the existing marketplace. This is called a strategic canvas and analyses: what the central competitive parameters are, what is being invested in, and what are the characteristics of the products/services received by the customer? Regarding the two examples from Cirque du Soleil and the Australian wine industry Kim and Mauborgne identify the following factors that characterise the existing market (Table 1)
The next step is to break away from the existing form of competition and engage in value innovation by considering four fundamental questions:

1. Which factors taken for granted in the existing industry should be eliminated?
2. Which factors from the existing industry standard should be reduced?
3. Which factors should be enhanced more than the existing industry standard?
4. Which brand new factors should be created, currently not featured in the existing industry?

Regarding the two examples, Table 2 shows how the four main questions have inspired *Cirque du Soleil* (A) and Australian *Yellow Tail* (B) respectively to create successful new work methods. They lead to the blue ocean.
TABLE 2

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<tr>
<th>ELIMINATING FACTORS</th>
<th>ENHANCING FACTORS</th>
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<tr>
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<td>A</td>
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<tr>
<td>A STAR ARTISTS</td>
<td>UNIQUE PERFORMANCE LOCATIONS</td>
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<td>ANIMAL SHOWS</td>
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<th>REDUCING FACTORS</th>
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<td>A</td>
<td>THEMATIC</td>
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<td>FUN AND HUMOUR</td>
<td>ELEGANT ENVIRONMENT</td>
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<td>EXCITEMENT AND UNEASINESS</td>
<td>MANY PRODUCTIONS</td>
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<tr>
<td>WINE’S COMPLEXITY</td>
<td>ARTISTIC ART AND DANCE</td>
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<td>WINE’S VARIETY (NUMBER OF CHOICES)</td>
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<td>WINEMAKER’S PRESTIGE</td>
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<th>B</th>
<th>EASY TO DRINK (TASTE ADJUSTMENT)</th>
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<td>PRICE VS. BUDGET ADJUSTMENT</td>
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<td>INCREASED INVOLVEMENT OF RETAIL INDUSTRY</td>
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RELEVANCE FOR UNIVERSITIES
The two examples have been simplified to their most basic form. Furthermore, the examples are limited by the fact that the two companies are considered isolated and it is assumed they can manoeuvre alone in the blue ocean. This is rarely the case in practice and definitely not in a complex, whole sector such as the world of universities. However, inspiration can be drawn from the approach’s insistence on rethinking what value is and how it is created, rather than focusing on how to be just a little bit better than the competition in a zero-sum game (Kim and Mauborgne 2005). It requires however, that one moves up and down the scale from the individual researcher to the institution to the whole sector. When examining the new factors needed to achieve value innovation, it is also necessary to carry out a deeper examination of the significant digitalisation and other technological developments that have taken place since these examples
were first expressed. It is pivotal to what the World Economic Forum calls the 4th Industrial Revolution, where a number of new technologies cross physical, digital, and biological worlds (Schwab, 2016). It will fundamentally change the reality that universities must prepare for and carry out research in.

Universities find themselves in a market of knowledge and education, which has become even more globalised and standardised in the last decade. International accreditation, increased mobility and a sharper focus on international publications at universities, which previously had a more local focus, has intensified the competition for resources, research talents, and talented students (who are fee-paying in most countries). Regarding both research and education, Denmark is well-placed and internationally competitive compared to the country’s size (DFIR 2016). However, a number of reforms (DEA 2016) have created an even greater red ocean for the universities through even greater micromanagement, which leads to a greater degree of conformity between the different universities and a focus on the lowest common denominator. Meanwhile, there is also a move towards further reducing the autonomy of universities and thereby limiting local opportunities to improve their global competitiveness. Instead of turning the focus towards how we can produce the best quality in research and education and create the greatest contribution to innovative power in society, the focus remains on an even more fine-meshed and formalised degree of goal attainment.

Our wish is to recreate the innovative power of universities in society by allowing ourselves to be inspired by blue ocean thinking. How can we rethink the existing universities and add strong entrepreneurship to create value innovation for the universities? And how can we ensure that there will also a place for Danish universities in international knowledge creation and dissemination in the future, which is crucial for maintaining our growth and prosperity?
The aim of universities through the last 1000 years has been to house and create new knowledge, and educate for the benefit of society. Universities were previously self-governing with their own jurisdiction, and even their own prison service as was the case at the first Danish university, the University of Copenhagen (KU), which was founded in 1479 by Christian I with leave from the Pope. After the Lutheran Reformation in 1536, the university was reopened as a Protestant university. And until 1836, the university’s form of governance was largely a matter for professors and a chosen rector, with its own funding and only partially dependant on contributions from the State. From its foundation, the university has been part of an international network where Danish scholars had close ties with colleagues at other European universities. A number of new universities joined it in the 20th century: Aarhus University (AU) was founded in 1928 as the second in the Danish kingdom. There are now eight universities in Denmark: the University of Southern Denmark (SDU, 1968), Roskilde University (RUC, 1972), Aalborg University (AAU, 1974), and the IT University of Copenhagen (ITU, 1999). The Technical University of Denmark (DTU) was founded as the College of Advanced Technology in 1829, and
Copenhagen Business School (CBS) was founded as Handelshøjskolen (The Business School) in Copenhagen in 1917.

Every institution has its own history, which leaves an indelible impression on the current organisation and identity. KU and AU have traditionally been characterised by the classic Humboldtian model of higher education, which first developed in Berlin in 1810. Its core ideal is one of self-sustaining institutions that span a wide range of scientific fields and disciplines. Its organisation was built around distinct subjects with focus on academic freedom and close ties between research and education, but not necessarily focusing on distinct needs in the surrounding society.

The establishment of the newer universities has challenged this model. After the universities’ merger of 2007, which included sector research institutions, the Royal Veterinary and Agricultural University, the Aarhus Business School, the Danish University of Education, and the Danish Pharmaceutical College, KU and AU have also grappled with the Humboldtian organisation. Today sees a more heterogeneous institutional landscape, both between the universities, and internally in some cases. In parallel with this institutional development, universities have also developed from admitted a few hundred students in the beginning of the 1900’s, to the current so-called university of the masses, where a good 25% of a year group go on to attend university.

Following debates around 1968, the Act of Governance for universities was adapted so that the so-called might of professors was changed and universities’ students and technical/administrative staff had a voice and were represented in the governing bodies. In 2004, a new universities act was adopted which introduced boards with a majority of external board members and internally elected members chosen from among teachers, students, and technical/administrative staff. The current boards are co-opting, and they employ rectors who guide the university through a hierarchical line management with employed deans, institution leaders, etc.
The form of governance in universities today, in addition to boards and the employed academic hierarchy, is characterised by micromanagement from the group of owners who, via an accreditation institution and evaluation institution, control and approve both current and new educational programmes. There are detailed development contracts between the university and agency, and a complex budget model whereby universities receive basic funding, funding from research output, and funding from the number of existing students (STÅ rates). This taximeter system has become even more complicated in recent years with a completion bonus, which rewards universities for graduates completing programmes, and a progress reform, which penalises them if they do not reduce the length of time used in study programmes by 2020 (Universities Denmark 2016). Thus the education area is under an increasing degree of public regulation and control.

Parallel to this development, an increasingly greater share of research funding is represented by public and private foundations in particular, often via competitive funding within quite specific areas. The large percentage of private foundation funding is a unique Danish phenomenon and in recent years, has had even greater prominence because of the cuts in public sector funds and increase in private funding. An internationally unique financing landscape has been established for research, which has historically leaned towards biomedical research and with a great degree of variety across other research fields (SFI 2016). The landscape is developing rapidly and is driven for example, by a legitimate desire in many public and private foundations for a greater degree of strategic and catalytic effects from their efforts, which are also being articulated more as investments rather than grants. This creates unique opportunities for direct cooperation between universities, foundations, and the societal stakeholders they represent.

The Danish universities face stiff competition in this complex environment: for programme places, students, educational programmes, PhD grants, and national and international research grants. It is a red ocean that has become increasingly choked because of cuts to university grants and
to independent public funding for research from 2015. Meanwhile, the accumulation of restructuring, mergers and increased micromanagement means that it has become even more complicated to navigate somewhat freely in the different layers of management. Universities are experiencing internally that the noble academic exchange featuring collaboration and competition with the meritocracy as an assessment criterion, has been supplemented with - and in some cases replaced by – an understandable strategic focus on costs.

This is in sharp contrast to the widely-held belief that universities should deliver the best research and education by international standards. Therefore, we find there is a need for a serious and thorough blue ocean strategy for Danish universities. We do not have a completed formula, but would like to lay the groundwork for a discussion with all stakeholders: universities with researchers and students, the group of owners with the ministries and agencies as representatives for society, industry, commerce and the public labour market, which has a need for graduates and research results.
The red ocean is characterised by the competition faced by everyone against everyone else on the same playing field with the same goal. It is a precise metaphor but not an exhaustive description of the reality in which universities navigate, or the featured dynamics at a university. One also needs to think of complex ecosystems with players and coalitions on many levels.

There is a constant dynamic in an ecosystem between that which builds and that which breaks down. There is a need for both stability and change to maintain continuity and make development possible. There are processes straddling different scales from the individual to groups and larger units. It is not a simple picture, but transposed to the world of universities, it paves the way for analysis of these dynamics on different levels. From the research microsystem comprised of researchers, lecturers, institute leaders, advisors and students, to the research macrosystem of institutions and stakeholders both at home and abroad. To understand the ecosystems balances and imbalances, one has to understand the dynamic interaction between these different parts.
Looking at the university sector overall, the "World-class knowledge" report (DFIR 2016), shows that Denmark performs quite well internationally. By comparing the historic development of a large number of key parameters in Denmark, Sweden and the Netherlands, DFIR demonstrates that "the research system can be compared with an ecosystem, where its maintenance and development is controlled by a sensitive balance". The balance is governed by a number of central elements as variables that mutually affect each other. "Some of these variables create dynamic, others ensure stability...An appropriate balance can create the foundation for the dynamic and quality found in excellent research environments".

The picture becomes more complicated the deeper one delves into the system. DFIR identifies three layers of researchers at universities: a top layer of permanent staff who attract large grants, a middle layer of permanent staff who only have a few individual research resources, and a growth layer of temporarily employer researchers and PhD students. The report shows that a shift in balance between these layers has occurred in recent years. The top layer has had relatively better access to resources because of competitive funding. Meanwhile, the growth layer has increased in number significantly because of a political desire to educate more PhD graduates and prioritise competitive research funding. The middle layer has been squeezed in the process as basic research grants, which previously could have been used to support the middle layer’s research, are now of an amount that in many areas can barely support the most basic activities. This has resulted in an "hourglass model": fat at the top, a wide base at the bottom, and a narrow bottleneck in the middle (Figure 1).

**FIGURE 1 / THE STRUCTURE IN THE DANISH RESEARCH LANDSCAPE**

Illustration of the structure in the Danish research landscape from the rhombus of a lot of funding for researchers employed in the middle layer (1980-1990) to the triangle (1990-2006) and now the hourglass where the middle layer is squeezed (2006-) (DFIR, 2016).
The outlined hourglass model creates all the conditions for an internal *red ocean* on all levels and with relatively little dynamic exchange between them. The growth layer is competing to enter the ranks of the permanently employed, the middle layer is competing to establish independent financing in order to develop a research profile, and the top layer is competing to constantly develop their CV so they may remain competitive.

The DFIR report best demonstrates that the research microsystem cannot be understood without also looking at the macrosystem and its governing mechanisms. The hourglass model plays out within a greater institutional framework and the individual researchers are not in practice isolated individuals purely competing with each other. The system unfolds in a complicated environment with players on many levels, departments, institutes, and universities. A *blue ocean* perspective can shift the focus from the individual’s struggle in a *red ocean* to an understanding of how the department, institution or sector as a whole can create new opportunities through value innovation. It is not just about competing on an established field, but about creating value through renewing the existing ways of competing. It is about creating valuable renewal in the short term by keeping an eye on the long-term goal.

It allows Danish universities to be viewed from a greater, international perspective. The research horizon has always been international and it is now more important than ever. *Times Higher Education* has recently released its ranking of the most international universities from 20 select countries (Bothwell 2017). Two Swiss universities top the list, ETH in Zurich and École Fédérale Polytechnique in Lausanne. The analysis indicates a connection between the individual countries’ GDP and the degree of internationalisation of the universities (Figure 2).
Denmark performs well in the internationalisation study with an overall ranking in 8th place behind Singapore, Switzerland, Hong Kong and four English-speaking countries. However, that can be improved on if we develop mobility opportunities for Danish and foreign students alike, and if we actively consider creating study and career systems that are compatible with the rest of the world. It is not just about an internal competition between the Danish universities, but seeking out the opportunities offered by the sector in an international perspective.

By translating this to the universities’ internal reality, the combination of a blue ocean perspective and a system approach raise a number of questions:

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Data from the analysis of 150 universities in 20 select countries (Bothwell 2017). As a linear correlation was not assumed, the trend line ($r^2 = 0.49$) is only illustrative.
Is it a given that “middle level researchers” and “top researchers” are separate layers competing separately, or can they pull together and establish a new common field to navigate in?

How can subject continuity be retained, how can the approach to the innovation platform be retained, and who has responsibility for maintaining the continuity?

How do we ensure the concept of interplay and exchange with our surroundings is included in universities as an opportunity to both generate new research questions and relevance of educational programmes?

Are the Danish universities primarily competing with each other or are they part of an alliance in a greater examination of a global playing field?

The answers to these questions are not simple or a given. They require new ways of thinking, which do not just look at the individual researcher, but take a new view of the many different levels in the institution and their dynamic.
PROPOSAL FOR A FINANCIAL FRAMEWORK FOR A BLUE OCEAN

The best universities are characterised by an uninterrupted focus on creating the highest quality knowledge and knowledge attainment. Focus that is created by professional dialogue, reflection and an inspiring interaction with the rest of the world, and the education of graduates to the highest level. Top universities utilise their framework optimally to create and share high quality, diverse knowledge for the maximum benefit of the society which has invested in them. Here we will outline a model for a financial framework that can support a blue ocean in the Danish university sector. Firstly, the need for financing in the blue ocean will be estimated and will be compared to the current availability of financing in the form of basic funding and competitive research funding. Thereafter, there will be a more nuanced look at the picture by dividing the current available competitive funds across the different career levels from PhD student to senior professor. This approach allows for an overall discussion on distribution policy on a national level, but does not take into account the differences between the individual universities and fields.

The analysis does not take the funding of teaching activities into account. It can be difficult to differentiate between the funding of research and
teaching activities in practice, because to a certain extent, they draw on the same infrastructure and personnel resources. It is outside the scope of this analysis to examine that relationship.

In recent years, basic funding has remained constant and competitive funding has increased in the Danish university sector (Figure 3). This shift in funding from basic funds to external funding has actually been happening over many years. In the 1970s and 1980s, external funding comprised 10-20% of research funding, from the 1990s to 2005, this share increased to approx. 30%, and since 2009 has been over 40% (DFIR, 2016). Universities have thusly moved from a situation where competitive funding was just a ripple on the surface of the dominant basic funding, to the situation today whereby funding from foundations finances a large part of the direct research costs.

FIGURE 3 / FUNDING FOR RESEARCH AT DANISH UNIVERSITIES

The balance between basic funding and competitive funding for research at Danish universities. Basic funding for research covers basic grants for research as well as grants for sector-related research. Competitive funding for research is grant-financed research companies, income-generating companies, including forensic medicine, as well as "other grants". Source: Universiteternes statistiske beredskab (Universities Denmark statistical division)
A stable **basic funding** allows them to defray costs such as rent, general infrastructure including administration and basic laboratory facilities, as well as salaries for set staff of researchers. It ensures universities have the opportunity to academically govern long-term and daring research projects in a living and dynamic interaction with research-based education. Such a stable platform, where research ideas can freely develop over a longer period of time, and in collaboration with excellent colleagues and students, also attracts the best researchers.

The importance of this is expressed very clearly in a study by the Swedish Royal Academy of Sciences under the previous chairman of the Nobel Committee Gunnar Öquist. The study concludes that scientific quality is best developed through stability and long-term national funding structures together with academic leadership, which firmly and purposefully governs with world-class quality in mind. So that a university can take responsibility for its own quality development, there is a need for a division between basic funding, which is at the disposal of academic management (B), and competitive research funding, which is at the disposal of researchers (C) at a ratio of 3:2 (B/C = 1.5, Öquist & Benner 2012). The basic funding allows the university to plan long term, and Öquist & Benner argue that the academic drive is deposited with external foundations and stakeholders if the balance shifts too much in favour of competitive funding.

A great share of the costs associated with more short-term projects, which typically involve the research education of PhD students and postdocs, new apparatus, etc. could on the other hand come from competitive funds released on the basis of quality and originality, possibly supplemented with other criteria. It is a healthy competition built on peer assessment which ensures quality. Where is the point of balance between basic funding and competitive funding in actual kroner? We will attempt to find this by providing a rough proposal by setting up a simple model for the collective Danish universities.

As a starting point, we look at the current distribution of students and researchers and the political goal of having 25% of a youth cohort pursuing a university education at Master’s level. This results in approx. 160,000\(^2\) enrolled students at Bachelor’s and Master’s level for all of Denmark in 2015.
To reach the level of other typically comparative countries (DFIR 2016), we would need to educate a further approx. 3000 PhD students/year and approx 1500 postdocs/year. It would make the universities internationally competitive, and make it possible to meet the need for researchers in industry and public sector systems outside of universities. Thereby satisfying the ambition of the globalisation agreement to create new knowledge-based jobs.

Universities can support this ambition by sending the majority of PhDs and postdocs into relevant jobs outside the university. We assume that 80% of PhD students and 80% of postdocs (who are also in a scientific education process) will find work outside of university, while approx. 20% will follow an academic research career. It would therefore only be the latter that would be looking for the possibility of competitive financing for a research career at university.

The research-based education from Bachelor’s degree to postdoc is ensured by a staff of permanently employed researchers (associate professors and professors) and by assistant professors, who traditionally have followed a course with a high likelihood of permanent employment. This group is described as faculty in following model. They comprise the university’s backbone and have responsibility for the long-term perspectives in research and education.

Table 3 shows the current number of scientific employees in Denmark in 2015. We have included this as a basis for the calculation of the ”need for” research funding in the blue ocean.

<table>
<thead>
<tr>
<th>POSITION</th>
<th>PHD (ENROLLED)</th>
<th>POSTDOC</th>
<th>ASSISTANT PROFESSOR</th>
<th>ASSOCIATE PROFESSOR</th>
<th>PROFESSOR</th>
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<tbody>
<tr>
<td>TOTAL</td>
<td>8.794</td>
<td>2.643</td>
<td>1.338</td>
<td>4.451</td>
<td>2.320</td>
</tr>
</tbody>
</table>

Sources: PhD: Universities Denmark statistics division (Universiteters Statistiske Beredskab). Other: Danish Ministry of Science and Higher Education, Scientific personnel at universities 2015, 03.11.16. Note: Professor includes professors with special responsibilities and clinical professors.
As an illustration of the relationship between the number of people in the different age groups, we depict the number of people in the whole university system divided by career level in Figure 4. The y-axis shows the typical nominal age for the different career levels. The arrows indicate the dynamic in the system together with the primary economic distribution, with which we operate in this model.

FIGURE 4 / SCIENTIFIC STAFF AT DANISH UNIVERSITIES 2015

The areas are an expression of number, while the y-axis assumes the connections’ typical duration for the academic career level. The arrows indicate the dynamic in the system together with the primary economic distribution used in the model. The figure is purely illustrative and not to scale. Sources: Number of students and PhD students: Universities Denmark statistics division (Universiteternes Statistiske Beredskab) 2015. Number of VIPs: Danish Ministry of Higher Education and Science: Memo on scientific personnel at the universities 2015, 03.11.16.
To calculate the direct research funding need in such a university system, we have estimated (in round figures) direct salary and operational costs for the different career levels together with the distribution of competitive funding and basic funding. Typical salaries for the different career levels have been used in the model calculation. The faculty salary only includes 50%, as they also contribute to education, which is not included in this model’s calculation. Annual operation is estimated for natural sciences and medicine at DKK 100,000 (PhD students), DKK 200,000 (postdoc), DKK 1 million (assistant professor with starting package), DKK 500,000 (associate professor), and DKK 1.5 million (professor). We estimate the costs to be half of this for social sciences and humanities. Table 4 sums up the results from the model calculation, see Annex 1 for further details.

<table>
<thead>
<tr>
<th>BLUE OCEAN DIRECT COSTS DIVIDED BY VIP</th>
<th>PH.D.</th>
<th>POSTDOC</th>
<th>ASSISTANT PROF.</th>
<th>ASSOCIATE PROF.</th>
<th>PROF.</th>
<th>TOTAL</th>
<th>OVERALL RESEARCH INCOME 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPETITIVE</td>
<td>3.640</td>
<td>1.543</td>
<td>1.041</td>
<td>1.798</td>
<td>2.825</td>
<td>10.847</td>
<td>8.282</td>
</tr>
<tr>
<td>BASIC</td>
<td>1.547</td>
<td>0.269</td>
<td>0.416</td>
<td>1.542</td>
<td>0.921</td>
<td>4.694</td>
<td>8.852</td>
</tr>
</tbody>
</table>

Model calculation in DKK million for the need for direct salary and operational costs for research divided by employment category in the overall university section in 2015. Own calculations. For a detailed table, see Annex 1. Overall research income 2015: Universities Denmark statistics division (Universiteternes Statistiske Beredskab).

The model calculation shows the total need for covering direct research costs at all Danish universities is approx. DKK 15.5 billion.

Universities Denmark statistics division (Universiteternes Statistiske Beredskab) calculates the sector’s current income for research at a total of DKK 17.1 billion. If these funds went in full to direct research financing, there would be a fine balance between need and accessibility. But there is no free rent for research. For every krone a university uses directly on
a researcher in practice, more than half goes on rent, general research infrastructure, administrative support, etc. In the following, we lay out a conservative estimate that the total costs are 50% greater than the direct costs for research.

If we take these indirect costs into account, the picture looks very different because they must be added to the need for direct financing and subtracted from the accessible funds, as the latter must cover both direct and indirect costs.

Table 5 gives an estimate of both the direct and indirect costs. It shows there is an underfinancing of approx. DKK 6.2 billion to establish a *blue ocean* in the Danish university sector.

<table>
<thead>
<tr>
<th>INCOME AND COSTS</th>
<th>BASIC FUNDING FOR RESEARCH</th>
<th>COMPETITIVE (INCL. OVERHEADS)</th>
<th>INDIRECT RESEARCH COSTS</th>
<th>SUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCOME 2015</td>
<td>8.852</td>
<td>8.282</td>
<td>-</td>
<td>17.134</td>
</tr>
<tr>
<td>NEED</td>
<td>4.694</td>
<td>10.847</td>
<td>7.771</td>
<td>23.312</td>
</tr>
</tbody>
</table>

Accessibility of and need for research funding including indirect costs (rounded figures, DKK million) *Source: Income: Universities Denmark statistics division (Universiteterne Statistiske Beredskab), 2015. Need: Own calculations, see Annex 1.*

Indirect costs are financed in the existing system mainly by basic research funding, and to a lesser extent, via overheads. It can therefore be a dilemma for an institute when individual researchers attract external funding, as it can in practice weaken the institute’s options. This is particularly the case for private financing, but even with the larger public ventures that come with an overhead, the institute can be left with a large bill to pay afterwards as embedment obligations, etc. can take up a great strategic latitude. The indirect costs associated with competitive funding thus put pressure on a research financing system that otherwise was balanced.
For simplicity’s sake, we have not taken the overhead that follows certain forms of competitive funding into account in this calculation. Depending on local agreements, it may contribute to basic funding. It is outside the scope of this analysis to draw up a more detailed account. If we calculate using very rounded numbers and take these conditions into account, then the total underfinancing of DKK 6.1 billion accounts for the unmet needs for basic funding. The model also provides a rough estimate for the relationship between basic funding and competitive funding \((B/C=1,1)^3\), which is still a good bit away from the ideal of Öquist and Benner’s \((B/C = 1,5)\). If anything, an even greater share of financing should be redirected to basic funding. Danish universities are not sailing on a financial blue ocean. This finding raises a number of political questions:

Does Denmark want to utilise the potential of the university sector further by investing in Danish universities, and if so, how?

If universities are allowed to continue at the current level, or one wishes to introduce further cutbacks, how can one ensure that there continues to be an opportunity to practice long-term and strategic academic management?

The division between basic funding and competitive funding is central to both questions. The actual underfinancing of basic funding will be felt more, the more the balance in financing shifts. Paradoxically, an increased external financing from private foundations with few contributions to the indirect research costs will actually put pressure on the balance and reduce the strategic options. Öquist and Benner’s analysis (2012) shows that an imbalanced university sector is not effective in the long run. It is therefore in everyone’s interest to find a point of balance for a given funding level. The balance between basic and competitive funding can be fundamentally adjusted in two ways: the State can redirect focus from competitive research council funding to basic funding for universities, or foundations can cover the full research costs, no matter whether they are public or private. We hope that this very simplified analysis can lead to an open debate and help establish a better foundation of data.
To create a more nuanced picture of the accessibility to and need for competitive funding, we have illustrated these (divided by age group) in figure 5. Our preliminary analyses show that the middle group of researchers (associate professors) in particular are challenged by access to external financing. This corresponds to the *hourglass model* (Figure 1). The development is problematic as the middle group as part of the *faculty* are crucial to the backbone of the university system. The picture becomes even more complicated when one considers that there are very different levels of cross-disciplinary access to resources into account. We have not analysed this, but experience from the university world indicates that there are areas, which in practice have very limited access to research resources. This is neither good for the internal dynamic in the research environment, nor for the university’s ability to sustain a broad, long-term development profile. We recommend that this is examined in greater detail.

**FIGURE 5 / NEED AND ACCESSIBILITY DIVIDED BY VIP POSITIONS**

Source: Accessibility: (SFI 2016). Need: Own calculations based on the prerequisite that 80% of PhDs and post-docs do not pursue a university career.
The calculations are a simplified estimate, but the picture they create is one that matches the realities experienced at universities. They suggest that there is an underfinancing of research activities of DKK 6.2 billion. It results in permanently employed researchers, and thereby that the institutions, cannot realise their strategic potential. They demonstrate that the relationship between basic research funding and competitive funding is very skewed. It makes it difficult for universities to undertake long-term ventures. It is also becoming more and more difficult to maintain even the most minimal research efforts without external financing. This is particularly a problem for the middle layer of researchers (associate professors and professors without large grants), who traditionally have made up the backbone of the university, and who through long-term planning have ensured diversity and quality. Thus the value of further external financing will fall if there is not a counterbalance of contributions to the indirect costs.

The economic challenges we have identified are fundamentally quite simple. They can be resolved in many ways, but it requires that we rethink the universities’ strategies, fields, and stakeholders.
Our analysis shows that Danish universities are currently trapped in a red ocean of short-term perspectives and internal competition. This is not the result of a deliberate strategy. Rather, a number of independent factors have played a role, including general tendencies in public governance and setting of frameworks, broader recruitment at universities, the powerful internationalisation of research and education, and the changing relationship between public and private sources of financing.

Things are going well on certain fronts. Danish research has significantly improved internationally in the last 10 years, based on research-related indicators (DFIR 2016). But significant cut-backs in public financing and increases in public regulation in recent years can quickly change the picture. Therefore, we want a unified and unifying vision for universities in Denmark in the 21st century.

Inspired by the blue ocean, we propose a closer look at the central competitive parameters: What is presently being invested in, and what characterises the contributions that deliver? Such an analysis makes it possible to identify factors that should be eliminated, reduced, enhanced and innovated (Table 6).
**TABLE 6 / STRATEGY FOR THE BLUE OCEAN UNIVERSITY**

<table>
<thead>
<tr>
<th>ELIMINATE</th>
<th>ENHANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>- MICROMANAGEMENT. TAXIMETER WAY OF THINKING</td>
<td>- SELF-DETERMINATION</td>
</tr>
<tr>
<td>- DEMOTIVATED STUDENTS AND DEMOTIVATING PROGRAMMES</td>
<td>- MOBILITY AND FLEXIBILITY FOR STUDENTS AND YOUNG RESEARCHERS</td>
</tr>
<tr>
<td>- RESEARCH FOR THE SAKE OF EVALUATION</td>
<td>- IMPACT AND INTERNATIONALISATION</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REDUCTION</th>
<th>INNOVATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>- NATIONAL COMPETITION BETWEEN UNIVERSITIES</td>
<td>- SOCIAL CONTRACTS</td>
</tr>
<tr>
<td>- MASS EDUCATION PROGRAMMES</td>
<td>- DIVISION OF ROLES BETWEEN THE UNIVERSITIES</td>
</tr>
<tr>
<td>- RESEARCH WITHOUT CONNECTEDNESS</td>
<td>- DIGITALISATION AND “BIG DATA”</td>
</tr>
</tbody>
</table>

**ELIMINATION**

Everyday life at many institutions is largely marked by micromanagement and the taximeter way of thinking, which is established overall in the relationship between the Ministry of Higher Education and Science and the Universities. These tools, which may look good on paper, can make it difficult in practice to establish new solutions, such as programmes which cross existing divisions, or examine new fields. Instead it breeds a logic that focuses exclusively on the economic factors, which from a governance point of view can be optimised, but it creates neither growth, innovation, nor quality.

Meanwhile, study progress reform binds students to set paths, which makes it difficult for them to seek out early opportunities in relation to external cooperative partners and possible end-users, or opportunities across established study courses. These governing tools can thereby contribute to creating demotivated students on demotivating programmes, who do not have the possibility to take responsibility for their own education and for the opportunities it can create. There is both a waste of money and possibly the most important resource at the university’s disposal: the students’ time and engagement in a period where crucial, formative learning and development is established.
The focus of the last 10 years on increasing research at universities, has been a success to a certain extent, experienced internally, but also in relation to international environments, whether reflected in ranking lists, or measured by more or less advanced publication indicators. The national Bibliometric Research Indicator (BFI) is used in governing research financing in Denmark and aids the ministry’s allocation of basic funding. It is a simplified metric that looks at the number of articles and weights them with some rather rigid targets for the ‘quality’ of the journals in which they are published. The BFI system may pave the way for an optimisation strategy, where one authors many short articles in the second-best journals rather than focusing on a more fundamental question of quality and excellence – both from a research and impact point of view (Committee on Science Policy 2016). Such a strategy in the current system can make sense for the individual researcher or institution, which is not ideal when taking a bird’s eye view, or for the long-term perspective, and should not be rewarded by an evaluation system. We should not research for the sake of evaluation, but for the sake of society, research, students and ourselves.

REDUCTION
A blue ocean perspective is not about removing the competitive element from the individual institution, but shifting the focus from a fight to the death on the same playing field as everyone else, to surviving and thriving through innovation, diversification and variety. It is a more fruitful vision for the Danish university world than a sector locked in an uneven battle for who can fight to the top of the first division nationally or internationally.

There are no indications that the society will ask less of our knowledge and competence levels in the future. Quite the opposite. We can expect that even more will need to be in contact with universities at some point in their lives. University for many does not necessarily mean a university for the masses producing standardised graduates on a conveyor belt. One of the strengths of universities lies in the close links between education and research, which in concrete terms is a personal meeting between students and researchers. When it succeeds, it provides a unique, experience-based learning which helps to ‘beholds the celestial light’, ‘to seek solid ground in
the depths’ or find ‘in silence, death, in the surge, life’, as is beautifully put in some of the universities’ mottos. The challenge therefore is to develop a university for many without ending up in a factory-style university for the masses. It is not just about the efficiency of large lectures with hundreds of students, but also about developing forms of teaching that build on dialogue and close contact. It is not just about taking in students shortly after they have finished upper secondary school, but also about developing new instructive ways of interacting with university later in (the work) life.

No one is interested in carrying out ‘bad’ research, but all experience shows that it is difficult to formulate precise and explicit criteria for good research. Thus, populist arguments against ‘research for research’s sake’ or ‘ivory tower research’ have missed the target in the long term. The great breakthroughs often happen on the basis of something that is seemed esoteric, or nerdy, or even perhaps unusable in the moment of creation (Committee on Science Policy 2016). Likewise, there are also many moments that seem like potential goldmines, but cannot stand the test of time. The final judgement is only delivered in the long historical perspective. Perhaps the least one can expect of research is that it connects. It could connect to its own tradition, or to other researchers, living or dead; it could be to problem areas, people or needs outside the walls of the university. It does not mean that research must necessarily be developed in teams and groups; university should nurture both birds that fly alone as well as those that move in a flock, but an answer to a simple question should be demanded from research: what are you connecting to?

ENHANCE
Navigating in a blue ocean requires a significant degree of autonomy and strategic thinking from the individual institution. It should be able to work creatively with its tradition and identity and use them as a starting point to explore new territories. Seen in the larger perspective, the aim is to ensure and develop quality throughout the whole sector via diversity. This can only happen with a great degree of local self-determination in the individual institution. It is not just about taking on strategic and economic responsibility, but also working with the individual institution’s identity
with a sense of self-understanding, competence and as a *brand*. But also in relation to the local and global surroundings with their public and private players. It is crucial that the permanently employed key researchers who comprise the university’s backbone are not impoverished and paralysed. In many places, it is about finding new balances between leadership and self-determination in the slipstream of university reforms.

Self-determination also involves economy: ensuring a space for action to navigate strategically and not deposit development responsibility in the more or less strategic decisions taken by foundations and ministries. In concrete terms, a better balance between basic funding and competitive funding needs to be found to close the gap on the idea balance of $B/C = 1.5$.

The model requires a greater degree of mobility and flexibility in the system, particularly for *students and younger researchers*. Are there opportunities within the individual institution for moving between fields and educational silos during a course of study or career? It is equally important to be able to move between universities so we do not end up with inbreeding and regionalisation, and to be able to move back and forth between the university and surrounding companies and institutions. It is easy to be a home-body and choose the university that is just around the corner. It is also easy to employ those you have been involved with educating, but both situations create a frozen system without a strong dynamic, and it works against quality as well as the dynamic diversity.

In a small, open economy like we have in Denmark, our model requires a high degree of internationalisation. It is about having a global horizon both in relation to collaboration and competition. It is about people – that both students and researchers are part of the international network and some are always heading out to gain new knowledge, while others are bringing the knowledge to Denmark. There are few places where this is more important than the knowledge economy that universities work with.

We are preparing the way for increased focus on the *impact* of universities on the surrounding world. Research should be aware of its responsibil-
ity to leave a mark on its surroundings, for example in the form of new inventions, forms of organisation, or models of learning and development. We must find new ways to establish an interface for impact, to introduce relevant questions and challenges into universities. It also requires the rethinking of programmes, which are one area where universities create impact. How can we best qualify our graduates for the immediate needs, and for the jobs, tasks and problems not yet facing us? The question relates to a central part of the pedagogical DNA of universities: creating graduates who have not just learned a subject and some methods, but fundamentally have learned to learn and navigate in still unknown situations.

INNOVATE

Our analysis paves the way for a number of innovations in the university system. Most importantly is the formulation of a new social contract for universities. What can society’s parties expect from researchers and graduates? What are the public and private parties paying for when they support research and education? It is about value and values, about quality and integrity, about a critical eye and about being a central institution for society which creates future and progress. This contract is at the same time deeper and broader than the current results contract between the ministry and the institution. It calls for a new form of multi-party negotiations between universities, agencies, public and private users, and the large non-profit foundations. It opens the sector to public interest, which is crucial for creating the future facing us. In the State system, research and education should not just be a matter for a relatively small ministry, which historically has experienced great economic fluctuations. It should be on the agenda across the entire political spectrum and particularly with central ministries.

The dynamic diversity we are arguing in favour of allows for a more clear division of roles between the individual universities, that each wish to develop clear brands and identities. This can be seen within the public University of California system where the individual campuses, Berkeley, Irvine, Davis, Santa Cruz, etc., are not just a geographic location but also a specific proposal for how a high-quality university can be organised and arranged.
A similar model in Denmark would mean that the individual universities would see themselves in relation to a larger *University of Denmark* entity, and would have a clearer understanding of specific identity and room for opportunity within this context. It includes a division of tasks so that everything is not being offered everywhere, but that universities, in collaboration, could ensure a smarter service for society through a suitable division of research and education tasks. A side benefit of this could lead to much needed geographic student mobility.

The significance of *digitalisation and ‘big data’* cannot be underestimated; they will permeate both university practice as well as their surroundings. It is about new building and educating people in new competences, about fundamental basic terms for many of the research processes we use across faculties and disciplines, and about a research field in itself. We have already seen the first effects of new technologies in the teaching area in the form of *MOOCs (Massive Open Online Courses)*, which provide everyone with access to material from some of the greatest universities in the world. This development has paradoxically put focus on new forms of teaching, where the concrete exchange and problem-solving between teacher and student is key e.g. *flipped classroom*.

**VALUE INNOVATION**

These guidelines will make it possible for universities to navigate a *blue ocean* and help bring the rest of society along with them. They create a sector characterised by quality and dynamic diversity. They rethink the role of the university in a fundamental *value innovation*, creating valuable renewal in the short-term by keeping a eye on the long-term and the deep perspective. They allow universities to do what they do best: quality, integrity and excellence, linked closely with the surrounding society. They create opportunities for a dynamic innovative environment outside of universities of a much better quality than we currently have in Denmark. They leave their mark not only on the private and public sectors, but also on the civil society sector, which is currently one of the most exciting growth fora for the common good.
The best universities create knowledge, recognition and produce graduates of the highest quality. Knowledge that will be used in ways and means that are currently unknown to us. Knowledge which can develop and take on new forms, because it is living and active. There is a great difference between learning something that is already known and in creating a new realisation. There is a difference between carrying out step by step improvements to an existing product and creating a game changer which shakes up and changes the world as we know it. University graduates must learn this by their own hand, which is why the current university DNA is comprised of research-based programmes that interact closely with the world around them. If the educational programmes were not closely linked with active research environments which, through critical and reflective preparation of new knowledge, contribute to front line research, the students would just obtain a passive knowledge. We as society would in a short space of time lose the underlying philosophy and the basic values which are found in always seeking out new knowledge and in taking a critical stance. How could it be any different?
Research is therefore a prerequisite for educating graduates, who tackle new problems in the way that researchers can, but education is also a prerequisite for daring to and being able to afford to carry out research into very fundamental questions with long perspectives. There are two reasons for this. The first is because research is risky, a lot can go wrong. It is therefore essential that research and education go hand in hand. Even though research only rarely leads to a new landslide realisation, one has still educated graduates along the way – graduates who have learned to research, to establish new knowledge and differentiate "facts" from "alternative facts". The second reason is that there is critical learning potential to be obtained from trying out a research process, experiencing set-backs, and the delight at establishing even a single new point or fact. A separation of research and education is therefore fundamentally a bad idea, both for the individual student and for society.

The Danish universities have grown from the Humboldtian model from the beginning of the 1800s. It builds on a strong link between teaching and research, extensive academic freedom in the choice of research topics, and a strong commitment to learning and general education. We have argued that in 2017, innovation, social engagement, strategic thinking and local roots are just as important to the university landscape. At a glance, it seems like this is the case with Stanford University in California. They have combined the classic Humboldtian idea with a very successful innovation agenda in close collaboration with surrounding industries such as Apple, Google, Amazon and a wealth of other IT companies. It is important to draw inspiration from California, but also from somewhere closer to our own tradition. The link between relevance, research and education is not only important in relation to the surrounding society, but just as crucial in relation to the individual student. The competences gained at university are for life and not just for school. They are, and should be, generic, but also applied, applicable and personally meaningful. It has much a ring of Grundtvig as of John Hennessy, Stanford’s 10th president (2000-16).

This may be the secret ingredient in the Danish universities’ blue ocean. A balance between the Humboldtian focus on subject and academic free-
dom, Stanford’s focus on solutions and social contracts, and the Danish Folk High School’s focus on the student’s creation of a personal, responsible and meaningful education. This configuration has room for the individual institution to find its unique place. That will strengthen our opportunities to navigate in unknown oceans which may bring us joy, usefulness and meet our needs.
REFERENCES


# ANNEX 1

## CALCULATION MODEL* FOR DIRECT RESEARCH COSTS (EXCL. OVERHEAD)

<table>
<thead>
<tr>
<th>2015</th>
<th>PHD (ENROLLED)</th>
<th>POSTDOC</th>
<th>ASSISTANT PROFESSOR</th>
<th>ASSOCIATE PROFESSOR</th>
<th>PROFESSOR</th>
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<tbody>
<tr>
<td>STEM TOTAL</td>
<td>7.011</td>
<td>2.262</td>
<td>772</td>
<td>2.677</td>
<td>1.515</td>
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<td>SSH TOTAL</td>
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<td>381</td>
<td>566</td>
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<td>805</td>
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<td>1.338</td>
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<td>2.320</td>
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<td>500.000</td>
<td>300.000</td>
<td>350.000</td>
<td>375.000</td>
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<td>1.557,850.000</td>
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<td>% EXTERNAL SALARY***</td>
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<td>0.83</td>
<td>0.09</td>
<td>0.05</td>
<td>0.05</td>
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<td>OP.(STEM)/YEAR</td>
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<td>452,400.000</td>
<td>772,000.000</td>
<td>1.338,500.000</td>
<td>2.272,500.000</td>
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<td>OP.(SSH)/YEAR</td>
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<td>603,750.000</td>
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<td>OP.COSTS/YEAR</td>
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<td>490,500.000</td>
<td>1.055,000.000</td>
<td>1.782,000.000</td>
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<tr>
<td>% EXT. OPERATION***</td>
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<td>0.95</td>
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<td>0.97</td>
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<td>OP./PERSON(STEM)*</td>
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<td>1,500,000</td>
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<tr>
<td>OP./PERSON(SSH)*</td>
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<td>250,000</td>
<td>750,000</td>
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<td>EXPENSES TOTAL</td>
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<td>1,456,400.000</td>
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<td>EXT. COSTS TOTAL</td>
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</tbody>
</table>

* STEM includes medicine and natural science, SSH includes social science and humanities.

The model assumes that External expenses are covered by competitive funds from private and public sources while Uni expenses are covered by basic funding.

** Half of the salary for faculty is assumed to be paid by the education share.

*** Estimated in accordance with the Blue ocean idea as described in the text.
ANNEX 2

PROGRAMME / THE ROYAL ACADEMY ANNUAL SCIENCE-POLICY MEETING 2017 / BLUE OCEAN UNIVERSITIES

Thursday 16 March 2017
“Gamle mødesal/ Old meeting room”, H.C. Andersens Boulevard 35, 1st floor

14.00-15.35

Mogens Høgh Jensen, President of the Royal Danish Academy of Sciences and Letter:
Welcome

Andreas Roepstorff, Chairman, The Academy’s Committee on Science Policy:
The Annual Meeting 2017

Søren Pind, Minister for Higher Education and Science

Zunaira Munir, Blue Ocean Global Network:
Blue ocean strategy

Barry C. Smith, University of London:
Engaging the public, and engaging industry, on our terms.

Coffee Break

16.00-18.00

Barry Halliwell, National University of Singapore:
National University of Singapore: the Value of A Research-Intensive University in a Small Technology-Focussed Society

Chris Newfield, University of California at Santa Barbara:
How not to wreck the public universities

Panel discussion chaired by Liselotte Højgaard

Refreshments and networking
ANNEX 3

MEMBERS OF THE COMMITTEE ON SCIENCE POLICY IN THE ROYAL DANISH ACADEMY OF SCIENCES AND LETTERS AS OF 16 MARCH 2017

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NOTES

1 The evaluation is based on an interpretation of Kim and Mauborgne (2005/2015), aimed at highlighting the points we believe have the greatest relevance for the discussion about universities. Furthermore, out of respect for the size of the report, we have simplified the very thorough discussion of Blue Ocean Strategy within management and organizational theory.

2 Universiteternes Statistiske Beredskab (Universities Denmark statistics division): 160,258 enrolled students at Danish universities in 2015.

3 The sum of basic funding (4,694) and indirect research costs (7,771) divided by competitive funding (10,847).

4 Coelestem adspicit lucem (University of Copenhagen), Solidum petit in profundis (Aarhus University), In tranquillo mors – in fluctu vita (Roskilde University).