

DIVERSITY AND EXCELLENCE IN RECRUITMENT AND CAREER DEVELOPMENT



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This year, the DNRF has chosen to address the relationship between diversity and excellence in recruitment and career development of scientists.

Striving for diversity in research is not just a feel-good issue or a political point of view. Rather, it reflects the multitude of problems research seeks to unravel. Research has a long track record in showing that solutions to problems often take diverse approaches. The DNRF supports diversity with an open attitude whereby everyone – independent of age, identity group, value system, income, religion, political view, ethnicity, gender, sexuality, race, geography, or education – can contribute to research, with the only criteria being the best competencies and a will to pitch in. Striving to increase diversity in research environments is the rational thing to do because carrying out research requires a broad perspective in research questions and among the people who attempt to answer them. Researchers need to gather data from a diverse composition of groups. A mouse is not just a mouse, and not all humans are 30-year-old women.

In research, diversity is often measured by such things as the degree of internationalization, gender balance, interdisciplinarity, and, to some extent, the distribution of age in research groups. Behind these indicators of diversity lies a consensus that they have a positive effect on a research environment's level of performance. But do we know more precisely when and how?

We need to understand the relationship between diversity and excellence in research. Under what circumstances will diverse research environments foster excellence in research? Is there a risk that

focusing on diversity will damage the research itself? How does “growing up” in diverse research environments affect younger researchers' career development?

We have asked our Center of Excellence leaders about their view points on diversity, and we here bring case stories with five of them: Professor Anja Boisen, Professor Mette Birkedal Bruun, Professor Jørgen Kjems, Professor Peter Lodahl, and Professor Eske Willerslev. To all of you: Thank you very much for the effort with this exchange of experience.

The DNRF's diversity survey questions

The DNRF Centers of Excellence and Niels Bohr Professorships have a size and research scope for which a mono-disciplinary approach is rarely an option. In such environments, two human parameters – individual talent and collective diversity – are essential to create research at the highest international level and to accelerate breakthroughs and innovation.

To learn more about the mechanisms at play in the relationship between diversity and excellence, we asked the foundation's grantees the following:

1. How does internationalization create diversity and leverage research? What other diversity categories are important? Do you have examples of how diversity in recruitment can contribute to research breakthrough?
2. How do you weigh personal qualifications compared with diversity in recruiting?
3. Does diversity contribute to a fruitful research environment where young talents can grow?
4. What challenges do you see when focusing on diversity in recruitment?

"We support diversity with an open attitude whereby everyone – independent of age, identity group, value system, income, religion, political view, ethnicity, gender, sexuality, race, geography, or education – can contribute to research, with the only criteria being the best competencies and will to pitch in."



Professor Liselotte Højgaard
Chair of the board of the DNRF

Professor Søren-Peter Olesen
CEO of the DNRF

WHAT IS DIVERSITY?

Among the DNRF grantees, there is a consensus that the concept of diversity should include more than nationality and gender. Not surprisingly, interdisciplinarity – groups composed of people from different scientific fields with different training and different sets of tools – is seen as one of the most important parameters for research success.

Other indicators of diversity that many researchers emphasize are differences in age, regional upbringing, and personality.

“Maybe most importantly, in a diverse environment, nothing is inherently self-evident and obvious. Habits, mind sets, working hours, presentation styles, and so forth are challenged by the sheer fact that other people may do things differently. Exposure to diversity creates a self-reflective environment.”

— Professor Dorthe Berntsen, CoE leader
CON AMORE

Diverse talent

For a long time, in research and elsewhere, there has been a focus on talent. The DNRF wrote a pamphlet in 2014 titled Getting all talents in play. Talent yes, but the opportunities offered by diverse talent is the real deal.

“Diversity, as such, is not the main factor for leveraging research, but when combined with talent, it is powerful.”

— Professor Marja Jäätelä CoE leader CARD

Collective diversity vs. identity diversity

“Sometimes a focus on diversity can ironically lead to a mindset where people at the end of the hiring process suddenly remember, “Oh, we need this and that type of person in order to obtain diversity,” after which they struggle somewhat helplessly to dig out a candidate that fits this specific “diversity profile.” That approach will not lead to optimal results, neither short term nor in the long run.”

— Professor Jesper Grodal, CoE leader SYM

Collective diversity emerges from talented people working with different kinds of talented people, that is from an interplay of different diversity features, and that kind of collective diversity is different from identity diversity. As documented by the diversity researchers Professor Scott E. Page, at the University of Michigan, and Professor Katherine Phillips, at Columbia University, it's not gender, different types of personality, ethnicity, age, or income level in itself that will leverage research, but how these “diversity features” correlate with the differences in how the group members think, what dimensions they attach to the world, or simply the research question in front of them.

"Scientific breakthrough does not necessarily arise as a result of diversity at the center, but rather from putting together specific subject knowledge with an eye to solving challenges together. Our latest Nature publication is the result of a collaboration between a geomorphologist and a biostatistician. In this collaboration, the use of structural equation modelling was combined with a geomorphological analysis of satellite images."

— Professor Bo Elberling, CoE leader, CENPERM

INTERNATIONALIZATION – WHAT DOES IT MEAN

In the five accounts of specific experiences with building diverse research groups you will find in this booklet, we distinguish between scholars' nationalities and the countries in which they obtained their academic degrees and research experience when describing the centers in terms of diversity.

Internationalization is more than nationality. This again goes to the difference between collective diversity and identity diversity. A Swedish and a Danish scholar at the level of assistant professor might not seem that different. But let's say that the Swedish scholar has degrees from the US and India, and research experience from Russia, Belgium, and Sweden, and the Danish scholar has an entirely different profile in terms of geography. Then the degree of internationalization suddenly multiplies.

Add to this that the Swedish scholar came to Sweden as a refugee from Afghanistan at the age of eleven, her dad drives a taxi cab for a living, and her mother is a nurse. The Danish scholar is the son of an internationally renowned scientist and a neurosurgeon and has traveled between Ivy League universities since the age of two. You get the picture. Diversity multiplies again. Now we see how the Swedish and the Danish scholars, who hold the same academic position and are from countries that are alike, could likely have gained different sets of tools through their training, and may attach different dimensions to the world according to their specific life experiences.

Internationalization creates opportunities

"To us, the primary purpose of internationalization is to access a larger pool of talent, because this is essential to raising the quality. Increasing the internationalization at the same time improves the diversity by both a larger representation of nationalities and access to far more female researchers in an area where we still lag behind in producing female researchers in Denmark."

— Professor David Lando, CoE leader, FRIC

"In my opinion, internationalization is generally a strength because it almost inevitably creates both professional and personal diversity, and because the types of people who choose to leave their home country and challenge themselves in another country usually have strong personal qualifications. But obviously, internationalization does not guarantee high-level research."

— Professor Susanne Mandrup, CoE leader ATLAS

“In our case, the most effective lever has been the international collaborators committed in the contract between the university, the DNRF and me as center leader, and the Center of Excellence instrument, which has provided the opportunity for conferences, short-term and longer-term research stays abroad, and the opportunity to invite guest researchers. These, in combination, facilitate the necessary headway and quality in the research projects.”

— Professor Jørgen Ellegaard Andersen,
CoE leader QGM

At the Danish universities, internationalization is part of the strategy to strengthen research. But when asked about their career opportunities at the Danish universities a little less than half of the foreigners do not believe there are equal opportunities. The picture is the same when asked about opportunities in regard to external funding. Only 36% of the foreigners think they have opportunities equal to those of Danish nationals for obtaining grants.¹

These statistics are the result of an investigation conducted among foreign researchers at Aarhus University. The Danish Council for Research and Innovation Policy (DFIR) is currently analyzing data from other Danish universities to see if the tendency at Aarhus University is the same at other universities.

After centuries in which Danish research environments gained international experience by Danes going abroad for a few years and bringing the newest international knowledge and trends back, global scientists now come to the Danish universities on a large scale. The DNRF centers are fit to grasp this opportunity, but it is also evident that recruitment procedures at universities should be geared to evaluating these different intellects and offering them positions on an equal footing with Danish applicants. Universities should have strategies for how to handle the handicaps the international applicants have with respect to administration and teaching in Danish.

As pointed out by DFIR, there is an indication that fewer positions than expected are announced and filled in open international competition. We need a much higher degree of transparency to get the full picture. The DNRF welcomes DFIR's work on this.

¹ Industrial Ph.D. student Thomas Trøst Hansen has investigated this in collaboration with Aarhus University and the Danish Council for Research and Innovation Policy.

MAKING DIVERSITY WORK

Professor Katherine Phillips, from Columbia University's business school, has done studies in which she sets up cognitively diverse groups and homogeneous groups and has them solve the same problem. Her research shows that diverse groups are significantly better at solving the problem than the homogeneous groups.

Interestingly, when she afterwards asked the diverse and the homogeneous groups to evaluate their own group's performance, the groups evaluated themselves opposite to the actual results. On the questions "How effective do you think you were?" and "How confident are you that you have the right answer?" the homogeneous groups perceived themselves to be very effective and argued that everybody seemed smart; they were also confident that they had found the right solutions. The diverse groups, on the other hand, were much less confident about their results. Describing their problem-solving process, they emphasized that people were using words and tools that had not been mastered by everybody in the group, making it a much harder process, cognitively speaking. Phillips finds that it is precisely this strain that makes people more likely to share the unique information and perspectives they have in their heads, which, in the end, gave the better problem-solving results.

"I don't think that diversity is a barrier to research breakthroughs. But I do think it takes a lot of effort and determination to utilize diversity to achieve a breakthrough."

— Professor Bo Elberling, CoE leader, CENPERM

This tells us at least two things. First, there is a limit to how diverse a group can be in order for it to work. Being part of diverse groups is harder because a certain lack of cohesiveness may occur. One very important thing is to have cohesion on the goals. Diverse preferences will be an impairment to leveraging the different strengths of a diverse group. Second, some degree of diversity training is necessary to alleviate the built-in impediments related to diverse groups.

The question then is: how do you get the right dimensions?

Diversity training and inclusion in relation to younger researchers' career development

When considering diversity and excellence in recruitment and career development, two elements are essential: forming groups that can exploit collective diversity and maintaining that collective diversity. Doing so will leverage research. But how does it affect the younger researchers' career development to "grow up" in diverse research groups? And how can the principal investigators lead this collective diversity?

"In my opinion, quota schemes are not the way forward; rather, one should create an environment that inherently attracts and trains scientists of both sexes and with different professional, personal, and national backgrounds."

— Professor Lene Oddershede, CoE leader
STEMPHYS

"Our lunch conversations (we have lunch together every day) are often about cultural differences, differences in habits and values, family life, child rearing and so on."

— Professor Dorthe Berntsen, CoE leader,
CON AMORE

Recruitment at Danish universities

The DNRF Centers of Excellence, as well as the large centers supported by private Danish foundations, are of a size and scope to be particularly well suited to building diversified research environments and to leveraging the diversity among their staff. The CoEs are magnets for strong intellects from all conceivable backgrounds from all over the world, resulting in, for example, citation impact, which for research coming out of the CoEs is on the level of the best research in the world, and highly efficient research training, measured by the number of highly cited publications within three years from the scientist's first publication in Web of Science.

Many of these talented researchers leave the centers after a few years, either to take up positions abroad, thereby constituting nodes in an important future scientific network, or to take up positions in society or industry. A few of them stay at Danish universities, and it is important that they have a fair chance of this in terms of open positions which the best people can strive for. This model has served Danish research well, and as stated in the international evaluation of the DNRF, it has been one of the main drivers in the strong, positive development of Danish academia during the last 25 years.





CENTER FOR INTELLIGENT ORAL DRUG DELIVERY AND SENSING USING MICROCONTAINERS AND NANOMECHANICS (IDUN)

Description of the center in terms of diversity:

- The IDUN research team involves 14 senior core scholars, 9 post-docs, and 25 Ph.D. students and a varying number of visiting scholars.
- They come from the fields of nanoscience, biomedicine, bioengineering, pharmacy, microfabrication, optics, biochemistry, cell biology, mechanical engineering, and more.
- Other academic competencies in-house at the center: micro- and nanofabrication, instrumentation, etc.
- Research personality traits: A combination of all kinds of personalities: introverts and extroverts, structured and unstructured, etc. In general, people are experts and highly trained in their specific fields, but very much team players. The IDUN environment also facilitates teamwork and trains people in connecting their own expertise with other fields and assisting each other in different collaborations across disciplinary borders.



Professor
Anja Boisen,
CoE leader, IDUN

The IDUN scholars come from Denmark, Taiwan, Italy, Germany, Sweden, India, Switzerland, the UK, Lithuania, Finland, Ukraine, Kenya, China, and Iran.

They have academic degrees and research experience from Denmark, Taiwan, Italy, Germany, Sweden, India, Switzerland, the UK, the US, Lithuania, China, Ukraine, Finland, and Iran.

- Scholars' nationalities
- Countries from where scholars have obtained academic degrees and research experience



There are 20 women and 28 men.

- Women
- Men



The youngest scholars are 25 years old; the oldest are around 50. The majority are between 25 and 35 years old.

- 25
- 25 - 35
- 50



DIVERSITY TRAINING AND INCLUSION

– CONSIDERING YOUNGER RESEARCHERS' CAREER DEVELOPMENT

At IDUN we strongly believe that diversity in the group contributes to a fruitful research environment. And this belief influences both everyday life and the center's strategic focus. Of course, some overall decisions are made from the top down, after hearing out as many relevant people as possible. But when the road map is laid out, the focus is on autonomy, mastery, and purpose.

Managing a very diversified group in this way requires the right facilitation for it to be constructive. At IDUN we have had workshops on values, communication, research integrity, well-being, and the handling of conflicts. These workshops have been facilitated by external consultants and our center coordinator, who has been trained as a business facilitator.

"Managing a very diversified group requires the right facilitation for it to be constructive."

Having a facilitator organize and run the workshops has meant that all participants are free to contribute equally and that focus is on everyone participating with their expertise and opinion. This fosters a very inclusive process whereby everyone takes responsibility for the results of the workshop as well as the implementation of the results after the workshop.

Through these different workshops, we have agreed on a set of common values at IDUN, and these values have then been the basis for the workshops on communication and the handling of conflicts. To collect all the results of the different workshops, the center created the so-called "IDUN Guidelines." These guidelines contain all of the agreements that have been made during the workshops, such as the IDUN values, how we at IDUN collaborate both internally and externally, how to deal with personal issues such as stress, how

supervision is done, and what meetings are held at the center and their purpose.

The IDUN Guidelines are handed out to all new employees, and they help us to keep the IDUN values in mind in the everyday life of the center.

Facilitating fruitful collaboration between people in a big and diverse group is very much the focus of the IDUN center management on a daily basis. Every third month, we update our "milestone boards." These boards show the milestones for each employee for the next 3 months. The individual employee, together with collaborators, chooses his or her own milestones; however, the center leader carefully supervises this process. The board also includes the overall milestones for the project, and each employee is asked to carefully consider these when coming up with his/her own goals.

This exercise facilitates a high level of responsibility taken by each post-doc and Ph.D. student, both in terms of his/her own projects, and also in terms of the big project. This feeling of a common goal and being part of a bigger project is highly motivating, especially for the younger researchers. They are motivated by the fact that they can see that their individual projects are important in the bigger picture, and this leads to a more open and collaborative environment.

"This feeling of a common goal and being part of a bigger project is highly motivating, especially for the younger researchers. They are motivated by the fact that they can see that their individual projects are important in the bigger picture, and this leads to a more open and collaborative environment."

We see this collaborative environment and including leadership style as a benefit in the education of young researchers. It helps them to take responsibility not only for the success of their own part of the project, but also for the success of others and the overall project. Furthermore, it strengthens their ability to navigate through complex projects and groups and makes them better at collaborating and handling different aspects, both positive and negative, of collaborations. We can see that for some people it can be tough in the beginning to navigate in this rather flat structure, wherein collaboration, inclusiveness,

and communication are key aspects. However, after a period of adjustment, we see that the young researchers thrive in this environment and, through this, learn a lot about themselves, something that we are certain will be of great value later in their careers.

Of course, it is also a challenge to be part of a diverse group and to have a very inclusive management style. It sets high demands for a leader in terms of spending time on each individual and making sure that everyone is motivated, thriving, and helping to solve the conflicts that inevitably arise in a highly diverse group.



CENTRE FOR PRIVACY STUDIES (PRIVACY)

Description of the center in terms of diversity:

- The PRIVACY research team involves 8 senior core scholars, 7 post-docs, and 4 Ph.D. students as well as visiting scholars.
- They come from the fields of architecture, church history, German studies, the history of law, the history of political ideas, religious studies, and theatre studies.
- They read sources in Danish, Dutch, English, French, German, classical Greek, classical Hebrew, Hebrew, Italian, Latin, Portuguese, Russian, Spanish, and Ukrainian.
- Other academic competencies: archival experience from a broad array of European archives, manuscript editing, paleography, architectural design work, work on various forms of textual material, architectural plans and buildings, dating from the 1st to the 21st century.
- Research personality traits: a subtle combination of technical specialization and ingenuity; of classical scholarly profiles and pioneers.



**Professor Mette
Birkedal Bruun,**
CoE leader, PRIVACY

The PRIVACY scholars come from Belgium, Brazil, Denmark, England, France, Germany, Israel, Italy, and Sweden.

They have academic degrees and research experience from Belgium, Canada, Denmark, England, France, Germany, Israel, Italy, the Netherlands, Norway, Poland, Russia, Spain, Sweden, and Switzerland.

- Scholars' nationalities
- Countries from where scholars have obtained academic degrees and research experience



Ten are women, and nine are men.

- Women
- Men



The youngest scholar is 28; the oldest is 66. The recruited scholars are between 28 and 42 years of age, with the majority being in their late 30s.

- 28
- Late 30s
- 66



DIVERSITY AND EXCELLENCE IN RECRUITMENT AND CAREER DEVELOPMENT – OPPORTUNITIES AND CHALLENGES

The Centre for Privacy Studies (PRIVACY) is driven by a collaborative and interdisciplinary vision. We study the architectural, legal, political, religious, and social dimensions of privacy, by examining 11 historical cases: specific sites at a particular point in time within the period 1500-1800. Each of the 11 cases is examined by an interdisciplinary case team, comprising scholars from each of the core fields: architectural history, church history, the history of political ideas, and legal history – each with an additional view to social components. Only through close interdisciplinary collaboration can we analyze how different societal factors influence the delineations drawn between the individual and society in relation to notions of privacy and the private.

Recruitment

Scholars at PRIVACY need to have scholarly agility, to be well grounded in their own field, and to be ready to share skills and exchange knowledge with their colleagues. In our recruitment process, we strove to convey the composite requirements to potential applicants. We organized a two-day recruitment seminar, inspired by UrbNet's approach to recruitment. More than 70 people applied; 44 scholars from 16 countries were selected for a seminar at which participants were presented with the research program and given instruction regarding the application process and a first taste of the collaborative goals.

In the assessment of the applications for the research positions, we evaluated scholarly strength and technical research skills; each applicant's approach to the issue of privacy and the 11 cases; research experience and publications; collaborative experience; and compatibility with the associated institutions.

However, we also took into consideration each applicant's scholarly temper. As a result, we have composed a team with complementary skills, research profiles, and scholarly personalities – a team that includes both classical profiles and pioneers and a fine blend of scholarly fearlessness and minute technical precision.

"We strive to use disciplinary collisions constructively as a means to hone our scholarly argument rather than blurring them in pursuit of scholarly consensus."

The most acute challenge when gathering different disciplines and scholarly tempers is to understand each other. Different fields have different scholarly vocabularies and different parameters when it comes to "the strong scientific argument." We strive to use disciplinary collisions constructively as a means to hone our scholarly arguments rather than blurring them in pursuit of scholarly consensus. A concrete initiative in this regard is our "Learning together" seminars, at which scholars from the team present to their colleagues sources and technical skills pertaining to their discipline and we all try our hand at the tools and sources of our colleagues' disciplines, thus enhancing both the sense of individual disciplines and the joint interdisciplinary outlook.

"The most acute challenge inherent in interdisciplinary research when it comes to career development is that scholars remain recognizable to their peers."

Career development

PRIVACY scholars are grounded in their individual research fields, but their scholarly profile will become different from the profile of most of their scholarly peers. It is particularly vital to make sure that the young scholars remain recognizable to colleagues and research environments in their respective fields, including highly specialized institutional contexts.

The most acute challenge inherent in interdisciplinary research when it comes to career development is that

scholars remain recognizable to their peers. We thus face intensive work on two fronts: one traditional, one pioneering. At PRIVACY, we encourage our young scholars to publish in the formats that apply to classical research publications in their respective fields while breaking new ground in collaborative research publications that reflect PRIVACY's research program and interdisciplinary vision. In addition to this, we connect our young scholars to high-profile international mono-disciplinary research environments to complement the interdisciplinary endeavors at the center.



CENTRE FOR CELLULAR SIGNAL PATTERNS (CELLPAT)

Description of the center in terms of diversity:

- The CellPAT research team involves 6 senior group leaders, 12 assistant professors/post-docs, and 15 Ph.D. students and a varying number of visiting scholars.
- They come from the fields of medicine, molecular biology, biochemistry, biophysics, nanoscience, food science, chemistry, and space engineering.
- Other academic competencies: journal editor, product development, entrepreneurship, commercialization, and start-ups
- Research personality traits: a subtle combination of nerds, team players, and social glue-people who organize bowling events and the like.



Professor Jørgen Kjems, CoE leader
CellPAT

The CellPAT scholars come from Denmark, Sweden, Finland, Italy, Romania, Germany, England, Poland, the US, China, Russia, Iran, Taiwan, and Egypt.

They have academic degrees and research experience from Denmark, Sweden, Finland, Italy, Romania, Germany, England, Poland, the US, China, Russia, Iran, Taiwan, and Egypt.

- Scholars' nationalities
- Countries from where scholars have obtained academic degrees and research experience



Fifteen are women, and eighteen are men.

- Women
- Men



The youngest scholars are 25; the oldest is 60. The majority are between 25 and 35 years old.

- 25
- 25 - 35
- 60



DIVERSITY IN THE INTERPLAY BETWEEN PERSONALITIES AND INTERDISCIPLINARITY – OPPORTUNITIES AND CHALLENGES

Diversity comes in many flavors. Usually we think of nationality, gender, and age; however, regional background (city/country) or personalities (e.g., the nerd, the team player, or the social glue-person organizing a bowling event) can be regarded as elements of diversity. But perhaps the most important parameter for a research group's scientific success is interdisciplinarity. The team should consist of people with a focused vision, but with different backgrounds, perspectives, etc. For more applied research, it is advantageous to extend group diversity to include people with skills in product development. In particular, having team members with experience in entrepreneurship, commercialization, start-ups, etc., can be highly beneficial. This interplay of knowledge and skills not only provides a more stimulating research environment where everybody is challenged to learn new things, but also creates new fissures in smooth surfaces that are more likely to catalyze breakthroughs. This applies to all career steps, both among the young talents (students/post-docs) and among the permanent academic and technical staff.

“This interplay of knowledge and skills not only provides a more stimulating research environment where everybody is challenged to learn new things, but also creates new fissures in smooth surfaces that are more likely to catalyze breakthroughs.”

Hence, to build up a strong group, recruitment is of key importance. The members of the group must complement each other and be team players. Only then will the sum become greater than the individuals.

Diversity in CellPat

In CellPat, recruitment of staff members with divergent academic backgrounds is the single most important parameter and contributes greatly to our research success. Perhaps the best example of a major diversity-driven research breakthrough in our group is our self-assembling DNA box published in *Nature*. The research that led to this breakthrough involved people with skills in at least four different disciplines: the computational designer who created the theoretical blueprint; the chemist and molecular biologist who synthesized and assembled the ingredients; and the biophysical team that visualized the product using light, x-ray, and electron microscopy, while drinking coffee together under the same roof of the interdisciplinary nanoscience center (iNANO). This multifaceted approach enabled us to solve the very challenging problem of creating highly complex 3D nanostructures that each of us did not even dream were possible.

“In CellPat, recruitment of staff members with divergent academic backgrounds is the single most important parameter and contributes greatly to our research success.”

The CellPat center has a large proportion of young talents (more than 50% are under 30 years old) who are constantly being challenged with questions at the borders of their knowledge. This teaches them the benefit of moving out of their comfort zone and depending on their team for problem-solving. International diversity among young recruits also has profound advantages in terms of creating international networks. With more than 14 nationalities from four

continents in CellPat, the daily exposure to different cultures is substantial. Danish post-docs and Ph.D. students can learn about work discipline from foreign students, and strict enforcement of English as the common language in the lab enhances everybody's linguistic skills and primes the young talents for international adventures later in their careers. It creates life-long friendships across borders and will expand their international network later on in their careers.

However, diversity can also be a challenge. In CellPat we find that newly recruited students and post-docs, in particular, those from Asia and the Middle East, often need special attention when exposed to Danish culture. Differences in politeness, irony, work expectations, pride, and gender relationships are important parameters to consider, and care must be taken that national sub-groups do not emerge within the center or department. Therefore, diversity is also an undertaking that needs daily attention in order to make the advantages flourish.

Ph.D. students attending a course on diversity at the iNANO Ph.D. School where most of the CellPat students are enrolled.



CENTER FOR HYBRID QUANTUM NETWORKS (HY-Q)

Description of the center in terms of diversity:

- The Hy-Q research team consists of 7 senior core scholars (3 professors, 4 assistant professors), 9 post-docs, and 16 Ph.D. students, 10 master students, and a varying number of visiting scholars.
- The researchers at Hy-Q work within experimental quantum optics, nanodevices, theoretical quantum optics, and quantum optomechanics.
- Other academic competencies: electronics and mechanical engineers (paid on an hourly basis and drawn from the department)
- Research personality traits: Many different competencies need to come together in Hy-Q. The common denominator is performance at the highest international level. Social glue is essential to get people to collaborate across disciplines and cultural boundaries.



**Professor
Peter Lodahl,**
CoE leader Hy-Q

The Hy-Q scholars come from Denmark, Italy, Spain, China, India, Iran, Sweden, Finland, United States, Turkey, Ukraine, Germany, France and Canada.

They have academic degrees and research experience from Germany, France, China, Italy, Spain, India, Canada, Turkey, Finland, Sweden, Iran, the Netherlands, Denmark, Ukraine, and the United States.

- Scholars' nationalities
- Countries from where scholars have obtained academic degrees and research experience



There are 11 women and 31 men.

- Women
- Men



The majority of the group is between 20 and 30 years of age due to the center's many Ph.D.s, master students, and young post-docs. Only around 6 people are over 30 and only 2 people are over 40.

- 20 - 30
- Over 30
- Over 40



HOW TO APPROACH DIVERSITY AND EXCELLENCE

IN RECRUITMENT AND CAREER DEVELOPMENT IN A CENTER SET-UP

The overarching objective is striving for excellence. Focus on diversity in recruiting should always be a natural part of the selection process.

The Center for Hybrid Quantum Networks (Hy-Q) exploits photons to merge disparate quantum systems into large scale quantum networks. The long-term perspective of our research is to enable large-scale processing of quantum information over global distances. To make significant progress on such an ambitious vision requires bringing together an interdisciplinary and thus diverse team of top researchers with complementary competencies. It is a non-trivial task to set up a collaborative team where each individual's competencies are optimally exploited. It starts in the recruiting process, where an essential point is to reveal whether the candidate in question will be a good match with the existing team. Afterwards, it is a continuous task in daily interactions to bring the diversity among our team members into play. It requires a lot of attention and interaction in order to create a group where open communication and respect for colleagues are a matter of course. Each individual needs to understand the strength of collaborating.

“It is a continuous task in the daily interaction to bring the diversity among our team members into play.”

A passion and ambition for quantum physics are the overall unifying factors within the center. In addition, it is essential to create a collaborative and friendly atmosphere, and social activities are important in order to create a “social glue” between team members. Nurturing social relations even in very competitive contexts may be a very “Scandinavian phenomenon” that international employees often have to get used to, but they often adapt surprisingly quickly if the expectations are clearly communicated.

For Hy-Q, diversity in terms of competencies, gender, cultural background, etc. is natural and can be exploited as an asset. It is important to stress, however, that excellent research groups are to be seen as micro-environments that are often created from the bottom up and therefore can have very different needs in terms of diverse compositions. Scientific excellence must always be the top priority, and enforcing quotas and inflexible rules imposed by either the university leadership or the government may be a dangerous route to take. It should be an overall strategy to focus on excellence and to have confidence in the research environments in which you give the best researchers the possibility and freedom to assemble the strongest teams.

“For Hy-Q, diversity in terms of competences, gender, cultural background, etc. is natural and can be exploited as an asset. It is important to stress, however, that excellent research groups are to be seen as micro-environments that often are created “from the bottom and up” and therefore can have very different needs in terms of diverse compositions. Scientific excellence must always be the top priority and it may be a dangerous route to enforce quotas and inflexible rules from either the university leadership or governmental level.”

Clearly, structural challenges can arise, and in physics, the gender balance is often a fundamental problem. It is important to continuously address this challenge from the top down – from the university leadership and the government – by putting this issue on the agenda. The focus on success stories and role models is important to encourage more females to enter

physics. In my own group, we have recently managed to increase the fraction of female researchers very significantly. This has not been a deliberate strategy, but the focus has simply been on recruiting the best people with the competencies required for the team. However, a secondary consequence of the development of the group has been that the group has become more vibrant and balanced, and along this parameter, the group stands out compared to many other groups in quantum physics. This in turn means that we very likely will be able to attract even more top female candidates.

Prospects for maintaining a diverse research group

A diversity of competencies needs to come together in Hy-Q in order to advance the research. Being a university center, we are often restricted by the employment structure at a university. We are usually able to recruit Ph.D. students and post-docs. Beyond that level, we can sometimes recruit assistant or associate professors on temporary contracts, but with very uncertain future prospects even for top researchers.

Furthermore, a center within the field of experimental quantum physics requires highly qualified and experienced technical staff. This tends to be an overlooked element in debates about the diversity that leverages research.



CENTRE FOR GEOGENETICS (CGG)

Description of the center in terms of diversity:

- The CGG research team involves 5 senior core scholars, 9 assistant/ associate professors, 17 post-docs and 15 Ph.D. students, technical and administrative staff and a varying number of visiting scholars, in total 60 people.
- They come from the fields of Biology/ Botany/ Zoology/ Genetics/ Evolution, Geology/ Geosciences/ Glaciation Sciences, Bioinformatics, Physics, Mathematics, Archaeology, Anthropology.
- Other academic competencies in house at the center: DNA sample curation, ancient and environmental DNA extraction (for use in building DNA libraries for sequencing), DNA libraries from ancient and environmental DNA, DNA Sequencing, Bioinformatics, DNA Sequence analyses for inferences of selection, evolution, migration, phylogenies, population mixing.
- Research personality traits: a miraculous blend of dedicated and talented researchers with tolerant and supportive staff, who all seem to enjoy one another's company and who greet challenges with smiles instead of scowls.



Professor Eske Willerslev,
CoE leader, Center for
GeoGenetics

The CGG scholars come from Denmark, Argentina, Australia, Austria, Brazil, Canada, Chile, China, England, France, Italy, Mexico, Spain, Sweden, Turkey, & USA.

They have academic degrees and research experience from: Denmark, Argentina, Australia, Austria, Brazil, Canada, Chile, China, England, France, Italy, Mexico, Spain, Sweden, Turkey, USA, Germany, Russia, Iran, Belgium, New Zealand, and The Netherlands.

- Scholars' nationalities
- Countries from where scholars have obtained academic degrees and research experience



28 are women, 32 are men.

- Women
- Men



The youngest scholar is 23 (MSc student), the oldest is 72. The majority are between 25 and 55 years old.

- 23
- 25 - 55
- 72



THE PROCES OF BECOMING THE PRINCE PHILIP PROFESSOR AT THE UNIVERSITY OF CAMBRIDGE

The University of Cambridge in the UK is known internationally for its scientific excellence and is continuously ranked among the top 5 universities in the world, across various ranking lists. There are likely many reasons for Cambridge's success, but among them is surely the quality of its scientific staff. At Cambridge, you rarely speak to a professor – in any discipline – without being impressed by his or her curiosity, creativity, and international standing. Importantly, the Cambridge scientific mindset is focusing on what we can learn from scientific discoveries, rather than how they can be applied to industry. Still, industry is capitalizing on the university's scientific progress, as evidenced by a flourishing biotech industry in the Cambridge area. However, at Cambridge, one appreciates the natural order of things: basic research and the discoveries associated with it are the first and fundamental step for any industrial success, and such a step is nurtured and appreciated in its own right.

When I started working at the University of Cambridge I was particularly astonished by the diversity of personalities, as compared to my own university in Denmark. For instance, among the professors and readers, one finds highly religious people doing evolutionary biology or evolutionary paleontology, something that in most institutions would be considered incompatible points of view. Not at Cambridge – there, it is all about hiring people with original personalities, people who are unique in terms of their mindset and scientific approach. Cambridge appreciates the idea that such personality differences are crucial for thinking outside the box and for making groundbreaking scientific discoveries. Sometimes this results in the hiring of personalities that drift to the extreme end of the spectrum and whose scientific ideas represent minority views. However, it is not unusual that, decades later, exactly such a scientific minority's

views bring about scientific paradigm shifts. The university knows this. And even if such views do not ultimately yield success, the university appreciates that this is the price a research institution has to pay for staying at the forefront of scientific research.

As in most other scientific institutions around the world professors at Cambridge hold their positions until retirement. This is reflected in the hiring process, which is extremely thorough and where obtaining the best possible candidate is imperative.

When I applied for the Prince Philip Chair in Ecology and Evolution at the Department of Zoology at the University of Cambridge, I went through several stages of evaluation. The advertisement was very broad; the department was simply looking for an excellent scientist within the broader fields of ecology and/or evolution. There were no other specifics in regard to scientific interests or focus.

Based on our CVs, a handful of other applicants and I were invited to the department where we met with all of the group heads individually for scientific discussions. It took close to two days to complete this evaluation stage, since zoology is a large department covering everything from cellular biology to bird behavior. I also had lunch with students from the department while being monitored by one of the department's professors.

This segment of the process was followed by a scientific presentation to the entire department, permanent staff as well as post-docs and students. After thorough discussion in each of the scientific groups, each group head ranked the applicants individually, providing the head of department with a ranking list.

At this point three applicants were selected to move on to the official job interview. This was conducted by some 11 to 12 board members, of whom only three were from the University of Cambridge. The remaining members were professors from other high-ranking universities. Their questions covered everything from the details of my research to my scientific vision for the next 5 years to how I would deal with unproductive colleagues and students. The interview took two hours. Cambridge's free scientific mindset, its thirst for original thinkers, its acceptance of diversity among scientific staff, and, last but not least, its thorough hiring process are all things from which we in Denmark can learn much.

"It is all about hiring people with original personalities, people who are unique in terms of their mindset and scientific approach. Cambridge appreciates the idea that such personality differences are crucial for thinking outside the box and for making groundbreaking scientific discoveries. Sometimes this results in the hiring of personalities that drift to the extreme end of the spectrum and whose scientific ideas represent minority views. However, it is not unusual that, decades later, exactly such a scientific minority's views bring about scientific paradigm shifts."



DIVERSITY – WHEN AND HOW DOES IT LEVERAGE RESEARCH?

Diverse talent is key, not diversity and talent. As Jørgen Kjems puts it: “This interplay of knowledge and skills not only provides a more stimulating research environment where everybody is challenged to learn new things, but also creates new fissures in smooth surfaces that are more likely to catalyze breakthroughs.”

The exercise is not to even out the differences, as professor Katherine Phillips points out, it is precisely this strain of the cognitively harder process in diversified groups that makes people more likely to share the unique information and perspectives they have in their heads, and which, in the end, gives the better problem-solving results.

After establishing the vision and direction for IDUN’s research, Anja Boisen’s focus is on unleashing autonomy, mastery, and purpose in her diversified groups. She obtains this by a systematized approach to inclusion, ownership, and responsibility. Peter Lodahl points out that it is a continuous task in daily interactions to bring the diversity among his team members into play.

It requires attention and interaction in which he draws on the necessary overall unifying factor, which, in the case of Hy-Q, is a passion and ambition for quantum physics. Both examples show that it takes a continuous effort to benefit from diversity. This is an often neglected part of the debate about diversity.

To the DNRF grantees, the right dimensions are best created bottom up, when the research group is their own micro-environment with different needs in terms of diversity. Diversity quotas would be seen as an impediment.

As should be evident from the case stories in this booklet, it is a complex task to maintain and achieve the collective diversity which can benefit transformative innovation. The recruiting seminars held by Mette Birkedal Bruun and inspired by the processes at the DNRF’s UrbNet center allow the principal investigators to access much more than a person’s resume and publication list and to test out a broader range of elements for the desired collective diversity.

Another example of an inspiring recruitment process is Eske Willerslev's account from Cambridge where job interviews are conducted by a panel of 11-12 people of which only three are Cambridge employees.

Diversity in hiring e.g. in the form of internationalization is likely to have a longer term positive effect through the creation of international networks which Danish research will benefit from for years to come.

The younger researchers at CellPat are constantly being challenged with questions at the edge of their knowledge. This teaches them to move out of their comfort zone and leverage the team's collective diversity for problem-solving.

At IDUN, the systematized approach to inclusion, ownership, and responsibility strengthens the younger researchers' ability to navigate through complex projects and groups and makes them better at collaborating and handling different aspects, both positive and negative, of collaborations.

These aspects of "growing up" in diversified research groups will provide younger researchers with skills to succeed as the next generation of world-leading scientists.

Being part of a diversified research group can in some aspects be more tough than being part of a homogeneous group. Conflicts and misunderstandings can arise from differences in culture, senses of humor, expectations, etc. Handling this requires conscious considerations.

Research integrity, the best of methodology and the many hours invested to pursue new research endeavors are for the benefit of science and society. It takes a conscious and continuous effort to leverage diversity in research, and principal investigators together with the younger researchers, must continuously and consciously strive for the optimal research – in the most creative, dynamic and truth-seeking environment.

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