Innovation Fund Denmark

Self-evaluation of the role, tasks and organisation of IFD and its position in the Danish Research and Innovation system

July 2018

Innovation Fund Denmark

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List of abbreviations and acronyms

AAL	Active & Assisted Living Programme
AI	Artificial Intelligence
AIR	Annual Investment Reviews
AR/VR	Augmented/Virtual Reality
BONUS	Science for a Better Future of the Baltic Sea
CIID	Copenhagen Institute of Interaction Design
CRO	Contract research organization
DDC	Danish Design Center
DSF	Strategic Research Council
e-grant	The external user interface of GOT
ESCEL	Electronics Components and Systems for European Leadership
EUDP	Energy Technology Development and Demonstration Programme
Eurostars	R&D in small- and medium-sized enterprises
FET	Future and Emerging Technologies
FP7	The 7th Framework Programme
GBER	General Block Exemption Regulation
GO-T	Get Organized Tilskud – our IT system
GUDP	Green Development and Demonstration Programme
HE	Highly Educated
HTF	Danish National Advanced Technology Foundation
ICT	Information and Communications Technology
IFD	Innovation Fund Denmark
IM	Investment Manager
IoT	Internet of Things
IP	Intellectual Property
IPRD	Innovation Pilot in Rural Districts
JPI	Joint Programming Initiatives
JTI	Joint Technology Initiatives
MUDP	Environmental Development and Demonstration Programme
MYBL	More Years, Better Lives
PO	Programme Officer
PoC	Proof of Concept
R&I	Research and Innovation
RR	Research Reserve
RTO	Approved Technological Service Institutes (GTS)
SAB	Strategic Advisory Board
SE	Scientific Evaluator
SIU	Danish Agency for Institutions and Educational Grants
SME	Small and Medium-sized Enterprises
SO	Scientific Officer
SRL	Societal Readiness Level
TRL	Technology Readiness Level
UDP	EUDP, GUDP and MUDP

Introduction: Investing in the Future

In 2012, the Danish Government introduced a novel national innovation strategy. Denmark had to be better at competing for innovation, exploiting its strengths and potentials and cultivating more public-private partnerships. One of the main objectives of the strategy was to encourage Danish researchers to focus more on developing new solutions to global societal challenges, which also supported growth in Denmark. In short, the Government wished to get more value for the increasing amount of public money spent on research. This led to three focus areas for the new national innovation strategy:

1. Societal challenges must drive innovation
2. More knowledge must be transformed into value
3. Education must increase innovation capacity

To be able to work with these focus areas it was important first to create a more agile and well-functioning research and innovation system. Thus, based on a broad political agreement, the idea for one large innovation fund with the financial power to make a difference was born – and on 1 April 2014 Innovation Fund Denmark (IFD) was established.

The main task of IFD is to translate ideas, societal challenges and innovation needs into concrete projects, partnerships and solutions that contribute to knowledge building, growth and a better society. Furthermore, IFD must have a regional presence and support research and innovation throughout the country. These objectives were translated into a strategy, a new structure and governance and a very different organisational culture compared to the previous funds and councils, which were merged into IFD.

Today, IFD's Board of Directors and 47 employees yearly invest in more than 700 research and innovation projects conducted by entrepreneurs, scientists, public institutions and companies with groundbreaking ideas, knowledge and the drive to create growth and solve the challenges facing our society.

IFD invests in small projects that improve knowledge and everyday lives and in groundbreaking projects that can change our world

The 1,800 active projects with an accumulated provision of DKK 8 billion are distributed all over the country and everywhere in the value chain.

IFD has now existed for four years, and is well on the way in implementing the strategy and the associated cultural change. Hence, 2017 was the first full year of operation; this report will address how we as a Board, Management and organisation have implemented the legislation and strategy for IFD, and how far we have come. It will look at the strengths and weaknesses of our current practice, and based on our experience from these first years, point out where IFD's mandate may be too weak to meet both the goals within the objectives of the legislation and the needs of the Danish society from today's perspective.

When evaluating public institutions, it is natural to look at the impact and value they create in society. In this case, however, it is still too early to look at the overall impact of IFD's activities – especially the impact of university-based, research-heavy projects, which is the area receiving the majority of our investments. The conditions for impact assessment of research and innovation have never been better. Nevertheless, assessing socioeconomic impact still poses a challenge, for which reason IFD strives to improve and monitor the development of methods and approaches within this field. We are currently initiating our first impact analysis and will in 2018 be launching the first larger impact project within our SME programme, followed by analysis of the other programmes.

We wish you happy reading, and should more information be required, please do not hesitate to contact us.

Best regards,

Jens Maaløe, Chairman of the Board

Peter Høngaard Andersen, Managing Director

1. The Legal Frame of Innovation Fund Denmark

The role of IFD and the way it operates today are primarily determined by the Act on Innovation Fund Denmark no. 306 of March 29, 2014[1]. In the following, we describe IFD's statutory framework – including EU state aid rules – and how we interpret and adjust operations hereto. Furthermore, we elaborate on IFD's coordinating obligations and role in the Danish research and innovation landscape and eco-system, including the statutory framework for IFD's regional model. The regional model was established partly because of IFD's legal obligations to have a regional presence and partly because of new legislation from the Government requiring IFD to also be physically present in other parts of Denmark.

Subsequently, Chapter 2 outlines how IFD in 2014 translated the overall objectives of the Act into practice by formulating a new basic strategy. This also includes views on how IFD uses the mandate to act independently and in an agile manner according to socioeconomic changes and societal needs. This chapter goes into detail with how we interpret our role in the research and innovation eco-system and why IFD has decided to support projects across the entire value chain, but with the bias on strategic research.

IFD is a merger of three former funds and councils: the Danish National Advanced Technology Foundation, the Danish Council for Strategic Research and the Danish Council for Technology and Innovation. As a new initiative from the Government's innovation strategy, IFD was established as an independent body responsible for developing its own instruments and grant programmes. On behalf of the Minister, the Danish Agency for Institutions and Educational Grants (SIU) has the supervisory duty and is thus entitled to demand insight into IFD's systems, accounts and operations.

According to the goals stated in the Act, IFD shall award grants to strategic science and research focussing on societal challenges, technology development and innovation, which together contribute to increasing the proportion of innovative companies, private companies investing in research and development and highly educated employees in companies, respectively.

IFD investments must strengthen the link between high-quality research and innovation, including collaboration on research, technology development and innovation between knowledge institutions and companies

Furthermore, IFD has the task of supporting Danish participation in international collaboration within the above-mentioned areas. Finally, IFD must support the maturing of promising research results and inventions for faster dissemination, use and commercialisation of knowledge.

Statutory Framework

The main legal basis of IFD is the Act on Innovation Fund Denmark no. 306 of March 29, 2014. The Act sets out the objectives, tasks and governance of IFD as well as provisions on the awarding of grants, appeals, supervision etc. Furthermore, to increase transparency Executive Order no. 1150 of

[1] Act no. 306 of March 29, 2014

November 2017 sets out specific provisions regarding the awarding of grants, including especially IFD's power to place demands on applicants and their applications for funding.

An equally important part of the legal basis for the activities of IFD is the annual Finance Act. The Finance Act provides IFD with the finances for funding programmes and IFD operations. To varying degrees, the Finance Act earmarks funds to specific areas and otherwise stipulates limitations reflecting political priorities regarding the funding of research and innovation. IFD must observe these limitations in its daily work.

Pursuant to Section 4 of the Act, IFD shall design a limited number of funding programmes in accordance with the goals of IFD and within the framework of the annual Finance Act. Chapter 5 of the Act stipulates that decisions regarding the awarding of grants must be based on open competition and legally reasoned pre-published criteria such as quality, efficiency and relevance of applications. In this connection, emphasis shall be placed on *quality* within research, technology and innovation, *efficiency* in regards to society and business and *relevance* to growth and employment in Denmark. Furthermore, IFD shall set uniform guidelines to ensure common practice within IFD.

Based on the mandate in the Act, IFD has designed a number of programmes. Together they cover the entire value chain from research to innovation, involving scientists from research institutions, entrepreneurs and SMEs as well as large companies

For each programme, IFD has drawn up guidelines or calls comprising assessment criteria and other terms and conditions relevant to the specific programme and its purpose. Formally, funding is awarded to legal entities except for a few cases in the InnoFounder programme, where the beneficiary has not founded a company.

In addition, IFD must also observe the Danish Public Administration Act, and related laws in connection with awarding of funding. This includes obligations to guide applicants, to inform applicants of application assessments made by external peers, to justify decisions in writing, to refer to relevant legal provisions and criteria in the Act and Guidelines etc. and to provide applicants with appeal instructions. Furthermore, IFD shall continuously ensure that Board Members, peer reviewers and employees of IFD involved in the processing of applications avoid conflicts of interest.

The following outlines essential parts of the Act, which describe the politically defined core tasks of IFD.

Main Objective
The main objective of IFD is described in Section 2 of the Act. Through awarding of grants, IFD is to promote creation of knowledge and technology, including high technology, to strengthen research and innovative solutions of benefit to growth and employment in Denmark. Particularly, IFD shall support solutions to societal challenges and increase the effort within science and innovation in companies, including both small and medium-sized companies.

Authority and Aims
IFD shall fund strategic and challenge-driven research, technological development and innovation, which combined contribute to increasing the share of:

- innovative companies
- investments in research and development made by private companies
- highly educated employees in companies

Funding provided by IFD must underpin:

- the link between high-quality science and innovation, including collaboration on strategic research, technological progress and innovation
- Danish participation in international collaborations on the above-mentioned areas
- the support of promising scientific findings and inventions with a view to ensuring faster dissemination, application and commercialisation of knowledge

IFD is authorised to:

- award funding for societal partnerships
- co-finance projects together with other public or private funds
- award up to 20 per cent of the annual budget through international forums, provided the parties concerned distribute within open competition on the basis of a professional assessment
- participate in international forums as a granting authority
- Moreover, IFD can request co-financing from applicants.

State Aid

As part of the Government administration IFD must respect EU state aid rules whenever awarding funding to a company. IFD has a number of diverse programmes that target different beneficiaries. However, common to all programmes is that companies are among the beneficiaries, and thus each programme must comply with the EU state aid rules.

The EU state aid rules is taken into account in the design of each programme. The primary legal basis in terms of ensuring compatibility with EU state aid rules is the General Block Exemption Regulation (GBER) established by the European Commission. In addition, a minor part of IFD funding for research and development projects is awarded in accordance with the *de minimis* regulations, also established by the Commission.

The GBER sets out a number of requirements that must be met by each programme and whenever a company receives aid from IFD. GBER contains a number of common provisions, and provisions on monitoring, as well as specific provisions for different categories of funding.

Most relevant to IFD of the last-mentioned provisions for different categories of funding is Article 25, which allows aid for research and development projects. With the exception of the InnoFounder programme, which awards aid in accordance with Articles 22 (aid for start-ups) and 28 (innovation aid for SMEs), all other IFD programmes award research and development funding on the basis of Article 25.

In this connection, IFD limits the funding to project activities that fall within the EU definition of industrial research and experimental development. Furthermore, the IFD programmes limit the aid intensity of each beneficiary, including companies, in order to comply with the maximum aid intensities laid down in Article 25 (5). In the end, the exact amount of funding of a company's participation in research and development projects is based on the eligible and actual incurred costs of research and experimental development activities.

As mentioned above, a minor part of the funding is awarded in accordance with the *de minimis* regulations. The advantage of the *de minimis* regulations is that IFD can simplify the guidelines and the administration of funding in cases where the funding awarded to a company does not exceed EUR 200,000 over a period of three years. In general, this is very much to the advantage of SMEs participating in projects supported by the InnoBooster programme, but also of companies with a limited share of the budget in larger collaboration projects supported by the Grand Solutions programme.

In conclusion, the framework of the EU state aid rules limits the ability of IFD to support both SMEs and large companies in their effort to create new knowledge and carry out innovation.

Thus, the EU state aid rules do not prevent IFD from pursuing its goals, though the rules do place an additional administrative burden on both IFD and the beneficiaries and overall makes the public support of SME's and innovation activities less attractive than in other areas of the world.

Regional Presence

IFD invests in projects throughout Denmark and is by law obligated to have a regional presence.

From the beginning, IFD has actively visited all regions regularly and held panel meetings, conferences and information meetings all over the country

IFD has simultaneously worked very closely with the business support system in order to promote the funding programmes in all corners of the country.

On IFD´s initiative, formal collaboration agreements with the regional stakeholders were put in place, thus extending our regional presence. In November 2015, the Government, as part of a plan for growth and development throughout Denmark, decided that IFD was to be physically represented in at least two additional regions of Denmark. Since then IFD has operated with affiliated offices and regional employees in the three regions in the western part of Denmark and a regional coordinator located in the head office in Copenhagen.

Relocation Process

The regional presence of IFD will soon be even more profound. As part of the second round of a major relocation of state institutions and employees, IFD was asked by the Government in January 2018 to move the organisation out of Copenhagen. The Government wanted IFD to move to the country's second largest city, Aarhus. The Board of Directors, who by law must choose the location of IFD, accepted this. In March 2018, IFD therefore presented a new extended, regional model including a plan, timeline and budget for moving the head office to Aarhus. According to the timeline, IFD will be operating out of Aarhus by June 2019, and the new regional model will be fully implemented by end 2019.

Next Step – a New Reform

Alongside the relocation process, the current research and innovation system is about to change. A new political settlement in May 2018, has determined reforms of the system that will affect the mandate and organisation of IFD in the future. The aim of the political settlement is to simplify the system making it user-friendly with fewer entries. Consequently, a new mandate is given to IFD including a number of new tasks.

2. IFD Strategy and Culture

The objective of IFD is in short to bridge research and society. To make sure that we as a society get the most value out of the public money spent on research. In 2014, this overall commissioning was turned into a strategy for the newly established fund. The strategy was not only a way to shift focus, but also a plan for the new fund and a new way of funding research and innovation with public money. It included new governance, new structure, new organisation, different competency profiles for both managers and employees and new funding programmes and processes. To make this happen, it was necessary to build a new culture and in this process to formulate and implement new values supporting the strategy.

Naturally, the new fund has attracted much attention, and Management has prioritised the involvement of relevant stakeholders in the Danish research and innovation system. Thus stakeholders, including the universities, were also part of the strategy process.

Timeline for IFD Strategy and implementation

Mission, Vision, Objectives and Values

The IFD strategy is built on the experience of the three previous funds rethought as a fund with one clear aim. The objective is to help pave the way for entrepreneurs, researchers, public institutions and companies with expertise and ideas that can generate growth and create a better society in Denmark. This is elaborated in the following mission, vision and detailed objectives and values:

Mission
IFD invests in the cultivation and translation of ideas, knowledge and technology of benefit to the Danish society.

Vision
Entrepreneurship, partnerships and international outlook thrive, thus promoting the translation of ideas, knowledge and technologies into viable businesses and innovative solutions of benefit to society.

Objectives
IFD investments stimulate:

- Growth and employment[2]
- Solutions to key societal challenges

[2] Due to the economic upturn, focus on employment has now shifted from creating more jobs to providing the workforce with the right competences

The objectives are achieved by means of:

- Innovation and technological advances
- Interdisciplinary alliances
- Thriving entrepreneurship
- Research excellence
- A dynamic international outlook

Values

IFD formulated the values after a process involving the entire organisation and the Board of Directors. Today, IFD use the values in the recruitment processes and performance management system to attract and retain committed, professional employees who want to make a difference. The values are:

- Curious
- Brave
- Responsible

A Professional and More User-Friendly Fund

The new strategy instigated a new culture and a completely new way of working. The major changes included:

Changed governance – from a decentralised fund structure to one joint fund: Good governance requires a clear division of responsibilities and a transparent structure, so that everyone knows where decisions are made and by whom. Thus, today research and innovation projects are mainly processed internally in IFD (though the process still includes international peer reviews). For some of the smaller programmes targeting entrepreneurs and companies, expert panels are used to secure sufficient insight into the business aspects of the application in particular; though the final decision still rests with the Board of Directors or Management.

A more flexible organisation: The new governance ensures more flexible handling of applications, as the involved processes have become far more efficient. Furthermore, this renewed structure has facilitated interdisciplinary projects across different fields. In fact, these types of projects are a priority to IFD, as cross-disciplinary projects often bring the most significant value to society.

An organisation with different competencies: Also, in order to ensure fast, efficient processing of applications, IFD has decided to place most of the procedures within a strong core of highly knowledgeable and scientifically founded employees. This means that IFD has hired scientific officers (SOs; more on SOs under 'Organisation') specialised in all major scientific fields, including Energy, Climate, Health, Social Innovation, Production, Food etc. Based on internal reviews and, in the case of larger applications, external (international) reviews, the SOs present project proposals to the Board of Directors, who then make the final decision on all large-scale investments. When it comes to smaller applications from entrepreneurs and SMEs, Programme Officers (POs) draw on the expertise of the SOs when presenting projects and assessments to Management, who make the final decision with regard to these applications.

From financial support to investment: IFD has decided to use the term 'investment' about money allocated by IFD to selected projects. However, this does not mean that IFD requests equity interests or repayment – rather, IFD in its selection and close follow-up, focusses on the projects' value creation in society through knowledge, growth and employment. Moreover, IFD holds projects accountable for ensuring results and value for the benefit of Denmark.

A more accessible fund: One of the reasons for establishing IFD was to create a single point of entry to research and innovation funding and to simplify the application and follow-up procedures. Hence, a main part of the strategy implementation process was going from the 14 programmes of the previous

funds to three simple entries in IFD. These entries should address the three main target groups of IFD. They are:

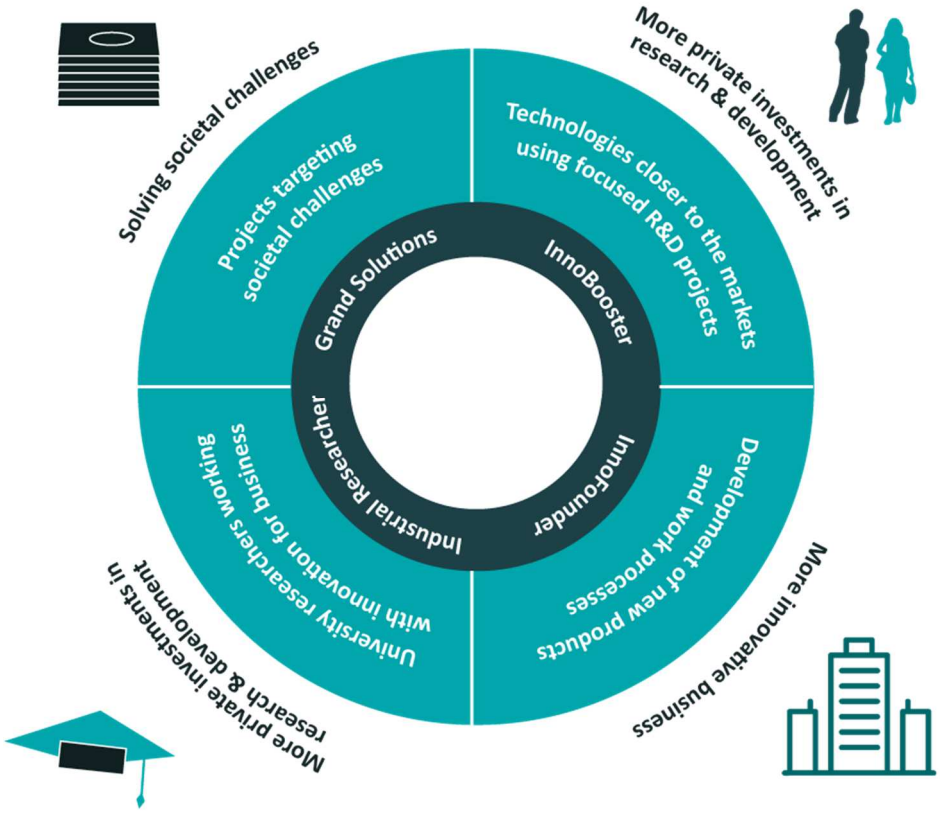
In addition, all application processes were either radically simplified or adjusted and optimised to avoid unnecessary administration. The three entries also reflect the structure of the new organisation. Consequently, IFD now consists of three operational departments called Talent, InnoBooster and Grand Solutions.

IFD continuously simplify programmes and application processes in order to be as user-friendly as the law allows. To address all given tasks and meet the changing political demands, IFD operates with a steadily increasing range of programmes. However, our new interface design with only three entries still guides applicants towards the right programme.

IFD has the following funding programmes:

- **Grand Solutions** – strategic research projects and other research and innovation projects, primarily public-private partnerships
- **InnoBooster** – innovation projects by start-ups or SMEs
- **InnoFounder** – young, newly graduated students that wants to pursue a career as entrepreneurs
- **Industrial Researcher** – PhD student or Post Doc project, where a university partners with a company or public institution to educate a young student to a research career in the private sector.
- **Innovation Pilot in Rural Districts (IPRD)** – innovation projects by applicants in defined rural areas of Denmark

The following figure shows how the different programmes contribute to solving the tasks of IFD stipulated in the Act.*



*The Innovation Pilot in Rural Districts falls under InnoBooster in this figure.

To become more accessible, IFD also had to undergo a cultural shift from the identity of the previous funds as public administrators to a science and innovation based, committed and dialogue-based fund. Today the profiles and contact information of all IFD employees are available on the website, and we highly encourage potential applicants to get in contact with us in order to receive guidance before applying. This also means that rejected applicants can contact SOs and/or POs to discuss and elaborate on rejections – and help them put together a more successful future application. To further increase the accessibility of IFD, we have developed a new, stronger digital presence (new website [version 2 will be launched in 2018], social media profiles and new newsletters) with a simple, modern and welcoming profile as well as a stronger physical presence supported by regular information and thematic meetings all over the country for all types of stakeholders.

Focus on the entire value chain: IFD seeks to build an extensive portfolio of projects covering the entire value chain – from basic research to implementation.

> *Introducing research-based knowledge into companies and public institutions (municipalities, hospitals etc.) has proven effective to generate innovation*

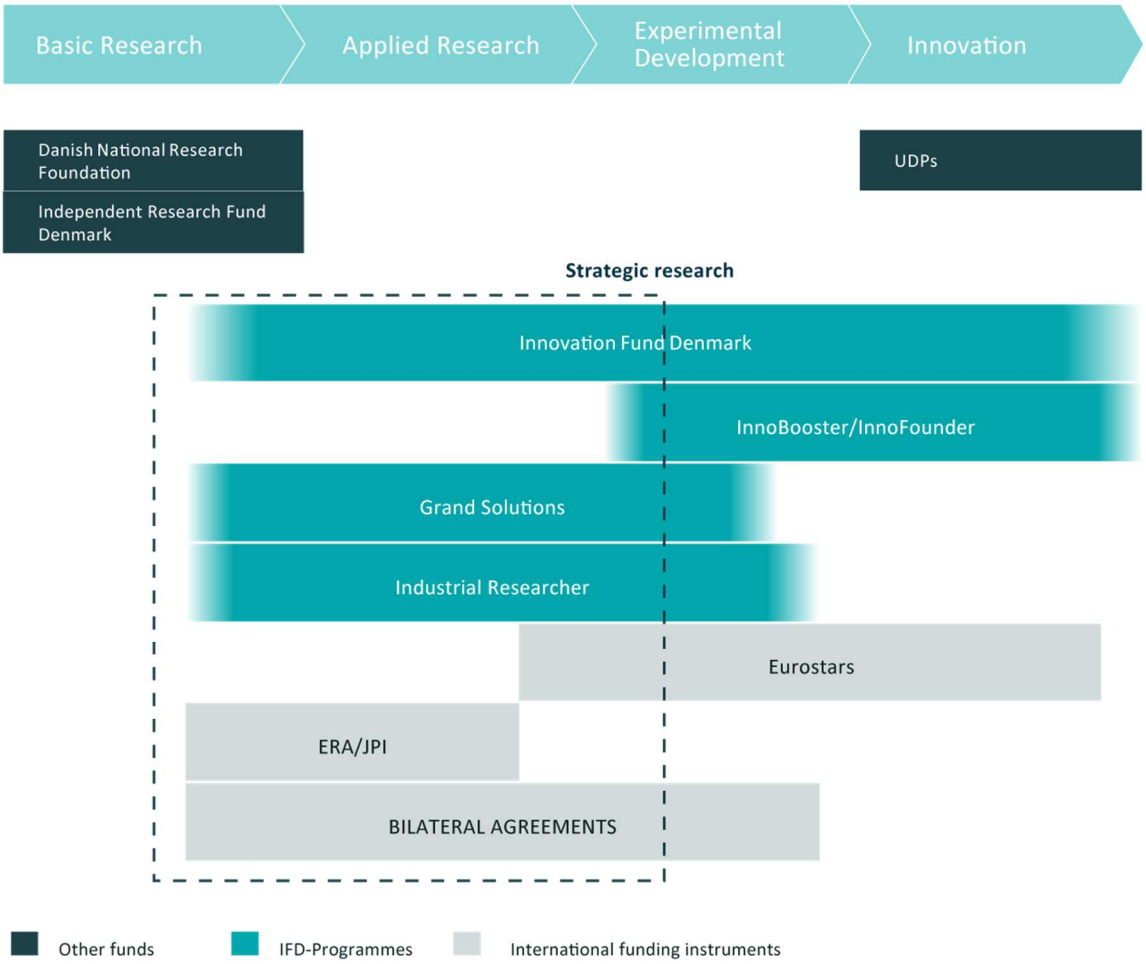
With IFD's new approach and finance models, both research institutions and companies have incentives to participate in such projects (more under 'Funding Instruments').

In 2014, the main societal need (and political focus) was to stimulate growth with the primary objective of creating jobs. This called for short-term, market-driven research and innovation projects with a focus on fast return on investment. Today, four years later, with a booming economy, low unemployment and a lack of labour and talents, there is a need for investing in long-term research and innovation projects supporting the future development and competitiveness of the Danish society. The setup of the IFD funding instruments allows exactly that.

> *IFD's focus on the entire value chain is a major strength, as it becomes possible to adjust investments to different, fluctuating (socio) economic conditions*

The different funding instruments of IFD covers different parts of the value chain (see the figure below). From an eco-system point of view, this means in practical terms that IFD takes over research heavy projects from the Danish National Research Foundation and the Independent Research Fund Denmark and mature these on the journey to new solutions or products. The eco-system are less obvious on the right side of the value chain. In this case, applicants have several options to choose from, and IFD thus coordinates its activities closely with other national funds and programmes to prevent overlap. For example, the InnoBooster programme targets small and medium-sized enterprises as well as start-ups, but does not fund elements containing market maturity, sales and marketing, which are instead covered by the Market Development Fund.

Innovation Fund Denmark and the Danish Research and Innovation System



Due to its focus on the entire value chain and on value creation, IFD, when investing in strategic research[3], demands more of the projects than previously. Strategic research projects are not required to deliver concrete and implemented solutions or products, but the project partners are obliged to *consider* how their research or (potential) solution can be implemented in society, and who should receive the output from the project in order to harvest the full value of the results.

Strategic focus on cultivating research talent – and focus on increasing exchange of knowledge between research and society/industry: One of the three IFD entries is Talent. From the outset, this entry consisted of two programmes, Industrial Researcher and InnoFounder, both with a strategic focus on developing talents as a specific goal, linking up universities and industry and producing good research results and thriving companies, respectively.

From the very onset, IFD had additional ideas for strengthening talent development and bridge building between academia and industry or entrepreneurship. These ideas were postponed, due to a 20 per cent decrease in funds from 2015 to 2016. In short, the ideas were a) to encourage spin-outs from universities through dedicated proof-of-concept (PoC) resources and b) a senior mobility programme supporting exchange of senior staff between academia and industry and entrepreneurship among senior staff in both academia and industry. Both ideas are currently in a

[3] According to the comments to the Act, strategic research is research that helps solve societal challenges within politically prioritised and demarcated areas.

concept development phase and have received constructive input and very positive feedback from various stakeholders.

Part of the talent strategy was integrated into IFD's knowledge strategy – the umbrella of knowledge activities across programmes. In these activities, we leverage our investments by providing project participants with enhanced skills or opportunities to further develop their projects. These activities cover project management programmes, product test facilities and international inspiration and exposure (see more under 'Knowledge Leverage').

Enhancing thriving and successful knowledge-based entrepreneurs: With a clearer national mandate regarding entrepreneurship, we are currently developing a start-up strategy. The strategy, which is still work in progress, is co-developed with stakeholders and will focus on three elements: 1. focus on more mature entrepreneurs not covered by InnoFounder.

Statistically mature entrepreneurs have a higher chance of success. The goal is to help them develop their business idea, strengthen their project and 'de-risk' them financially

2. address a wider pool of talents by reconsidering the rather narrow focus on knowledge-based innovation and the creation of growth companies. We may thus address our current lack of success with, for example, female entrepreneurs by being more open to these developments in the future. Finally, 3. closer coordination with universities and university colleges and their entrepreneurship initiatives can hopefully help generate interest among talented students and contribute to a more coherent approach, allowing us to further adapt programmes to the needs of start-ups.

Enhanced focus on value and impact: IFD neither demands a stake in projects or companies nor repayment. We focus on projects or companies' potential to create value for Denmark. To ensure that Denmark and the Danish society benefit from IFD investments, we follow all larger projects closely from beginning to end. IFD's call for proposals, concentrate on excellence, objectives, scalability or sustainability and value creation. These criteria are the same for all IFD funding instruments, though their interpretation varies between programmes (more on criteria under 'Funding Instruments'). This focus on value creation and the outcome of research and innovation projects also means that IFD terminates projects if no progress can be detected or the results show no promise.

An essential precondition for monitoring the value creation of IFD projects is to document whether they generate a societal return of investment that will create value for Denmark both in the short- and long-term. Therefore, in June 2016 IFD published a report on how to monitor, measure and document the impact of its investments.

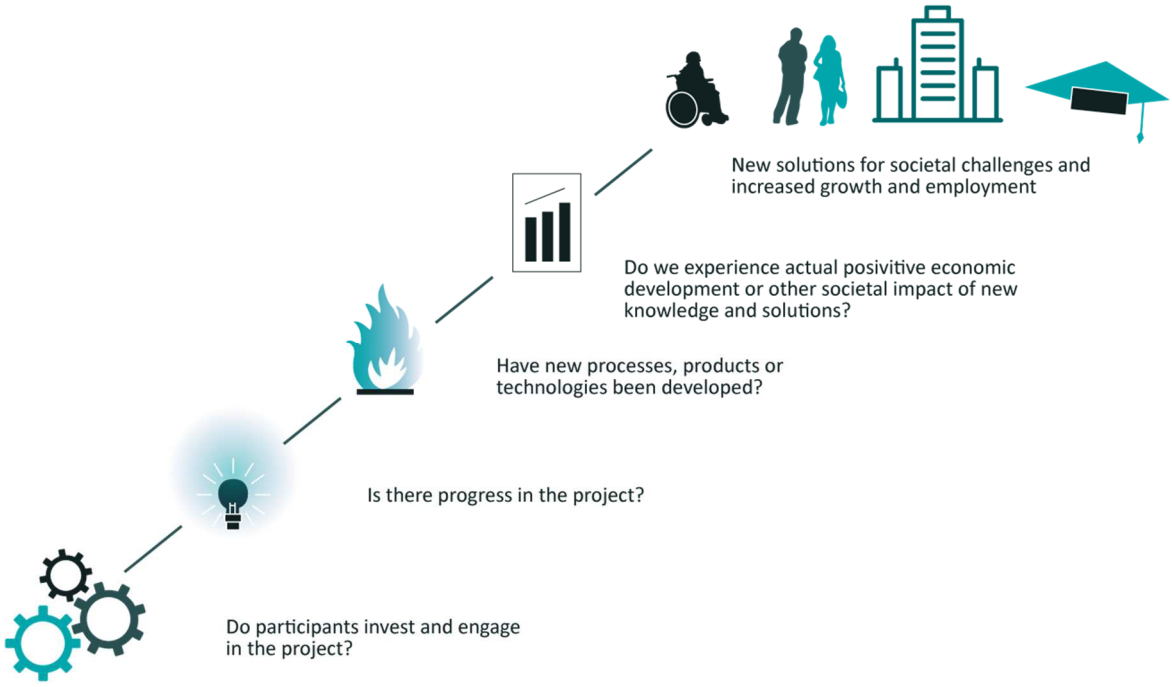
Conducting concrete measurements of the individual projects' socioeconomic return is a complex task, in that results and output may vary, just as projects can be affected by other factors outside IFD. Hence, IFD's publication on impact measurements describes how IFD aims to conduct these measurements by explaining what methods are found most relevant – based on national and international research and in collaboration with OECD.

As opposed to private companies, IFD has no bottom line clearly illustrating whether its investments have been profitable or not. Multiple factors affect the activities of companies and research institutions and thus the impact of the projects in which IFD invests. Depending on the type and size of investment, IFD examines the individual projects to identify their impact, for example by interviewing companies, universities and users of the new solutions. In general, IFD conducts quantitative analyses of the projects. Moreover, our investments generate a series of dynamic effects also mentioned in the publication. For example, innovation and research projects contribute to strengthening the culture of innovation and entrepreneurship in Denmark.

IFD aims to ensure that companies participating in IFD projects expand and increase their value creation significantly. In addition, the aim is for research results to enable future innovations. Impact measurement is an ongoing task, and IFD constantly strives to monitor and measure the effects of its activities. This is done in close cooperation with Danish and international collaborators with a constant view to documenting whether IFD's investments have a positive societal impact.

It is still too early to determine the impact of long-term research and innovation projects launched after the new strategy and setup. However, in 2018 IFD has initiated this process, which will start with a thorough impact analysis of the InnoBooster programme followed by analyses of the other funding instruments.

How IFD Measures Impact



An impact analysis of the partnership MADE was the first attempt to measure impact according to this framework. See Appendix A.

Communication Strategy

IFD communication has focussed on the above strategy, but also on communicating to the end users of IFD's activities – which in effect are the taxpayers.

The latter serves two purposes:

- Documentation of the value creation of projects and companies in which IFD/the State has invested public money.
- Communicating how research becomes accessible to society to the benefit of all.

In addition, IFD has formulated the following strategic themes, which serve as a guideline for all communication by IFD:

- IFD is the entire country's innovation fund
- Simplicity and transparency
- Growth through knowledge
- Benefit and value to society

IFD documents all investments in a project gallery. In addition, all relevant larger research and innovation projects are followed up by active communication to the press with a view to documenting and legitimising the value of the projects to society.

Since its establishment, IFD has experienced very positive interest from national media wanting to cover ÍFD activities, including new investments and value creation in Denmark. The table below provides a simple presentation of the media coverage of IFD compared to its peers:

Media coverage of IFD from 1 April 2014 up to and including 7 July 2017:

Number of press clippings	The largest public organisations within science, innovation and venture in Denmark
8,385	Innovation Fund Denmark
6,893	The Danish Growth Fund
3,012	Independent Research Fund Denmark
2,469	Energy Technology Development and Demonstration Programme (EUDP)
1,619	Danish National Research Foundation
1,508	Green Development and Demonstration Programme (GUDP)
1,173	Environmental Technology Development and Demonstration Programme (MUDP)*

*Established 1 February 2015

3. Organisation

Today IFD has its head office in Copenhagen. In addition, IFD has affiliates in the Incubators of the Region of Southern Denmark, the Central Region Denmark and the North Denmark Region as well as a professional and administrative coordinating function in the main office. The employees in the head office in Copenhagen are responsible for the IFD's main activities:

- Administration of 7 national and international programmes
- Processing of 3,000+ applications yearly for IFD' s own programmes
- Processing of close to 1000 international applications
- Development and communication around investment strategies within the fields of: Energy, Environment, Food, Life Science, Digitisation, Social Innovation and Society, and Transport, Construction and Production.
- Processing of 500+ applications yearly for the funds and programmes of other ministries (UDPs etc.)

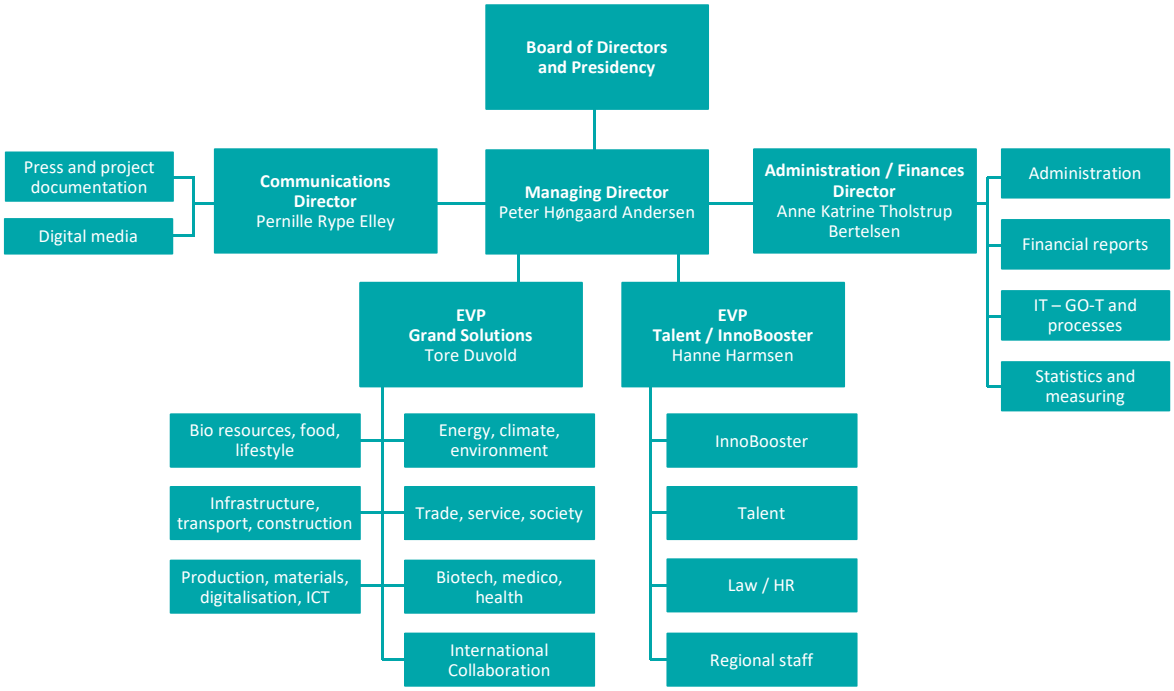
Other IFD tasks:

- In addition to administration and professional assessment of applications, IFD runs a series of knowledge programmes. These include a study programme for project and start-up managers in collaboration with Harvard Business School (from 2018 INSEAD), an Industrial Researcher course operated by Copenhagen Business School and a support function for InnoFounder beneficiaries operated by the Danish Design Centre and the Copenhagen Institute of Interaction Design.
- IFD conducts a number of information meeting at universities throughout the country, participates with stands at entrepreneurship fairs and hosts four large conferences a year and an annual award ceremony focusing on groundbreaking strategic research. IFD communicates (daily press, newspapers and television, web, social media, newsletters, publications, events etc.) intensively about project results to document the value resulting from the IFD's investments.

Organisation

IFD's organisation consists of 47 persons, including the Managing Director, two Executive Vice Presidents and two Directors. Specialists dealing with applicants and beneficiaries are organised in two larger departments: Grand Solutions and Talent/InnoBooster, while other staff functions are placed in the departments of finance/administration and communication.

There is little hierarchy, and the teams work in a matrix. SOs from the Grand Solutions team support the assessment of InnoBooster applications. In such cases, the InnoBooster team draws on the field-specific expertise of the SOs to qualify assessments.



The idea behind IFD was to create a simplified and flexible system. For this to become a success, the core of IFD had to be characterised by a high level of scientific and business competency enabling employees to meet applicants at the same level. This structure also requires that IFD employees are qualified to follow up on the quality and results of projects. The 2015 changes to this governance thus meant, that the staff had to be supplemented with a series of specialists – so-called SOs.

Since 2015, IFD is structured into six teams of SOs and POs specialised in the most relevant fields of research:

- Bioresources, food and lifestyle
- Trade, service and society
- Production, materials, digitisation and ICT
- Energy, climate and environment
- Infrastructure, transport and production
- Biotech, medico and health

The teams are interdisciplinary, and besides processing applications for larger research and innovation projects and acting as investment managers of ongoing projects in their respective areas, they are an integral part of the assessment process of the SME programme, InnoBooster. Furthermore, the teams are responsible for producing and updating investment strategies for selected areas within their fields.

The professional profiles of IFD:

Title	Profile	Tasks
Scientific officer (SO)	Academic PhD-level degree and several years' experience with research and development, ideally both in research institutions and companies. Solid, professional network within his/her field of expertise at national and international levels and good networking skills. Broad professional experience within relevant industries, entrepreneurship or funding an advantage. Senior SO has at least 10 years of professional experience from relevant organisations.	Responsible for strategic development of IFD's activities within own field and contribute to development of IFD across fields. Guide applicants, process and assess applications, conduct ongoing follow-up of projects. The latter includes participating in project management as investment manager. External communication on IFD´s strategies and programmes and dialogue with stakeholders at all levels. Senior SO performs coordination and has cross-organisational responsibility. Senior SO must contribute to the strategic development of IFDs programmes.
Programme officer (PO)	Academic degree focussing on research and/or business development and innovation. Relevant professional experience from e.g. university, start-up, company (public or private) and/or counselling/the promotion of trade system. Relevant professional networks. Senior programme officer has a minimum of 10 years of experience and a broad network within relevant areas.	Guide potential applicants, process and assess applications, conduct ongoing follow-up of projects and contribute to ongoing development of the concrete programmes and the fund's total portfolio. External communication on IFD strategies and concrete programmes and dialogue with stakeholders at all levels. Skills and interest in ongoing further development and optimisation of processes in collaboration with process officer. Senior programme officer performs coordination and has cross-organisational responsibility. Senior programme officer must contribute to the strategic development of IFD's programmes.
Regional officer	Relevant academic degree. Experience with innovation and business development. Professional specialisation an advantage. Knowledge of the local/regional business community. Knowledge of regional innovation environments and knowledge institutions.	Increase awareness of IFD's programmes in the region. Plan and implement educational activities in regional and municipal networks together with colleagues and in accordance with IFD's programmes. Plan and conduct information and dialogue meetings with potential applicants. Actively participate in the region's research and innovation system with a view to spotting trends and wishes for the development of IFD. Contribute to guidance, processing and assessment of application as well as ongoing follow-up of projects, especially InnoBooster projects.

Besides these profiles there is a range of other supporting staff functions, including administration, a legal officer, communications officers and reception.

Examples of specialised competences recruited 2014-2018

Management

Peter Høngaard Andersen
Managing Director responsible for the structure and strategy of IFD. BSc in Chemistry, MSc in Biochemistry and DMSc in Medicine. 30 years of experience from the pharmaceutical industry and biotech and 25 years leadership experience, most recently in Lundbeck as EVP of Research, Corporate Patents and Public Affairs. Has produced a significant amount of scientific publications and holds a series of patents. Founder/co-founder of seven biotech companies.

Hanne Harmsen
EVP and Head of Talents and InnoBooster. Master in Economics and Business Administration and PhD from Aarhus School of Business and Social Sciences. Extensive experience from various parts of the university sector. Director of Education at the University of Copenhagen from 2007-2013 and before that Vice-Dean for Research at Aarhus School of Business and Social Sciences. Director at Deloitte from 2013-2015.

Tore Duvold
EVP and Head of Grand Solutions. More than 17 years' experience from the pharmaceutical and biotechnological industries. Former EVP of Research at LEO Pharma and founder of a biotech company. Degree in organic chemistry from Oslo University and the University of Bergen and PhD in Bioorganic Chemistry from Université Louis Pasteur in Strasbourg. Has produced a significant amount of research publications and holds a series of patents.

Examples of competences in IFD

Bettina Hauge
Scientific Officer in Social Innovation and the social sciences field. Master in Anthropology from the University of Copenhagen and PhD from the Department of Sociology.

Peter Aadal Nielsen
Scientific Officer in Biotech, Medico and Health. MSc in Chemistry/Biochemistry from the University of Southern Denmark and PhD in Computational Chemistry from the University of Copenhagen. Substantial experience from international pharmaceutical industry and various biotech companies.

Lars Winther
Scientific Officer in Biotech, Medico and Health. MSc in Chemistry/Physics from the University of Copenhagen and PhD in Chemistry of Polymers from the Technical University of Denmark. 25 years' R&D experience. Head of department at Dako and start-up consultant. 25 patents/patent applications.

Michael A. E. Hansen
Scientific Officer in Production and Digitisation. MSc in Engineering and PhD in Mathematics both from the Technical University of Denmark. More than 17 years' experience with R&D and innovation and the founder of several start-ups. Previously worked abroad for a period of years.

Anitha Sharma
Scientific Officer in Energy, Climate and Environment. MSc in Engineering and PhD in water treatment and health. Extensive professional experience from all parts of the value chain – from research to product.

Regional employees must increase the visibility of IFD among potential applicants and stakeholders, increase the number of high-quality applications and contribute to greater synergy with business promoter organisations in each region. Their specific tasks include training regional consultants to help applicants and serve as an entry point to collaboration for organisations and stakeholders. In addition, they perform programme management tasks. Based on the initial results, IFD has decided to extend its systematic effort to train consultants and improve collaboration in the two remaining regions, the Capital Region of Denmark and Region Zealand.

Board of Directors

According to the Act, a majority of the Board Members – including the Chairman – must have experience from the private sector. At the same time, a majority of the members must be either acknowledged researchers or research-competent professionals conducting research activities. At the same time, the Board must represent experience with a number of areas, including commercialisation of research results, international activities, research, development of technology, innovation and public-private research and innovation partnerships.

Evaluation of the Governance

IFD governance has concentrated the decision-making power in the Board of Directors, for which reason two things are essential:

1. Procuring independent, external professional assessments of projects
2. Maintaining strict, clear rules concerning conflict of interest

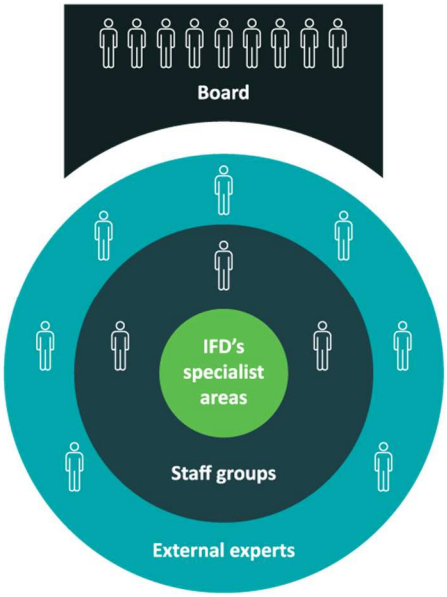
With regard to the first item we have – inspired by Danish and international governance structures – adopted a method which, based on external assessments, ensures independence in assessment processes, before the final recommendation is presented to the Board of Directors. With regard to the second item, we take as our starting point existing conflict of interest rules (copied from the Danish Agency for Science and Higher Education), but have tightened up these within specific areas to ensure full eligibility in all IFD decisions.

IFD's investment governance involves the Board, in-house staff and experts

Board
– 9 politically appointed members with research and industry expertise
– Determines the overarching strategic investment priorities
– Defines awards policy and criteria
– Makes all investment decisions regarding "Grand Solutions"

Staff/Executive Management
– Each specialist area is allocated groups of employees, who jointly possess expertise within:
  · Project management
  · Research and innovation disciplines
  · Administration
– Staff/Executive Management are assigned end-to-end responsibility for applications, including:
  · Decision-support documents for the Board's decisions on "Grand Solutions"
  · Evaluation and decision-making surrounding other applications

External experts
– A corps of experts in research and commerce
– Are paid for each application they review
– Sign agreements with IFD on non-disclosure, remuneration and impartiality



Eligibility Rules According to the IFD Rules of Procedure

In all activities, IFD obeys common administrative law principles of eligibility. In addition, IFD has adopted a set of unique principles of conflict of interest in connection with the final decision to approve or dismiss applications:

- An employee processing applications must, before starting to process a case, inform the Board and Management of any circumstances that can call the eligibility of the Board member or employee into question.
- The Board (or Management) will determine whether the Board member or employee is eligible, and the member or employee will not participate in the processing and decision regarding his/her eligibility.
- A Board Member or employee who has been declared disqualified, cannot participate in discussions of matters in the case and must leave the meeting room when the case is being processed.
- It must be evident from the Board Meeting proceedings, if the question of eligibility has been discussed, just as the decision of the Board must be evident from the proceedings.

Supervision

The supervisory function is delegated to the Danish Agency for Institutions and Educational Grants (SIU) under the Ministry of Higher Education and Science, and in practice, the IFD Management meets with the SIU Management once a month, besides several more informal meetings at all levels of the organisation. Furthermore, IFD and SIU hold a yearly monitoring meeting, where the IFD Management is asked to explain a list of issues defined by SIU, after which SIU formulates a public report about the monitoring. Based on this annual report, IFD typically makes a number of adjustments in internal processes and procedures.

4. Funding instruments – including assessment and follow up procedures

Investments from IFD must contribute positively to society. That is why we link investment types to growth or societal challenges. By doing so, we ensure that our investments in research and innovation contributes to society and solves challenges. Either by solving a specific societal challenge or by focusing on the use of researchers in the private sector, innovation in companies or private investments in research and education.

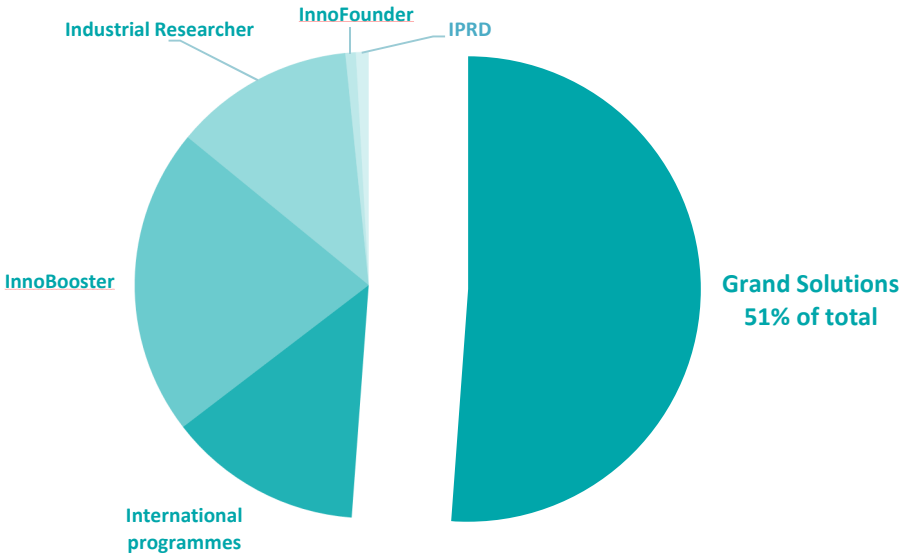
From the Act, IFD investments has the following frame: Grants are subject to open competition, and the assessment of applicants is based on reasoned criteria published beforehand with a focus on quality, effect, and relevance. The granting practice has to be managed by uniform guidelines imposed by the Board of Directors. The public instructions must ensure the assessment of applications for scientific activities by acknowledged researchers, and with a relevant involvement of external evaluators.

A grant is allocated to a person or a legal entity based on the assessment of IFD in correlation with the concrete means. The application procedures of IFD have to be simple, flexible, and balanced in proportion to the complexity of the means and the size of the investment. In order to ensure project progress, IFD has to establish a flexible model for the follow-up and evaluation of projects that have been granted previously.

The following describes each of IFD's funding instruments and their assessment procedures.

4.1 Grand Solutions

Programme size of total funding budget for IFD 2017



Background and Framework

IFD first launched the Grand Solutions programme in 2015, initially under the name 'Large-scale projects'. The programme invests in collaborative projects and partnerships at different stages across the value chain with a view to generating new knowledge, stimulating economic growth, creating jobs and solving societal challenges. The programme has a broad scope covering strategic research and research-based innovation within a wide range of fields and sectors. It focusses on accelerating excellent research of benefit to society. The programme comprises a number of calls with thematic priority areas and an open call, as described in the figure below. In addition to traditional large-scale challenges, Grand Solutions also invests in 'opportunity-driven' research and innovation in emerging fields such as quantum technology and new therapeutic breakthroughs.

Societal Readiness Level (SRL) is a way of assessing the level of societal adaptation of e.g. a social project, a technology, a product, a process or an intervention to be integrated into society

In 2017, IFD introduced the Societal Readiness Level (SRL) in order to stimulate a more conscious approach to developing new innovative solutions synchronised with societal challenges and needs, mega-trends, regulations and, not least, human acceptance. At the same time, the notion of value creation was expanded to comprise broader societal and human value in the context of the UN's Sustainable Development Goals.

Grand Solutions targets ambitious projects, and competition is tough. The programme processes are efficient and fast

The Grand Solutions programme targets ambitious projects with a long-term perspective, top-notch science and high-value propositions. The programme process has been optimised to reduce the time from decision to contract. It is now characterised by active follow up and a high degree of flexibility with regard to changes in the project or the outside world. However, obtaining this type of investment is not easy; the assessment process is comprehensive and competition tough. Furthermore, due to the high investment rates, projects are closely followed by IFD and participants in the projects are required to document the project expenses in detail.

The overall budget frame of Grand Solutions varies from year to year – from more than DKK 1 billion in 2015 to DKK 700 million in 2018, and is typically half of IFD's total budget. IFD typically invests DKK 5-30 million per project, although some investments are substantially higher. IFD can fund up to 75 per cent of the total budget of the project, though IFD encourages co-financing, especially from the private sector. Grand Solutions projects typically run for 3-5 years and are expected to reach implementation 2-10 years after project end.

The Grand Solutions programme invests in activities ranging from strategic research to development, PoC and demonstration, reflecting the broad scope of the programme. Funding can be used to cover expenses in connection with travelling, dissemination, PhD students – although only the hours they spend on the project in question – and, to a limited extent, essential research infrastructure. Thus, the Grand Solutions programme is designed to be flexible and accommodate a variety of different projects independent of size and position in the value chain. However, applicants are required to clearly state where in the value chain the project is positioned, as this will have implications for the composition of the project consortium, the types of activities undertaken and the expected results.

IFD also took over responsibility for a substantial project portfolio from the former Danish Council for Strategic Research and the Danish National Advanced Technology Foundation. Most of these projects have now ended or are in their final stage. A significant effort has been made to monitor and service these projects at the same level as IFD projects.

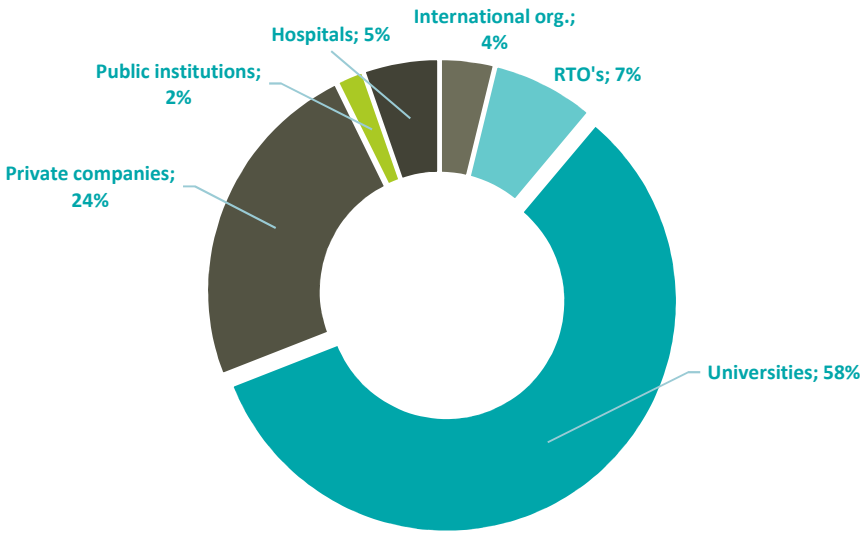
Table 1: Grand Solutions investments and success rates 2015-2018

	2015			2016			2017			2018		
	Applied (DKKm)	Invested (DKKm)	Success rate	Applied (DKKm)	Invested (DKKm)	Success rate	Applied (DKKm)	Invested (DKKm)	Success rate	Applied (DKKm)	Invested (DKKm)	Success rate
Bioresources Food and Lifestyle	1,099	139	13%	1,371	221	16%	613	131	21%	424	77	18%
Biotech, Medico and Health	2,008	116	6%	1,355	123	9%	531	71	13%	759	137	18%
Energy, Climate and Environment	1,182	147	12%	964	178	18%	502	128	25%	706	133	19%
Trade, Service and Society	296	88	30%	213	76	36%	236	38	16%	deadline 14.08	*30	-
Infrastructure, Transport and Constructio	266	43	16%	100	20	20%	-	-	-	-	-	--
Production, Materials, Digitisation and ICT	1,315	228	17%	1,175	228	19%	794	88	11%	1,030	**225	15%
Open call	2,189	264	12%	821	43	5%	1,683	207	12%	deadline 14.08	*130	--
	8,355	**1,026**	**12%**	**6,001**	**891**	**15%**	**4,359**	**663**	**15%**	**2,920**	**731**	

* Budget, ** where of DKK 70 million is part of the budget for the next round

Any legal entity is eligible for funding under the Grand Solutions programme. This includes universities and other research institutions, RTOs, public and private companies as well as government organisations. IFD expects and encourages applicants to seek out the best possible partners at international level, and foreign organisations can participate in projects and receive funding on the same terms as Danish project participants, though the head applicant must be Danish and a significant value must be captured in Denmark. The composition and roles within consortiums differ dependent on the nature of the project and its position in the value chain. Universities often take a leading role in research-intensive projects, while companies take a leading role in more downstream projects.

Figure 1: Distribution of funding across partner types 2016

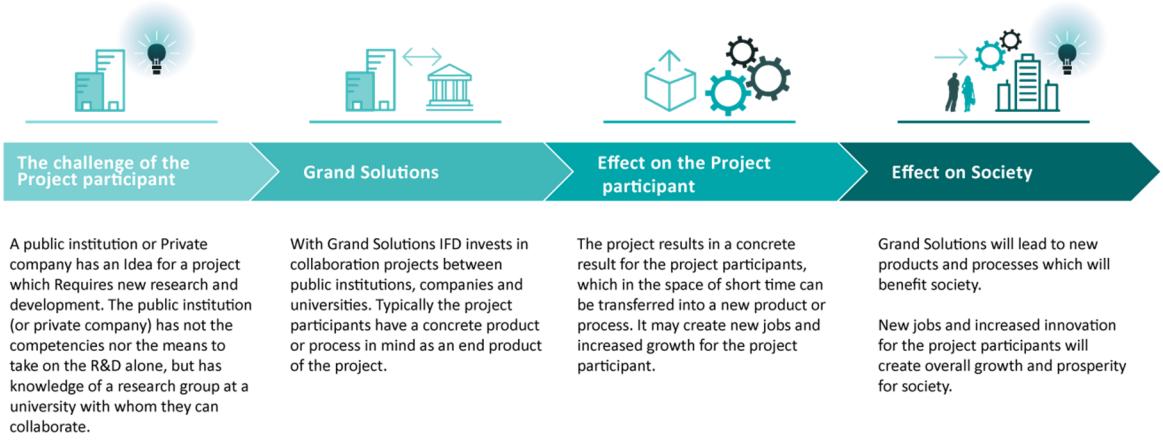


The overall agenda of Grand Solutions is set top-down; the thematic areas are defined at national political level and funds are allocated through the annual Financial Act. These political decisions are however, embedded in a broader bottom-up consultation process.

The Research2025 catalogue acts as a source of inspiration and the basis for prioritising research investments in various contexts, e.g. political negotiations on the distribution of the Research Reserve and strategic considerations in Danish knowledge institutions and in relation to Danish participation in international research collaborations (ufm.dk)

The research themes outlined in the Act are established with reference to an 'inspiration catalogue' of research priorities, currently the Research2025 catalogue compiled by the Ministry of Higher Education and Science, and based on a dialogue with businesses, the research community and other stakeholders. In addition to thematic challenges, a smaller part of the programme – around 20 per cent of the funding – is allocated bottom-up through an 'open call', which may fall within any area that fits the programme strategy and guidelines.

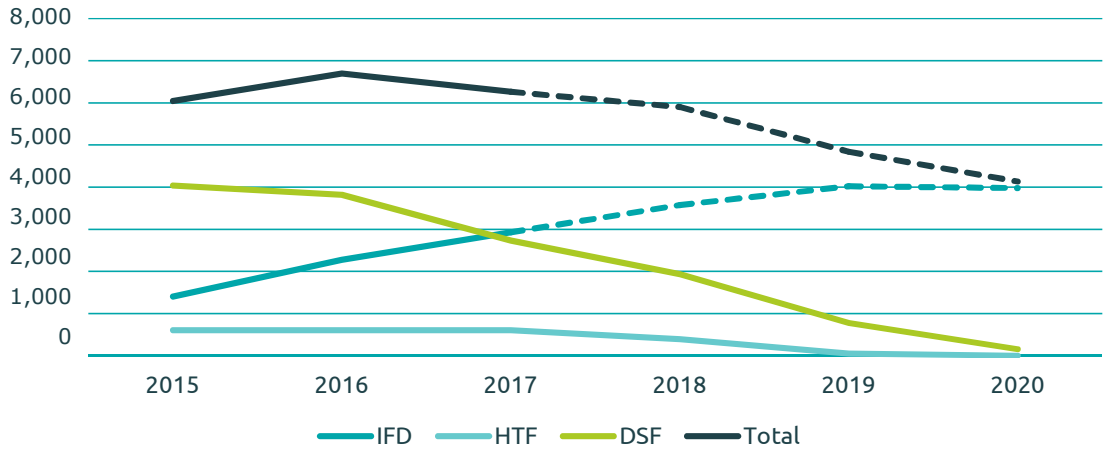
Figure 2: Intervention logic for Grand Solutions



Collaboration is the main aspect of Grand Solutions, and IFD requires projects to implement project management, appoint a strong project leader and adopt a well-defined governance structure with clear separation between operations management and strategic leadership.

Grand Solutions investments have declined significantly from more than DKK 1 billion in 2015 to DKK 6-700 million in 2016-2018. The current investment level implies a decline in the project portfolio over the next few years, as illustrated in the figure below.

Figure 3: Active Grand Solutions projects (IFD investments)



Projections for Grand Solutions (2018-2020) are based on the 2017 budget level.
HTF: Danish National Advanced Technology Foundation, DSF: Strategic Research Council

Operational Model

The Grand Solutions programme has existed since 2015 and have launched 169 projects as of June 2018. At the operational level, the programme is run by IFD SOs and POs supported by administrative functions. IFD SOs have extensive knowledge and experience in the fields of research and innovation covered by IFD, while the POs take a more generalist approach with experience in funding programmes related to specific fields.

Scientific Officers are key experts in their respective fields. They have a strong research background combined with several years of experience from relevant private or public organisations

The Grand Solutions department is divided into dedicated teams based on the overall fields covered by the programme; see figure 4 below. In reality, many projects span a range of disciplines, and in practice, assessments are conducted by more than a single team. To achieve the highest level of expertise in all relevant areas, IFD has established a network of scientific experts (the Scientific Evaluator (SE) Network) with a proven track record within the different investment fields.

Scientific Evaluators are acknowledged external experts with a proven track record in their respective fields. They complement the SOs in assessments and project monitoring processes

The SEs assist IFD in connection with the assessment of new proposals and monitoring of active projects. This comprehensive expertise has allowed IFD to establish qualified dialogue with universities, research institutions, companies and key stakeholders. Moreover, the assessment model secures a higher degree of integrity, as SOs are employed in IFD.

Figure 4: Grand Solutions teams divided into six sectors

Calls for Proposals and Mobilisation of Applicants
A pre-call is published late November, while the first round of calls containing the full application material is published in the beginning of the year. IFD provides two Grand Solutions call rounds per year; the open call in connection with the second round. This provides applicants with more options and IFD with increased flexibility in terms of using the overall budget efficiently.

IFD campaigns the calls, visits all university cities in Denmark and organises targeted workshops for potential applicants. In addition, workshops and presentations are organised on request of organisations. Potential applicants are also encouraged to contact IFD to discuss new ideas at any time and to seek guidance on completing an application. Applicants who do not receive funding are highly encouraged to contact IFD for feedback on their application and its shortcomings identified during the assessment process. It is IFD's experience that this dialogue is highly appreciated and in many cases leads to better consortia and projects.

Assessment and Investment Decisions
Applications are assessed according to three overall criteria: 1) quality of research and innovation, 2) value creation and 3) efficiency and implementation. A new single-phase process was adopted from 2017, as illustrated in the figure below. Following submission, IFD SOs and SEs conduct an assessment and recommend the highest ranked proposals to the Board of Directors. Based on the scientific assessment and the Board's own assessment, the Board selects applications, which are then submitted for external peer review and interview by IFD staff, Management, the SEs and representatives from the Board of Directors.

Grand Solutions is based on a single written application followed by international peer review and a project interview. The assessment period is 100 days

These three elements form the basis of the final recommendations to the Board of Directors, which makes the final decisions on investment. The success rate of the Grand Solutions programme currently stands at around 10-20 per cent, depending on the call. The evaluators (SOs/SEs) are in continuous dialogue with the Board Members during the assessment process, during which the Board receives five 'packages'.

The Board of Directors is involved in the entire process and makes the final investment decision

Package no. 1 includes all applications with all information, including allocation of SOs/SEs and Board Members. Package no. 2 includes scientific assessments and ranking of the applications and proposals for interview candidates. Package no. 3 includes an overview of all applicants invited to interview after feedback from the Board. Package no. 4 contains all peer reviews and the consulting procedure, while package no. 5 includes all feedback from the interviews, a final ranking and final recommendations. The process culminates at a Board Meeting attended by the internal evaluators.

The new process has enabled IFD to reduce the time from application to investment to 100 days. The selected applicants are contacted immediately after the final Board Meeting and invited to negotiate the investment agreement.

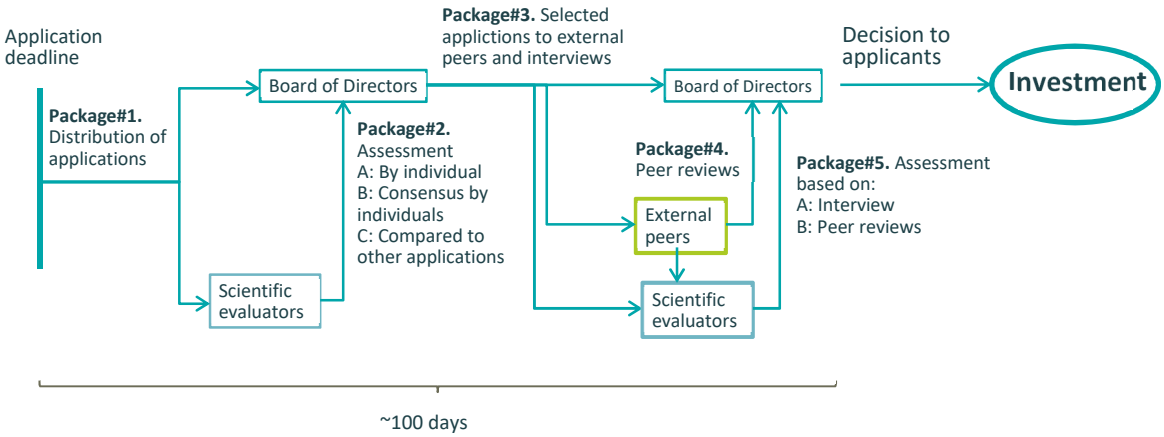
Kick-off meetings with new projects are organised to guide the new projects effectively through the negotiation to conclude the investment agreement, which must be completed within 60 days from Board decision

Shortly after the final Board Meeting, a kick-off meeting is held for successful projects; it is attended by the project leader and the administrator, among others. All elements of the investment agreement are discussed, including the legal framework, budget rules and collaboration agreement. At the end of the meeting, individual meetings with the IFD Investment Manager (IM; more on the IM below) are organised. The negotiation period is set to 60 days, excluding holidays.

Kick Off Meeting for Grand Solutions

The Grand Solutions process is now working effectively, and the applicants receive a reply within just 100 days. If a Grand Solutions project is granted, the project partners are invited to a meeting on the content of the future contract negotiations and the structure of investment agreements. Direct dialogue saves both time and resources later in the process.

Figure 5: The overall process from application deadline to investment



Project Monitoring and Follow-up
IFD takes a proactive approach to project follow-up and portfolio management. IFD participates in Grand Solutions projects by allocating an SO or PO to each project, who will act as IM with the purpose of ensuring optimal progress and necessary adjustments. The IM participates in the project Steering Committee as observer.

IFD allocates an Investment Manager (IM) to each project. The IM participates in the project Steering Committee and provides guidance and competent feedback

Projects may be invited to annual investment reviews (AIR), where the progress and value creation achieved by the project are reviewed. These reviews differ from regular steering committee meetings in that IFD invites the project to present its results and plans to a panel of relevant experts (internal and external). AIR meetings are also attended by the IFD Management and selected Board Members. Some projects fail to live up to expectations. There can be several reasons for this, and IFD actively seeks solutions to help projects back on track. IFD may ultimately decide to withdraw its investment, if the project fails to achieve results, the major hypothesis turns out not to be relevant or in case of serious breaches of the investment terms. A decision to withdraw an investment can only be made by the Board of Directors after a thorough process including a close dialogue with all project participants. Similarly, successful projects may apply for additional funding where new opportunities or breakthroughs have been identified.

IFD invites selected projects to annual investment reviews (AIR) focussing on their progress and value creation

Portfolio Management
IFD actively follows the project portfolio and monitors the progress and challenges of each project. The Board is informed on a regular basis in case of serious challenges and major deviations. Portfolio management is used to identify gaps and to guide future investments. The portfolio distribution is – on an overall level – shared with key stakeholders such as other ministries, universities and industry confederations.

The portfolio management system is used to monitor projects and guide future investments

The portfolio management system is the IFD's internal reporting tool with a simple interface for all projects in the Grand Solutions portfolio. The system serves as a common memory. The IM uses the tool to store information of project decisions, progress assessments and early warning signs requiring action. Through the system, the IM monitors the projects regularly on four parameters: research, value creation, leadership/collaboration and administration using simple red and green symbols. IFD extracts this information to gain an overview of the entire portfolio or choose relevant sub-sets based on several parameters. The system contains a search engine that allows the user to select projects for relevant reports.

From the Brains of Grasshoppers and Biotech to Investment Manager
Peter Aadal Nielsen

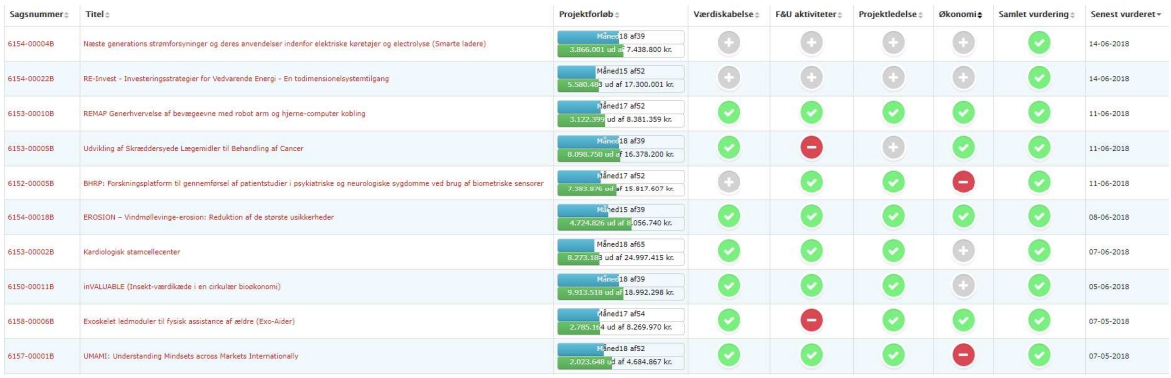
As a former researcher and entrepreneur, Scientific Officer Peter Aadal Nielsen has a solid basis for monitoring and advising IFD projects within life science.

Peter Aadal Nielsen holds a PhD in computer chemistry from the University of Copenhagen and has for a period of years worked on drug discovery projects at a large international pharmaceutical company and a Danish biotech company.

A failed attempt to develop a drug against obesity made him want to develop new ways of testing medicinal products. He therefore founded the biotech company Entomopharm, where he did research into using the brains of grasshoppers to test the ability of drugs to penetrate the blood-brain barrier.

As Scientific Officer at IFD, Peter Aadal Nielsen has an overview of the latest new trends within research and innovation in life science.

Figure 6: Example of portfolio overview



Sagsnummer	Titel	Projektforløb	Værdiskabelse	F&U aktiviteter	Projektledelse	Økonomi	Samlet vurdering	Senest vurderet
6154-00004B	Næste generations strømforsyninger og deres anvendelser indenfor elektriske køretøjer og electrolyse (Smarte ladere)	Måned18 af39 3.866.001 ud af 7.438.800 kr.	+	+	+	+	✓	14-06-2018
6154-00022B	RE-Invest - Investeringsstrategier for Vedvarende Energi - En todimensionelsystemtilgang	Måned15 af52 5.580.48[illegible] ud af 17.300.001 kr.	+	+	+	+	✓	14-06-2018
6153-00010B	REMAP Generhvervelse af bevægeevne med robot arm og hjerne-computer kobling	[illegible]ned17 af52 3.122.399 ud af 8.381.359 kr.	✓	✓	✓	✓	✓	11-06-2018
6153-00005B	Udvikling af Skræddersyede Lægemidler til Behandling af Cancer	Måned18 af39 8.098.750 ud af 16.378.200 kr.	✓	−	+	✓	✓	11-06-2018
6152-00005B	BHRP: Forskningsplatform til gennemførsel af patientstudier i psykiatriske og neurologiske sygdomme ved brug af biometriske sensorer	[illegible]ned17 af52 7.393.976 ud af 15.817.607 kr.	+	✓	✓	−	✓	11-06-2018
6154-00018B	EROSION – Vindmøllevinge-erosion: Reduktion af de største usikkerheder	Må[illegible]ed15 af39 4.724.826 ud af 8.056.740 kr.	✓	✓	✓	✓	✓	08-06-2018
6153-00002B	Kardiologisk stamcellecenter	Måned18 af65 8.273.[illegible] ud af 24.997.415 kr.	✓	✓	✓	+	✓	07-06-2018
6150-00011B	inVALUABLE (Insekt-værdikæde i en cirkulær bioøkonomi)	Måned18 af39 9.913.518 ud af 18.992.298 kr.	✓	✓	✓	+	✓	05-06-2018
6158-00006B	Exoskelet ledmoduler til fysisk assistance af ældre (Exo-Aider)	Måned17 af54 2.785.[illegible]4 ud af 8.269.970 kr.	✓	−	✓	✓	✓	07-05-2018
6157-00001B	UMAMI: Understanding Mindsets across Markets Internationally	Må[illegible]ed18 af52 2.023.648[illegible]d af 4.684.867 kr.	✓	✓	✓	−	✓	07-05-2018

The above example shows indications of critical challenges in Grand Solutions projects. Almost 10 per cent of the projects in the portfolio are marked as 'not satisfactory' with regard to progress and call for intervention. The primary cause of unsatisfactory progress is typically lack of project leadership or disagreements between the project participants.

Conclusions and Lessons Learned

Strengths:	Weaknesses:	Opportunities:
• Ambitious, prestigious, long-term perspective • Bridging academia and industry/public sector • Strong science foundation • Stimulates new collaborations across the value chain and across sectors • Cross-disciplinary approaches • Increased awareness of societal aspects • Broad value creation • Open to international participation • Highly skilled and committed staff • Tough competition, but fast assessment process • Close follow-up and monitoring of active projects, e.g. AIR and project interviews • Flexible with regard to project changes • High demand in both academia and industry	• Complex projects • Often weak leadership or • industrial partners lack sufficient commitment • Co-financing from industry often at a minimum level • Some university staff are hesitant when it comes to innovation and industry collaboration • Limited international participation • Extensive application form and complicated budget template • Not enough internal resources, e.g. IMs are responsible for too many projects • Tough competition and missed investment opportunities • Reduced budgets in certain areas makes the programme less attractive, e.g. energy • No political earmarking for social innovation from 2018 • Understaffed team and too high workload	• The new political reform (2018) opens up for market adaptation, which could lead to new types of innovation projects closer to the market • Increased interest and acceptance from academic and industrial partners can improve the innovation output • Use of data and advanced digital solutions has great potential for impacting on the public sector • Trend-spotting and focus on new opportunities can mobilise new fields and new innovative approaches, e.g. cyber security • Traditional (conservative) sectors open up to new approaches and seek new collaborations, e.g. the maritime sector • Greater international participation can lead to increased quality and new perspectives • The programme should be simplified to reduce the administrative burden on applicants and projects • Application form should be redesigned to allow applicants more freedom to unfold their project proposal

The Grand Solutions programme is unique in a Danish context, as it is the only programme, which builds bridge between universities and (private or public) companies

The main factor for successful Grand Solutions projects is close and genuine collaboration between participants with shared goals and visions. Successful projects are often driven by strong and visionary individuals. International outlook can be a strong driver behind successful projects. The most significant obstacles to successful Grand Solutions projects largely mirror the drivers; this includes unprofessional or poor project leadership, poor collaboration between partners and a narrow national focus.

The Grand Solutions programme has been continuously optimised to make it faster and more efficient, reducing the time from application to contract and freeing up time for active follow-up on projects and close dialogue with current/future applicants. IFD has introduced several strategic initiatives such as investment strategies, annual investment reviews, trend-spotting reports and workshops, SRL and a broader notion of value creation based on UN's Sustainable Development Goals. Significant efficiency gains have been obtained by developing and adapting fully digitised workflows with the administration system GO-T, LEAN processes and planning and by engaging the entire team in both day-to-day management and development of the scheme.

The user experience survey (see appendix) points to areas for improvement. The programme will and should remain demanding, however. It is designed to support the best researchers and the most ambitious ideas that have the capacity and potential to deliver high value. However, administrative simplifications should be investigated, including more freedom in the application form, a less complex budget template and a reduced number of written reports. The survey also reveals that many projects want the IM to spend more time on the project. This is also IFD's strong ambition, but a challenge due to limited staffing. Currently, a typical IM is responsible for more than 30 projects.

The World's largest wind turbine wing

A Grand Solutions research collaboration has developed a new hybrid material that has been used to produce the world's largest wind turbine wing. A wing measuring more than 100 metres is about to see the light of day.

Danish Research Result 2017

Each year two Danish media select the Danish research result of the year. In 2017 one specific research result was the favourite in both competitions. The Grand Solutions project Genome Denmark has mapped a new reference genome, and the project may prove significant to the future treatment of diseases.

In 2018, Social Innovation such as education and social challenges were not included among the political priority areas for IFD. This is an unfortunate development, since Grand Solutions is designed to focus more broadly on both technology and Social Innovation in both the private and public sector. There is a risk that this will limit the value of many technological solutions, and that IFD may be perceived as a simple technology driver if we cannot invest in projects on both "man and machine".

The new reform of the Business Promotion System contains interesting opportunities with regard to business promotion, which may open up to new types of projects targeted at new and innovative business and market models. Trend-spotting also creates new opportunities, and it has become clear that areas such as personalised medicine by extended use of data and artificial intelligence (AI), new business opportunities in a growing cyber security market and a future sustainable aquaculture and marine resources are attracting attention and spark new efforts to develop relevant projects and innovation models.

The role of public-sector organisations, reflecting the role of the public sector in the Danish economy more generally, is also worth noting. The involvement of public authorities is often crucial to ensuring regulatory framework conditions that allow new solutions to be adopted in society.

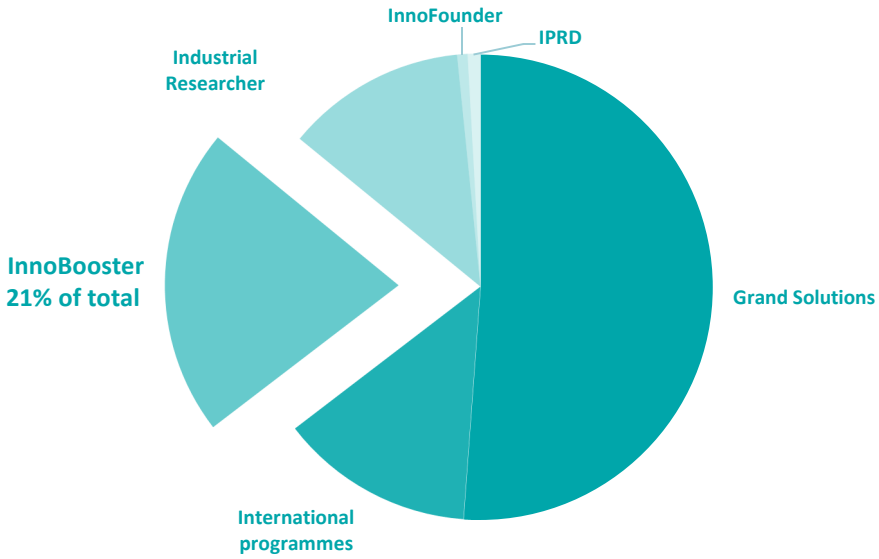
In conclusion, the Grand Solutions programme is considered unique in a Danish context, as it is the only programme that builds effective bridges between universities and (private or public) companies. The programme has been optimised with two annual application rounds and an assessment time of less than 100 days. There are also many new opportunities arising from trends and scientific breakthroughs, and it is important that IFD constantly remains at the forefront, spotting these trends and devoting them the necessary attention. The cultural aspects should not be underestimated; real change comes from genuine curiosity and a wish to work across the value chain, bridging academia, industry and the public sector – allowing research to create solutions that will improve the economy, society and people's lives.

Process highlights for Grand Solutions

Information & Guidance	Application	Assessment	Follow-up	Impact
General meetings with universities and meeting with potential applicants both public and private. Guidance offered to both new applicants and applicants who have applied before Information on IFD webpage, social media and newsletters	Multiple project partners, both public, private and international to attract the most competent partners	From application to decision in 100 days Project applications assessed on scientific excellence with societal impact and value creation (among other criteria) Interviews with highest ranked projects	Annual investment reviews (AIR) conducted on selected projects Project leaders participate in the project leadership programme ”Making Innovation Happen” Investment Managers observers in project steering committees	Impact analysis on selected research areas (MADE, Industry 4.0, Cyber Security)

4.2 InnoBooster

Programme size of total funding budget for IFD 2017



Background and Framework

When the Danish Government launched its national innovation strategy *Denmark – a nation of solutions* in 2012, it stressed the need to strengthen the support for knowledge-based innovation in SMEs. At the same time, the Government highlighted the challenge consisting of too many overlapping schemes and programmes, which confuses companies with little or no experience with the Danish innovation system. Hence, it was decided to establish a single joint programme supporting knowledge-based innovation in SMEs. The programme should replace a number of loosely connected SME initiatives and, at the same time, reach out to new types of innovation projects in need of financial support.

The new programme – named InnoBooster – was launched in August 2014, four months after the birth of IFD, and it specifically aims to support new entrepreneurs and SME-based innovation and thus contribute to increasing the share of innovative companies.

Since then, the programme has undergone a number of adjustments based on user input and accumulated in-house experience.

InnoBooster is a cross-disciplinary innovation programme supporting knowledge-based innovation in SMEs, including start-ups, based on a bottom-up approach. The decision to include start-ups in the programme was strategically important, as this target group severely lacked access to early-stage risk capital. Therefore, one of the objectives of the InnoBooster programme was to support early-stage start-ups and help them mature their technology and business. By financing a company's early-stage technological development, InnoBooster allow start-ups to mature their technology and business to a point where they can either start generating a revenue or reach a stronger technology platform supporting their dialogue with future investors. InnoBooster thus focusses on individual companies. However, InnoBooster projects can – and very often do – include contract research or other kinds of subcontracting from universities or CROs.

The objective of the InnoBooster programme is to help SMEs, including start-ups, successfully execute knowledge-based innovation projects that can ultimately contribute to growth and job creation in Denmark. This transformation can take the form of a new product or service or significantly improve a process within the company in an innovative way, thereby increasing its competitiveness.

In order to span the broad range of needs from well-established SMEs to new, promising start-ups and, at the same time, reach new types of innovation projects, InnoBooster was designed as a very flexible bottom-up programme. Therefore, the programme has no barriers in terms of thematic priorities, allows for a broad range of budget items and provides a broad scope in funding size ranging from DKK 50,000 to DKK 5,000,000. Grants below DKK 1,500,000 fall under the *de minimis* state aid rules, while larger grants fall under the EU Block Exemption Regulation.

Photo-editing 2.0

An InnoBooster investment helped the entrepreneurs of the start-up, Spektral to launch their software that makes it easier to cut out defined elements in digital photos. They have developed an algorithm that enables the computer to distinguish people and objects in a photo from the background. The system is so good that the company, Litecap based in Silicon Valley have invested in the company. Spektrals next goal is to establish partnerships with the world's largest social media, including Facebook, Instagram and Snapchat. The company has grown from the founders to a staff of 20 and continues to grow.
The photo shows a test of Spektral's solution.

From idea to Phase II Clinical Trials

In an InnoBooster project the company, Dermtreat has developed a plaster – Rivelin® – that attaches to the surface of a mucosa (e.g. in the mouth cavity). This enables effective treatment of e.g. painful mucosa conditions, for which there is currently no approved treatment. The positive results have subsequently secured Dermtreat DKK 120 million in external investor capital. According to Dermtreat CEO, Dr Jens Hansen, the InnoBooster investment was vital. Investor capital has enabled Dermtreat to grow from a start-up with potential to a Danish company with a number of employees.

What Is in It for the Applicants?
The InnoBooster programme can co-finance the following expenses related to a knowledge-based innovation project:

- Man-hours – a fixed hourly rate of DKK 750 including overhead (or by actual expenses, if the grant is > DKK 1.5 million)
- Invoices from knowledge providers, both universities and CROs, national as well as international
- Expenses for equipment and materials

The programme offers 33 per cent financing of these expenses, but in reality the fixed hourly rate of DKK 750 ensures a much higher level of financing.

Interest among companies in participating in InnoBooster has been strong and increasing since the launch in August 2014. In 2017, IFD received and processed 1,763 applications, and around 25 per cent of these were successful. The programme has financed more than 1,400 projects since the start in August 2014.

As shown in Figure 7, InnoBooster has been quite successful in attracting start-ups to the programme, as 44 per cent of the applicants and 35 per cent of the grantees are start-ups.

Figure 7: Distribution of applications between start-ups and established SMEs

Type of company	Share of applications 2016-2017	Share of grants 2016-2017
Start-ups	44%	35%
SMEs > 3 years	56%	65%

As shown in Figure 8, the Capital Region of Denmark is the Danish region, which by far has made the most use of the InnoBooster programme, representing more than half of all applications as well as grants.

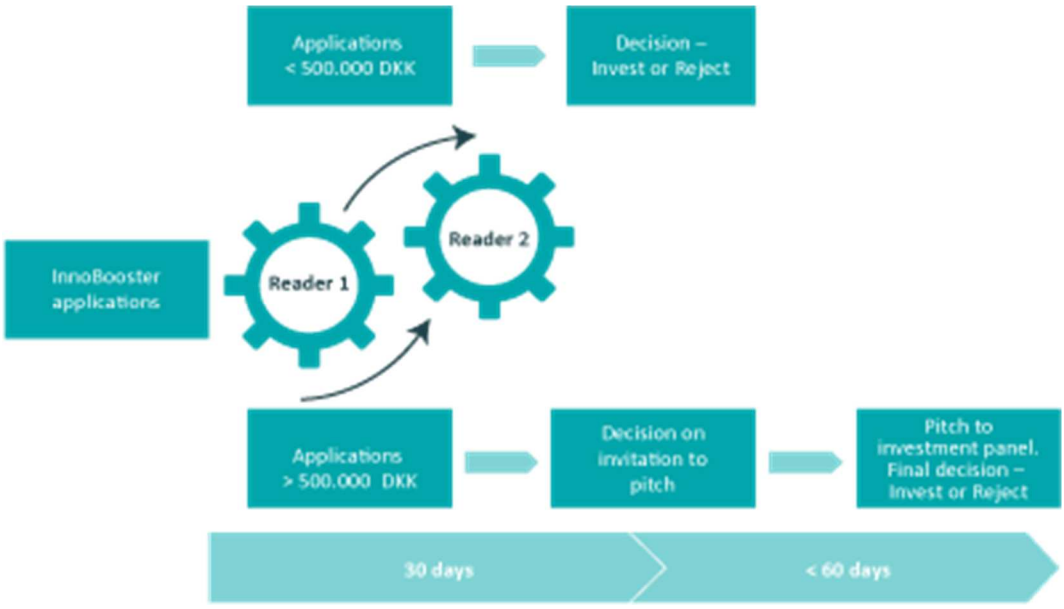
Figure 8: Distribution of applications and grants among the five Danish regions

Region	Share of applications 2016-2017	Share of grants 2016-2017
Capital Region of Denmark	56%	51%
Central Denmark Region	19%	21%
North Denmark Region	7%	8%
Region Zealand	7%	5%
Region of Southern Denmark	11%	15%

Operational Model and Process

The application process of InnoBooster is outlined below. The process is based on the Guidelines for InnoBooster and follows the Danish Public Administrative Act.

InnoBooster – Application process



InnoBooster application, assessment and follow-up procedures are explained below.

How to Apply
The InnoBooster programme, is utilising an open call procedure, and is open for applications from 15 February - 1 June and again from 15 August - 1 December. Applications are submitted through the e-grant portal, and all information is available from the website and e-grant.dk. Information is also disseminated to applicants through information meetings and a wide-ranging network of strategic partners, including the incubators. The consultants from the incubators are trained by the IFD InnoBooster team to supervise potential applicants in the application process.

The application form consists of eight text boxes and an activity plan of a maximum of five A4 pages, which must contain a technical description of the idea and innovation project and its business potential. The application form also allows companies to include a link to a two-minute video pitch of the project and/or solution, a feature many applicants uses. On workdays, applicants can call a hotline with questions about the application process.

Assessment and Investment Procedures
The assessment procedure is based on the following assessment criteria:

Novelty
- *Innovative scope:* Does the InnoBooster project initiate new development activities in the company?
- *Competition:* Do the project results differ markedly from existing solutions in the market/industry?

Value creation and business potential
- *Value creation:* Will the company gain a significant competitive advantage and in the long run make a significant profit on the new solution?
- *Market potential:* Has the market potential been clarified and the demand rendered probable?
- *Potential for growth and/or employment:* Will commercial benefits from the project result in significant financial growth and/or jobs in Denmark?

Economic efficiency and completion
- *Clarity:* Is it clear what development activities will be conducted as part of the project, what concrete results the company will have obtained at the end of the project, and how these will be used?
- *Team and competences:* Does the company have a team with the right competences and experience to successfully complete the project, and does the company plan to involve the right partners and/or new staff?
- *Financial resources:* Does the company have the necessary financial resources to complete the InnoBooster project?
- *Realistic budget:* Is the budget reasonable and realistic vis-à-vis the outlined activities?
- *Economic efficiency:* Does the desired funding measure up to the expected commercial benefits and the risks of the project?

All applications are initially assessed by two employees at IFD, typically POs with business development experience as well as, for technology-heavy applications, SOs. Final decisions are made by IFD Management at weekly meetings. InnoBooster is the only programme where the authority to make final decisions has been delegated formally to the Managing Director. This has been necessary due to the turnover of applications. The Board of Directors is informed on a portfolio/budget level at ordinary Board Meetings.

For applications of up to DKK 500,000, the goal is to complete the entire process – from application to final decision – in 30 days. If the application is unsuccessful, a rejection letter outlining the reasons for

the decision is sent to the applicant, and the applicant is encouraged to contact IFD for more detailed feedback, especially if the applicant wants to resubmit the application. Feedback sessions are held as phone meetings and documented on the case.

Panel meetings: For applications beyond DKK 500,000, the first step on receipt of the application is to decide whether the company should be invited to pitch the application the independent InnoBooster Panel consisting of industry and innovation experts.

InnoBooster Panel meetings are held every third week, where eight-nine companies get to pitch their ideas. The panel consists of five industry and innovation experts as well as the Head of the InnoBooster team

The InnoBooster Panel members are selected from a pool of approximately 70 experts; the aim is to match the projects with the most relevant experts. At the same time, the Panel Chairman and the Head of the InnoBooster team ensure consistency in the use of the assessment criteria. At the InnoBooster Panel meeting each project is assessed in its own right, as there is no goal to reach in terms of approval rates or budget.

The InnoBooster Panel members receive the applications and pitch material well in advance, and the company gets 10 minutes to do the pitch, followed by 20 minutes of questions and dialogue with the panel. The recommendations of the panel are submitted to IFD Management, who makes the final decision. The entire process from application to final decision is <60 days. Applicants, not invited to pitch, receive the final decision within 30 days and are encouraged to contact IFD for more detailed feedback.

Follow-up on InnoBooster Projects

All companies receiving an InnoBooster investment must present financial statements and document all external expenses through invoices every three months. The funding is disbursed based on these financial statements. All major changes to InnoBooster projects, e.g. changes to key objectives, time schedule or supplier, must be approved by IFD. Companies receiving funding of more than DKK 500,000 must participate in a progress meeting halfway through the project, where they present their progress relating to the milestones described in the application and update IFD on the commercial perspectives of the project. These progress meetings are also useful for discussing potential adjustments to the project, even though such adjustments can take place outside progress meetings. Furthermore, accountant's statements documenting the expenses must be submitted annually. All InnoBooster projects must submit a concluding report and evaluation after completing the project. The concluding report focusses on the technical and commercial results obtained through the project and is referred to if the company decides to apply for a new InnoBooster project at a later point in time.

Conclusions and Lessons Learned

Since the launch in August 2014, the InnoBooster programme has seen strong and increasing interest. In 2017, IFD received 1,763 applications, representing an increase of around 20 per cent from 2016. As InnoBooster is still a relatively new programme, it has not yet been possible to conduct an effect or impact analysis, as Statistics Denmark has a time lag of two years. However, in 2017 a programme

evaluation was carried out focussing on the level of satisfaction of applicants (both grantees and rejected applicants) with, among other things, the design, processes, application material and service and administration of the programme. The evaluation was very positive on all aspects of the programme. Among the most important findings were:

- InnoBooster is easy to understand.
- InnoBooster is a flexible and demand-driven programme, which matches the companies' need for funding of innovation activities. Also, the bottom-up approach of the programme is highlighted as a particularly important feature.
- The work involved in writing the application is manageable, and the application form is short and easy to complete.
- The processing time for applications is short.
- The administrative demands for reporting and documentation are limited.

The evaluation also included a benchmarking exercise, benchmarking InnoBooster with comparable programmes both regionally, nationally and in the EU. The benchmarking exercise showed that the programme outperformed other programmes on all parameters investigated.

Evaluation of InnoBooster

InnoBooster is straight forward. It is easy to apply; applicants get a fast reply; the reporting requirements are few; and applicants can always get help or feedback on their application from IFD staff. The flowers in the photo were sent by the largest trade organisation in the country, DI, congratulating IFD on the positive evaluation revealing great satisfaction among companies and entrepreneurs.

Currently, IFD is ready to carry out the first impact analysis of the programme, which includes comparisons with relevant control groups.

InnoBooster is positioned right at the centre of the main objectives stated in the Act, i.e. creating growth through knowledge-based innovation, just as it is aligned with IFD's strategic objectives regarding e.g. accessibility and flexibility

To conclude, InnoBooster has in a few years established itself as a well-known and attractive option for SMEs and start-ups. Through its focus on innovation, the programme supplements Grand Solutions by funding further innovation in spin-outs based on Grand Solutions results and by funding projects previously rejected by Grand Solutions due to too little research emphasis. The decision to fund such projects is often based on internal dialogue between SOs and POs, and underlines the relevance of

having both types of programmes under the same roof. InnoBooster also supplements InnoFounder well, typically as an investment following a project under InnoFounder.

InnoBooster pitching

In 2018, the InnoBooster team introduced live pitching to demonstrate how InnoBooster assessment really works. The photo is taken at one of these sessions.

Strengths, Weaknesses and Future Opportunities

A key strength of InnoBooster is that the programme provides soft, non-dilutive funding to start-ups and SMEs at a point in time or life span where funding is crucial to these target groups. The programme has been especially well received and is popular in the Danish start-up environments. It is also well-known among local, regional and national organisations supporting SMEs and start-ups. The bottom-up approach and short response time fit the needs of many companies. Finally, the programme shows indications of high impact, especially when funding the early-stage technology development of start-ups, which later allows them to close deals with venture capital and business angels.

As for weaknesses, the impact of the programme still needs to be documented. It is thus too early to judge whether the programme is 'just' popular or also a good investment for Denmark. Another challenge is better penetration among more established SMEs with more than 20 employees and with a potential for innovation and growth.

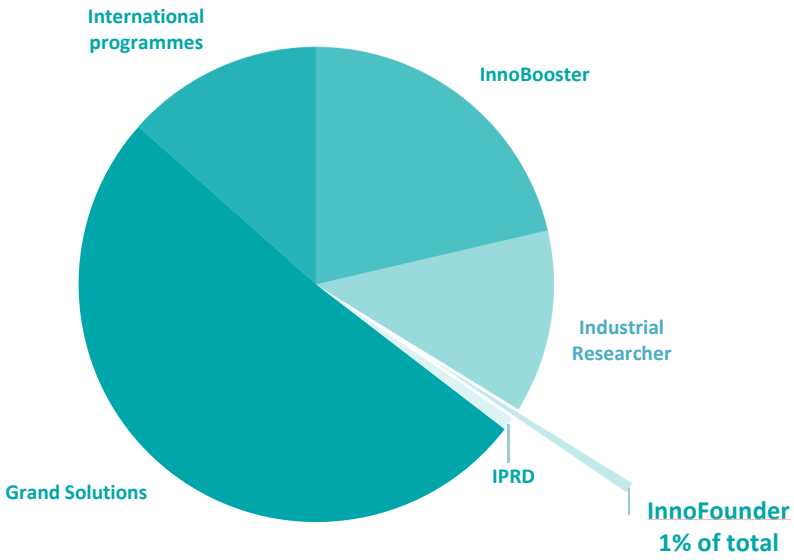
Future improvement opportunities should be based on the upcoming impact analysis, but increased emphasis on SMEs is on the to-do list. This might be supplemented with a more strategic approach to defining innovation opportunities and the involvement of owners/management. Finally, the regional presence of IFD has definitely increased awareness of the InnoBooster programme, though there is still room for improved coordination with regional players and down-stream investors.

Process highlights for InnoBooster

Information & Guidance	Application	Assessment	Follow-up	Impact
IFD webpage, social media, hotline & active guidance by regional players (trained by IFD)	Open all year excluding summer and winter breaks Short written application with video-option	Applications < DKK 500.000: decision within 30 days Applications > DKK 500.000: pitch to panel decision within 60 days	Mid-term meeting (> 500.000) Final report in power point format	Impact study initiated

4.3 InnoFounder

Programme size of total funding budget for IFD 2017



Background and Framework

InnoFounder was established with the aim to increase the number of knowledge-based start-ups, focussing specifically on recent graduates. The programme (originally named Entrepreneurial Pilot) emerged from a 2012 government initiative on innovation. The programme was originally designed and launched by one of the institutions that merged into IFD in 2014, but was completely redesigned by IFD. In 2017, the name was changed to InnoFounder.

InnoFounder was designed with a dual focus on providing financial support and developing entrepreneurial skills through coaching of entrepreneurs/companies at an early stage.

The objective of the InnoFounder programme is specifically to: *accelerate the development of innovative business ideas of graduates towards a stage where the ideas can be further developed within the framework of the graduates' own companies, typically in an interaction with external investors*.

The societal objective of the programme is to increase the number of innovative companies and the number of graduates in private companies (as pointed out in the Act). From the outset, the programme has thus focussed on knowledge-intensive ideas and start-ups.

Through the years, InnoFounder has been optimised based on user and panel input, stakeholder input in general and accumulated in-house experience – overall with the aim of making the programme more attractive, easier to access and to limit red tape.

These changes have led to increased focus on international outlook – the main reason for changing the name to InnoFounder. A number of activities have been introduced to facilitate international and higher ambitions in general, and the incubator programme has been redesigned to better challenge and coach participants in areas where IFD has identified weaknesses, i.e. financing and market and user/customer understanding.

Operational Model and Procedures

As a consequence of the redesign, IFD recently (2017) appointed the Danish Design Center (DDC) and the Copenhagen Institute of Interaction Design (CIID) as operators responsible for mentoring and workshops within InnoFounder. IFD and the operators work closely together on marketing, evaluating and adapting the programme on a continuous basis. The current version of InnoFounder is design-driven, putting emphasis on design thinking and on challenging the often technology-based ideas at an early stage, with understanding of potential users and continuous iteration about the product-market fit.

Workshops building specific skills, take place approximately once a month and have, for the last cohort, focussed on topics such as design methods, value proposition, pitching, getting to know the market, growth hacking, legal (IP, setting up a company) and financing. Mentors are typically experienced coaches with start-up experience.

During the incubator period, InnoFounders are also invited to participate in other IFD initiatives. Examples include the intensive one-week SCALEit course held in Silicon Valley and the Roskilde Festival Living Lab, where companies are invited to test their products on an audience of 130,000 festival guests (see 7. Knowledge Leverage for more on these activities).

New Experiences for Festival guests

For the past two years, IFD has collaborated with Roskilde Festival, which is the second largest music festival in Europe. During the festival IFD entrepreneurs are given a chance to test their products on real-life users. The photo shows a table with solar cells allowing festival guests to charge their mobile phones while relaxing and chatting.

What Is in It for the Applicants?

The InnoFounder programme offers:

- A monthly grant of DKK 15,000.
- A special grant of DKK 35,000 to support the development of the business idea.
- Space in a joint office environment in Aalborg, Aarhus, Sønderborg, Odense or Copenhagen.
- An experienced mentor, who follows the team throughout the InnoFounder process.
- Workshops featuring world-class experts.
- Access to the InnoFounder community of investors, start-ups and corporate professionals in Denmark and internationally.

From students to successful start-up

Based on a student project, the team behind the KUBO Robot received InnoFounder funding in 2016 and has since then been highly successful. The programming language has been designed specifically for the KUBO Robot and can be used by children from three years and up. In 2017, KUBO Robot participated in the SCALEit camp organised by IFD, where up to 10 entrepreneurs each year get a chance to test their concepts in one of the world's toughest tech environments. Today KUBO has affiliates in eight countries and is currently extending to further markets.

From InnoFounder to private capital

The photo shows the company SPIIO testing its solution. Using a wireless sensor gardeners can monitor their plants. The device can monitor and record temperature, moisture and light. This can help gardeners give their plants the attention they need, when they need it. An online map gives the gardener an overview of the well-being of his plants. The main focus of SPIIO is the American market, and the company now has four FTEs in its permanent staff. The company has managed to attract external funding of DKK 4.5 million.

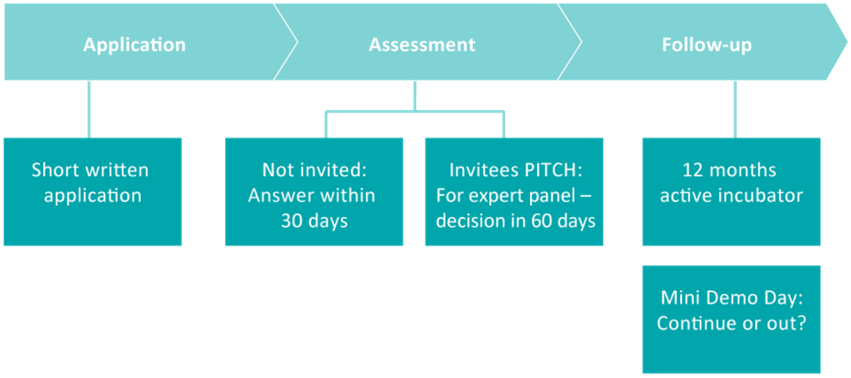
40 participants have been selected each year since the start in 2014, bringing the total InnoFounder population to 158 as of June 2018.

Process

The entire InnoFounder process is shown below and spans two annual calls. The process is based on the Guidelines for InnoFounder, the mandate of the InnoFounder panel and the Danish Public Administrative Act.

Application, assessment and follow-up procedures are explained below.

Figure 9: InnoFounder Process



Applying for InnoFounder
The two annual calls follow graduation periods (September and March). Information about the programme is posted on the IFD webpage and social media at least six weeks before the application deadline and information meetings are held at higher education institutions.

Up to three Founders can apply for a project based on the same idea. All applicants must have graduated from a higher education institution in Denmark (or be Danish citizens with an international degree) at the beginning of the programme and no more than 12 months before the application deadline.

The application consists of a short written application, where applicants must address issues relevant to the assessment. Applicants can call a hotline with questions about the application process.

Applications are completed and submitted online via the e-grant portal.

Assessment and Investment Decisions
Application assessments are based on the following assessment criteria:

Novelty
- *Innovative scope*: Is it clear how the business idea builds on new knowledge or new usage of existing knowledge?
- *Competition*: Is it clear how the business idea or execution differs from competing products or services?

Value creation and business potential
- *Market potential*: Is there a market for the business idea?
- *Scalability*: Is it clear how the business idea can be realised in the form of a scalable product or service?
- *Finances*: Is it clear how it is possible to profit from the business idea?
- *Value creation*: Does the business idea have the potential to create growth and jobs in Denmark and/or solve concrete societal challenges?

Implementation
- *Clarity*: Is it clear what the business idea is about?
- *Feasibility*: Can the business idea be realised, and can the InnoFounder funding progress the idea to a stage where it can be further developed within the ordinary framework of a business setup?
- *Team*: Does the team behind the business idea have the relevant competences to take advantage of the described opportunities?

Four reviewers initially assess all applications – from IFD, the EVP of the programme and a PO and from the operator, the Head of Incubator and the Head of Mentoring, both of whom are formal members of the InnoFounder Panel. The four reviewers meet to decide a ranking to identify up to 40 applications, who are recommended for project pitches in front of the Panel.

Apart from the two operator representatives, the InnoFounder Panel consists of five members, all selected for their insight into entrepreneurship and covering various core business areas, e.g. IT, life sciences and industrial design (the panel: https://innovationsfonden.dk/en/news/innofounder-panel). The Panel assesses all selected applications before the meeting, and the scores of all panellists are shared between Panel Members prior to the meeting.

By the end of the Panel meeting, where applicants pitch and answer questions, the InnoFounder Panel recommends up to 20 applicants per application round for admission to the programme. This recommendation is based on the assessment of the written application and the oral presentation in relation to the assessment criteria. The application material and recommendations are submitted to the IFD Board of Directors for final approval.

The entire process from application to final decision takes < 90 days. Applicants who are not invited to pitch receive final decision within 30 days.

InnoFounder Boot Camp

New IFD InnoFounders begin with a three-day boot camp – over the next 12 months their entrepreneurship ideas will mature. They must make the ideas ready to be introduced on the market and the company to stand on its own feet.

Follow-up on InnoFounder Projects

The progress of the individual InnoFounders and their projects is carefully evaluated throughout the incubation period. Furthermore, all InnoFounders complete an exit survey during the last month. Impact analyses of the programme will be conducted on a regular basis, but so far, none have been conducted due to the short existence of the programme and the lag of data in Statistics Denmark.

Following up on the progress during the programme

The mentors, who meet with the InnoFounders regularly, report their progress on several aspects critical to developing start-ups:

- People and organisation
- Concept and communication
- Product and service
- Market
- Business model

The relative weight of the various dimensions changes during the programme, with e.g. increased emphasis on business model at later stages.

After the first six months, the InnoFounders give a progress pitch at a mini demo day and an external panel (start-up experts) provides feedback. According to the guidelines, a score of less than three combined with a negative evaluation by the operator (stating that successful progress is unrealistic) can result in a recommendation to terminate the project in question. This rule was added recently, inspired by feedback from former InnoFounders on the importance of keeping InnoFounders on their toes through the programme.

The programme ends with a demo day, where InnoFounders pitch their project to invited representatives from the venture capital environment.

InnoFounders evaluate all workshops during the programme. At the end of the programme, they provide a general evaluation of the programme as well as a report on their perceived progress and status.

Conclusions and Lessons Learned
From the very outset, InnoFounder has been an attractive programme with a large number of applicants. The success rate is correspondingly low – ranging from 7-17 per cent since the start in 2014.

Most participants, around 50 per cent, are based in the Capital Region of Denmark, some in the North Denmark Region, the Central Denmark Region and the Region of Southern Denmark and very few in Region Zealand (less than five per cent). This corresponds well with the experience of the distribution of the Danish start-up environment in general. When it comes to gender, between 10-20 per cent of the participants and 30-35 per cent of the applicants are females. The majority of applicants and participants are university graduates (more than 70 per cent), and many business ideas focus on the application of new technologies (e.g. Internet of Things (IoT), AI/Virtual Reality (VR), robotics), address sustainable solutions and contain digitally based business models.

As InnoFounder is still a relatively young programme, it has not been possible to determine its impact yet, as Statistics Denmark has a time lag of two years. At the time of writing, IFD is ready to launch its first impact analysis of the programme, which includes comparison with relevant control groups. However, based on IFD's exit survey, it is possible to identify certain trends. Very few InnoFounders (9 per cent) leave the programme early.

After finishing the programme, most InnoFounders (64 per cent) continue to work on their business idea, living exclusively from income generated by their company

At the end of the programme most InnoFounder companies (68 per cent) have a product or solution on the market or an almost market-ready product or solution. 49 per cent have managed to generate a revenue during the programme. Most InnoFounder companies (69 per cent) have specific plans to hire paid employees by the time the programme ends, and the majority (86 per cent) are in the process of applying for private or public funding. About half of the companies (46 per cent) receive external funding during the programme.

InnoFounders, together with InnoBooster form an important part of the entrepreneurial ecosystem in Denmark.

Strengths, Weaknesses and Future Opportunities
Reflecting on the first years of the InnoFounder programme, it is clear that the programme has managed to establish itself as a well-known, attractive programme for young, ambitious entrepreneurs and that the programme has a major impact on the Danish start-up ecosystem.

Furthermore, IFD sees great interest in the programme, both from the start-up environment, higher education institutions as well as from investors in general. IFD receives positive feedback from participants and see it as a strength that IFD provides and markets a national programme, though it seems clear that Copenhagen is the capital of entrepreneurship in Denmark. Furthermore, IFD

receives positive feedback regarding its increased focus on international ambitions. Although early, IFD also considers the new design-driven approach a strength, which supplements the typical technology push approach of IFD start-ups well. Finally, the quality of the start-ups seems high and there are good indications of impact, in some cases impressive impact.

An obvious weakness of the programme is the fact that its impact has still not been fully documented. In addition, IFD is not happy with the low number of female participants, though it reflects the overall figures for female entrepreneurs in Denmark. Finally, the focus on recent graduates prevents many more mature entrepreneurs from accessing the programme.

Opportunities for improvement follow the weaknesses. An impact analysis of the programme will be conducted in 2019, and IFD has launched a female role-modelling initiative and plans to revise its communication material focussing on gender biases. The gender issue can also be addressed in dialogue with the higher education institutions. A programme targeting more mature entrepreneurs, who statistically have a higher success rate, is currently being developed and has already attracted much interest and constructive input from many stakeholders. IFD has also considered raising the number of allowed InnoFounders; however, in order to maintain the high quality it has been decided to maintain the current budget.

Process highlights for InnoFounder

Information & Guidance	Application	Assessment	Follow-up	Impact
Operator & IFD info-meetings, IFD webpage, social media and hotline	Short written application	Not invited: decision within 30 days Invitees: pitch for panel: decision within 60 days	12 months active incubator Mini-demo day after 6 months: continue or out	To be conducted in 2019

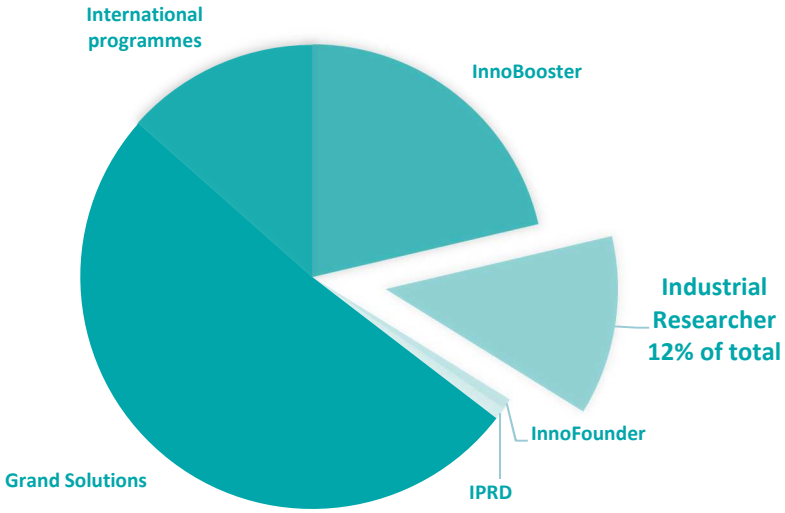
4.4 Industrial Researcher

Henning Larsen

Industrial Researchers are almost a permanent part of the staff at Henning Larsen. First and foremost, the company's collaboration with researchers results in better buildings, but also provides one of Denmark's largest and most acclaimed architectural companies with inspiration and innovation.

Henning Larsen currently has an Industrial PhD develop software for testing, in virtual reality, the acoustics of new buildings before they are built. The aim of the project is to help Henning Larsen architects design buildings with better acoustics in the future.

Programme size of total funding budget for IFD 2017



Background and Framework

The Industrial Researcher programme consists of two programmes: the Industrial PhD and the Industrial Postdoc. They are regular PhD and Postdoc scholarships, though with a commercial angle, as the projects are anchored in and partly sponsored by a company.

The programmes invest in PhD and Postdoc projects, where the candidate is employed in a private company and collaborates with, and is enrolled in, a public-sector research institution, most often a national or foreign university. The candidates perform their research at both the company and the research institution. The quality of the research and its relevance to the company are the main criteria for selection.

The aim of the programmes are to train and develop research talents to become industrial researchers, to strengthen collaboration between research institutions and companies and to trigger development and business-oriented innovation in Denmark. In relation to the law, the programmes thus address the share of investments in research and development made by private companies, the share of highly educated workers employed by companies and the connection between high-quality science and innovation.

The two programmes were designed at different points in time. The Industrial Postdoc programme has existed since 2011, while the Industrial PhD goes back to 1970. With the offset of IFD in 2014, the programmes became part of the Talent area, due to their focus on developing research talents.

IFD streamlined the Industrial Researcher programmes and cut back on red tape

IFD streamlined the programmes, cut back on red tape and made it possible for international partners to participate.

What Is in It for the Applicants?
The Industrial PhD programme funds:

- A share of the company's expenses for the Industrial PhD candidate's wages: DKK 17,000 per month in 2018 (up to 50 per cent of the gross wages).
- A lump sum to the university enrolling the PhD candidate covering e.g. supervision, workstation, equipment, PhD courses and assessment. In 2018, DKK 360,000 was granted to projects within the technical, basic, agricultural, veterinary and life science and DKK 252,000 to projects within the humanities and social sciences.
- A lump sum of DKK 100,000 (in 2018) for:
  - Travelling expenses in connection with conferences relevant to the project and visits to foreign universities and companies. For Industrial PhD candidates enrolled at a foreign university the amount is higher: DKK 122,000 in 2018.
  - Participation in PhD courses not offered by the home university and which result in ECTS credits.

The Industrial Postdoc programme funds:

- Part of the company's expenses for the Industrial Postdoc's wages: DKK 22,000 in 2018 (up to 50 per cent of the gross wages).
- Part of the company's expenses in connection with the travels of the Industrial Postdoc (relevant national and international conferences and stays at foreign research institutions and companies): DKK 2,500 per month of the project in 2018.
- Part of the research institution's expenses for mentoring, equipment, materials, hours spent by researchers, technicians and other assisting personnel on the project: DKK 12,500 per month of the project in 2018.

Operational Model and Procedures

Information about the programmes and application process is communicated through various channels, mainly the IFD website and at presentations, e.g. at university info events. During week days a hotline is open to potential applicants.

As of 2018, the number of application deadlines for the Industrial Researcher programmes increased from three to four, giving applicants more chances of applying and reapplying.

These four rounds include a separate call open only to organisations in the public sector. The remaining calls are open only to companies in the private sector. This structure has been implemented in order to earmark a part of the funds to public sector organisations.

Applications are submitted via the e-grant portal. The application process is continuously evaluated by IFD with the objective of simplifying the process for both applicants and reviewers. Applicants receive an answer within 40 days after submission of the application. During these 40 days, IFD conducts an efficient process of thoroughly checking all data provided in the application, distributing applications to the committee members with the right expertise, preparing and holding a committee meeting and follow-up. At each application round, IFD receives approximately 100 applications amounting to an average of 400 applications each year, with Industrial Postdoc applications representing 20-25 per cent of the total.

The IFD's Industrial Researcher Committee consisting of 25 professionals with a career in academia and/or private companies assesses the applications.

Assessment and Investment Decisions

Assessments are conducted on the basis of the criteria of the given programme:

Criteria for the Industrial PhD
Research quality
The project must be at PhD level and possible to complete within the project period. Assessment of the research quality focusses on:

- The novelty of the research
- The quality of the description of state-of-the-art
- The relevance and level of the theoretical foundation
- The quality of hypotheses/research questions
- The relevance and clarification of methods and data

Commercial significance and effect
The project must have a clear significance for and effect on the Danish company's business and the assessment focusses on:

- The expected contribution to the company (e.g. revenue)
- Plan for and probability of implementation and commercial realisation of results

Project implementation
The application must demonstrate that the project is well organised and that the project parties are competent and relevant. The assessment focusses on the following aspects:

- The organisation and feasibility of the project (e.g. structure and time schedule, distribution of roles, candidate's time allocation, communication and publication plan)
- The candidate must be active at both the company and the university
- The qualifications of the project parties

Criteria for the Industrial Postdoc
Research quality
Generally, the project must be at postdoc level and possible to complete within the project period. Assessment of the research quality focusses on:

- The novelty value of the research
- The quality of the description of state-of-the-art
- The relevance and level of the theoretical foundation
- The quality of hypotheses/research questions
- The relevance and clarification of selected methods and data
- The relevance and expected impact of research publications

Commercial significance and effect
The project must have a clear significance for and effect on the Danish company's business and the assessment focusses on:

- The results' expected contribution to the company's business foundation and/or revenue
- Plan for and probability of implementation and commercial realisation of results

Project implementation
The application must demonstrate that the project is well organised, and that the project parties are competent and relevant. The assessment focusses on the following aspects:

- The organisation and feasibility of the project
- The candidate must be active at both the company and the research institution
- The qualifications of the project parties

Criteria for the Industrial PhD and Postdoc in the Public Sector
In projects involving a public sector organisation instead of a company, the criteria concerning commercial significance and effect are replaced with criteria concerning novelty and usefulness in the organisation. Usefulness can include increased efficiency or knowledge building that directly improves the organisation's competences and productivity.

Follow-up

Follow-up conducted by IFD takes various forms – from large-scale evaluations of data compiled over a long period of time to statistics concerning application rounds and feedback from applicants or project participants.

The university supervisor is responsible for the academic follow up of the project, while the company supervisor is responsible for making sure that the project is anchored in the company and has a clear commercial angle.

Kick-off
Every six months IFD hosts a Kick-off event for newly approved Industrial PhD projects. The candidate as well as the main company and university supervisors shall participate. The objectives of the event are to prepare the project partners for the collaboration, to provide network opportunities and to introduce IFD to the funded projects. Kick-off activities include film clips with useful advice from previous participants and supervisors and a board game that introduces the participants to various possible scenarios that may occur during the project. In addition, the event includes a poster session.

Industrial PhD Dilemmas Challenged at Kick-off Events

Twice a year _ Industrial PhDs and Postdocs, business and careers advisers from companies and universities are invited to a kick-off meeting hosted by IFD. During the meeting, participants play a board game preparing them for their future research collaboration. The game is designed by IFD and called Trilemma – the Industrial PhD Board Game. The game forces the participants to consider a series of dilemmas and challenges they may meet during the course of their Industrial PhD project and to discuss the consequences of the given choices on the collaboration.

Industrial PhD Course
All PhD candidates must participate in an Industrial PhD course worth five ECTS credits, which prepares them for their role as industrial researchers. The course is described in section 7 on knowledge activities.

Industrial Researcher Prize
IFD wishes to reward and draw attention to talented Industrial PhDs and Postdocs, who have combined outstanding research with business value creation. Therefore, in 2017 IFD introduced the annual Industrial Researcher Prize, among others. Among the assessment criteria is the role model potential of the candidate with regard to the Industrial Researcher profile and promotion of the Industrial Researcher programme.

The Industrial Researcher programme very clearly supports the main objective of IFD outlined in the Act: bridging research and society in order to create societal value

Portrait of an Industrial Researcher

Sara Shafiee

The research talent, Sara Shafiee has developed a groundbreaking IT solution that strengthens the link between a company's production, development and sales. Sara arrived in Denmark from Iran with knowledge of textile engineering, but had to switch fields culturally and professionally. Not only has she created a new life and career for her herself in Denmark, in record time she has managed to become a role model for female elite scientists. Sara Shafiee's industrial PhD alone includes 25 publications.

Project Evaluation by Participants
Midterm and final evaluations of the Industrial PhD programme were introduced in 2017, asking the participants to evaluate the project halfway through and again at the end of the project period. The midterm evaluation mainly focusses on the collaboration of the parties, while the final evaluation focusses on the effects and results of the project. This gives IFD an opportunity to detect problems early on and intervene, if necessary, and to collect long-term data on the character of effects and results of Industrial Researcher projects.

Completion Rates
For Industrial PhD projects initiated between 2002 and 2008 the overall completion rate is 90.8 per cent. This is slightly higher than the corresponding overall completion rate for regular PhD students, which is 88 per cent.

Measurable Impact
So far, IFD has made no register-based impact analyses of the Industrial Researcher programme. Additionally, the Industrial Postdoc programme has not been running long enough to generate sufficient data for statistically meaningful analyses. It will probably be relevant to conduct a register-based Industrial Postdoc programme analysis around 2020.

Since the Industrial PhD programme has been running for a long time, the data available for statistical analyses are of a high quality. Previous register-based impact analyses of the Industrial PhD programme have shown positive results considering the participating companies' revenue, size, number of employees and patenting activities.

Analyses have shown that Industrial PhDs experience, increased income, increased private sector employment, a larger share of management positions and slightly reduced research focus in jobs compared to regular PhDs

The table below sums up the main differences on an individual level:

Table 2: Comparison of Industrial and regular PhDs

	Industrial PhD	Regular PhD
Public investment in education	DKK 1.0-1.3 million	DKK 2.1-2.5 million
Completion rate	90.8%	88%
Yearly income after graduation (adjusted for age, scientific field, gender)	10-15% higher than regular PhD	-
Employment rate five years after graduation	95.5%	90.9%
Holding a job requiring specialist expertise	85%	90%
Employed as manager	8%	5%
Employed in the private sector	83%	33%

Conclusions and Lessons Learned

The former PhD and Postdoc programmes were merged into the IFD Industrial Research programme in 2014. At IFD, the new Industrial Researcher programmes have been further developed with emphasis on internal efficiency, user-friendliness and relevant support activities.

The two programmes supplement each other well and act as a strong bridge between academia and industry characterised by a dual focus on research and business opportunities. They clearly meet the objectives outlined in the Act, specifically concerning more research in private companies, as well as an increase in the number of graduates in the private sector. They overlap with Grand Solutions in terms of TRL levels, but also supplement Grand Solutions, as Industrial Researcher projects are smaller and more focussed, with only two partners, and thus often act as a first step towards strategic research relationships between academia and the industry. Apart from that, the focus on the student and on developing his or her talent makes the programme unique in this context.

Strengths, Weaknesses and Future Opportunities
The key strengths of the programmes are their ability to strengthen and facilitate collaboration between universities and the industry, while at the same time getting more academics employed in the private sector.

The Industrial PhD has a confirmed, highly relevant impact and is a well-established brand in Denmark

The Industrial Researcher is a well-established brand in Denmark as evident from the rising number of applications over the years and the considerable co-financing provided by companies. Other strengths of the programmes are the short response time and great gender balance.

Opportunities for future development include an ongoing IFD pilot project examining the potential of a new type of Industrial Researcher programme. Under the Smart Cities initiative, a cluster of nine Industrial PhD and Postdoc projects has been launched within the construction sector. The projects in the cluster receive both public funding from IFD and funding from a private foundation in the construction industry, and together the projects constitute a learning network with activities connecting students, companies and university supervisors. The objective is to create synergy between the projects, to raise awareness of research in the sector and, naturally, to create an impact in the industry. If they prove successful, this could be a model for future Industrial Researcher cluster initiatives.

Smart Cities Initiatives

Together IFD and Realdania have etablished an industry cohort of nine industrial research projects within smart buildings and smart cities. An information meeting was held on 23 May 2018 at BLOXHUB in Copenhagen.

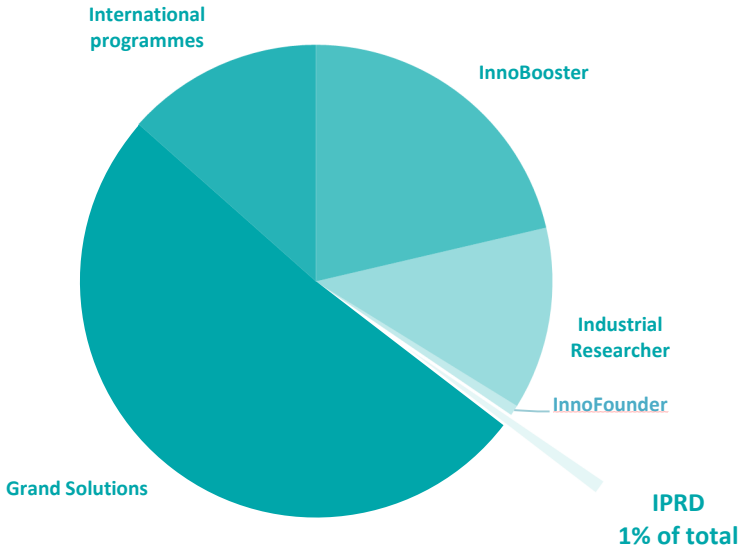
Another relevant initiative is an idea for a programme also with the aim of bridging academia and the industry through individuals, but with an emphasis on more senior level participants. Currently, at the concept development stage, IFD is investigating the interest in and potential of a 'senior mobility programme', where industry professionals spend time with a group of researchers at a university, and vice versa, with the aim of establishing contact facilitating future collaboration and research. Though at an early stage, both academia and the industry have shown considerable interest in the initiative.

Process highlights for Industrial Researcher

Information & Guidance	Application	Assessment	Follow-up	Impact
IFD webpage, social media, hotline & info-meetings	Four annual calls Joint application between company, student & university	Assessment involves expert panel and decision is taken <60 days	Kick-off day for all projects. Industrial PhD-course. Survey on project progress and climate	Positive impact well-established

4.5 Innovation Pilot in Rural Districts

Programme size of total funding budget for IFD 2017



Background and Framework

The Innovation Pilot in Rural Districts (IPRD) is a new programme established on political demand in 2016. The programme gives SMEs in rural municipalities the opportunity to receive funding for up to two years for hiring individuals with a higher education as part of an innovation project. The programme is based on the assumption that employees with a higher education – called Innovation Pilots – create innovation and increase productivity in a company, and that there is a lower number of employees with a higher education in rural districts. As such, it fits well with the IFD Act, which puts emphasis on attracting employees with a higher education to SMEs.

DKK 10 million was allocated to the programme in 2016, 2017, 2018 and 2019, respectively.

To keep administration and rules simple, the structure of the programme is inspired by InnoBooster. Only SMEs based in one of the 54 designated rural municipalities can apply. A further condition is that the company must either have an annual turnover of no less than DKK 2 million (latest financial year) or attracted a minimum of DKK 500,000 in external capital over the past three years.

What Is in It for the Applicants?
The company receives a fixed grant meant to co-finance the cost of a new employee with a higher education for one or two years. The grant is DKK 12,500 per month, making the total project grant either DKK 150,000 or 300,000. Grants are awarded under the *de minimis* state aid rules.

Application and Assessment Process

The application process is similar to InnoBooster. The programme opens for applications on 15 January and closes again when the budget for the year is allocated. Applications are submitted through the e-grant portal and consist of some basic information about the company and a three-page description of the company and the educational background of current employees, the innovation project and the desired educational background and skills of the Innovation Pilot. Applicants can call a hotline with questions concerning the application process.
The assessment of applications is based on the following assessment criteria:

Novelty

- The company gets input in the form of new knowledge; i.e. the educational background of the Innovation Pilot differs from that of the other employees.
- The development activities are new to the company.
- The new employee creates new development opportunities for the company.

Value creation and business potential

- It is clear how the company will profit from the results of the project.
- The expectations for business potential are realistic.
- The company expects the Innovation Pilot to pave the way for more new employees

Financial efficiency and completion

- The project is believed to be completed with resources available in the company combined with the skills of the innovation pilot.
- The value creation measures up to the desired grant. Especially two-year projects should be able to add substantial value to the company during the second year.
- Clear and realistic project activities and milestones.

Two IFD POs assess all applications, and decisions are then approved by IFD Management. All applicants get a decision within 30 days.

Table 3: Status of Innovation Pilot in Rural Districts

Applications

	Applications received	Applications approved	Percentage approved
2016	• 60	• 34	• 57%
2017	• 63	• 39	• 62%
2018 (as of 31 May)	• 91	• 36	• 40%

Projects

	• Projects approved	• Projects launched	• Projects abandoned*	• Percentage abandoned
2016	• 34	• 31	• 9	• 26%
2017	• 39	• 32	• 8	• 21%
2018 (as of 31 May)	• 36	• 24 (approx.)	• 3	• 8%

*projects that were never launched or later abandoned

So far, three projects have been completed. A relatively large share of the projects were terminated before completion, mostly due to difficulties finding an Innovation Pilot. Some failed to attract a candidate on time or gave up and had the grant retracted. Some companies hired a candidate who could not be approved or decided not to go through with the project for some reason. Funds reserved for abandoned projects are allocated to the following year.

Based on the share of abandoned projects, the guidelines were updated for 2018. More emphasis is now placed on the educational background and skills of the desired candidate and match between candidate and project requirement. The hope is to avoid projects with unrealistic expectations as to what a candidate with a higher education can deliver. In addition, the bar for two-year projects has been raised.

Conclusions and Lessons Learned

Reflecting on the programme so far, it is clear that the Innovation Pilot in Rural Districts has received a mixed reception among SMEs so far. Funding for an additional employee is considered an attractive option, and IFD has learned from collaboration partners (incubators among others) that it is easy to sell the programme to SMEs. For some companies, the Innovation Pilot is an employee they would not otherwise have been able to afford, while for others the grant is an option to match expectations and thereby attract highly educated candidates to areas far from a university. However, the scope of the programme makes marketing difficult, i.e., only companies from selected municipalities can apply and the funds are used up quickly after the programme opens. Some applicants find the requirement of the programme on a specific education level hard to understand, leading to difficulties in the application or hiring process.

Strengths, Weaknesses and Future Opportunities

The programme matches the aim of IFD, and it is considered attractive in the business support environment. Similarly, some SMEs have also begun to report positive results.

Unfortunately, many projects have never been launched or have been abandoned. We see indications that wage support is not a determining factor with regard to project success. Companies in rural districts continue to have difficulties attracting and retaining candidates especially with the current low level of unemployment, just as applicants in general have difficulties planning relevant projects that fit the competencies of graduates. Furthermore, branding a programme with such a limited budget is complicated.

For the rest of the budget period, IFD will continue to market the programme and work closely together with stakeholders, who have direct access to potential companies. As some projects come to an end, it is also possible to develop role model cases capable of spurring interest in the programme. Finally, IFD will conduct early evaluations of the programme in order to provide input concerning the future of the programme.

Process highlights for Innovation Pilot in Rural Districts

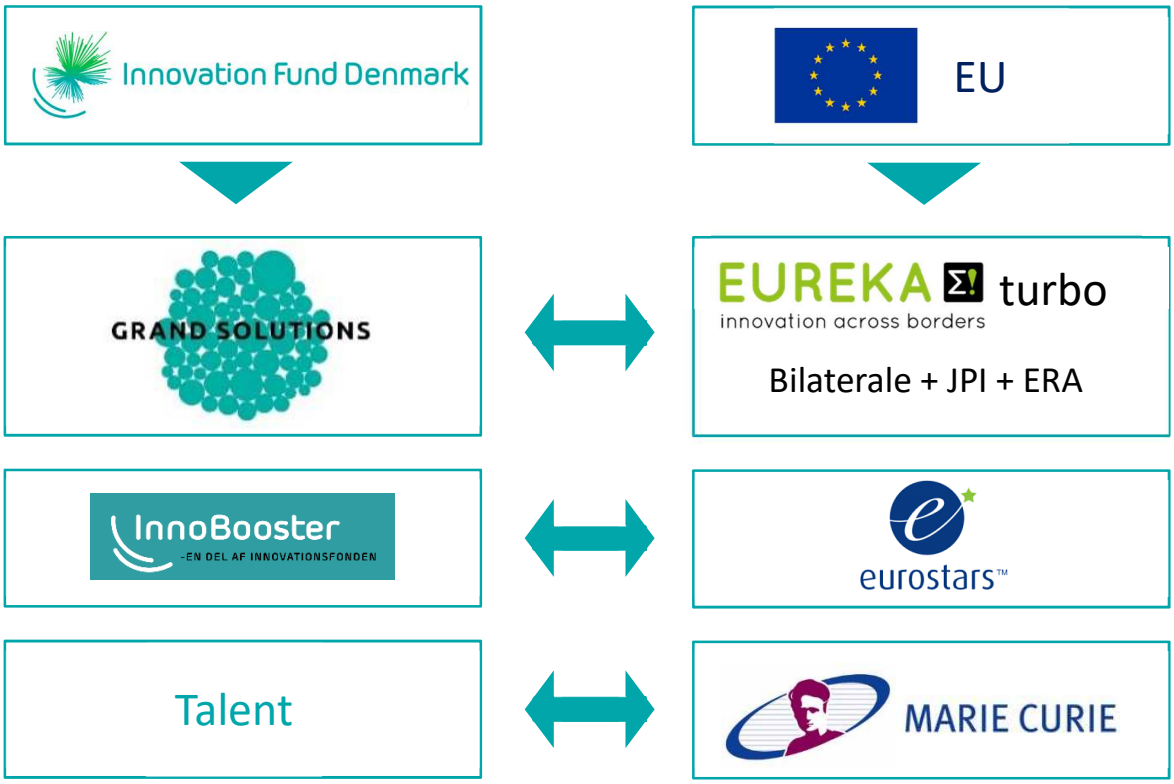
Information & Guidance	Application	Assessment	Follow-up	Impact
IFD webpage, social media, hotline and active guidance by regional players (trained by IFD)	Open all year minus summer and winter break. Short written application	Fast < 30 days	Simple exit survey	

5. Internationalisation

Background and Overall Framework

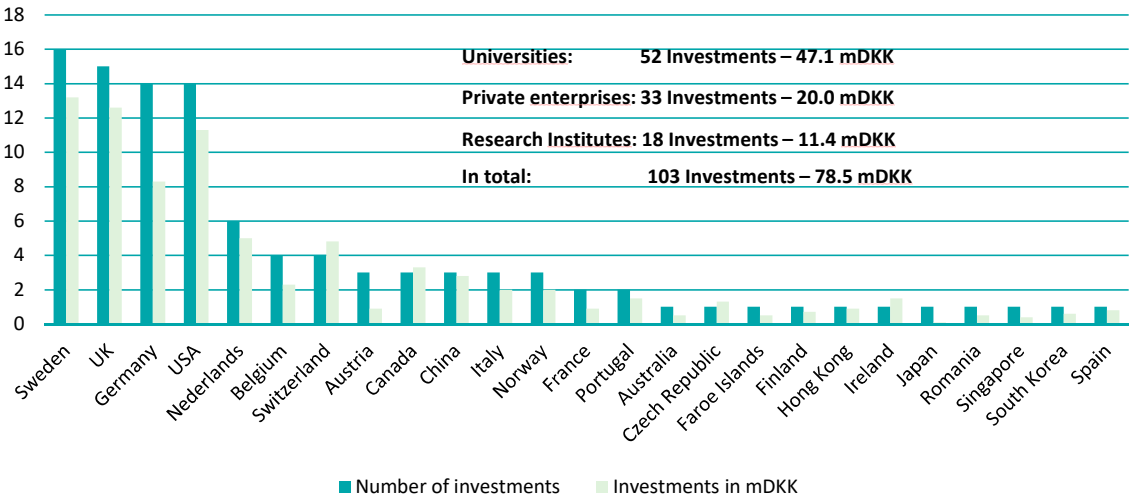
The international perspective is vital to a country like Denmark, which has an open economy, clear positions of strength and a culture of international collaboration and trade. IFD considers international collaboration a key element in strengthening and constantly developing Danish research and innovation. The international perspective and the right competencies strengthens IFD projects giving them an opportunity to develop innovative solutions with a global potential benefitting Denmark. IFD therefore allows international partners within the Grand Solutions programme, where international partners are funded on equal terms and participate actively in a wide range of international programmes and collaborations. IFD can allocate up to 20 per cent of its total budget to international projects – as long as they apply in open competition with other projects and are of high quality. The international programmes should complement and strengthen the national programmes, as illustrated in the figure below.

Figure 10: Relation between national and international programmes



IFD currently participates in 46 international collaborations and programmes and have investments in more than 250 international projects.

Investments in international partners in Grand Solutions projects 2015-2017



IFD has taken over the responsibility of a large number of international programmes. Its international engagement includes network participation and programmes within four bilateral collaborations, Articles 185 and 187 (e.g. Eurostars, AAL, Bonus and ECSEL), nine Joint Programming Initiatives (JPIs), several ERA-NETs with/without affiliation to JPIs and EUREKA. Since 2014, additional ERA-NETs and other types of programmes have emerged, including the EU Future and Emerging Technologies (FET) flagships and Nordic collaborations under NordForsk. In total, IFD currently participates in 46 international collaborations and programmes and have investments in more than 250 international projects.

Table 4: International programmes and calls funded by IFD 2014-2017

2014 – 17 calls	2015 – 14 calls	2016 – 14 calls	2017 – 13 calls
Bilateral – Brazil	Bilateral – South Korea	Bilateral – Brazil	Bilateral – Brazil
Bilateral – India	ECSEL	Bilateral – India	Bonus
Bonus	ERA ANIHWA	Bilateral – China	ERA Core Organic
ERA ANIHWA	ERA CAPS	Bilateral – South Korea	ERA Electric Mobility
ERA CAPS	ERA COFASP	ECSEL	ERA FACCE ERA-GAS
ERA COFASP	ERA ICT Agri I	ERA FACCE Surplus	ERA QuantERA
ERA IB2	ERA ICT Agri II	ERA ICT Agri II	Eurostars 6
ERA Susfood	ERA MBT	Eurostars 4	Eurostars 7
ERA Synbio	ERA Synbio	Eurostars 5	EUREKA-TURBO
Eurostars 1	Eurostars 2	JPI HDHL	JPI Antimicrobial resistance
JPI Antimicrobial resistance	Eurostars 3	JPI MYBL	JPI Climate ERA4CS
JPI Climate	JPI FACCE MASCURE II	JPI Neurodegenerative Diseases	JPI HDHL
JPI FACCE	JPI Neurodegenerative Diseases	JPI Urban	WaterWorks 2015
JPI Healthy diet healthy life	AAL	WaterWorks 2014	
JPI Urban			
JPI Water			
JPI Neurodegenerative Diseases			

IFD funding of international programmes has doubled from 2014 to 2017

According to the National Research Statistics Report, two of the precursors for IFD – The Danish Council for Strategic Research and the Danish Council for Technology and Innovation - together awarded an average of DKK 95 million each year to international programmes in the period 2010-2013. IFD funding of international programmes has increased since 2014 from DKK 103 million to DKK 168 million. IFD expects to maintain this level of engagement in international programmes in 2018. EU co-financing also increased from DKK 23 million in 2014 to DKK 83 million in 2017. The total amount of IFD investments granted to Danish participants in international projects reached DKK 253 million in 2018. This increase in international investments occurred in a period in which the total IFD budget decreased compared to the reference period 2010-2013.

Table 5: IFD investments in international programmes and EU co-funding 2014-2017

	Number of investments	IFD investments mDKK	EU co-financing mDKK	Total public investment mDKK
2014	68	103.0	22.6	125.8
2015	87	97.4	22.6	120.0
2016	101	148.3	36.4	184.7
2017	131	168.1	84.3	252.5
Total	**387**	**516.8**	**165.9**	**682.7**

The international programmes are divided into three categories:

1. Co-funding programmes under Horizon 2020, Articles 185 + 187 and NordForsk
2. Thematic bilateral collaborations
3. Bottom-up calls targeting small and medium-sized companies under Eurostars (Article 185)

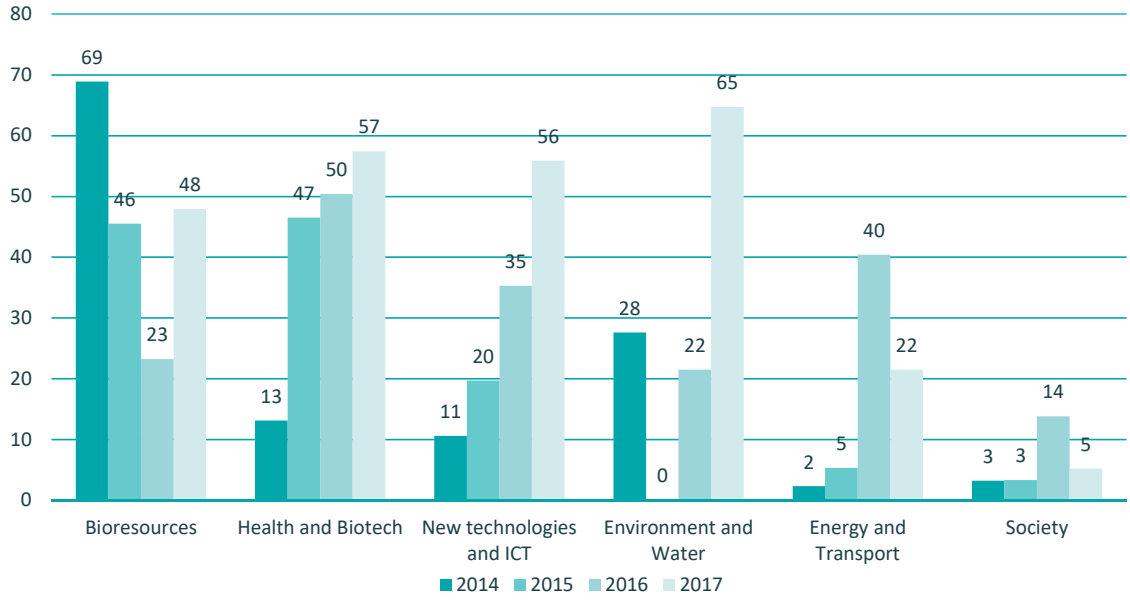
The bioresource area has traditionally received a majority of investments

The bioresources area has traditionally seen the highest number of programmes and the highest level of funding. IFD has only participated in a few thematic programmes within life sciences (health) and the contribution to this area comes from biotech companies and researchers participating in Eurostars. The number of IFD investments linked to JTIs or ERA-NETs covering new technologies related to ICT or new materials have been relatively limited, but many Eurostars projects fall within this field. IFD has participated in a number of environment and water-related programmes, in particular JPI Water and the related ERA-NET WaterWorks and the Article 185 programme, Bonus (referring to the Baltic Sea). Energy and Transport has historically received limited attention with IFD participation in just a few thematic EU programmes and a bilateral call with China; however, many Eurostars projects fall within this field. The international projects area that has seen the most limited focus is projects of benefit to society in general. AAL for ICT solutions for elderly people and the JPI MYBL programme are the only two programmes within this area.

A large call focussing on personalised medicine has helped facilitate Nordic collaboration

Nordic collaborations were revitalised in 2017 when FD launched an initiative focussing on personalised medicine, taking advantage of the strengths of the Nordic healthcare systems with structured patient records. It soon became clear, that the Nordic countries shared a common agenda and a will to launch a joint initiative aimed at finding new innovative personalised medicine solutions, in order to increase patient outcome and improve the efficiency of the healthcare sector. The call is supported and hosted by NordForsk under the 'open invitation initiative' with a common administrative platform and significant co-funding, resulting in a call amounting to DKK 100 million. This model will be used also for renewable energy, digitisation of the public sector and sustainable aquaculture.

Figure 11: Thematic distribution of IFD and EU funding 2014-2017



International Strategy

It was clear from the beginning that there was no clear strategy behind the international engagement, except on the part of the bioresources area. Priorities were primarily driven by individual researchers. The overall investment level was relatively low, but the number of programmes was high. Consequently, the administrative burden was substantial and the impact and Danish influence limited. IFD therefore decided to develop a strategy that could help prioritise and focus the efforts on fewer programmes and to review priorities across the portfolio. The strategy was launched in July 2017, following which a dialogue process was initiated with relevant stakeholders. The strategy is centred on six strategic criteria as described in the figure below.

The international strategy with six criteria will help IFD and its stakeholders select the most relevant programmes

Figure 12: Criteria for IFD's engagement in international programmes

Criteria		Assessment criteria
1	New knowledge base in Denmark	• Contribution to strategic research • New relevant knowledge for Denmark • Innovative solutions on societal challenges
2	Growth and employment in Denmark	• Potential for creating knowledge based growth and employment • Export potential for Denmark
3	General political priorities, including priorities of key stakeholders	• National political priorities supports the participation • Key stakeholders supports the participation
4	Financial attractive + low administrative burden	• Attractive budget • Attractive co-financing • Administrative burden vs benefits
5	Demand driven in relation to Danish applicants and attractive collaboration partners	• Demand from qualified applicants • Access to attractive collaboration partners/countries
6	Clear governance, transparency in application and evaluation	• Clear and well-defined governance of projects • Transparency of administrative procedures • Good and qualified evaluation procedures

Open dialog with stakeholders is necessary, and IFD has established a Strategic Advisory Board

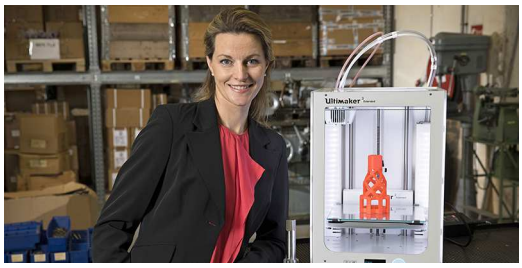
A number of thematic workshops attended by strategic level stakeholders from universities, RTO's and industry confederations have been organised and directly affected several short-term priorities, including GEO ERA, RegSys and Blue Bioeconomy. The Research2025 catalogue has been central in these discussions.

Prioritising Process Involving Stakeholders

It is evident that international collaborations require long-term strategic planning. IFD therefore invited high-level representatives from all Danish universities, the Ministry of Higher Education and Science and industry confederations to debate the strategic priorities in relation to key strengths and future needs. The meeting resulted in the establishment of a Strategic Advisory Board (SAB) anchored at the top of the institutions. The SAB will meet biannually and help IFD prioritise international collaborations from a national strategy perspective.

Global Presence: Different Instruments for Different Purposes

IFD strives to obtain a global presence with programmes covering different needs, as illustrated in the figure below. Challenge-driven research will be concentrated among selected programmes complementing the national programmes, where a concentrated international effort on projects and policy is required. These programmes fall within Horizon2020 with ERA-NETs, JPIs, FET Flagships and Nordic programmes. New relations will be supported by bilateral calls open to a selected group of the countries Denmark has official bilateral agreements with, including China, India, Korea and Brazil. Internationalisation of innovative SMEs will be covered by Eurostars. Flexible instruments for accessing new opportunities in countries outside the EU via targeted bilateral or multilateral collaborations will use the EUREKA GlobalStars initiative.



Eurostars as a stepping stone for success

Thürmer Tools has manufactured special thread-cutting tools for more than 100 years. The company is now a front-runner in Industry 4.0. Thürmer Tools has kick started their success in the IFD Eurostars programme. Photo by Thürmer Tools.

Bilaterale programmes 10 national programme countries	Eurostars Focusing on R&I in SME's
EU co-funded programmes Thematic programmes	Nordic Projects, EUREKA, GlobalStars etc.

Administration

In 2017, IFD's administration of international projects was harmonised across all programmes and integrated in IFD's electronic administration system, GO-T (e-grant). This 360-degree revision included all stages of the life cycle of international programmes – from IFD's decision to engage in the programme, registration of applications and registration of the investment through reporting on progress and payment to final reporting. The core of the new administration form is centralised registration and project administration. Equally important is clear division of responsibilities between the individual SO, the SO's thematic group and the international coordination and administration. As a consequence of the 360-degree revision, IFD has created an administrative environment which, with relatively few resources, can accommodate more projects and a much better system for monitoring the progress of approved projects. Better quality of data on applicants and approved projects has contributed to high-powered statistics on IFD's international engagement. This has facilitated the continuous development of IFD's strategic engagement in new programmes.

Conclusions and Lessons Learned

Strengths:	Weaknesses:	Opportunities:
• Overall increased engagement in international programmes • Reduced number of programmes, though increased funding • Excellent performance in the Eurostars programme • Strong bilateral collaborations • Revitalised Nordic collaboration • Clear strategy with six criteria for prioritisation • A process including stakeholder involvement at strategic level (SAB) • Efficient administration model incorporated in to the e-grant portal and harmonised with national procedures	• Limited impact of several ERA-NETs • Administrative burden of ERA-NETs and JPIs • Lack of transparency and long process time of EU programmes • Limited innovation and industry participation in bilateral projects • Difficult to get a clear position on certain stakeholders' strategic priorities • Limited resources for establishing Danish positions in new and existing programmes	• National consensus on strategic priorities • Ramp-up of national influence and positioning in new programmes, but requires sufficient resources • GlobalStars for bi- or multilateral collaborations with global technology hotspots • Revitalising Nordic collaboration • Increased international participation in Grand Solutions • FET Flagships on quantum technology, energy and digitisation • Selected JPIs • Smart Grid and integration of energy systems • Marine research and innovation

IFD took over a large portfolio characterised by unclear priorities, limited funding and unstructured manual administration. Increased funding, a clear strategy, stakeholder involvement significantly improve IFD's international engagement and a common administration model synchronised with the national instruments. However, the strategic agenda is still in an early stage and will require a continuous effort to implement long term strategic planning.

A key challenge remain, namely the limited qualified resources to drive the strategic agendas of new and existing programmes. IFD's original administration budget was based on the assumption that IFD would receive economic contributions from the Commission to cover expenses related to administrative and strategic tasks within the programmes. However, contrary to FP7, these expenses are not covered under Horizon 2020. It is therefore vital that these resources are made available to position Danish interests and maximize the value of Danish participation. This will allow IFD to engage key experts to drive the ramp-up phase of new programmes and take an active part in driving the strategic agendas, CSAs and calls.

Process highlights for international activities

Information & Guidance	Application	Assessment	Follow-up	Impact
Managed by international administrative bodies in collaboration with national funding authorities Decision on Danish co-funding is made by the IFD Board of Directors			Kick of meeting with Danish projects to strengthen bonds to IFD Follow up in collaboration with relevant national and international administrative bodies	Ongoing evaluation of the Eurostars-programme

6. Coordinating Role and Advisory Function

IFD's Coordinating Role in the Research and Innovation System

According to the Act, IFD must coordinate its investments with other relevant public and private authorities. This obligation applies to the composition of funding instruments and themes as well as to the organisation of the administration.

In addition to this, the idea with IFD was to create one entrance for researchers and knowledge-based companies. It was supposed to lead to fewer funding bodies and a simpler set-up and design, making it easier for applicants to apply for funding. Furthermore, IFD should have the necessary resources to make a difference by being able to support especially long-term and costly research and innovation projects. The realisation of this political idea and the merger of the three former funds meant that IFD became the main player in the Danish research and innovation system. Therefore, IFD has continuously coordinated its programmes and initiatives and shared knowledge with the other players of the Danish research and innovation system including close collaboration with regional authorities. Furthermore, IFD has taken an active part in the common work at ministry level for an even more unified administration system. In particular, IFD has addressed the issue of coordination at four levels:

- The national research and innovation system: other national research funds, development and demonstration funds within other ministries (UDPs), innovation incubators, innovation networks, approved technological service institutes (RTOs).
- Other sectors – including the Ministry of Industry, Business and Financial affairs, the Ministry of Health and Danish Ministry of Energy, Utilities and Climate.
- Coordination with national and regional business promotion systems – including the municipalities.
- The private market: private funds, banks, investors, business angles etc.

All of the above were involved in IFD's 2014 strategy process, and subsequently IFD has coordinated investment strategies, organised conferences and held regular formal and informal meetings with stakeholders.

IFD meets with the UDPs every six months at management level and has worked closely together with especially the EUDP to coordinate interfaces. Furthermore, IFD has held joint information meetings with UDPs for applicants and other private end public investors and organised joint conferences.

All other relevant ministries have delivered input to IFD's investment strategies to align these with overall national strategies on e.g. health and energy.

Assessment of Scientific Quality of Other Ministries' Research Programmes

Background and Overall Framework

IFD has continued the obligation of the former Danish Strategic Research Council to conduct research assessments of applications submitted to other ministries for allocation of research appropriations.

The obligation to assess the scientific quality of other ministries' research programmes is pursuant to section 5 of the Act on IFD, amended in Act no. 384 of April 26, 2017.

'Section 5. IFD shall approve the award procedure and conduct a research assessment of submitted applications for individual ministries' allocation of state research appropriations, which are not basic appropriations linked to a particular institution or appropriations for research-based government services. The individual ministers then allocate the funds among the applicants whom IFD has found eligible.

Part 2. IFD may, on request, assist other public and private institutions with research assessments of award procedures and applications received prior to the allocation of research appropriations by such institutions'.

The IFD Board of Directors has delegated the competence regarding research ministerial advice to IFD Management. IFD Management thus approves the grant procedure and conducts research assessments of incoming applications for other ministries' allocation of state research appropriations, which are not basic appropriations linked to a particular institution or appropriations for research-based government services.

Operational Models
In 2016, the Permanent Secretary of the Ministry of Higher Education and Science sent a letter to all ministries informing them of IFD's obligation to perform scientific assessments, outlining the ministries' duties in this regard and presenting the two operational models.

A number of ministries, boards and programmes allocate funds upon application to research in their own field. In such situations, they must observe the provisions on research assessment outlined in section 5 of the Act.

The Act states that IFD must approve the grant procedure and conduct research assessments of incoming applications for the individual ministries' allocation of state research appropriations, which are not basic issues related to a particular institution or appropriations for research-based government services. The individual ministers then distribute the funds among the applicants, whom IFD has found eligible. The duty of other ministries to submit proposals to IFD for the allocation of such appropriations applies irrespective of whether the purpose of the funding falls within the scope of IFD.

Two Operational Models for Research Assessment
IFD has two different models for conducting research assessments:
- Model 1 involving a research committee in the individual Ministry
- Model 2 not involving a research committee in the Ministry

Model 1 – Research Committee in the Ministry
The task of IFD is to determine whether the Ministry's research committee is in possession of the competencies relevant for research-related insight.

IFD must approve the call text and call procedure, including e.g., whether application deadlines are reasonable for objective assessment criteria, a reasonable description of the academic areas and topics. IFD must furthermore ensure that there is a connection between the funds offered and the consultation procedures and what is expected of the applicant etc.

The call text and call procedure are typically prepared by the relevant ministry and the Ministry's research committee together with IFD. IFD ensures that the relevant Ministry's call refers to the IFD data management rules.

Model 2 – No Research Committee in the Ministry
IFD must approve the call for applications and call procedure, and ensure that application deadlines are reasonable, that there are objective assessment criteria and a reasonable description of the field. Furthermore, IFD must ensure that there is a correlation between the funds offered, the consultation process and what is expected of the applicant etc. IFD must also ensure that the relevant Ministry's call refers to IFD's data management rules.

A typical process (model 1) is therefore as follows:
The research committee of the relevant Ministry assesses the applications, determining whether they fulfil the assessment criteria of the relevant call and are 'scientifically eligible' or 'scientifically non-supportable'. The committee prepares, for the use of IFD, a scientific justification concerning the applications, which the committee finds to be 'scientifically non-supportable'.

IFD must then have access to all applications and the opportunity to participate in the final meeting. On this basis, IFD takes a position on the total research assessment.

Subsequently, the relevant Ministry can decide which applications are eligible project proposals; though 'scientifically non-supportable' applications cannot be granted. It is the relevant Ministry's responsibility to ensure that all relevant rules regarding execution are observed under the Public Administration Act.

Model 2 – No Research Committee at the Ministry
IFD must approve the call for applications and call procedure, and ensure that application deadlines are reasonable, that the assessment criteria are objective, that a reasonable description of the field is provided, that there is a correlation between the funds offered, the consultation process and what is expected of the applicant etc. IFD must ensure that the call text provides information on IFD's processing of personal data.

A typical process (model 2) is therefore as follows:
IFD decides whether a special committee should be set up under the auspices of IFD to assess applications, or whether it can be conducted as a written procedure with internal or external peer reviewers. Typically, this depends on the amount requested, the expected number of applications and professional interests.

IFD selects relevant peers, possibly upon recommendation by the relevant Ministry.

Assessment of applications is conducted via peer review performed by SOs in IFD, potentially with involvement of SE's or external peers with relevant specialist expertise. IFD prepares a scientific account concerning the applications that are considered 'scientifically non-supportable'.

The relevant Ministry decides which applications are eligible for funding; though 'scientifically non-supportable' applications cannot be granted. It is the relevant Ministry's responsibility to ensure that all relevant rules regarding execution are met, including the Public Administration Act's rules on grounds for refusal.

In 2017, IFD assessed research quality of >500 applications under 13 different research programmes at 10 ministries. Examples of programmes include calls from GUPD, EUDP, and the Danish Victims Fund as well as a call on possible HPV vaccine side effects and calls on medical cannabis for the Danish Medicines Agency.

Conclusions and Lessons Learned
It is a weakness that the process is time-consuming, and as the other Ministries depend on the IFD assessment deadlines are often tight and interfere with IFD's own deadlines. The resources for conducting scientific assessments vary and are difficult for IFD to forecast.

It is a major strength that the scientific assessment procedure qualifies the scientific level of research funding provided by Danish ministries, and it gives IFD relevant insight into various research areas. This insight is used in the development of IFD's investment strategies, in dialogue with applicants on IFD calls and in the assessment of IFD applications. It also gives IFD a good basis for fulfilling its coordinating role in the Danish research and innovation system.

Role in Research2025

IFD SOs have spent a considerable amount of resources in 2016-2017 on supporting the preparation of Research2025, the national strategic research inspiration catalogue. They have studied the strategic research suggestions of stakeholders (dominated by the supply side), compared to global and national trends, helped facilitate thematic work groups, identified obvious, but forgotten need gaps and broadened specific wishes of individual research groups. In addition, redundant and repeated technical terms have been removed, and technical and scientific errors have been corrected. Finally, the catalogue has been proof read.

Investment Strategies

In order to guide and inspire potential applicants in their value-creating strategic research and innovation efforts, IFD continuously updates its investment strategies.

Originally, IFD initiated a broad strategy mapping process in 2015 to define needs, opportunities and emerging trends within all major areas. Relevant stakeholders from both the supply and demand side participated in a dialogue that resulted in theme-specific investment strategies, carefully avoiding 'pick the winner' approaches.

IFD currently has eight active, theme-specific investment strategies. The first four investment strategies, Health, Energy, ICT, and Trade Service and Society, were updated late 2017. Further, a new Personalised Medicine strategy was released in early 2018.

The SOs utilised the original input material, updates on global macro trends and final Research2025 catalogue in addition to the latest knowledge about societal needs in their update of the strategies, supplemented by dialogue with relevant supply and demand stakeholders within the specific themes.

The continuously updated strategies and investment criteria, together with the more static Research2025 catalogue and the current politically established thematic calls, form the framework of Grand Solutions calls as well as the calls of the prioritised international programmes.

The basic overall criteria for the strategic research investments – excellent research, value creation, efficiency, implementation and societal readiness – are consistent in all external communication targeted at potential applicants, in the thematic and open call texts as well as in the assessment and score schemes. They are also used in interview questions, acceptance and rejection communication and the subsequent progress evaluation model.

7. Knowledge Leverage

IFD supports projects with financial means. To further support projects and project leaders at a more individual level, IFD has developed a number of support activities aimed at the specific funding programmes or specific challenges. Some of these courses have already been described in connection with the funding instruments, as they support the different programmes – e.g. the Industrial PhD Course, the SCALEit course in Silicon Valley for InnoFounders etc. These learning initiatives are popular among the universities and beneficiaries.

InnoFounders in Silicon Valley

IFD strives to give Danish start-ups the best foundation for realising their entrepreneurship dreams – at home and abroad. Therefore, selected entrepreneurs are given a chance to network and knowledge-share with experienced entrepreneurs, leading IT companies and venture capitalists during the annual one-week SCALEit camp in Silicon Valley. The photo shows IFD entrepreneurs at SCALEit 2017.

Our thought leading activities, such as the IFD trend reports and InnoTalks are part of our knowledge building process to be able to guide our investments to the right areas and be able to strategically coordinate with relevant Ministries.

Prime minister at Innotalk 2017

Ground-breaking knowledge and innovation are the pivot of the debate at the two-three yearly InnoTalks organised by IFD, which always attract a large audience of 300 or more. The photo shows Prime Minister Lars Løkke Rasmussen speaking about the future labour market at an InnoTalk held in 2017.

Making Innovation Happen – Enhancing Project Management

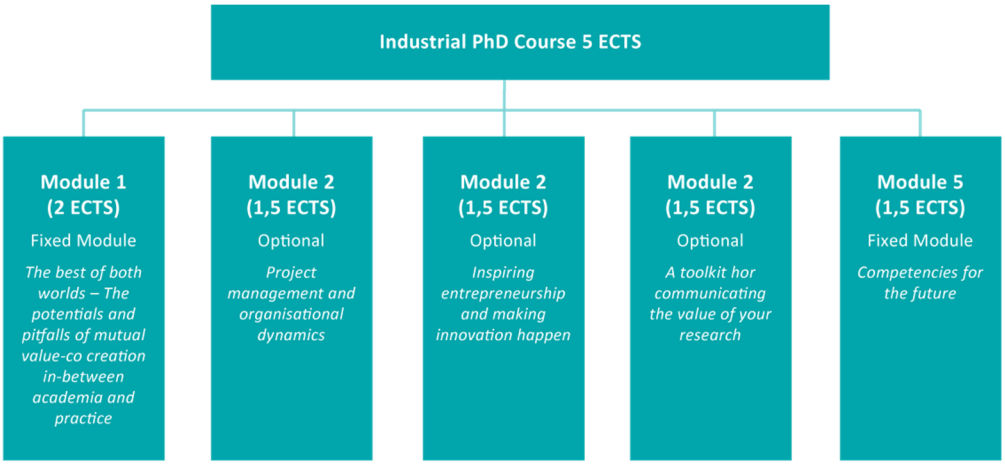
Another large-scale initiative is our joint project management course. Based on a public tender, INSEAD has run the course since early 2018. Previously, the course was run by Harvard Business School. It is offered to leaders of Grand Solutions projects and to large InnoBooster projects on a competitive basis and two cohorts of 30 participants complete the course each year. The learning goals relate to business understanding, project management and personal leadership. The course runs over a period of eight months with 10 full teaching days (9 at the INSEAD campus) supplemented by

online learning. The relevance, quality and learning impact of the course (at Harvard) received very positive evaluations. With increased focus on application to own projects and personal leadership, we expect the course to receive even better evaluations and have a greater impact in the future.

Industrial PhD Course

IFD has recently introduced an Industrial PhD Course with a view to preparing Industrial PhD students for their role as Industrial Researchers and strengthening the Industrial Researcher profile acquired through the programme. The course provides the participants with theoretical and practical tools for managing research projects at the intersection between academia and the business community as well as competences for working in different environments and getting the best out of both worlds.
The main course is mandatory, but includes a series of optional modules enabling students to put together a unique course relevant to their project. IFD has aimed to put together a course curriculum and action-oriented activities that relate to the students' own projects and provide them with project-relevant tools.

The modules and structure of the Industrial PhD Course are as follows:



The InnoFounder Incubator

InnoFounder is a 12-month incubator for graduates with an innovative business idea. Each year 40 InnoFounders participate in the incubator. Since 2017, it has been run by a consortium consisting of the Danish Design Centre (DDC) and the Copenhagen Institute of Interaction Design (CIID). It takes a design approach, meaning that focus is on the users and the context of the use rather than on specific products and business models. The programme activities are completed iteratively in accordance with the principle of 'Build, test, learn, repeat', i.e., designing solutions, performing tests, receiving feedback and translating new learning into improvements and further development. IFD and the operator work closely together on marketing, evaluating and adjusting the programme on an ongoing basis.

Besides funding, the incubator provides participants with 1) a mentor who follows the InnoFounders throughout the course, 2) monthly workshops with other InnoFounders featuring different domain experts, 3) space in a co-working area with other entrepreneurs in either Aalborg, Aarhus, Sønderborg, Odense or Copenhagen and 4) access to the InnoFounder community of investors, start-ups and corporations in Denmark and internationally.

Throughout the course, the InnoFounders regularly receive a score on five dimensions determining their progress (see example of overview below). The five dimensions are: 1) People & Organisation, 2) Concept & Communication, 3) Product & Service, 4) Market and 5) Business Model. Halfway through the course, at Mini Demo Day, this score forms the basis of a decision of whether the individual

InnoFounders have shown enough progress to continue. After 12 months, the course ends with a Demo Day, where the InnoFounders pitch their ideas to investors and other actors from the ecosystem. At this point, the business ideas are expected to be at a stage where they can be further developed within the framework of the InnoFounders' own businesses, typically together with external investors.

SCALEit

Danish companies must be present at the global level to become successful. In order to prepare start-ups for global competition and to launch the international scaling process, IFD has developed the SCALEit course together with Innovation Centre Denmark in Silicon Valley. SCALEit is a three-month business development course including a one-week intensive boot camp in Silicon Valley, a pre-camp in Denmark one month prior to the trip to California and 'office hours' via Skype both before and after the boot camp. Since 2017, 10 InnoFounder or InnoBooster start-ups have participated in the programme each year.

At the SCALEit boot camp, start-ups receive highly qualified feedback on their business ideas from successful entrepreneurs, advisors and investors from the ecosystem in Silicon Valley. Furthermore, they get insight and access to one of the well-functioning ecosystems within innovation: a large international market, world-leading IT companies and one of the most important areas of venture capital.

GoB2B

One way of scaling a small business is through close collaboration with a big company. Munich is at the forefront when it comes to start-up big company collaborations and have numerous examples of win-win collaborations between start-ups and big companies located in and around Munich (e.g. BMW, Audi, Airbus, Bosch, Siemens, Osram, Google and IBM Watson IoT). To learn from and tap into their experiences, IFD has co-developed a GoB2B course with Innovation Centre Denmark in Munich. The course was launched in the spring of 2018 with the participation of six InnoFounder or InnoBooster start-ups with B2B potential. It includes a one-week intensive boot camp in Munich, a pre-camp in Copenhagen and Skype meetings before and after the boot camp. During the boot camp, the start-ups are equipped with tools for collaborating with big companies, and they get access to a strong ecosystem of companies and stakeholders supporting start-up-corporation collaboration.

Roskilde Festival as a Living Lab

In 2016, IFD entered into a strategic partnership with the Roskilde Festival. This partnership was initiated to facilitate testing and user involvement in the product development process, offering companies in IFD's portfolio the opportunity to carry out tests and user involvement activities at Roskilde Festival to boost their development.

Roskilde Festival is the largest festival in Denmark. For one week each summer, it turns Roskilde into the fourth largest city in the country with approximately 140,000 guests/inhabitants. The Festival is a unique living lab due to the number of available users gathered in a real-life setting, not a test environment. The average age of the participants is 24 years.

Companies from IFD's portfolio apply for the initiative, providing a description of the test activity they wish to carry out and why. They are selected based on the following criteria:

- To what extent does the activity lead to significant development of the applicant's product with a view to optimising the product, the market potential, the competitive edge, the scalability or the probability of profiting from the product?
- To what extent do the product and test activity add value to the context, to the user or to the infrastructure of the setting?
- To what extent does the activity foster one or more of the 17 UN Sustainability Development Goals?

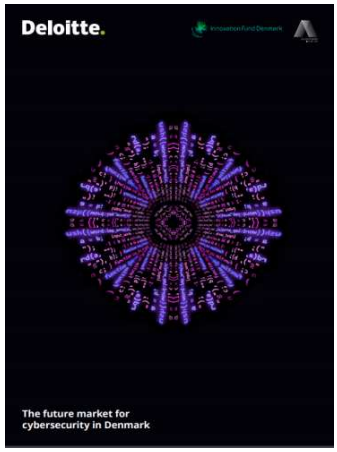
In addition to the test activities, Roskilde Festival has become a platform for IFD events. In 2017, it became the starting point for IFD's strategy process for entrepreneurship with an event where relevant stakeholders, within the ecosystem for entrepreneurship, discussed how entrepreneurship in Denmark could be strengthened. In 2018, the InnoBooster Panel has attended a back stage event to learn more about design-driven development and giving feedback to the test companies.

Spotting Trends

As the field of research and innovation is constantly changing, it is crucial that IFD is agile and capable of spotting new trends – trends that will become important in the next few years. Successful trendspotting by IFD stimulates new breakthroughs and guide the 1,700 yearly applicants in the right direction. It also helps IFD maintain a balanced view of risks and potentials when making new and proactive investments.

Some of the major trends IFD has helped push to the top of the professional and public agenda in Denmark are Quantum Computing (2016), Industry 4.0 (2016), Automated Workforce (2017), Personalised Medicine (2017), Cyber Security (2018) and Gender Balance (2018). All trend analyses are based on six to nine months of preparation, where data is collected and systematised. The concept has become so well esteemed that IFD has the benefit of conducting pro bono collaboration with companies like McKinsey, Deloitte and the Boston Consulting Group.

In addition, specific trends are highlighted in the investment strategies that are regularly updated and published by IFD.



InnoTalks

IFD has introduced and matured the successful concept InnoTalks. Each InnoTalk focusses on a relevant topic, which according to IFD will become of vital importance to the future development of Denmark. The starting point is new knowledge within research, technology and innovation. Often the subject is linked to trend reports presented at the InnoTalk. Each talk gathers high-level national and international speakers and a full house of approximately 300 attendants. The next talk will be on gender and diversity, and IFD is currently collaborating with McKinsey on conducting a gender and diversity analysis of Denmark.

The last three InnoTalks are outlined below:

Cyber Security (March 2018)
InnoTalk on the threats, opportunities and potentials of cyber security. Among the speakers was the world's most famous hacker Kevin Mitnick. In connection with the event, IFD published a report on the future market for Cyber Security. The report was a pro bono collaboration with Deloitte and the Alexandra Institute.

The Future Labour Market (April 2017)
InnoTalk on how technology changes our jobs and requires new skills. The speakers included Prime Minister Lars Løkke Rasmussen. In preparation for the InnoTalk, McKinsey presented a new report on the effect of ICT on the workforce, which fuelled intense debate in Denmark.

Winning the Industry 4.0 Race (December 2016)
InnoTalk on how new technologies – from collaborative robots to 3D printers – will play a crucial role in a new industrial paradigm. IFD presented a survey on +500 companies and interviews conducted as part of a pro bono collaboration with the Boston Consulting Group. The study gave new knowledge on how the technological development fosters changes in the business concepts of companies.

Awarding Research Talents and Role Models

IFD strives to promote research, innovation and growth in Denmark, among other things with a view to supporting excellent research and scientific breakthroughs that may contribute to solving main social challenges. Since 2017, IFD has awarded a series of prizes honouring and highlighting researchers who master the difficult art of creating excellent strategic research and translating it into concrete value of benefit to society. The prizes are:

Innovator Prize
The prize honours excellent researchers, inventors or teams who through new knowledge and groundbreaking research have developed innovative products, processes, services or market breakthroughs, which have led to concrete and confirmed value for one or more companies based in Denmark.

Grand Solutions Prize
The prize honours an ongoing or completed successful Grand Solutions project. The projects and winners have distinguished themselves through extraordinary value creation, thus acting as role models for future research collaborations. The prize comes with additional research funding.

Industrial Researcher Prize
The prize honours industrial PhDs or postdocs affiliated to the IFD Talent programme. The winners have managed to combine great research insight with a strong business understanding and to generate commercial value for companies in Denmark.

Industrial Research Award winners, February 2018

2018, was the second time IFD awarded these prizes to talented researchers. At the event focus was on the individual researchers and projects. All prize-winners thus enjoyed extensive media coverage. Especially the winner of the annual Grand Solutions Prize – a project on climate-friendly cows – was mentioned in both newspapers, online media and TV.

8. Financing[4]

Investment Budget

IFD' investment budget is granted under the Danish Finance Act. The budget consists of two major allocations: a basic grant and a grant from the so-called Research Reserve (RR). In addition, a number of smaller allocations, varying from year to year, together make up the total IFD investment budget.

The IFD investment budget is distributed on two main accounts: 1) Strategic and Challenge-Driven Research and 2) Technology Development and Innovation. The total IFD investment budget in the period 2014-2018 is listed in Table 6 below.

Table 6: IFD investment budget 2014-2018

	2014	2015	2016	2017	2018
Strategic and Challenge-Driven Research					
Basic grant	511	456	241	357	337
Political agreement on distribution of the Research Reserve pool	215	350	323	178	355
Additional political agreements	123	8			
Technology Development and Innovation					
Basic grant	729	753	654	683	665
SUM	**1.577**	**1.567**	**1.218**	**1.218**	**1.356**

IFD's total funds in 2014-2018 decreased from DKK 1.6 billion in 2014 to around DKK 1.4 billion in 2018. However, from 2017 to 2018 the total funds increased by almost DKK 140 million, as evident from Table 6. The increase in 2018 is the result of a larger RR allocation.

The budget decrease in 2014-2017 is primarily driven by a decrease in the Strategic and Challenge-Driven Research budget.

[4] All amounts at current prices

Strategic and Challenge-Driven Research

The investment budget for Strategic and Challenge-Driven Research is further sub-divided in a number of thematic areas. Certain thematic areas, e.g. Strategic Growth Technologies, Bioresources and Environment and Energy are re-occurring, while others are only prioritised a single year. This sub-distribution of the Strategic and Challenge-Driven Research budget is outlined in Table 7 below.

Table 7: Basic grant budget for Strategic and Challenge-Driven Research 2014-2018 – sub-division in thematic areas

	2014	2015	2016	2017	2018
Basic grant total	*510.9*	*456.3*	*240.8*	*356.9*	*336.5*
Strategic Growth Technologies	84.3	83.2	39.3		
Environment and Energy	104.5	101.5	68.4	103.3	96.1
Food, Health and Lifestyle	100.9	97.6	69.0		
Clinical Research	63.6	63.7	64.1	64.1	64.1
Future Energy Technologies and Systems	157.6	110.3	-		
Technological Opportunities				85.4	79.5
Bioresources				104.1	96.8

The other part of the Strategic and Challenge-Driven Research budget comes from the political settlement on the annual RR and other political agreements. Typically, these budget allocations are sub-divided in thematic areas as illustrated in Table 8 below.

Table 8: Grants from the Research Reserve and other political agreements allocated to Strategic and Challenge-Driven Research 2014-2018

	2014	2015	2016	2017	2018
Finance Act for 2012 – total allocation	*8.2*	*8.3*			
Peace and Conflict Research	8.2	8.3			
Reform of Early Retirement Pension etc. – total allocation	*114.3*				
Bioresources, Food and Other Biological Products	114.3				
Research Reserve allocation 2014	*214.7*	*-*	*-*	*-*	
Organic Food Production	29.5				
Health, Quality of Life and Clinical Research	59.1				
Environment and Water Etc.	64.0				
Strategic Growth Technologies	35.5				
Transport and Logistics	26.6				
Research Reserve allocation 2015		*349.6*	*29.5*	*-*	
Bioresources, Food and Other Biological Products		103.4			
Organic Food Production		24.6			
Healthy, Psychiatry and Clinical Research		64.0	29.5		
Competitive Environmental Technology Supporting Green Transition		39.4			
Production Systems and Strategic Growth Technologies		39.4			
Transport and Infrastructure		39.4			
Future Welfare		39.4			
Research Reserve allocation 2016			*293.4*		
Food			158.5		
Health and Clinical Research			14.8		
Competitive Environmental Technology			24.6		
Strategic Growth Technologies			51.2		
Transport and Infrastructure			19.7		
Space Research			14.8		
Tourism			9.8		
Research Reserve allocation 2017				*178.2*	
Bioresources, Food and Environmental Technology				69.9	
Welfare, Health and Education				39.4	
Strategic Growth Technologies				44.3	
Space and Drone Technologies				24.6	
Research Reserve allocation 2018					*354.6*
Green Growth					88.7
Better Health					108.4[1]
New Technological Opportunities					157.5

The total budget for Strategic and Challenge-Driven Research is invested via the Grand Solutions and Industrial Researcher programmes and international collaborations. The concrete calls thus vary from year to year as a result of the changing political priorities.

Technology Development and Innovation
The IFD total investment budget also includes grants from the Technology Development and Innovation account. This grant is not subject to the same level of thematic sub-divisions as seen in the Strategic and Challenge-Driven Research account. The grant allocated for the Technology Development and Innovation account is outlined in Table 9 below.

Table 9: Grant for Technology Development and Innovation 2014-2018

	2014	2015	2016	2017	2018
Basic grant total	728.6	753.1	654.0	683.3	664.8
Strengthened Innovation Efforts in SMVs		78.1		28.0	28.0
Industrial Researcher in Greenland and the Faroe Islands			1.7	1.7	
Industrial Researcher on Dementia					2.2
Innovation Pilot for Rural Districts				10.0	10.0

International Co-Financing
A number of the international programmes in which IFD participates include co-financing. In 2017, IFD thus received DKK 84.3 million in co-financing corresponding to 33 per cent of the total investment made in international collaborations, cf. table 10 below.

Table 10: IFD's international programmes – Grants and co-financing 2017

		Commitment (DKKm)	Co-financing (DKKm)
Article 185	BONUS Blue Baltic	53.0	38.7
	EuroStars	98.3	24.6
JPI	HDHL	3.3	1.1
	AMR Cofund	9.8	1.7
ERA-NET	WaterWorks	14.1	6.0
	CoFund Electric Mobility	6.4	1.0
	QuantERA	7.7	0.8
	EUREKA-TURBO	14.4	
	FACCE - Era Gas Cofund	10.5	3.0
	Core Organic	11.2	1.5
	ERA4CS-JPI Climate	13.4	6.0
	Bilateral collaboration between Denmark and Brazil	10.4	-
	TOTAL	**252.5**	**84.3**

Implementation of IFD Investment Budget
After approval of the Finance Act in Parliament, IFD receives a grant letter from the Danish Agency for Institutions and Educational Grants (SIU), which defines the framework for implementation.

IFD defines an investment budget for the year, and IFD's Board of Directors and Management monitor the implementation on an ongoing basis.

The IFD investment budget forms a basis for the creation of the budget in IFD's electronic investment administration system, GO-T. This system links the individual Finance Act accounts over thematic sub-divisions down to calls and individual applications and projects.

Internal management of the investments is handled directly in GO-T. External input on the other hand, e.g., assessments, inputs from the IFD Board of Directors etc. is handled via the e-grant portal – the external user interface with GO-T.

Once an investment decision is made, a separate electronic case is created for each single investment. All subsequent administration, including approval of financial statements, progress reports etc., is processed via the investment cases in GO-T. Furthermore, IFD projects report their results, submit reports and make enquiries regarding changes etc. via the e-grant portal directly into their specific case.

IFD continuously strives to adjust and streamline its administrative processes, including improvement of application conditions, simple and transparent processing of applications, and targeted and result-oriented investment administration.

IFD's follow-up on results of ongoing projects now includes ongoing portfolio reviews and annual investment reviews for selected projects

Budget for Investment-Related Activities
From the total investment budget, IFD can allocate funds to support selected activities and projects. These selected activities include costs for panels, peers, SEs, certain communication activities, educational activities and prizes. Budget allocation for 2015-2017 is outlined in Table 11 below.

Table 11: Expenses for investment-related activities 2015-2017 (DKKm)

	2015	2016	2017
Total expenditure	**23.3**	**16.8**	**26.4**
Programme-related expenses (panels, peers, SEs, communication activities, system support etc.)	13.1	10.1	17.1
Board	1.2	1.3	1.5
Educational activities (Making Innovation Happen)	7.6	5.2	7.9
Other	1.3	0.2	-0.2

IFD is expecting to spend around DKK 35.5 million in 2018. This increase is primarily driven by evaluation activities and increased costs of system support.

Co-financing
With regard to IFD's three largest programmes, Grand Solutions, Industrial Researcher and InnoBooster, IFD investments generate significant co-financing from private companies.

Grand Solutions generates a co-financing of DKK 70 for each DKK 100 invested by IFD

InnoBooster generates a private co-financing of DKK 200 for each DKK 100 invested by IFD

Innovation Fund Denmark Operating Budget

The Finance Act also allocates a budget for IFD operations. The Finance Act forms the basis of a grant letter from SIU to IFD, which outlines the framework for the budget. Based on the grant letter, IFD draws up a budget for IFD operations for the coming year. The IFD Board of Directors and the Minister for Higher Education and Science formally approve the budget. Table 12 below outlines the annual IFD operating budget and expenditure for 2014-2018.

Table 12: IFD operating budget and expenditure (DKKm)

	2014	2015	2016	2017	2018
Budget	31.1	37.5	36.5	40.7	42.9
Expenditure	30.9	40.5	36.9	38.9	-

Current prices.

As of 2017, DKK 4.0 million have been added to the IFD operating budget to further strengthen the regional development. Table 13 below outlines the IFD operating budget for 2018. DKK 2.0 million of the total budget of DKK 44.8 million represent savings from previous years.

Table 13: IFD operating budget 2018

	2018
Total budget	44,800,000
Salaries etc.	34,456,966
Rent etc.	2,650,000
Internal services	3,320,000
Other operating costs	4,373,034

The majority of the budget is allocated to employee costs, e.g. salaries, pension schemes etc. The current full-time equivalents are evident from Table 14 below.

Table 14: Innovation Fund Denmark full-time equivalents (FTE)

Departments	FTE incl. student workers	FTE excl. student workers
Management	4.0	4.0
Finance and Administration	8.2	7.8
Communisation	4.0	4.0
Grand Solutions	16.4	16.0
InnoBooster, Talent and Legal	10.1	8.9
Regional staff	4.0	4.0
TOTAL	**47**	**45**

IFD optimises its overall investment administration, including work procedures, system support, data and follow-up and the administrative setup acting as a framework for investment administration on an ongoing basis.

Today, SIU undertakes a significant part of IFD's investment administration, which means that IFD spends a considerable amount of administrative resources on coordinating processes and concrete tasks with SIU. With the aim also of taking over all administrative tasks, IFD is conducting an IT implementation project in 2017-2018, which from 2019 will result in:

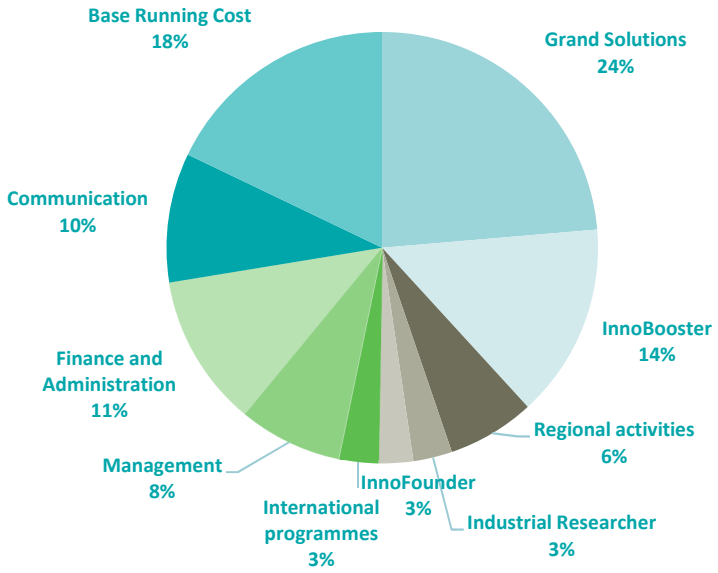
- Full support of project budget and accounting processes
- Improved support of the administration of application processing
- Development of communication module supporting all communication between IFD and projects

What Are the Costs of Running the IFD Programmes?

The budget for IFD operations in 2018 is DKK 44.8 million.

The distribution of the budgeted expenses for 2018 is outlines in Figure 14 below.

Figure 13 Organisational budget distribution 2018



The total cost of operating IFD includes the operating budget and the budget for investment related activities. Altogether, this amounts to approximately DKK 80 million, corresponding to close to 6 per cent of the investment budget.

Strengths, Weaknesses and Opportunities for the Future

IFD has in the last four years worked hard on digitising the administrative routines and processes. By first half of 2019 this will be fully implemented. However, the hunt for new optimisations will not end but continue in the years to come.

IFD has identified a number of weaknesses that needs clarification and asked SIU to clarify the framework for investment-related activities. Currently, it is unclear if activities related to knowledge and skill development activities for projects etc. can be part of this budget. A clarification is expected with the Finance Act for 2019.

IFD's international activities are currently at an unprecedented high level with a major commitment within both Horizon2020, bilateral collaborating countries and EUREKA. It typically takes 1-3 years before new initiatives are translated into concrete strategies and calls. During this period, it is vital that Danish interests are represented. This requires a significant effort; an effort which was previously funded by the EU Commission under FP7, but not under Horizon2020. Therefore, funding of these international activities has not been part of the budget since 2014 and it is not clear whether IFD can use investment-related funds to cover expenses connected with such activities. IFD expects this to be clarified in 2018.

IFD recognises a great need to engage external stakeholders with a view to promoting Danish interests and achieving greater success and impact in international collaborations

9. Conclusion and future perspectives

Research and innovation change the world and our everyday lives. IFD invests in the development of Denmark through the minds of the country's best researchers, entrepreneurs and companies. IFD invests in better health, in a greener society and better welfare and in a more competitive economy.

By bridging research and society, IFD is here to make a difference for Denmark

The report has gone through the background and legal framework of IFD and has described strategic activities from 2014-2018 and, in so doing, outlined where IFD stands today in relation to fulfilling the legal and strategic framework and objectives. The last four years, IFD has worked its way from the merger of three main funding organisations with 14 programmes, administration focus and a culture of officials to a setup with three entries, a more efficient and smoother organisation with a scientifically founded staff focussing on the applicants – researchers, entrepreneurs and companies. We are easy to reach and happy to guide applicants through the framework and assessment procedures, and applicants' commitment is high and their projects of great benefit to Denmark.

It has been quite a journey – with a few challenges and adjustments on the way – but IFD has come a long way. IFD is today a well-known brand, and especially the larger funding instruments Grand Solutions and InnoBooster are well known by researchers and companies all over the country.

IFD has become a strong and well-known brand throughout Denmark

Today, the employees handle seven national and international instruments and programmes. They process more than 3,000 applications yearly for IFD's own funding instruments and several hundred more for international programmes and those of other Ministries, besides a number of other activities in IFD. Investments are followed closely from start to end, and each year hundreds of projects are documented in IFD's own media channels or independent Danish media.

Game Changers – Moving and Extended Mandate
The process has seen two game changers, which will continue to affect IFD throughout 2018 and 2019: the relocation process and the extended business promotion mandate.

Relocation process: Since February 2018, IFD has worked on a relocation plan for a new headquarter in Aarhus and extensions of IFD's regional model.

From 1 June 2019, IFD will be head quartered in Aarhus, and by September 2019, IFD will have all staff functions in place

For now, IFD operates with a plan of temporary double staffing of crucial functions for part of the transition period. This is to ensure that IFD reaches the key performance indicators of the relocation process, which include maintaining quality, staff commitment and deadlines.

The new professionalised organisation with clearer governance is a huge strength for IFD, as it allows having both an interdisciplinary perspective and be very agile and efficient in the assessment processes. It will be a challenge to maintain this during the relocation process and the development of a more decentralised structure headquartered in Aarhus and with affiliates in Copenhagen, Odense and Aalborg. Therefore, IFD is currently exploring ways of supporting the new organisation through more digitisation and more mobile Management and employees. Again, once the transition has been completed, it will be a great strength for IFD to be represented throughout Denmark and situated close to the different research environments and Danish hubs of strength. IFD will truly be a nationwide fund.

Extended mandate: The new reform of the Business Promotion System will result in a smoother system with only two levels instead of previous three. It will extend the mandate of IFD. The agenda for the rest of 2018 will include exploring ways of dealing with the new tasks, as the reform must be implemented by start 2019. IFD awaits the final framework from the Ministry. To accommodate a system in transition IFDhas together with the Danish Growth Fund coordinated a temporary initiative.

IFD and the Danish Growth Fund are now working on a common entrance for companies that would previously have contacted the state venture funds

As soon as IFD receives more information about the new framework, it will initiate planning and implementation of the new task from 2019.

Thorough and valid impact assessments are still required to determine IFD's impact on society. Still, IFD's portfolio contains great examples of projects and companies that create growth and contribute to solutions or directly solve societal challenges. Through IFD's funding instruments and criteria for investments, projects become increasingly qualified to create value for the partner companies and society as a whole. Furthermore, the aim of IFD is to ensure that the demand for international benchmarking and excellence leads to even better research in Denmark and more sustainable and growing companies.

IFD's current programmes cover tasks and strategic objectives and address important needs in society – both during periods characterised by a booming economy such as the present, where the need for strategic long-term views is important, and during recessions, where the priorities is on creating jobs and growth short term.

To adapt to socio-economic fluctuations, it is of vital importance to Denmark that IFD, also in the future, can act as independently and agile as possible when it comes to the frames and structures of funding instruments and investment areas

In conclusion, the report finds that the Board, Management and organisation of IFD these past four years have fully lived up to the IFD values - demonstrated great curiosity, bravery and responsibility towards the defined tasks. Despite regular major external changes, IFD has managed to develop a professional, streamlined and efficient organisation and structure for the main purpose of creating value for Denmark. IFD's processes are well defined and followed up by great accountability regarding impartiality, deadlines etc. Bringing research and society together is the core of IFD's strategy and it is the ambition that this transition will be acknowledged in the future development of the Danish research and innovation system.

IFD looks forward to the next chapter and to continuing its journey of investing in researchers, entrepreneurs and companies that support and propel development and growth in Denmark.

Appendix A

List of references for the self-evaluation of Innovation Fund Denmark

The following list is a compilation of selected reports, documents and presentations by, or relating to, Innovation Fund Denmark that the Expert Panel might want to consider including in their assessment of Innovation Fund Denmark.

The list includes publications in both English and Danish.

At the request of the Expert Panel, publications in Danish could be translated by external translators under the approval of the Danish Agency for Institutions and Educational Grants.

Each reference will include the original title, a translation of the title in parenthesis, the year of the publication and a link to the publication if available. Below each reference is a short description of the content.

UK References

Innovation Fund Denmark – 2015 strategy
2015.
Publication of IFD's strategy as formulated early 2015, following the establishment of IFD in 2014.

Booklet: A presentation of Innovation Fund Denmark
2017
The profile and value propositions of IFD.

The users' experience of Innovation Fund Denmark
2018. [Attached to the Self-evaluation of IFD for the Expert Panel]
Evaluation report by IRIS GROUP of the users experience with the Grand Solutions, Industrial Researcher and InnoFounder – made to be comparable with the evaluation of InnoBooster also by IRIS GROUP.

Impacts of Grand Solutions 2015 projects on research and innovation
2018. [Attached to the Self-evaluation of IFD for the Expert Panel]
Evaluation report showing the preliminary research and innovation results made by the 2015 Grand Solutions projects. The report also includes a more in depth look at some of the most promising projects, in terms of their expected results. Report made by IRIS GROUP.

Bridging Science and Technology through Academic-Industry Partnerships
2014
Working paper on the effects of the Danish National Advanced Technology Foundation (DNATF), an older but similar programme to IFD's Grand Solutions programme.
By: Sen Chai & Willy Shih, Harvard Business School (2014), Bridging Science and Technology through Academic-Industry Partnerships. Harvard Business School Working Paper 13-058, July 22, 2014

European Innovation Scoreboard
2018
Annual score board by the European Commission ranking the European countries in relation to their relative attractiveness in terms of innovation. The 2018 edition names Denmark the 2nd most innovative country in the ranking.

The Global Competitiveness Report 2017-2018
2018
Annual publication the World Economic Forum on each nation's competitiveness including an innovation index (12th pillar) ranking Denmark 10th in the world.
Business School (2014), Bridging Science and Technology through Academic-Industry Partnerships. Harvard Business School Working Paper 13-058, July 22, 2014

DK/SE References

Vækst og Beskæftigelse gennem Innovationsfonden
2015 (Growth and employment through Innovation Fund Denmark).
Publication highlighting the need to strengthen growth and employment in Denmark, and how the initiatives and programmes of Innovations Fund Denmark aim to achieve this. By Innovation Fund Denmark.

Årsrapport 2017
2017 (Annual report) [available for 2014, 2015, 2016 and 2017].
Annual reports written by IFD outlining key performances for the given year, and summarising budgetary remarks.

Lov om Danmarks Innovationsfund
2014 (Act of Innovation Fund Denmark).
The legislation concerning Innovation Fund Denmark

Innovationsfondens internationale strategi
2017 (International strategy for Innovation Fund Denmark).
Strategy document outlining the Innovation Fund Denmark strategy for selecting and governing international programmes.

Effektmåling af Innovationsfondens projekter
2016 (Effect evaluation of the projects of Innovation Fund Denmark).
Publication outlining possible ways for IFD to measure impact and effects in the approved projects. The publication is written in general terms outlining how effects could be measured, but the publication itself, does not apply the methods outlined, in actual projects

Midtvejsevaluering af MADE
2017 (Midterm evaluation of MADE – manufacturing academy of Denmark).
Evaluation report of the results generated in the MADE project halfway through. An econometric assessment of the impact the already achieved results could generate if implemented technologies were expanded to similar companies in Denmark not participating in the project. Conducted by DAMVAD Analytics for Innovation Fund Denmark.

Danmark på verdenskortet
2017 Putting Denmark on the world map).
Folder made by IFD highlighting a broad range of Grand Solutions projects.

Brugernes oplevelse af InnoBooster
2017 (Users evaluation with InnoBooster).
Evaluation report by IRIS GROUP of the users experience with the InnoBooster programme, highlighting how the users perceive the application and project evaluation process, how relevant and flexible they find the programme, how the evaluate the administrative processes involved with running a project etc. Both grant approvals and rejections were included in the report.

Tal om Forskning og Innovation 2016
2016 (Research and Innovation in numbers).
Annual publication by the Ministry of Higher Education and Science regarding public spending on research and innovation through Danish research and innovations systems. Covers other funding agencies as well as Innovation Fund Denmark.

Analyse af effekten af den eksisterende forskningsindsats
2018 (Analysis of the effects of the existing research initiatives).
The publication reviews existing literature from Danish settings on effects of R&D spending. The complete publications can be found here

Viden til Vækst 2018 – Offentlig-Privat samspil om forskning
2018 (Knowledge to growth 2018 – Public-Private interaction on spending in research)
Annual publication by the Ministry of Higher Education and Science regarding public-private interaction on spending in research. Covers other funding agencies as well as Innovation Fund Denmark.

Tillväxtanalyse – International scanning of research programmes that focus on societal changes
2018 (Growth analysis - International scanning of research programmes that focus on societal changes) [Swedish publication].
Publication by the Swedish government looking at national research programmes focusing on major societal challenges. The present study describes and analyses the process and experience of working with national research programmes in selected countries, among them the IFD programme, Grand Solutions.

Appendix B

Additional data on each of the programmes.

Grand Solutions

Figure 1.1.: Number of applications and approvals, with success rates in parenthesis. 2015-2017 – Grand Solutions.

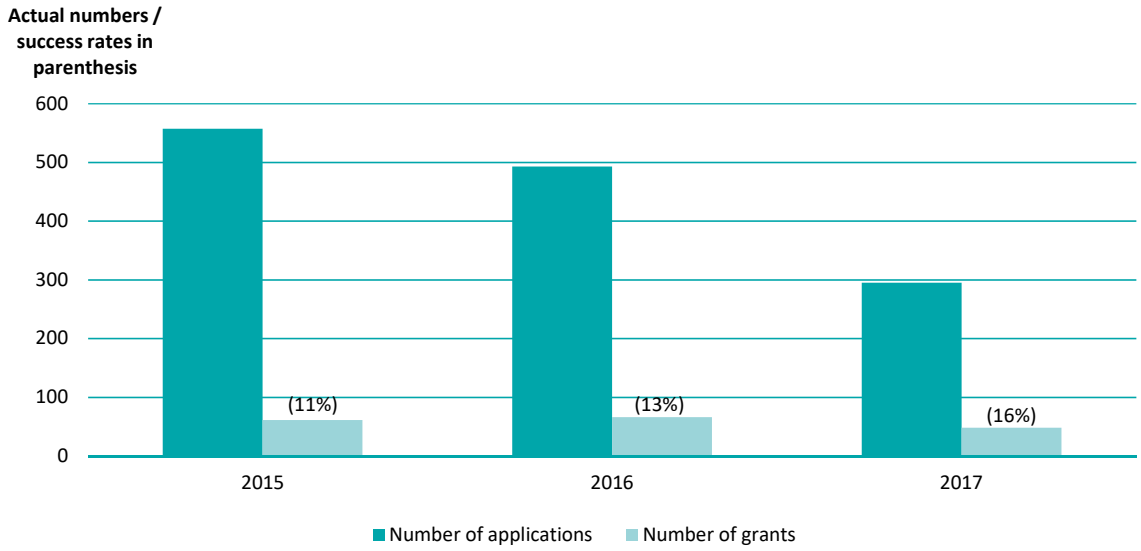


Figure 1.2.: Investment applied for and investment granted in DKKm. 2015-2017 – Grand Solutions.

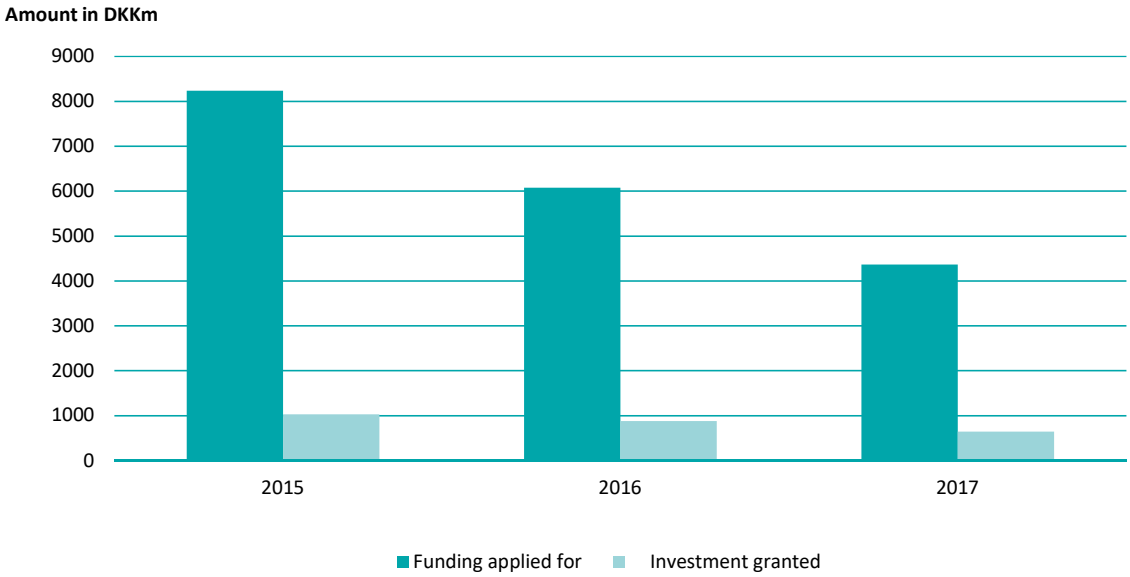


Figure 1.3.: Number of approved projects within each of IFD's sector areas. 2015-2017 – Grand Solutions.

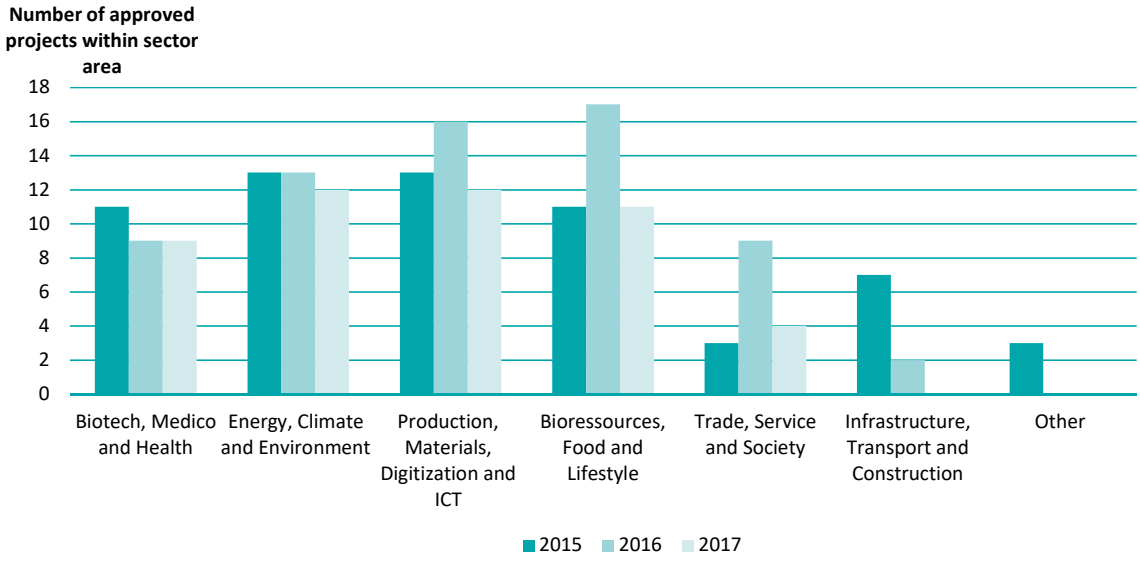
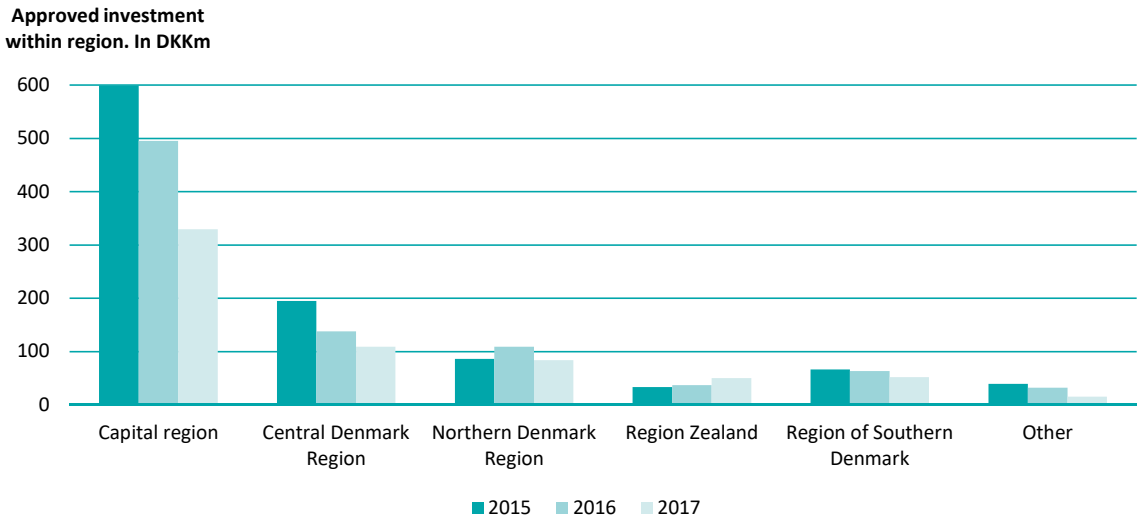


Figure 1.4.: Approved investments within each region of Denmark in DKKm. 2015-2017 – Grand Solutions.



InnoBooster

Figure 2.1.: Number of applications and approvals, with success rates in parenthesis. 2015-2017 – InnoBooster.

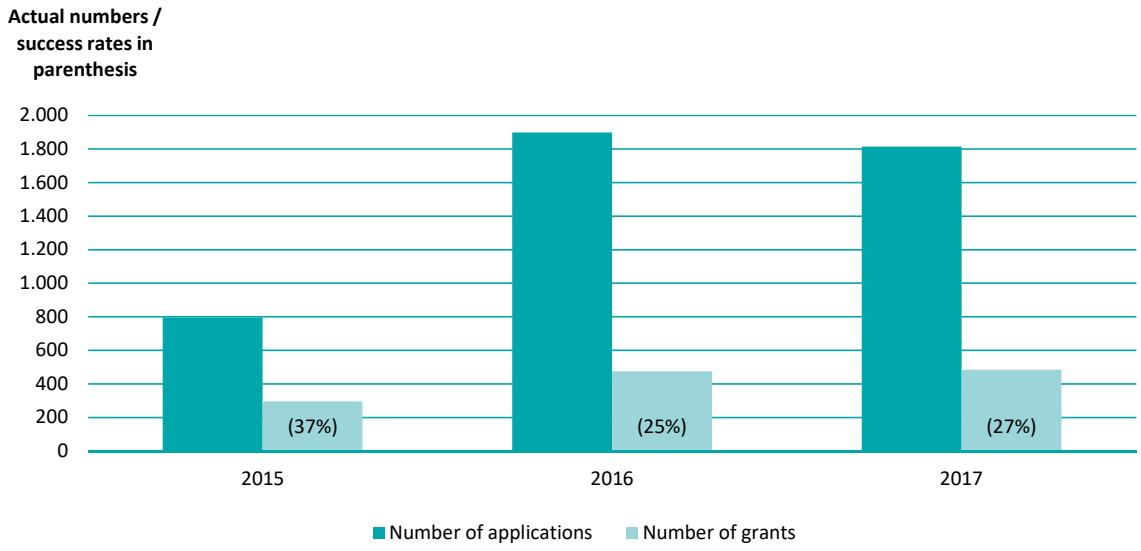


Figure 2.2.: Investments applied for and investment granted in mill. DKK. 2015-2017 – InnoBooster.

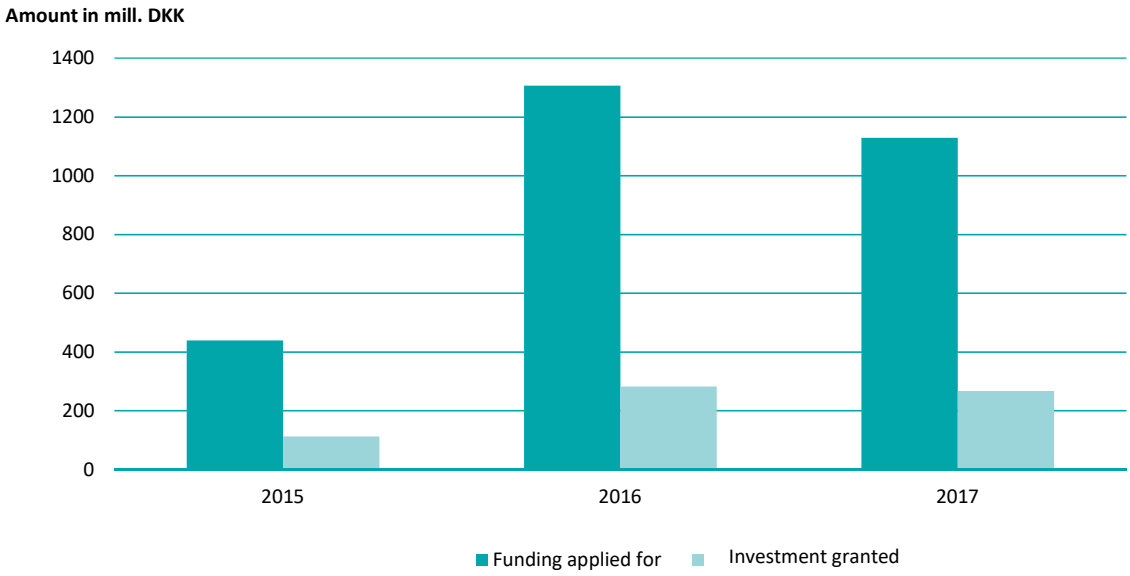


Figure 2.3.: Number of approved projects within each of IFD's sector areas. 2015-2017 – InnoBooster.

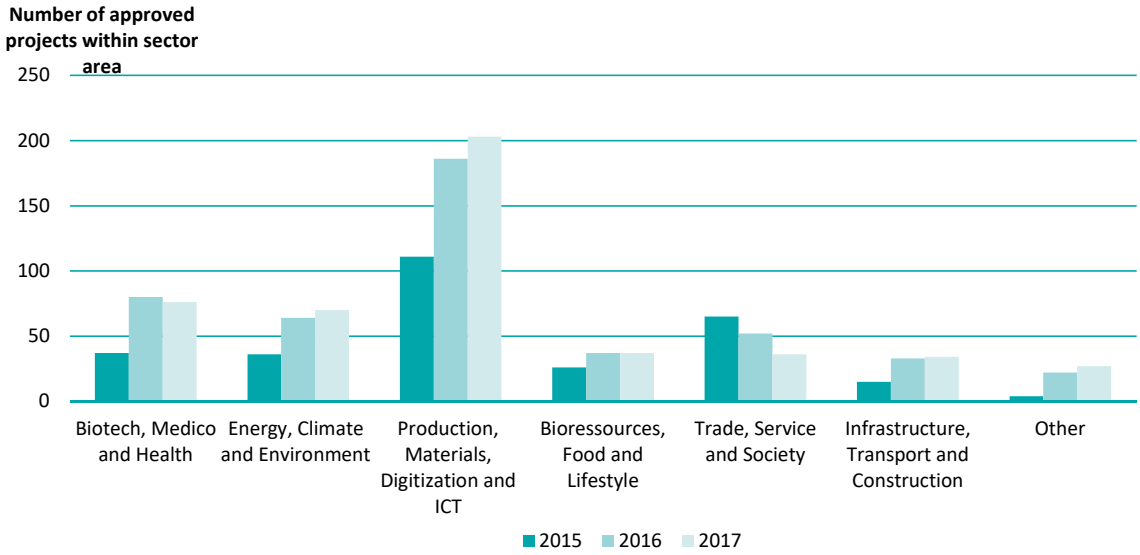
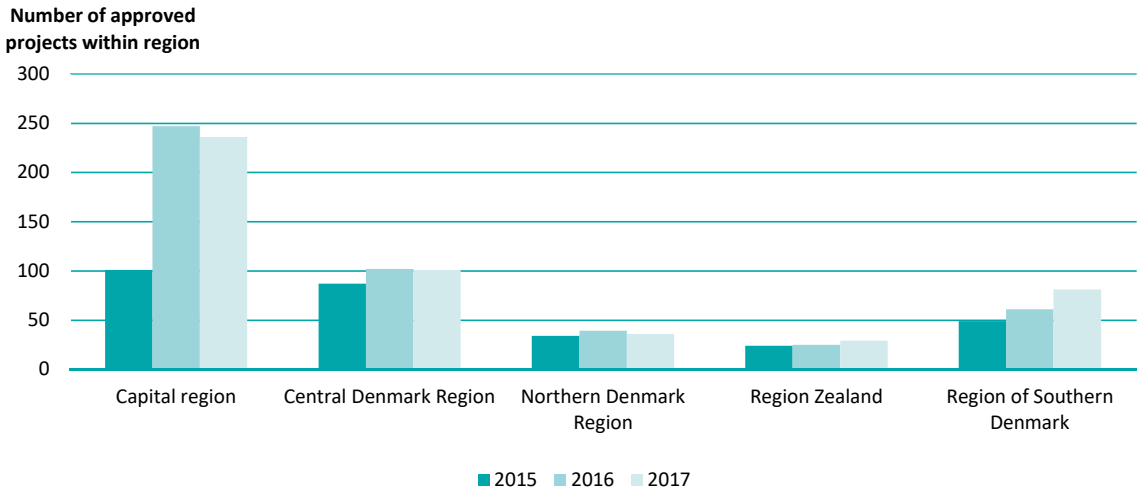
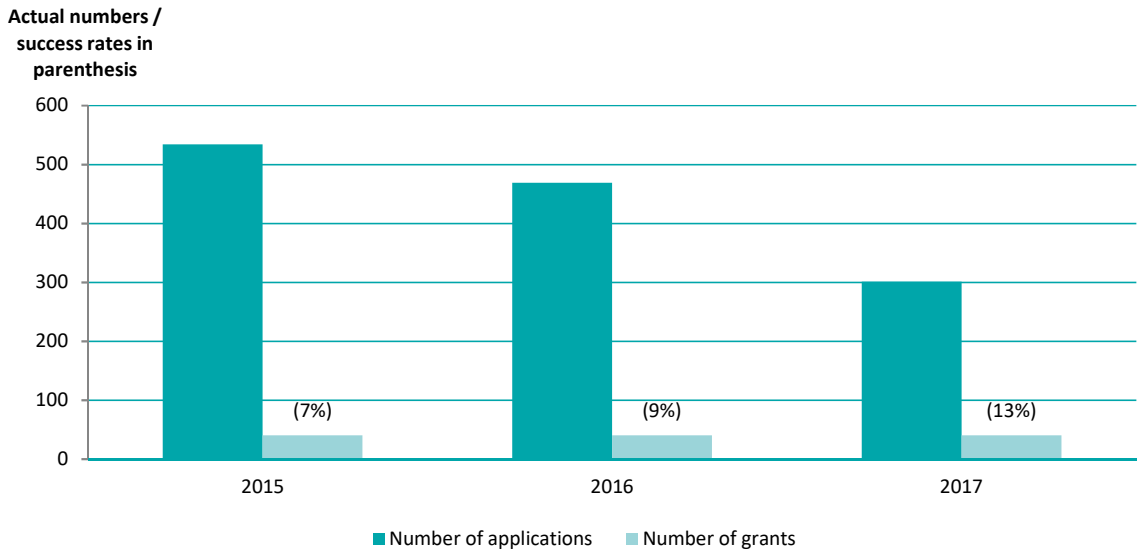


Figure 2.4.: Approved projects within each region of Denmark. 2015-2017 – InnoBooster.



InnoFounder

Figure 3.1.: Number of applications and approvals, with success rates in parenthesis. 2015-2017 – InnoFounder.



Note: In the Innofounder programme IFD distinguishes between projects and investments, due to the way the programme is set up. Each InnoFounder project can have up to three participants, and each of these receive an investment from IFD. This figure shows number of investments.

Figure 3.2.: Investments applied for and investment granted in DKKm. 2015-2017 – InnoFounder.

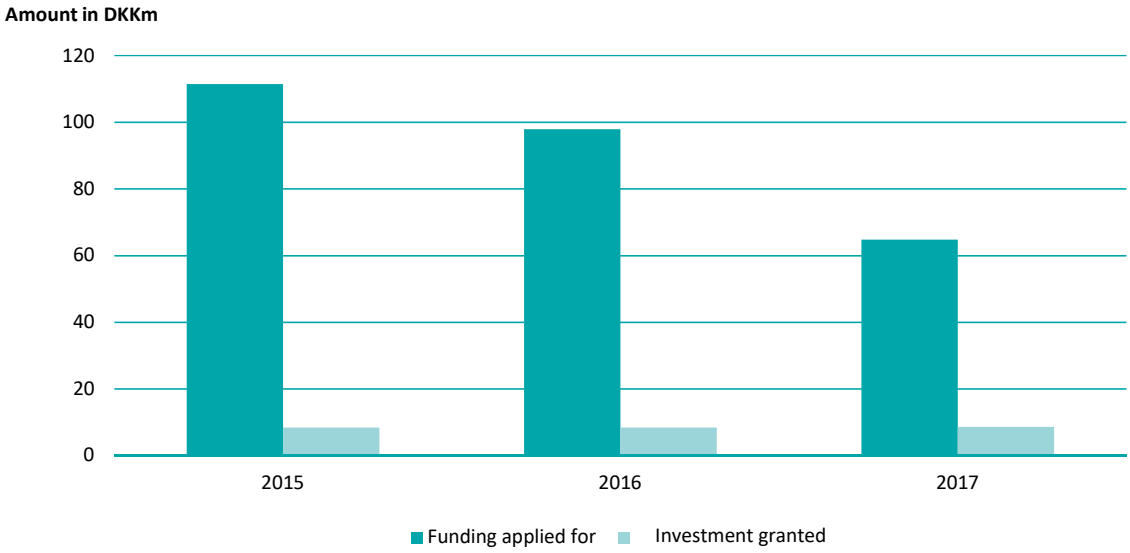
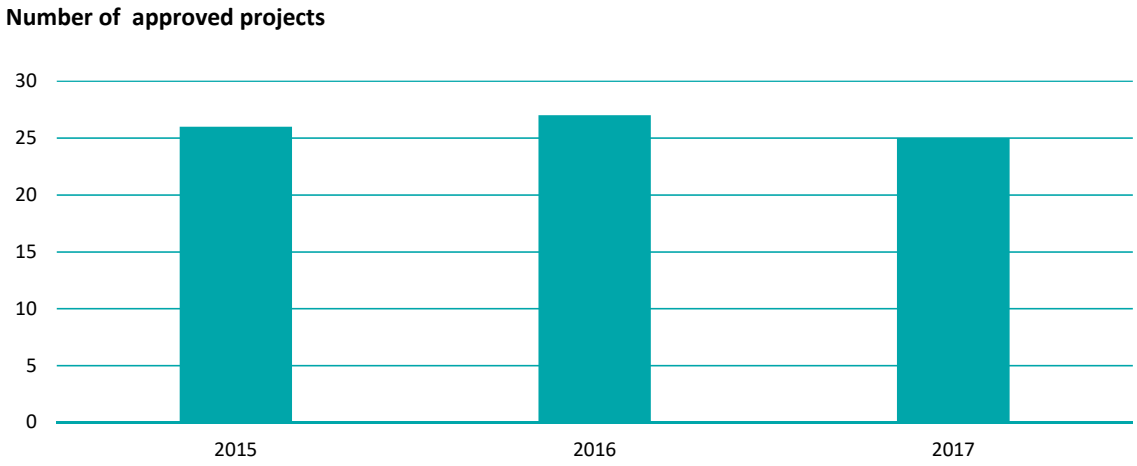
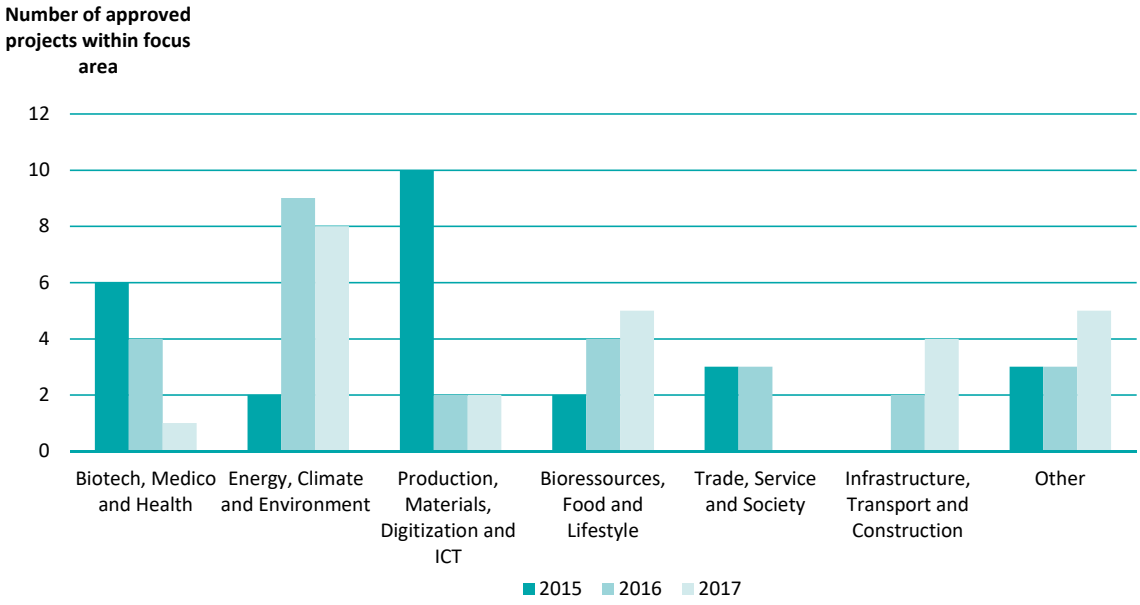


Figure 3.2b.: Number of approved projects. 2015-2017 – InnoFounder.



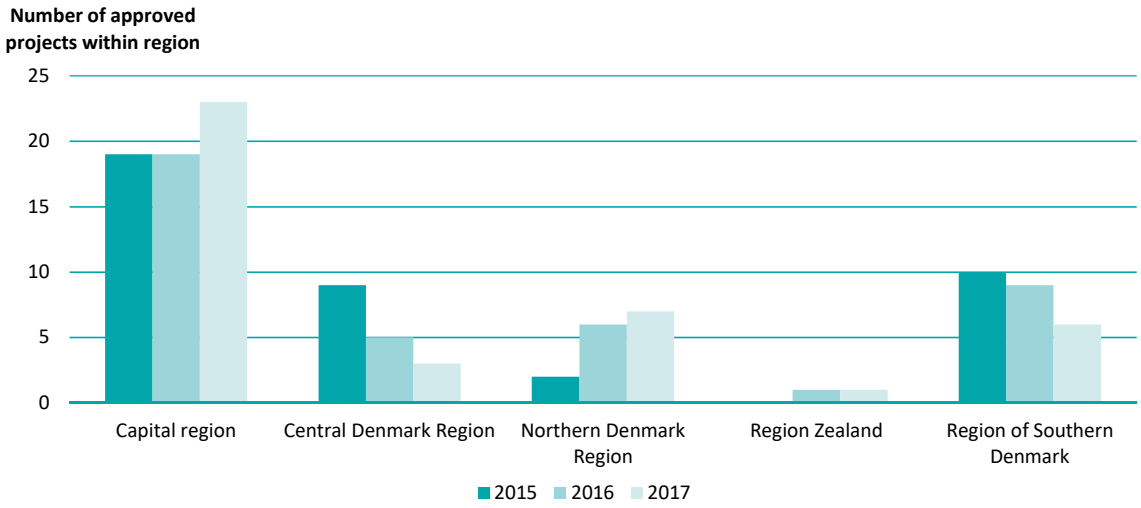
Note: In the Innofounder programme IFD distinguishes between projects and grant, due to the way the programme is set up. Each InnoFounder project can have up to three participants, and each of these receive a grant from IFD. A project can however also have just one Innofounder. This figure shows number of projects.

Figure 3.3.: Number of approved projects within each of IFD's sector areas. 2015-2017 – InnoFounder.



Note: This figure shows number of InnoFounder projects.

Figure 3.4.: Approved projects within each region of Denmark. 2015-2017 – InnoFounder



Industrial Researcher

Figure 4.1.: Number of applications and approvals, with success rates in parenthesis. 2015-2017 – Industrial Researcher.

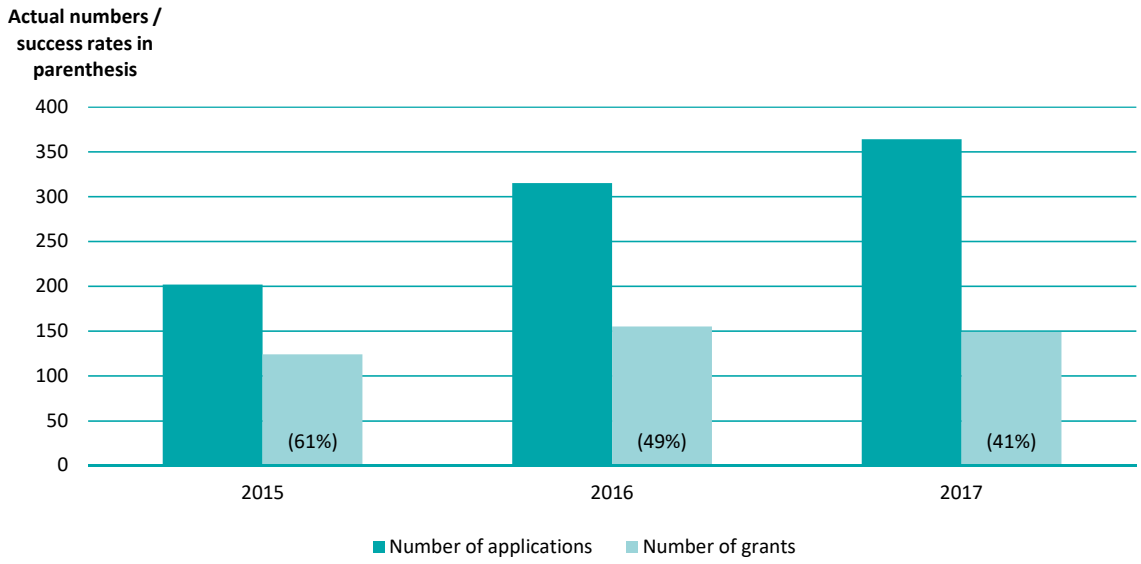


Figure 4.2.: Investments applied for and investment granted in DKKm. 2015-2017 – Industrial Researcher.

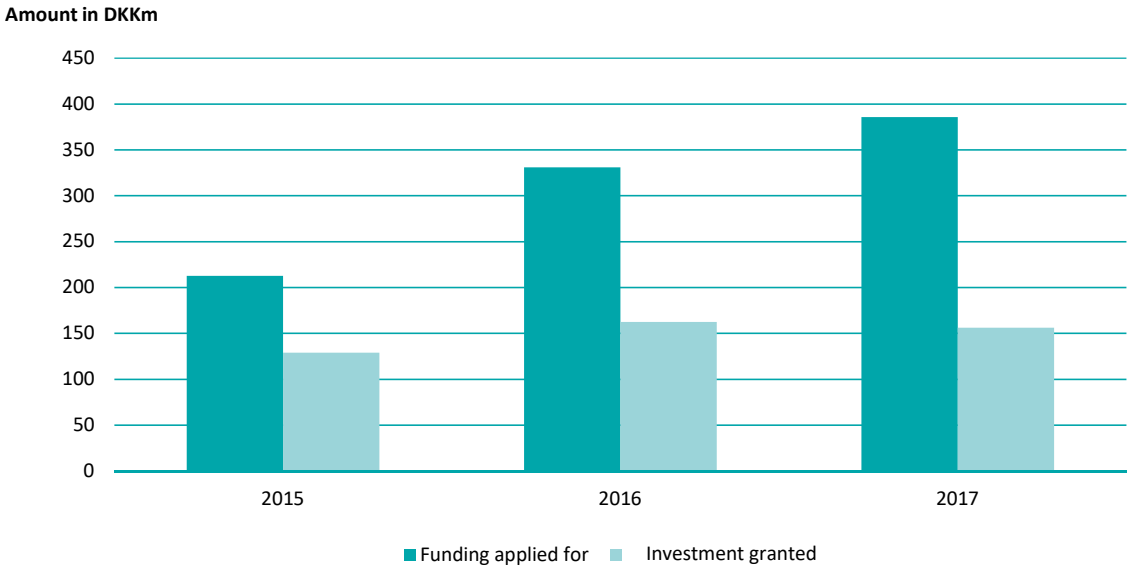


Figure 4.3.: Number of approved projects within each of IFD's sector areas. 2015-2017 – Industrial Researcher.

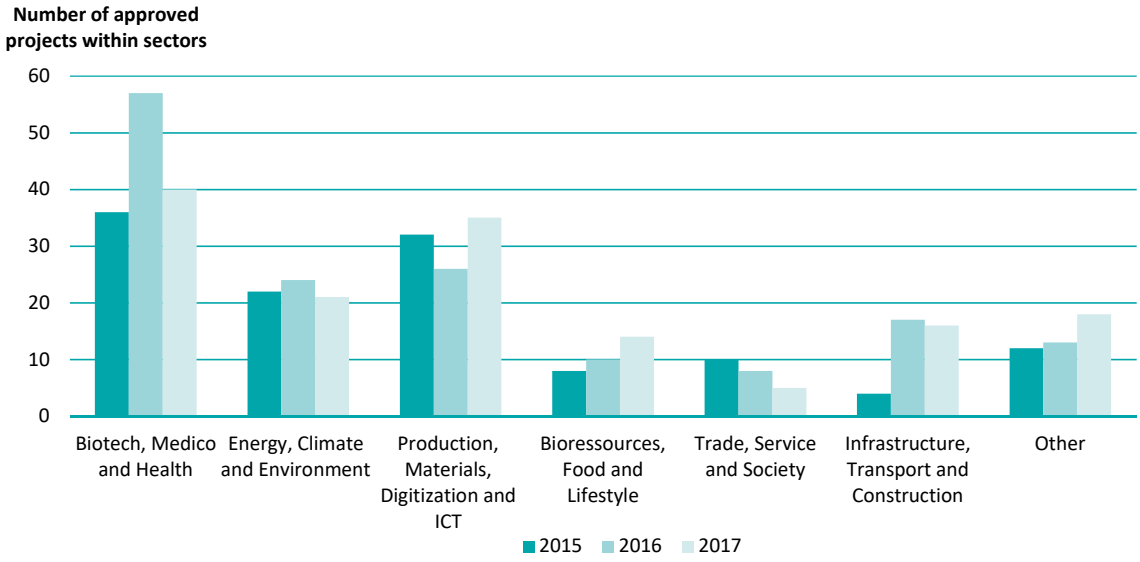
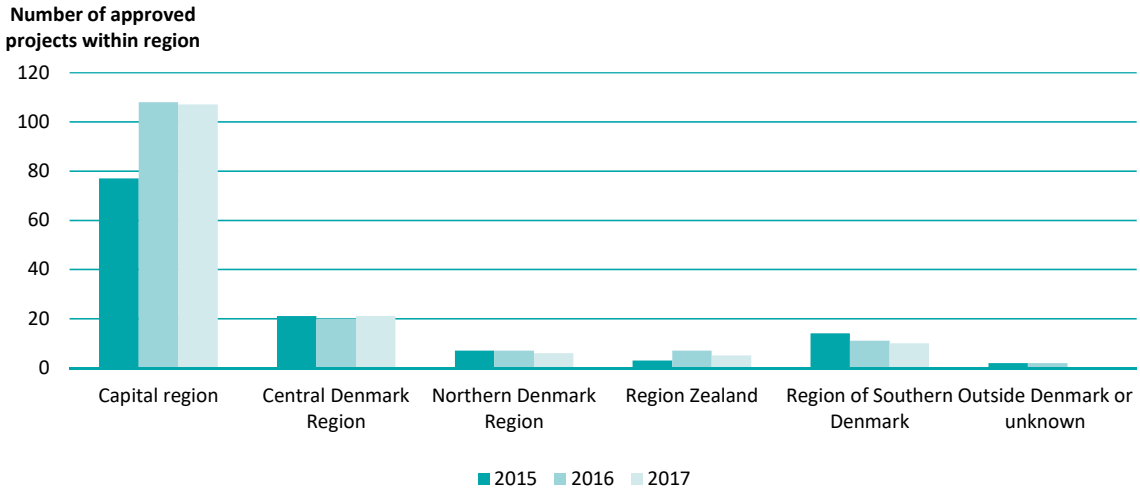
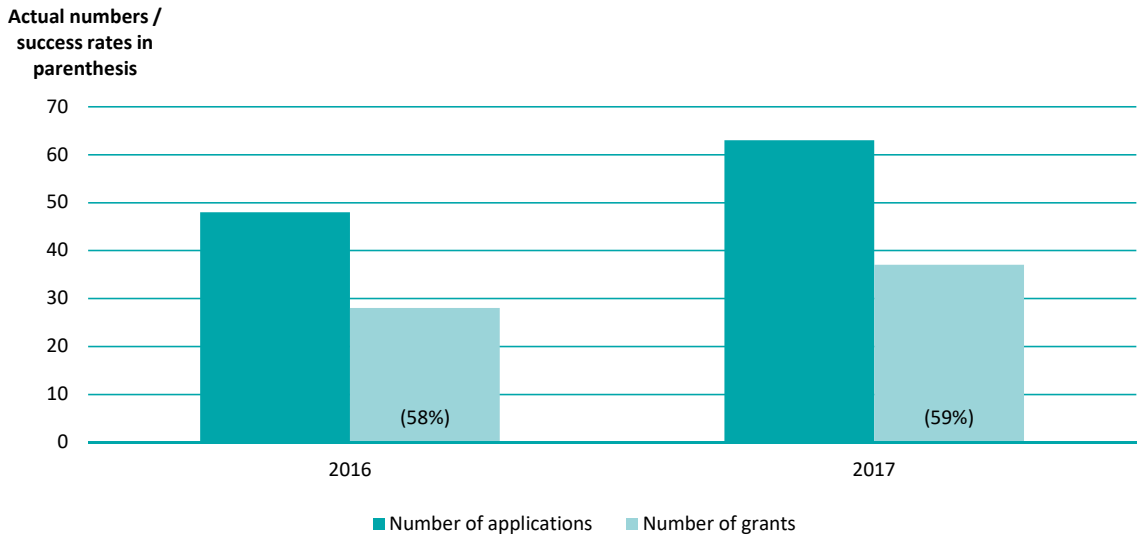


Figure 4.4.: Approved projects within each region of Denmark. 2015-2017 – Industrial Researcher.



Innovation Pilot in Rural Districts (IPRD)

Figure 5.1.: Number of applications and approvals, with success rates in parenthesis. 2016-2017 – IPRD.



Note: The IPRD programme started operating in 2016.

Figure 5.2.: Investments applied for and investment granted in DKKm. 2016-2017 – IPRD.

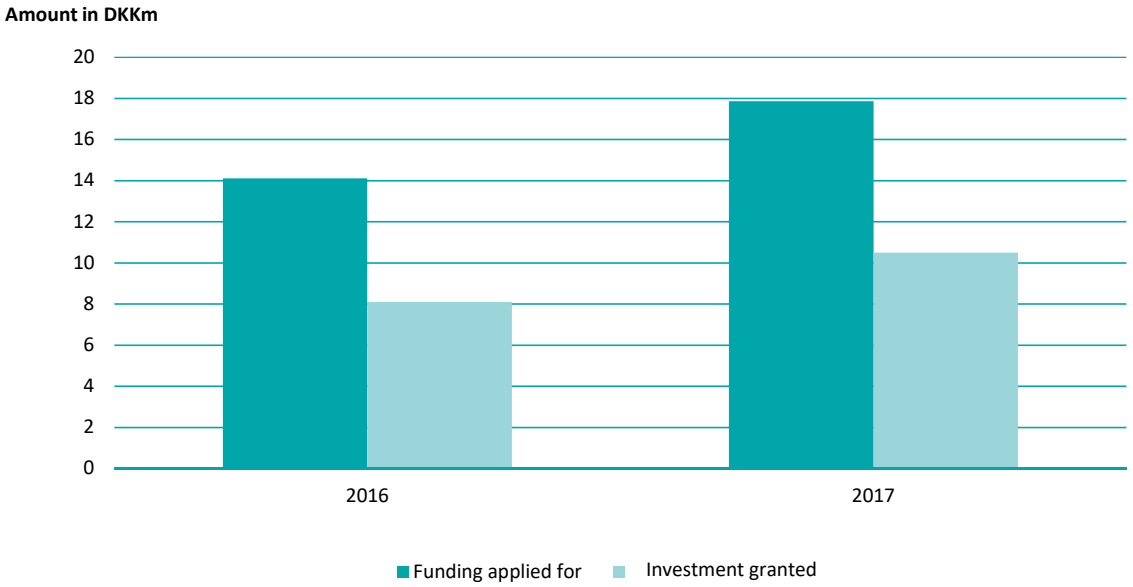


Figure 5.3.: Number of approved projects within each of IFD's sector areas. 2016-2017 – IPRD.

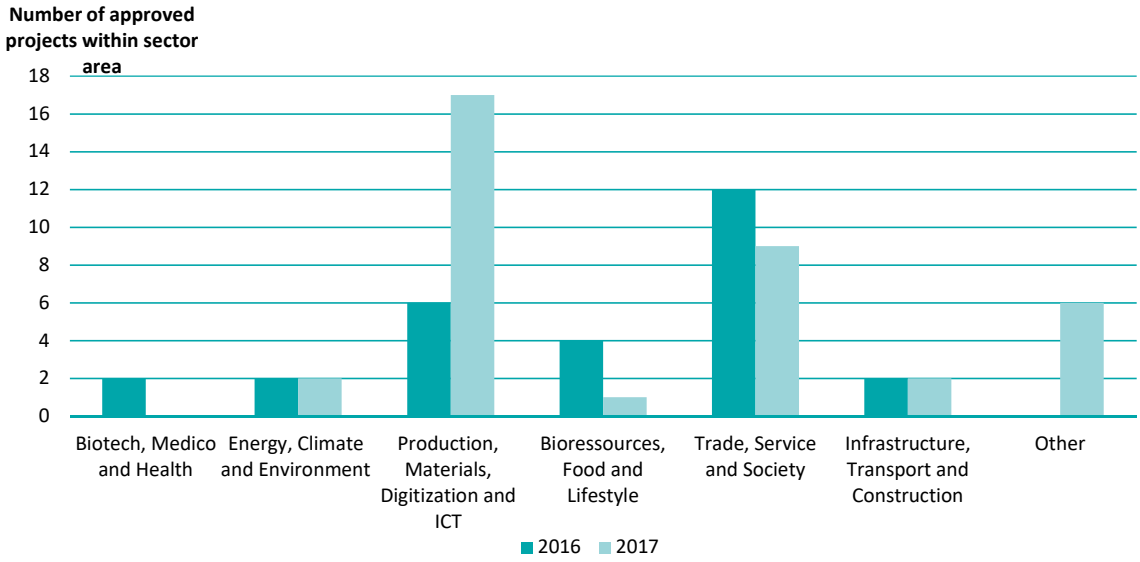
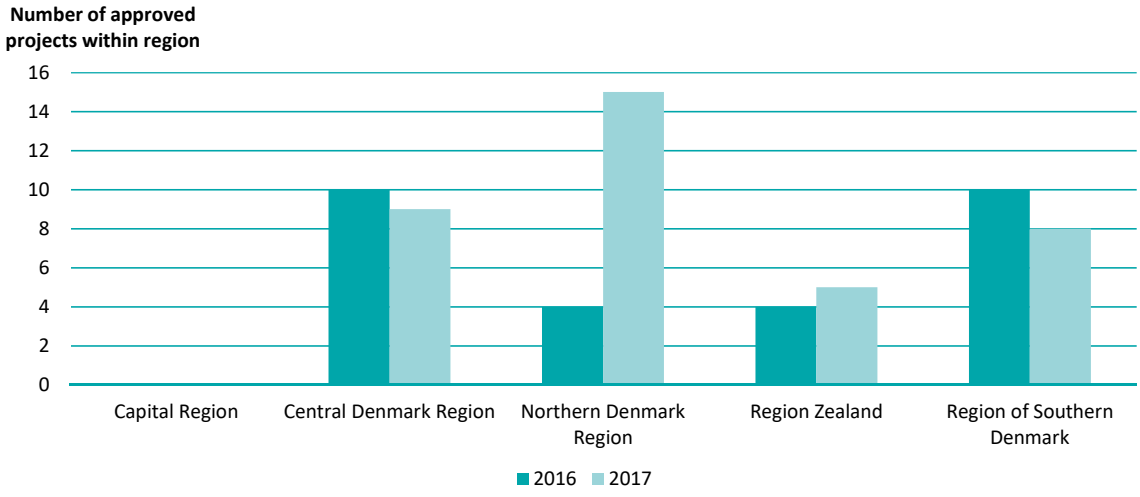


Figure 5.4.: Approved projects within each region of Denmark. 2016-2017 – IPRD.



Note: Due to the official definition of rural districts, none of the areas in the Capital Region are eligible for investment.

Appendix C

Portfolio overview of active Grand Solutions projects

The following figures show a portfolio overview for each of the IFD's sector areas, for the Grand Solutions programme. Each area is broken down into subcategories, giving a detailed overview.

Figure 1: Biotech, Medico and Health

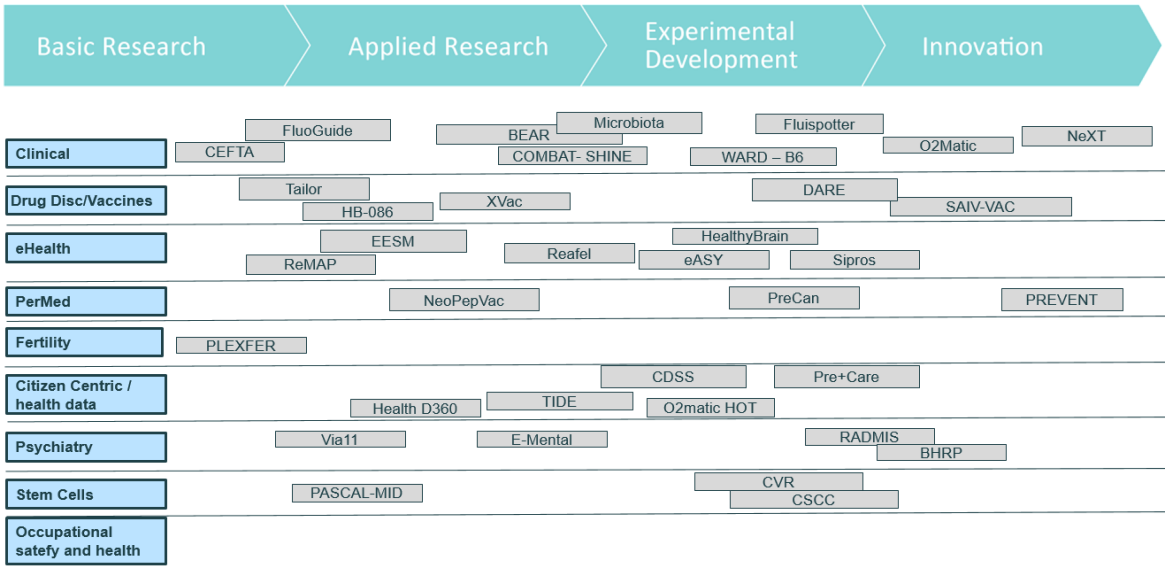


Figure 2: Production, Materials, Digitisation and ICT

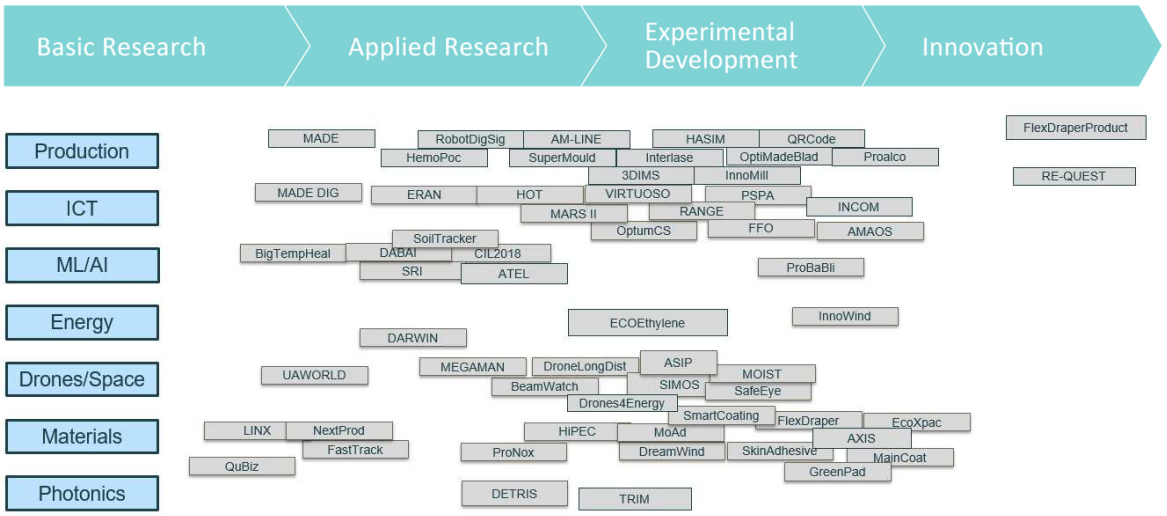


Figure 3: Energy, Climate and Environment

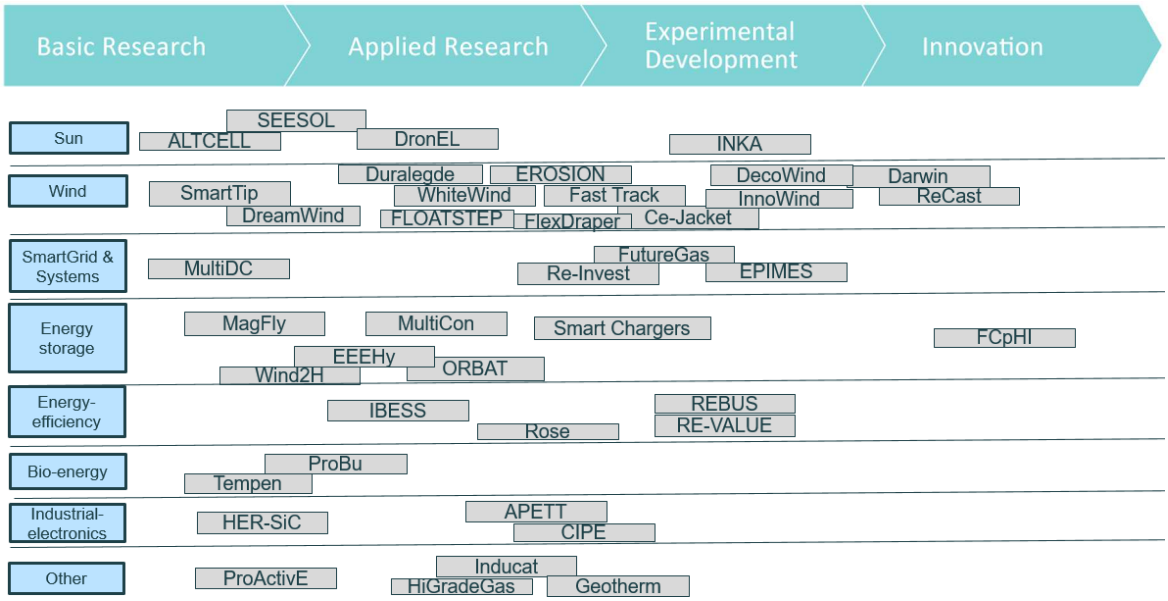


Figure 4: Bioresources, Food and Lifestyle

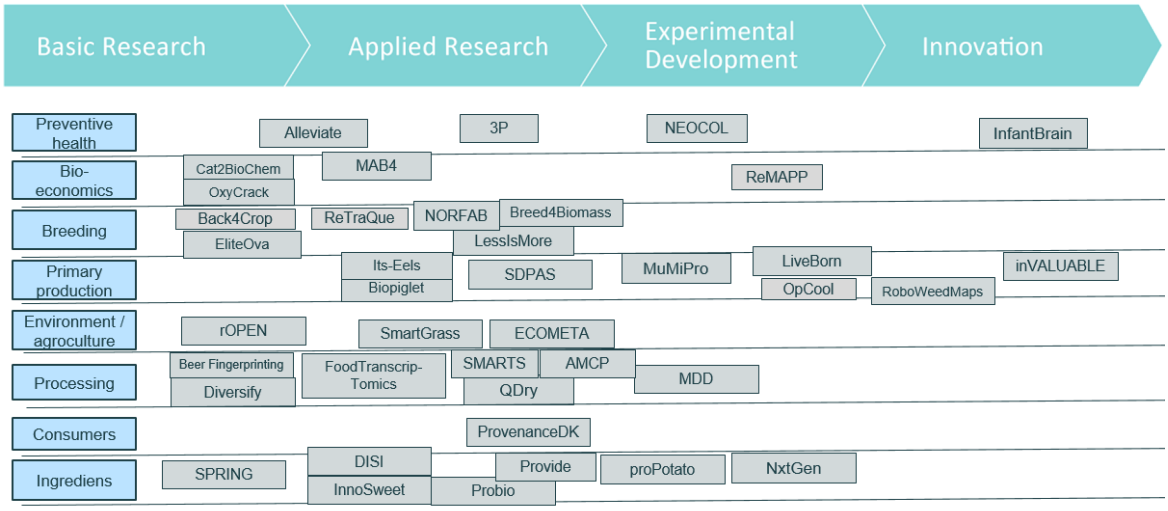


Figure 5: Infrastructure, Transport and Construction