

# Industrial PhD

## (Industrial Postdoc)

**Peter Frigaard, Aalborg University**

Some slides based on Klaus Ammitzbøll

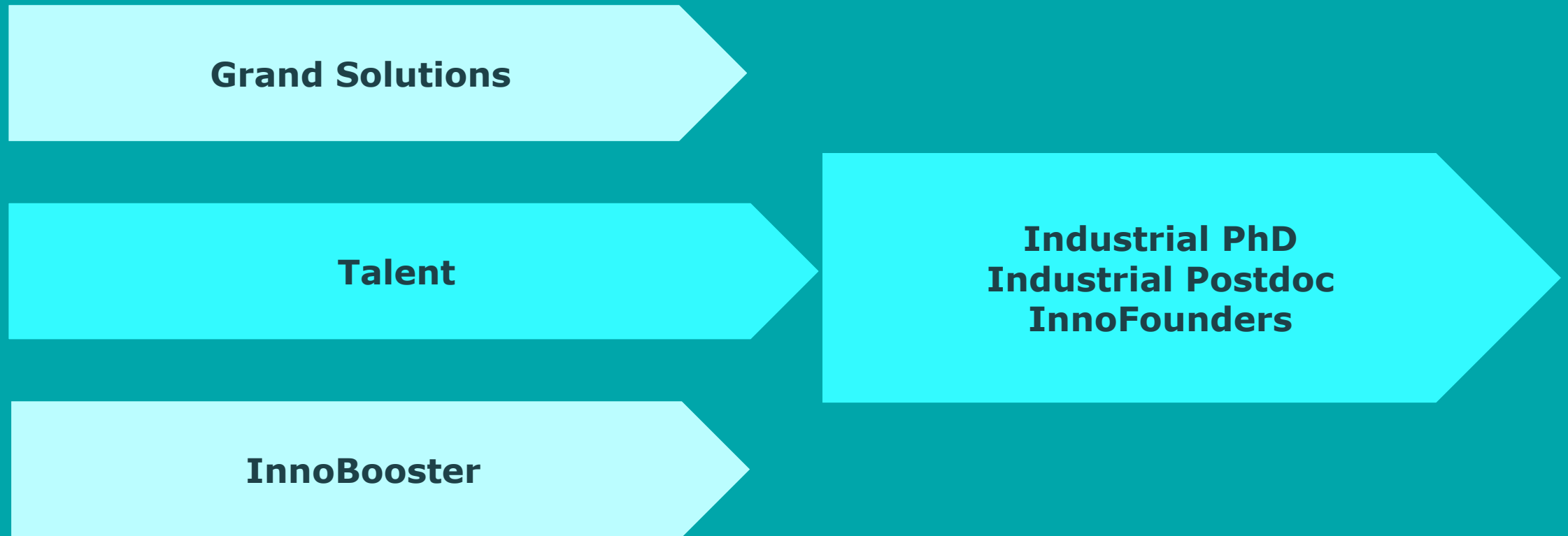
17/11-2017



**Innovation Fund Denmark**

RESEARCH, TECHNOLOGY & GROWTH

# Three entrances for Innovation support



# Industrial PhD

## Basic idea 1#3

- Governmental support to Technological Innovation.
- Cooperation between university and industry



# Industrial PhD

## Basic idea 2#3

- Economical growth in any country depends strongly on Technological Innovation.
- The value of a Technological Innovation depends on time from research/innovation to market/invoice.
- The Industrial PhD student is employed in the private sector (The company) and is enrolled at a university **at the same time.**
- The student is a strong connection between university and industry.



# Industrial PhD

## Basic idea 3#3

- We believe in the **Triple Helix** idea.
- Cooperation between State, University and Industry.
- The state (Regulators) define goals in due time.
- An example: The existing Danish building regulative is named Bygningsreglement 2015. The new regulative for 2020 was announced already in 2013. 25 kWh per kvm. Already now the industry do research that will develop products able to fullfill requirements for 2020.
- The state needs better advises from universities.



# Industrial PhD

## Basic structure

- An Industrial PhD is a three-year research project and PhD education with an industrial focus
- The Industrial PhD student is employed by a private sector company and enrolled at a university **at the same time**
- The student must be employed in a Danish company branch, but the university can be located anywhere in the world
- The student has **two main supervisors** – one at the university and one at the company



# Industrial Postdoc

## Basic structure

- An Industrial Postdoc is a research project of 1-3 years with an industrial focus carried out by a recent PhD graduate (within past five years)
- The Industrial Postdoc is employed on a full-time basis in a Danish branch of a private sector company
- A public sector research institution also participates
- The research institution and the company **both assign a mentor** to the Industrial Postdoc



# Industrial PhD and Postdoc

## Restrictions

- The researcher is **only allowed to work on the PhD or Postdoc project** in the company
- The researcher **divides her/his working time** between the company and the university, and works on the same project both places
- The project is full time
- Only Industrial PhD: The company must pay back subsidies if it discontinues the education without due reason





# Industrial PhD

## Funding, expenses and subsidies

- The company employ and pay the Industrial PhD student.
- The company can apply for:
  1. Half the salary of the student. 3 years.
  2. Tuition fee for the PhD school
  3. Running expenses



# Industrial PhD

## Funding, expenses and subsidies

- The company employ and pay the Industrial PhD student.
- The company can apply for:
  1. Half the salary of the student. 3 years. 54.000.000 pesos
  2. Tuition fee for the PhD school. 3 years. 30.000.000 pesos
  3. Running expenses. Test, travel, IT..... 16.000.000 pesos
- Typically 100.000.000 pesos.



# Industrial PhD

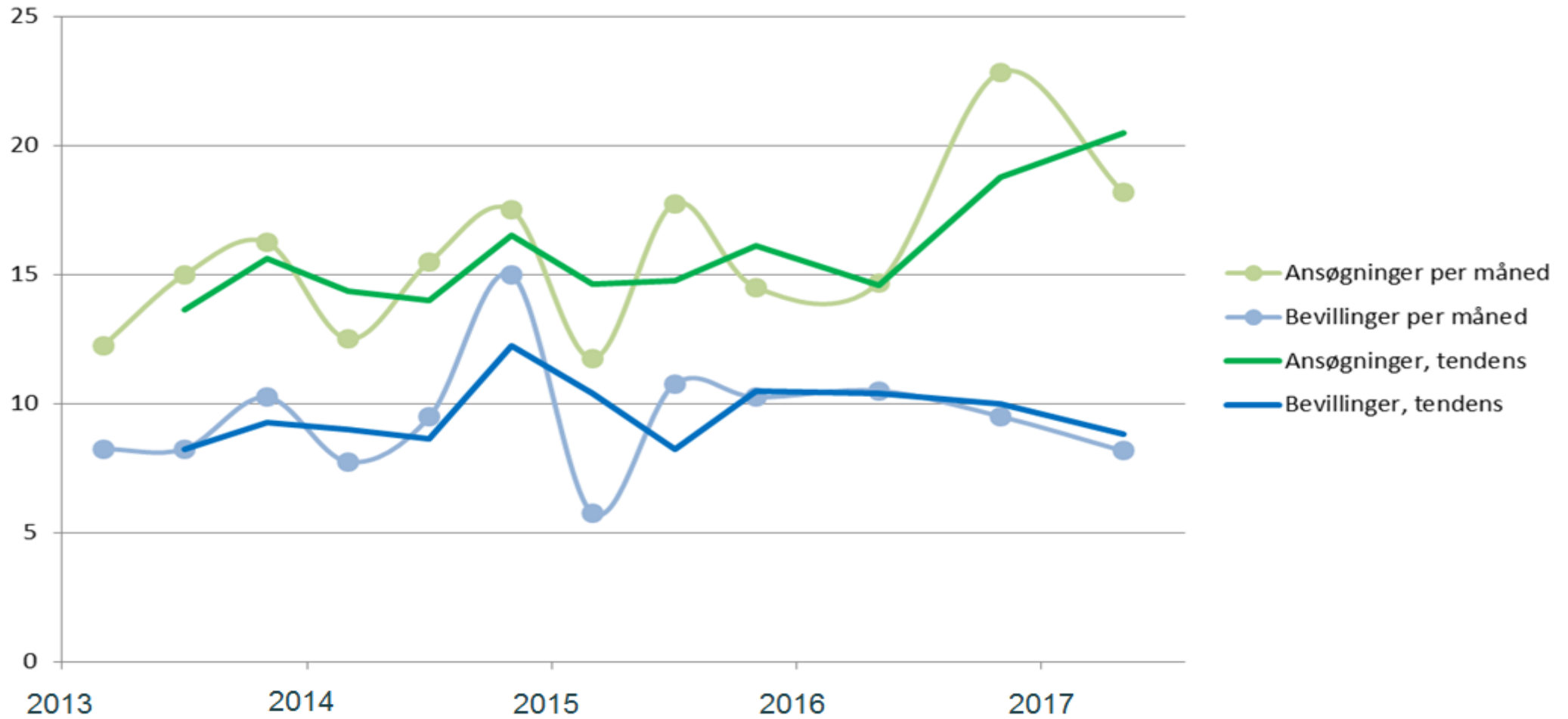
## Why engage?

- The company (probably) gets a highly competent and cheap employee to carry out research as well as access to state-of-the-art knowledge from the university
- The university / research institution is connected with companies and gets to better understand how they use research
  - as well as project funding: **50% success rate** expected in 2017
- The Industrial Researcher carries out research that is applied directly in the company, which is motivating, and builds networks at both places



# Industrial PhD

## Application trends



# Industrial PhD

## Background

- Dk has **more than doubled** its PhD production over the past 15 y.
- Approx 1000 PhD's graduate per year.
- The private sector accounts for **2/3** of total R&D expenditure in Dk.
- PhD candidates are very well accepted by industry. This will hopefully also be the case in the future. Require more and better collaboration between university and industry.
- Most new PhDs will have to find employment in the private sector in order to pursue a research career.



# Industrial PhD

## What are the challenges?

- Collaboration projects require practical considerations and above all **good communication** and **understanding** between participants
- The company, the Industrial Researcher and the university / research institution must understand each other's perspectives and interests, which often differ 😊
- This is why previous programme users recommend making agreements and aligning expectations before starting
- IPR control.



# Industrial PhD

## Happy users!

User survey from 2006:

- 98 % of students
- 94 % of company supervisors
- 94 % of university supervisors
  - are **satisfied** or **highly satisfied** with the programme
- Approx **90%** of all initiated projects are completed



# Industrial PhD

## Career paths

Further careers of Industrial PhDs, per 2007:

- 83 % work in the private sector
- 65 % work directly with R&D
- 8 % are in management positions (4 % for reg. PhD)
- 33 % continue in the company where they studied
- 10-15 % higher annual wages compared to regular PhDs





# Industrial PhD

## Formal requirements - candidate

### The Industrial PhD candidate needs:

- a relevant master's degree
- either:
  - a weighted grade average of **8.2** for bachelor's *and* master's degrees put together
  - *or* a weighted grade average of **9.5** for a master's degree of at least two years duration (120 ECTS)
- a thesis grade of at least **10**

If grade requirements are not met, it is possible to qualify through research articles, patents, grade progression, etc.



# Industrial PhD

## Formal requirements - company

### The company must:

- have a division geographically located in Denmark where the Industrial Researcher will be employed
- be able to financially support the project
- assign a supervisor / mentor to the project with knowledge about the industry (research knowledge is not required)
- be part of the private sector



# Industrial PhD

## Application

- Open to **all** fields of research
  - *No research field preferences except in special calls*
- High-quality applications only, please!
  - What, why, how?
- The application must explain how the project results have a **clear commercial significance and effect** for the company
- Also, it must be described how the project results will be implemented in the company



# Industrial PhD

## Commercial significance and effect

Generally, there are three types of commercially relevant paths:

### 1. Development of products or services

- *Describe market potential, competitors, development phase etc.*

### 2. Improvement of organisation or internal processes

- *Describe potential efficiency gains / savings, existing solutions, implementation plans*

### 3. Basic research in area of existing commercial activities

- *Describe type and extent of commercial activities, and how the project can potentially uncover new commercial avenues*



# Industrial PhD

## Application - deadlines and processing

- Two yearly application deadlines
- Next deadline is **xx.xx.xx**
- Processing time of max. **two months**
- Approx. 50 pct. approval rate expected for 2017
- Reasons are given for rejections, and it is possible to reapply
- It can be a good idea to mentally prepare the company for a possible rejection and resubmission of the proposal



# Special calls 2017: Smart buildings and smart cities: Connecting knowledge and people

- Thematic call for applications within all aspects of the construction sector:
  - Architecture
  - City environments
  - Construction and materials technology
- Deadline **25 September 2017**
- DKK 20 mill. available in total, enough for approx. 20 projects
- A cross-disciplinary portfolio of projects will be prioritised



# Industrial PhD

## Application assessment

- Applications are assessed by the Industrial Researcher Committee
- Consists of 25 researchers from private and public sector in a broad range of research fields
- When writing the application, consider that at least one committee member knows the field well and that the rest do not
- *How to address:* Be clear and precise. Demonstrate both your expert knowledge, your clarity of thought and your powers of persuasion!



# Industrial PhD

## Some definitions

- University PhD: Tell us how/why
- Industrial PhD: Give us the answer
- Industrial Post Doc: Show us the money





# Industrial PhD

## Some statistics

- The national Industrial PhD program: 100-120 per year. 62% SME
- Aalborg University: 10-12 per year
- Department of Civil Engineering: approx 2 per year
- Peter Frigaard: 3 over the last 10 years



# Industrial PhD

## My last industrial PhD (ongoing)

- The topic: Scour around Offshore Wind Turbine Foundations.
- The candidate: Master in Civil Engineering. Worked 2 years in industry.
- The company: 10 years old Consulting Engineers. Approx 10 employees.
- The business case: Improved methods to predict scour will make structural designs from the company more competitive.
- Future for the candidate: He will continue in the company.
- IPR: Not an issue



# Industrial PhD

## Another onng industrial PhD at the department

- The topic: New Windows with less energy losses.
- The candidate: Master in Civil Engineering. Worked 6 month in industry plus 6 month at the department before start.
- The company: Few years old window producer. SME.
- The business case: Develop a window designed for the 2020 buildings in DK.
- The future for the candidate: Unclear.
- IPR: NDA was signed before project start



# Industrial PhD

## Summary

- The Industrial PhD is supported by government. Approx 65%
- The candidate is employed by the company and at the same time enrolled as PhD student at the university.
- The candidate is the future link between university and the company.
- Knowledge (and economical growth) is created in cooperation in a triple helix setup.



**For more information:  
[www.erhvervsforsker.dk](http://www.erhvervsforsker.dk)**

**[innovationsfonden.dk](http://innovationsfonden.dk)**