2018 Japanese-German Symposium
Collaboration between Universities and Society, Business & Industry in Doctoral Training
Prof. Dr.-Ing. Gerhard Sagerer, Rector Bielefeld University

Universität Bielefeld

A   PhD training in Germany – overview

B   PhD training in cooperation with industry / companies

C   PhD Training as part of large, publicly funded projects, funded by:

- regional government

- federal government

- European Union

A PhD training in Germany – overview

Funding Situation of PhD Candidates in Germany

How do PhD candidates **fund** their PhD phase?

- Majority of **83%** are **employed**

- Remaining 17% either individual grants or own funds

Who employs PhD candidates?

- 73% universities

- 6% non-university research institutes

- **4%** university / non-university research i. **but: financed by industry**

- **6% industry**

- **11% other organisations**

Universität Bielefeld

Different Types of collaboration between Universitites & Industry / Society

PhD Candidate(s)…

- employed by **university**, getting **data / practice** from **industry**

- employed by **university**, **paid** by **industry**

- part of **Graduate School financed** by **industry**

- employed by **industry**, **supervised** by **university**

- employed by **university**, cooperation with **industry**,

  part of **larger project**, publicly **funded** by

  - **regional government** (NRW research training group)

  - **federal government**

  - **European Union**

B   PhD training in cooperation with industry / companies

Employed by University, Data from Industry

- **2 PhD candidates**, scientific staff (Faculty of Economics)

- PhD topic: Optimization of route planning for Bielefeld City's waste management company (methods: organisation research / data science)

- **Benefit for faculty:**

  - Real time data; first hand knowledge about company's systems

  - Close contact to company - expanding cooperation to other fields

- **Benefit for university:**

  - Demonstration / visibility of expertise

- **Benefit for company / city:**

  - Safes fuel and time, decrease noise / air pollution / traffic

Employed by University, Paid by Industry

- **10 PhD candidates** in past 5 years (Faculty of Technology)

- Topic example: „Spatio-temporal representations and predictions for driving in complexe scenes" (**autonomous driving**)

- **Benefit for faculty:**

  - Additional PhD positions

  - Data / results can be used for further research

- **Benefit for industry:**

  - Knowledge transfer

  - Owns rights to results / pays preferential price for patent rights

  - Close contact to PhD candidates – easy recruitment of high potential employees

Graduate School Financed by Industry

- Based on trustful cooperation regarding individual PhD projects,

  Honda financed a **Graduate School** at Bielefeld University

- **8-10 PhD** and **several Postdoc** positions

- Financed for **4 years** (2008-2012)

- Difference to individual projects: **Fundamental** research

- Honda decided on the general research field **„cognitive robotics"**,

  individual theses' topics setup by faculty

Employed by Industry, Supervised by University

- **1 external PhD candidate:** Employed by Rewe, while doing PhD work time reduced to 50%

REWE

- Closely **supervised by two professors** (Faculty of Business Admin.)
- Taking part in university courses for PhD candidates
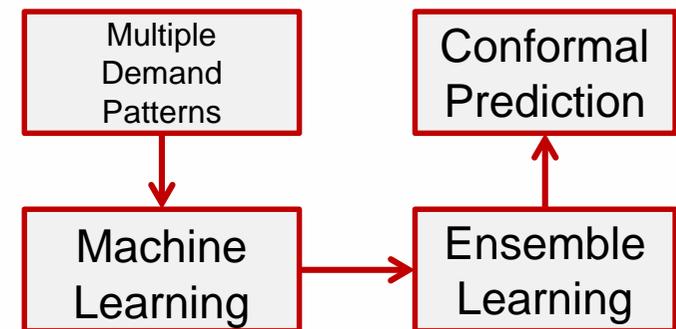- PhD topic: Optimized inventory management for online trading
- **Benefit for faculty:**
  - Huge amount of real data (Big Data!)
  - Close contact to company – expanding cooperation to other fields
- **Benefit for university:**
  - Demonstration / visibility of expertise
- **Benefit for company:** Decrease cancellation of online purchases due to unavailability of products – earn more ☺

Multiple Demand Patterns → Machine Learning → Ensemble Learning → Conformal Prediction

Universität Bielefeld

C   PhD Training as part of large, publicly
     funded projects, funded by:

          - regional government

          - federal government

          - European Union

C PhD Training as part of large, publicly funded projects, funded by:

  - regional government

NRW Research Training Group (regional government funding)

- **Government's strategy / aim:**
  - Solution of complex societal challenges needs
    inter- and transdisciplinary approach
  - „NRW Research Training Groups" offer inter- and transdisciplinary
    training to PhD scientists enabling them to solve complex problems

- **Funding scheme:**
  - Engineering, natural sciences and arts and humanities need to be
    combined in one project
  - External partners intergral part of project to guarantee transfer /
    pratice

► PhD candidates learn to communicate with different disciplines as well as
    stakeholders from industry, politics, civil society

Universität Bielefeld

NRW Research Training Group – example:
Global Refugee Migration:
Challenges / Chances for Germany's Health Care

- **Project aims:**
  - Survey refugees' health, assess risk factors
  - Identify barriers keeping refugees from using health care services
  - Development of group specific interventions
  - Develop integration strategies, set out a legal basis (human rights)
  - Develop strategies to overcome social / health-related inequalities
- **Interdisciplinary approach:** Biology, Law, Philosophy, Psychology, Public Health, Technology, Theology
- **Transdisciplinarity / practice:** Network of external partners, e.g. public health agencies, refugee councils, hospitals, medical practices, chamber of commerce, clearing agencies …

NRW Research Training Group – example:
Global Refugee Migration:
Challenges / Chances for Germany's Health Care

- 13 PhD candidates, 1 coordinator (Postdoc), 3 million euro in 4.5 years

- **Benefit for university:**

  - With help of partners getting access to refugees

- **Benefit for PhD:**

  - Trans-/interdisciplinary trained

  - Contact to possible employers e.g. governmental agencies, NGOs

- **Benefit for external partners:**

  - Better understanding of refugees' situation and needs

  - Improve (health) services for refugees

Universität Bielefeld

C   PhD Training as part of large, publicly funded projects, funded by:

Federal Ministry of Education and Research
Funding Scheme: Cluster of Innovation
Funding Scheme: Leading-Edge Clusters

Clusters funded by
Federal Ministry of Education and Research

- Leading-Edge Clusters: „it's owl"

- Regional Cluster of Innovation: „KogniHome"

- Part of federal government's **„High-Tech Strategy"**

- Both projects include PhD training / PhD candidates

- „it's owl" / „KogniHome": **PhD candidates employed by university**

  BUT: **employment by** industrial / organisational **partners possible**

  Challenge: industrial / organisational **staff lacks time to do PhD**

Leading-Edge Cluster Competition (2008-2017) (Federal Ministry of Education and Research)

- **Strategic aim:**
  - Strengthen research / innovation as keys to growth and progress
  - Special focus on cooperation between industry and science
- **15 clusters in Germany**
- Funds: 720 million euro between 2008-2017
  - 360 million euro by ministry
  - equally matched by participating companies
- Lead to: 900 innovations, 300 patents, **450 PhD theses**, 1000 Bachelor- / Master theses and 40 spin-offs

Universität Bielefeld

Leading-Edge Cluster: it's owl Intelligent Technical Systems in the region OstWestfalenLippe

The Technology-Network:
Intelligent Technical Systems OstWestfalenLippe . Germany

it´s owl

- 180 companies / organisations (6 universities), 47 research projects

- Funding: 40 million euro, 2012-2017

- Around 100 PhD candidates ($\sim$ **30 PhD** candidates at Bielefeld Univ.)

- **Benefit for companies:**

  - PhD candidates think outside the box– industry often lacks time to be creative

- **Benefit for universities:**

  - Industry provides „reality check" for creative ideas – which ideas can really be developed into products / spin-offs

- **Benefit for PhD candidates:**

  - Contact to different companies, network, „entrepreneurial thinking"

Cluster of Innovation: "KogniHome" (Federal Ministry of Education and Research)

- Part of Ministry's strategic research area:

  „Human-Technology-Interaction in context of demographic change"

- Regional innovation cluster with industrial / organisational partners

- **10 PhD candidates, fu**nding: 8 million euro in 3 years

- **Benefit for companies:**

  - PhD candidates think outside the box

- **Benefit for universities:**

  - Industry provides „reality check"

- **Benefit for PhD candidates:**

  - Contact to different companies,

    network, „entrepreneurial thinking"

Universität Bielefeld

C   PhD Training as part of large, publicly funded projects, funded by:

   - European Union

Universität Bielefeld

Innovative Training Networks
European Union

- **Strategic aim:** train a **new generation** of creative, entrepreneurial and innovative **early-stage researchers**, able to face **current and future challenges** and to **convert knowledge** and ideas **into products** and services for economic and social benefit.

- Funding of joint research training / **doctoral programs**, implemented by **partnerships of universities**, research institutions, research infrastructures, **businesses, SMEs**, and other socio-economic actors from **three different countries across Europe** and beyond.

Universität Bielefeld

DeLIVER - Innovative Training Network

- Topic: development and application of newly developed high speed and high resolution imaging tools in biomedical research

- Faculty of Physics

- 14 PhD candidates (3 employed by industrial partners supervised by university professors)

- 3.8 million euro, 3 years

- **Benefit for university / faculty:** additional PhD positions, funding

- **Benefit for company:** network, additional employees

- **Benefit for PhD candidates:** better paid than usual, more skills (transferable skills IP law, entrepreneurial skills), EU-wide contacts to potential employers

Different Types of collaboration between Universitites & Industry / Society

PhD Candidate(s)…

1. employed by **university**, getting **data / practice** from **industry**

2. 1) employed by **university**, **paid** by **industry**

   2) part of **Graduate School financed** by **industry**

3. employed by **industry**, **supervised** by **university**

4. employed by **university**, cooperation with **industry**,

   part of **larger project**, publicly **funded** by

         1) **regional ministry**

         2) **federal ministry**

         3) **European Union**

Thank You !
感謝！