Cooperation between Universities and Society, Business & Industry in Research and Innovation

2018 Japanese-German Symposium
April 26th 2018, Tokyo
(1) German universities and innovation

(2) University of Stuttgart and innovation

(3) conclusions
Research at German universities has expanded since more than 200 years

- **1803**
  expansion: Humboldt‘s Berlin University as model for the union of research and teaching

- **1933-45**
  setback: Germany wages war and takes life of citizens and scientists

- **after 1945**
  rebound: Institutes for Technology of Aachen, Darmstadt, Stuttgart become Universities

- **since 1989**
  globalization: increase of science budgets and knowledge transfer

- **today**
  digitalization: universities and industry seek to join forces for faster R&D and innovation
The mid-term goals of the EU assign more tasks to universities in Europe

Goals stated as Agenda EU2020

- increase employment → more start-up businesses
- increase R&D spending → higher public and private sector R&D
- increase tertiary education → more students

Source: European Institute of Technology and Innovation
Public research in Germany is conducted in several institutional branches

**Universities**
- 10,000 to 50,000 students
- Mission: research, teaching, **transfer**
- Sole institutions to award PhDs and degrees of law, medicine, education
- Funding: institutional from Federal states, research projects from German Science Foundation, Federal government, European Union, and industry + others
- Top technical universities in alliance of top nine technical universities (TU9)

**Non-university branches**
- Max Planck Society, Helmholtz Association, Fraunhofer Society, Leibniz Association
- Mission: research (fundamental or applied)
- All fields, strengths in life sciences, physics, technology
- Funding from Federal government, Federal States and industry + others
(1) German universities and innovation

(2) University of Stuttgart and innovation

(3) Conclusions
University of Stuttgart is an international research university
Germany

- Our vision is to understand and develop **Intelligent systems for a sustainable society**
- 10 faculties (engineering, mathematics, natural sciences, social sciences+humanities)
- 290 professors, 28,000 students
- budget of 557 mio. € (208 mio. € acquired from public and private funders)

- competitive research in simulation science, manufacturing, digital humanities, quantum physics, architecture and construction of adaptive buildings, energy
- „**Stuttgart way**“ of linking disciplines
  - intelligent materials and sensors
  - intelligent machines and buildings
  - intelligent ways of communication
  - reflection and assessment of technologies
  - transfer of knowledge
4 examples for partnerships for research and innovation in Stuttgart

• **#1: ARENA2036 – Cooperative Research Campus – Industry on Campus**
  Public-private partnership between university, non-university research institutes, multinational and medium enterprises
  Topic: Advanced future manufacturing + functional materials + digitalization (= industry 4.0)

• **#2: Cyber Valley - Joint use of big data** - Public-private partnership between universities, Max Planck society, multinational corporations and Federal State.
  Topic: Artificial Intelligence (AI)

• **#3: Reallabor - Citizen Lab** -
  Participation between science and society
  Topic: urban planning

• **#4: IBA 2017 – Metropolitan Association** - for developing new urban quarters and urban designing transportation 2017-2027
  Topic: Archineering and social sciences
Example #1  ARENA2036 Cooperative Research Campus - Partnership for Innovation

- First Federal „Cooperative Research Campus“ funding
- Partners: university and industry
- Scope: multi- and interdisciplinary and long-term (> 15 years)
- Goal: combination of basic and applied research and fast transfer to innovation
- funding: Federal grant 30 Mio. €
  (15 yrs. x 2 Mio. € / yr.) and matching
  30 Mio. € by industry
  overall goal: > 20 Mio € funding / yr.
- contracts specify general and project-driven protection of intellectual property
ARENA2036: Cooperative Research Campus of the University of Stuttgart

currently:
automated assembly of identical frames
(example: Mercedes in Finland)

future:
research towards modular, cyber-physical manufacturing units
ARENA2036 offers a research factory for co-working of diverse partners

Building
- 10,000 m²
- capacity 250 people
- 1 year to build
- 30 Mio. € by EU and University
- on campus

Concept for collaboration
- joint development of production and manufacturing
- flexible setting for knowledge work based on hardware
- short distances and fast decisions for agile developing
- multidisciplinary transfer for future employees
- partner mix: university, research institutes, industry (industry partners with large own R&D)
ARENA2036 took 5 years to start major research partnerships

- increase of research institutions from 4 to 6
- increase of industry partners from 3 to 25 partners
- new collaborations between industry partners
- environment for start-up businesses with incubator/accelerator PLUGANDPLAY
- PhD and MSc students
ARENA2036 is a central component of the strategy of the university.
Example #2: Cyber Valley - Public-private R&D in artificial intelligence

Sources: Bosch, Technol Rev, MPS
Cyber Valley
Will boost Artificial Intelligence research and development

• Brings together international key players from science and industry to concentrate their research activities in the field of **Artificial Intelligence**

• Cyber Valley partners will establish **new research groups and professorships** in the fields of **machine learning, robotics, and computer vision** in a new research center in the Stuttgart-Tübingen area in Germany

• Key element: training of up to 100 doctoral students
Cyber Valley partners use diverse big data for R&D in artificial intelligence

Structure

- Concept: research in machine-learning needs insight into corporate, real-life big data
- Measures: public and industry-endowed professorships, junior groups
- Budget: for companies 1.2 Mio. € per year to join and additional endowment of chairs
- Research goals: AI and machine learning (e.g. for cars and human computer interaction)
- New element for public-private campus: attract start-ups
Cyber Valley partners push for collaborative R&D

- University of Stuttgart and University of Tübingen, distance 40 km
- Max Planck Institute for Intelligent Systems (branches in Stuttgart and Tübingen)
- German and US corporations
- Federal State of Baden-Württemberg
Cyber Valley grows as artificial intelligence hub for academia and industry

- Two more large industry partners from the US have joined (Amazon, Facebook) → Cyber Valley goes global
- Recruitment of junior group leaders → Cyber Valley attracts talent
- On-going negotiations on IP distribution → Cyber Valley partners are subject of different jurisdictions and need different kinds of agreements
Example #3: Reallabor as Citizen Lab

- Real Labor ran for three years and brought citizens and grassroots initiatives into research projects exploring new ways of planning for urban mobility.

Source: Reallabor
Example #4: Metropolitan Association IBA 2017-2027

The **IBA International Architecture Exhibition** runs in the Stuttgart region from 2017 to 2027 and will hatch mobility and measures as well as new residential quarters. It will test solutions for regional cooperation. The university is one of five partners.

Source: [https://iba2027.de/](https://iba2027.de/)
(1) German universities and innovation

(2) University of Stuttgart and innovation

(3) Conclusions
Conclusions Partnerships for innovation of the University of Stuttgart

- We use Federal programs to start **new research environments** with local universities, research institutes and local and global companies.
- We aim to take a **holistic perspective** towards technological innovations. The university conceives and implements projects involving multiple disciplines and players.
- We set up long-term research projects with local non-university research institutes and industry that aim for **transfer of knowledge**.
- We are adding **education and research on building start-up businesses** to our portfolio.

Source: www.expat-news.com
Conclusions Partnerships for innovation of universities in Germany

- Germany shifts **toward public-private partnerships** for innovation.
- Public and private budgets for research and R&D go into measures that seek to **incubate technology for innovations**.
- Germany’s universities push and are pushed to hatch **ideas for growing sectors of the economy** such as IT, start of new businesses and “industry 4.0”.

Source: https://digitales-wirtschaftswunder.de
Thank you!

Univ.-Prof. Dr.-Ing. Wolfram Ressel

e-mail  rector@uni-stuttgart.de
phone  +49 (0) 711 685-82200
fax  +49 (0) 711 685-82113

University of Stuttgart
Rectorate
Keplerstrasse 7, D-70174 Stuttgart