



Engineering Education and Entrepreneurship at TUB

Dr. Patrick Thurian, Agnes von Matuschka and Prof. Dr. Jan Kratzer

Technische Universität Berlin | 22nd November 2015



Content

- Berlin – The German Start-up Capital
- Profile of the TU Berlin
- The Bologna Process
- Engineering Education at TU Berlin
- Joint Master Program: Innovation Management and Entrepreneurship
- Quality Management
- The Centre of Entrepreneurship
- Summary



Berlin, The German Start-up Capital

- 11 universities
- attractive living environment
- outstanding infrastructure
- international talent pool
- entrepreneurs
- accelerators
- upcoming start-up community
- hot-spot for founders
- creative people
- co-working spaces
- venture capital



The Next Silicon Valley? Berlin Startups Catching Up With The Hype

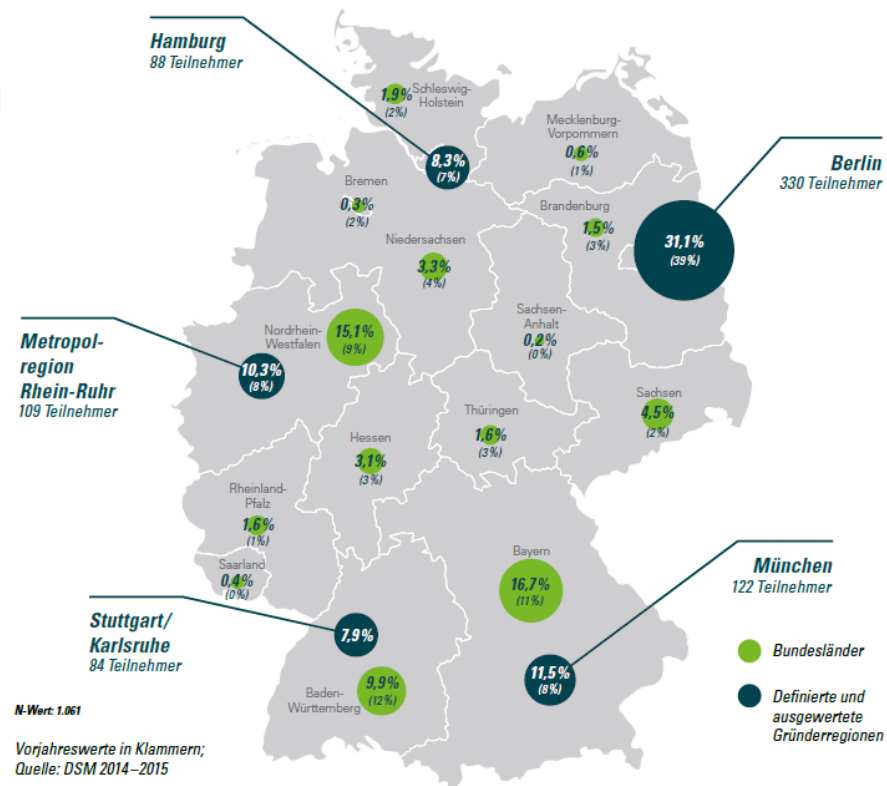
by ERIC WESTERVELT



Berlin, The German Start-up Capital

Facts from the 3 start-up monitor:

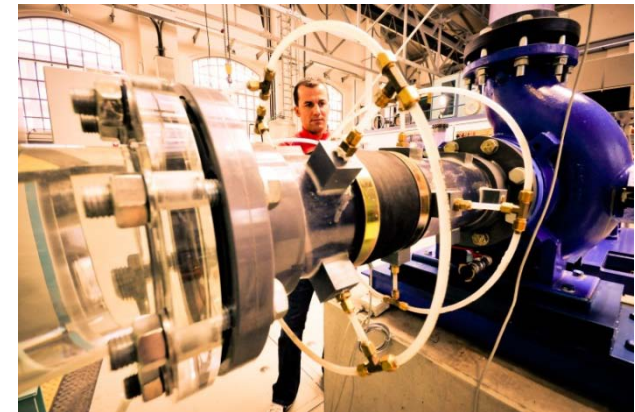
- 1000 start-ups are represented
- 31 % are located in Berlin





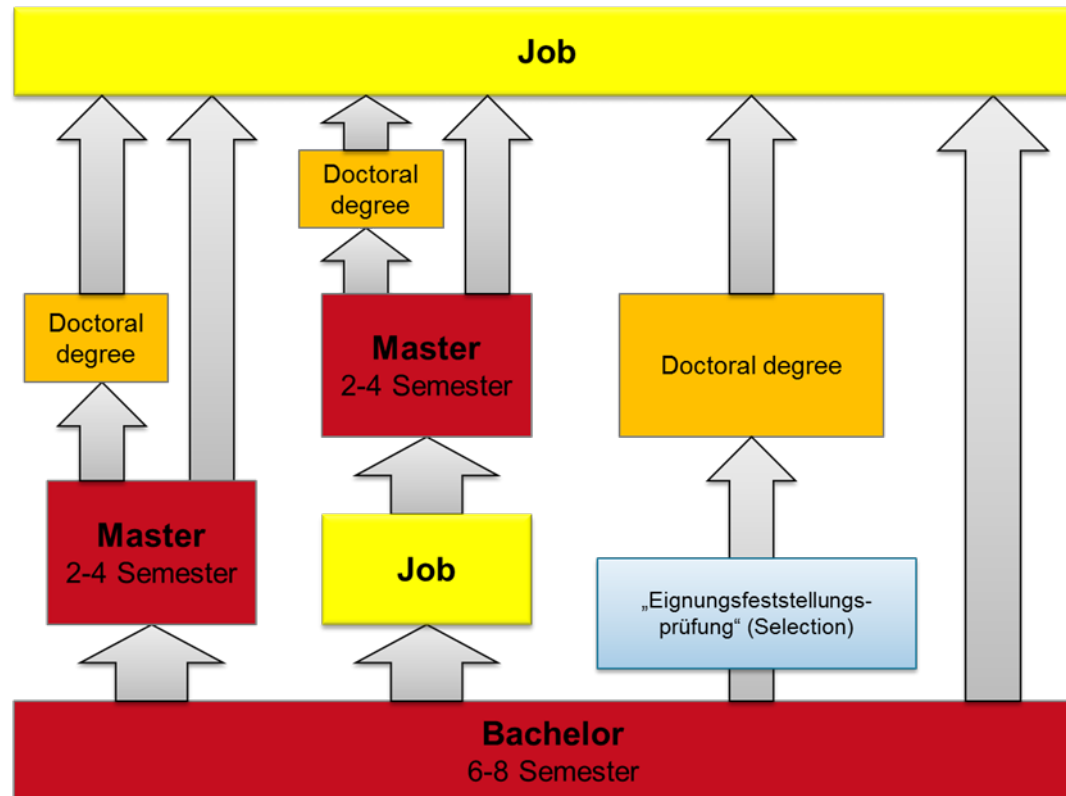
Profile of TUB - University with Entrepreneurial Tradition

- Technology focused location: 32,000 students,
- 331 professors and 2,691 research scientists in the heart of the city of Berlin
- more than 30 year history of technology transfer
- first high-tech incubator in Germany
- 800 technology-oriented spin-offs and founders
- founders survey 2013: 2.7 billion turnover, 20,000 employees
- awarded status as “Die Gründerhochschule” by federal ministry of Economics and Energy (BMWi)





The Bologna-Process





The Bologna-Process at TUB

- The TUB offers 120 study-programs (99 % are Bachelor and Master programs (winterterm 2015/2016))
- The Bachelor and Master programs have to be accredited in Berlin
- 78 programs successfully passed program-accreditation
- TUB accomplishes system-accreditation
- The profile of the Bachelor and Master programs is given by the research profile



Requirements for modern education in engineering

Characteristics of an excellent engineer

- Technical knowledge/expertise
- Learning, developing and improving
- Flexibility in adapting to change
- Management/motivation of people
- Management of projects/events
- Team-working; multidisciplinary/cultural
- Communication, verbal and written
- Focus on business/clients
- Proving leadership and vision
- Commitment to ethical and social responsibilities
- Commercial/financial knowledge/expertise



Engineering Education and the Bologna Process

European Credit Transfer System and 2-cycle

2 cycle = 3+2 years

Master is the goal

30 ECTS/Semester

→ B/M in total: 300 ECTS

→ Bachelor = 180 ECTS

→ Master = 120 ECTS

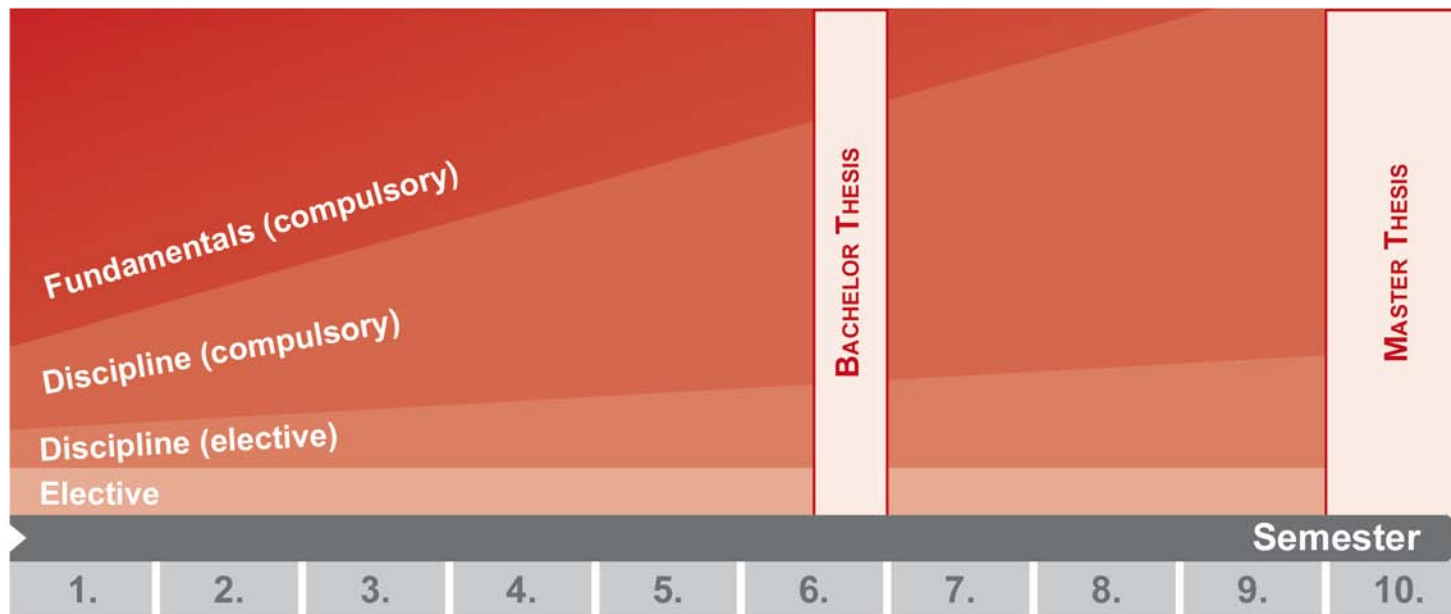
1 ECTS / 30 h workload

ECTS: European Credit Transfer System



Engineering Education and the Bologna Process

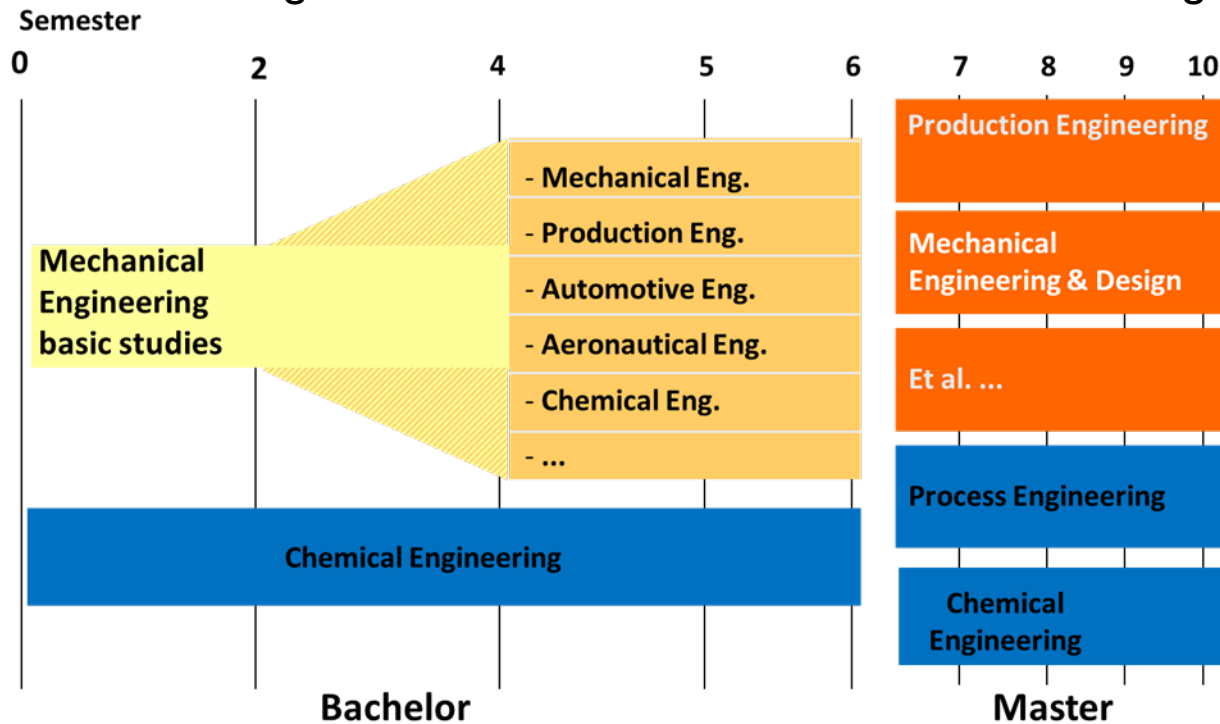
Curriculum design - Structure of Bachelor and Master Programs





Engineering Education and the Bologna Process

Curriculum design – Structure of Bachelor and Master Programs





Engineering Education and the Bologna Process

Curriculum design – Structure of Bachelor and Master Programs

Entrepreneurship education is integrated in the mandatory or in the mandatory-elective part of the curricula and in Summer Schools as well.

Modules are:

- Venture Campus (6 ECTS)
- Entrepreneurship Research (6 ECTS)
- Entrepreneurship – FÜS (6 ECTS)



Joint Master Program: Innovation Management and Entrepreneurship (IME)

Curriculum design – 2-year Master



Compulsory (24 ECTS):

- Entrepreneurship Research (6 ECTS)
- Business Research Methodes (6 ECTS)
- Venture Campus (6 ECTS)
- Innovation Economics (6 ECTS)



Compulsory Elective (36 ECTS)

Elective (30 ECTS)-Students stay abroad

Thesis (30 ECTS)



Joint Master Program: Innovation Management and Entrepreneurship (IME)

CHE BWL Master Ranking 2014:

The IME is classified as Germany's leading master programme in 5 out of 14 categories*

IME is leading in:

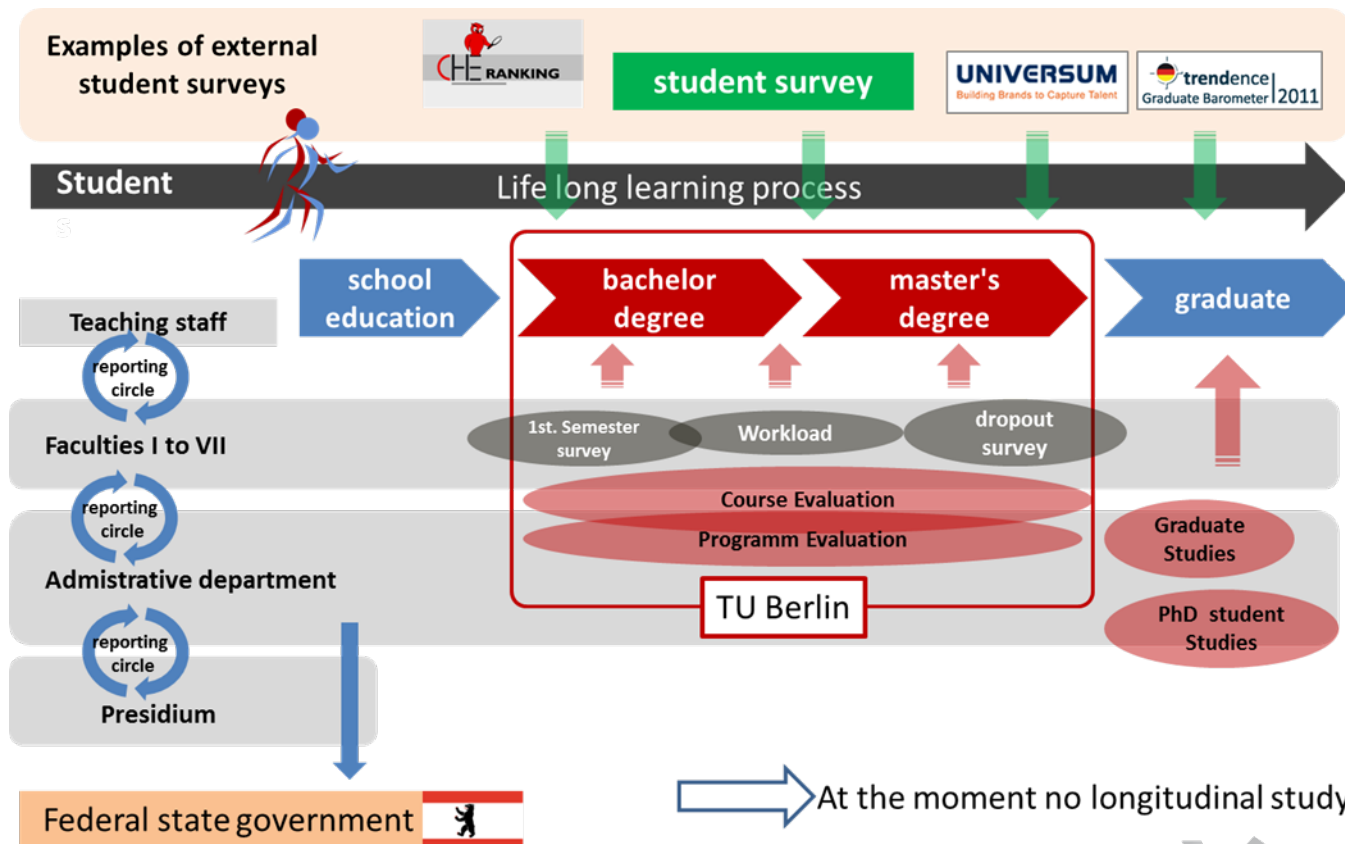
- Study comfort
- Practice focus
- Scientific focus
- Support in international exchange
- International orientation



UNIVERSITY OF TWENTE



Quality Management – Instruments and Results





Quality Management – Results of Graduate Studies

Keyfacts of the graduation cohort 2013 – part I

| | Bachelor | Master | Diplom | TUB overall average |
|-----------------------------------|----------|--------|--------|---------------------|
| Percentage of female gender ♀ | 35 | 30 | 28 | 33 |
| Grade average (Abitur) | 2,1 | 2,1 | 2,4 | 2,2 |
| Average age at time of graduation | 25,3 | 28,3 | 29,5 | 27,3 |
| Grade average of graduation | 2,2 | 1,6 | 1,7 | 1,9 |
| Average duration of study | 8,0 | 5,0 | 14,0 | 8,0 |
| N | 519 | 309 | 261 | 1.128 |



Quality Management – Results of Graduate Studies

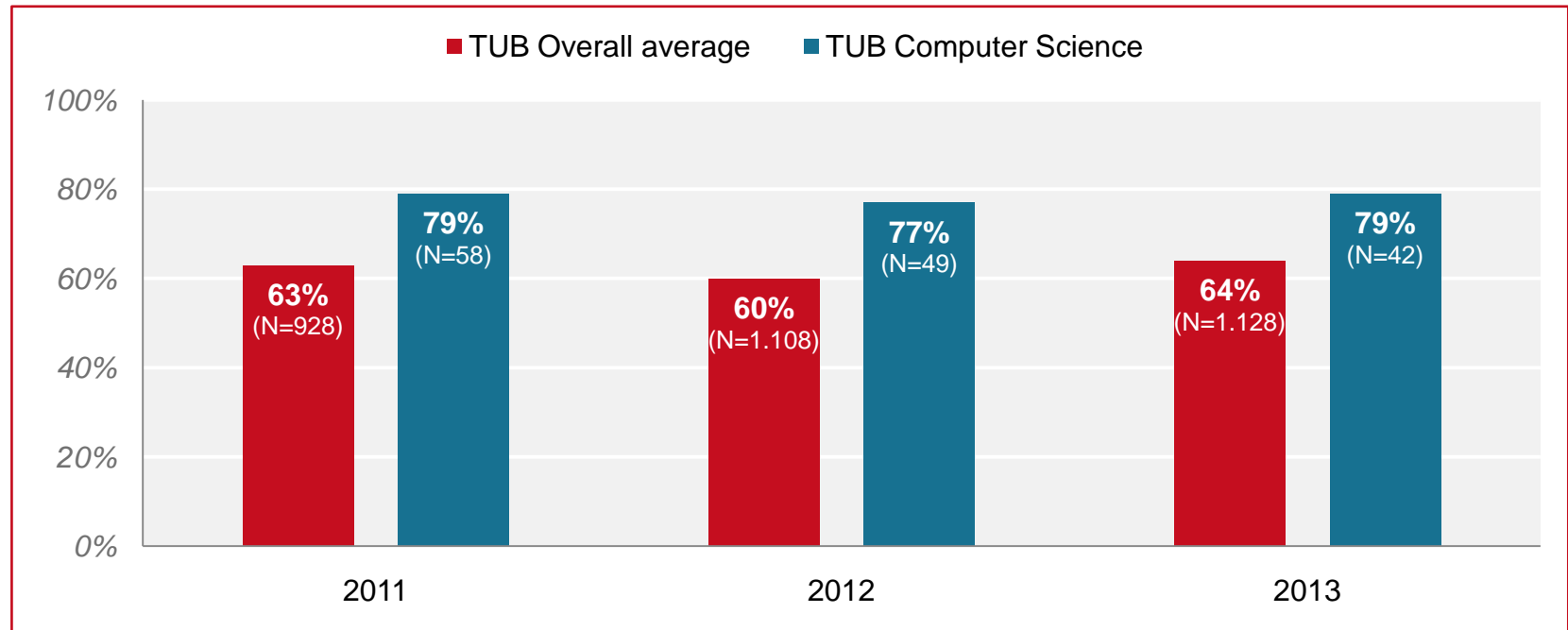
Keyfacts of the graduation cohort 2013 – part II

| | Bachelor | Master | Diplom | TUB overall average |
|--|----------|---------|---------|---------------------|
| Average duration for job search <i>(in month; Median)</i> | 1,0 | 2,0 | 3,0 | 2,0 |
| Average income (pre-tax) per month after graduation <i>(Median; Only full-time employee)</i> | 2.750 € | 3.250 € | 3.250 € | 3.250 € |
| Overall satisfaction with course of studies at TU Berlin <i>(Median 1=very satisfied / 5=very unsatisfied)</i> | 2,0 | 2,0 | 2,0 | 2,0 |
| Overall job satisfaction <i>(Median 1=very satisfied / 5=very unsatisfied)</i> | 2,0 | 2,0 | 2,0 | 2,0 |
| N | 519 | 309 | 261 | 1.128 |



Quality Management – Results of Graduate Studies

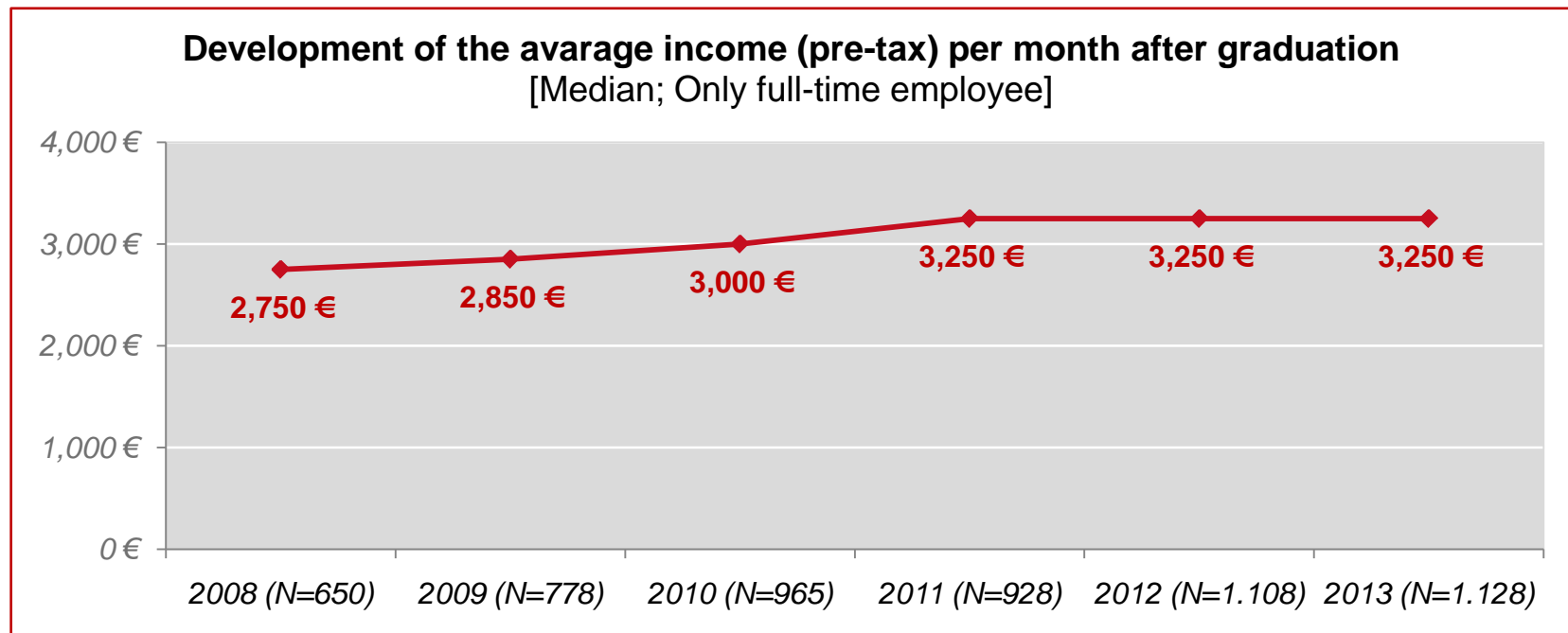
Students who stay in Berlin after graduation





Quality Management – Results of Graduate Studies

Income after graduation





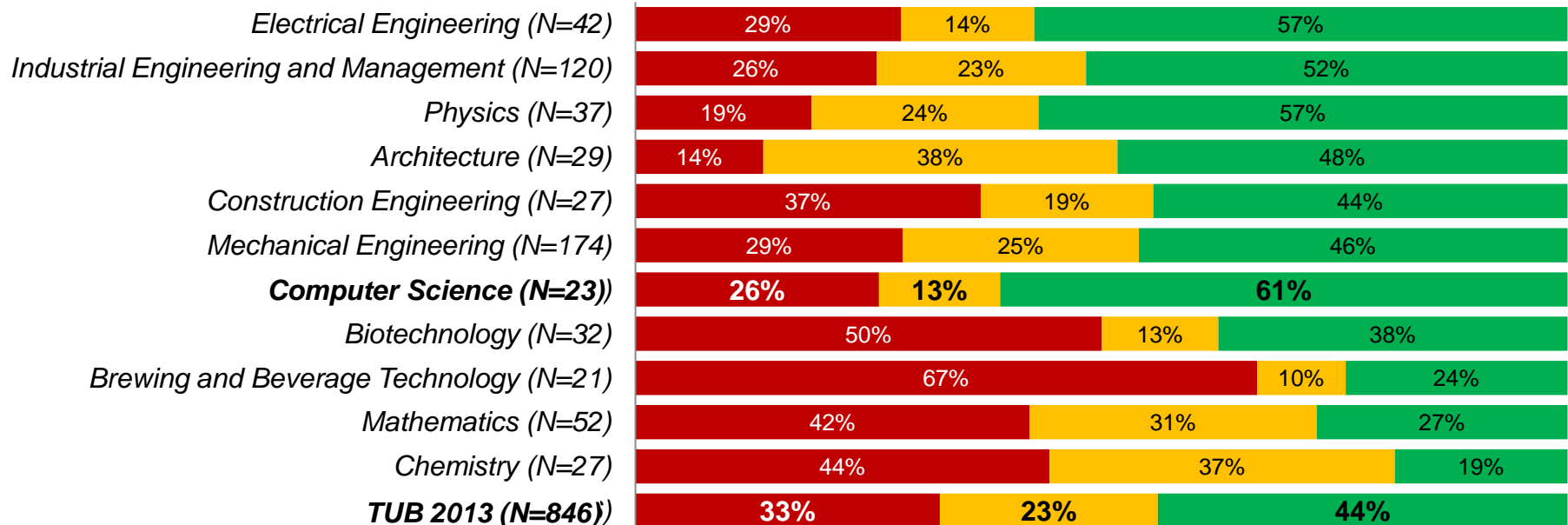
Quality Management – Results of Graduate Studies

Graduates as entrepreneurs

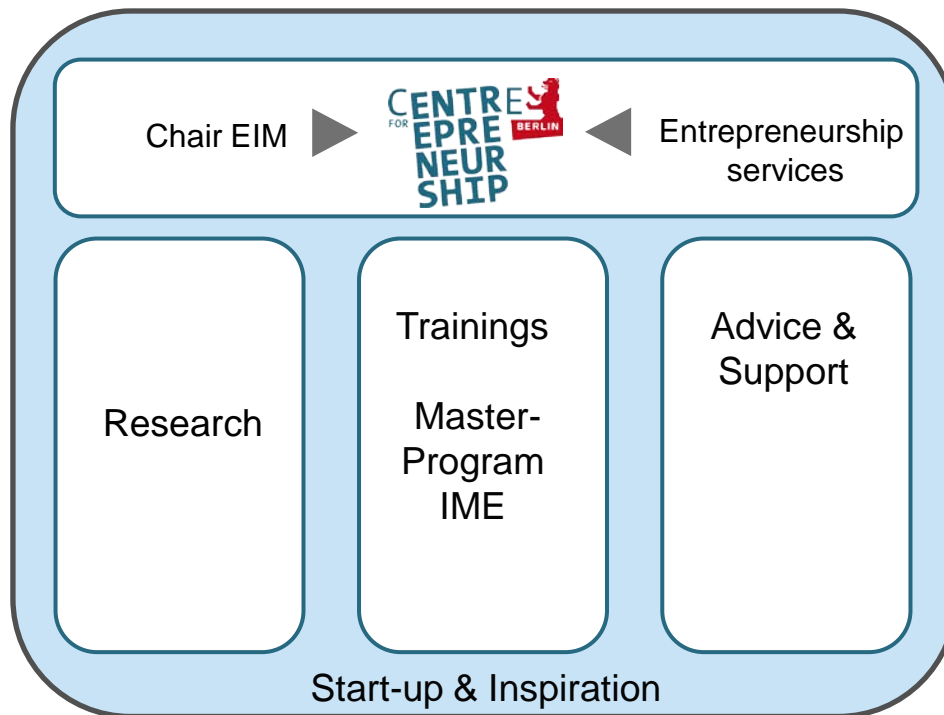
Inclination to entrepreneurship:

"In principle, I would be willing to found my own company/to be an entrepreneur."

■ Strongly disagree ■ Partially ■ Strongly agree



Centre for Entrepreneurship – a unique one-stop-shop for entrepreneurship



Networks

- B!Gründet Berlin
- EXIST-Universities
- EIT Digital
- EIT Climate-KIC



denk**FABRIK**
Gründerhochschule



European Institute of
Innovation & Technology

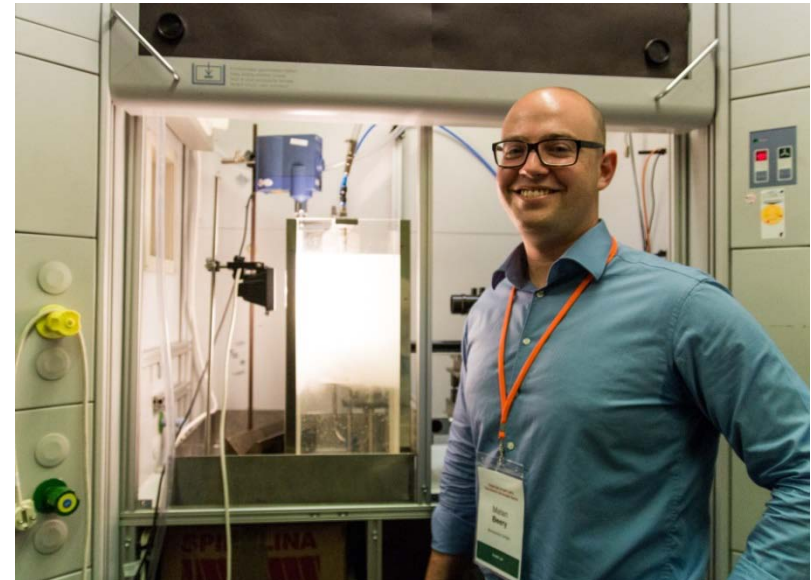




Fields of Activities of the Centre for Entrepreneurship

No matter how far your idea has grown already,
we provide tools to support

- Start-ups & Inspiration
- Advice & Support
- Master's Programmes & Training
- Research & Publications





Inspiration: Start-up Day

Role models on stage

- International Entrepreneurs (eg. Niklas Zennström, Skype)
- Real Start-ups from our networks: „Berlin All Stars“ and TU teams
- Audience: 500-1,000 people
- Get together and „speed dating“
- Involvement of student-club





Qualification/Masterclasses



... learning by doing ...

- StarTUp Academy
- StarTUp School
- Climate-KIC Summer School
- Joint master's degree IME
- Venture Campus
- Lecture series

High end workshops

- Business Model
- Pitch Training
- Lean Start-up



Advice & Support

What to consider, whom to contact, how to apply
for scholarships, funding, rooms,

- e.g.: EXIST Gründerstipendium
13 Teams in 2013; | 14 Teams in 2014
112.000 Euro / Team
- e.g.: EXIST Forschungstransfer



Support: Starting Space

- StarTUp-Incubator
- Prototyping-Lab
- Co-Working-Space
- Cooperation with Charlottenburg Innovation Centre (CHIC)





Support: StarTUp Propeller | Business Modell Re-Framing

- Systematic development of alternative business models (Process)
- Target group: existing teams with business ideas
- Incorporating experts
- Business Model Canvas

„This was a powerful change of perspective.“

„Now I am exhausted.“

„I liked our world to be rattled.“

„This also was fun.“

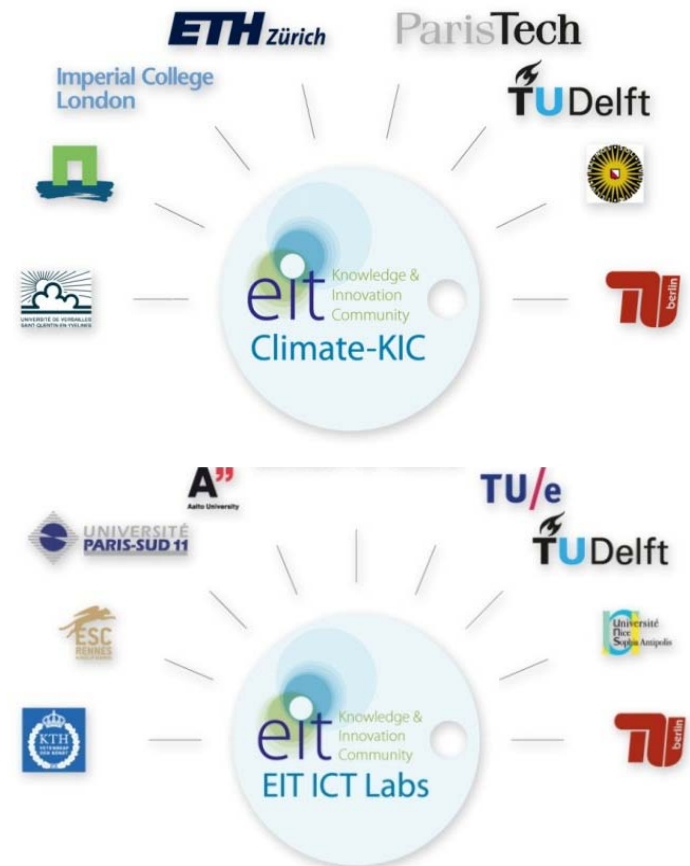




Support: Access to Finance | Access to Business

- International Networks
(e.g. EIT, TU goes global)
- Industry-access: Nokia, Telekom, Siemens etc.
- Alumni-Founders
- Investors Club | Investors Dinner | Alumni.Angel.Abend

More than 20 Start-ups got capital since 2012: e.g. Sablono, Komoot, TestObject, CarZapp, Panono







Research

Research Fields

Entrepreneurship Education

Ethnic Entrepreneurship &
Opportunity Recognition

Green Entrepreneurship

Innovation & Projekt Mgmt.

Innovative Behavior

Interlocking Directories

Lead User

Opportunity Recognition

Social Entrepreneurship

Publications

Awards

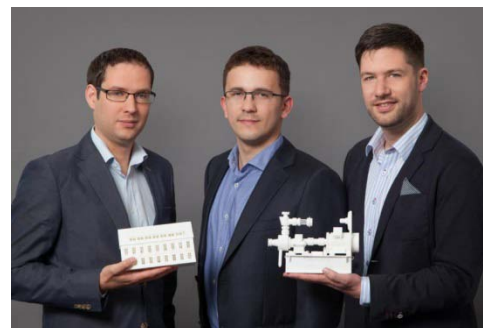


Research & Publications

Master thesis, PhD, articles in Entrepreneurship and Innovation Management

Selected Start-ups I

| Venture/ Idea | Year of foundation | Sector | Professional Background | Sponsorship |
|--|--------------------|---|--|---|
| Panono throwable panorama camera 360° | 2012 | Electrical engineering | technical informatics, communication | ESF-scholarship, EXIST-GS, crowdfunding |
| Sablono construction software | 2013 | Construction industry | engineering and economic's | EXIST-GS |
| 3YOURMIND 3D printing for industry and architecture | 2014 | Architecture and Industrial Enterprises | Econophysics, finance and accounting, computer science | EXIST-GS |



PANONO



SABLONO

3YOURMIND

EXIST
Die Gründerhochschule

CENTRES
FOR
EPRE
NEUR
SHIP

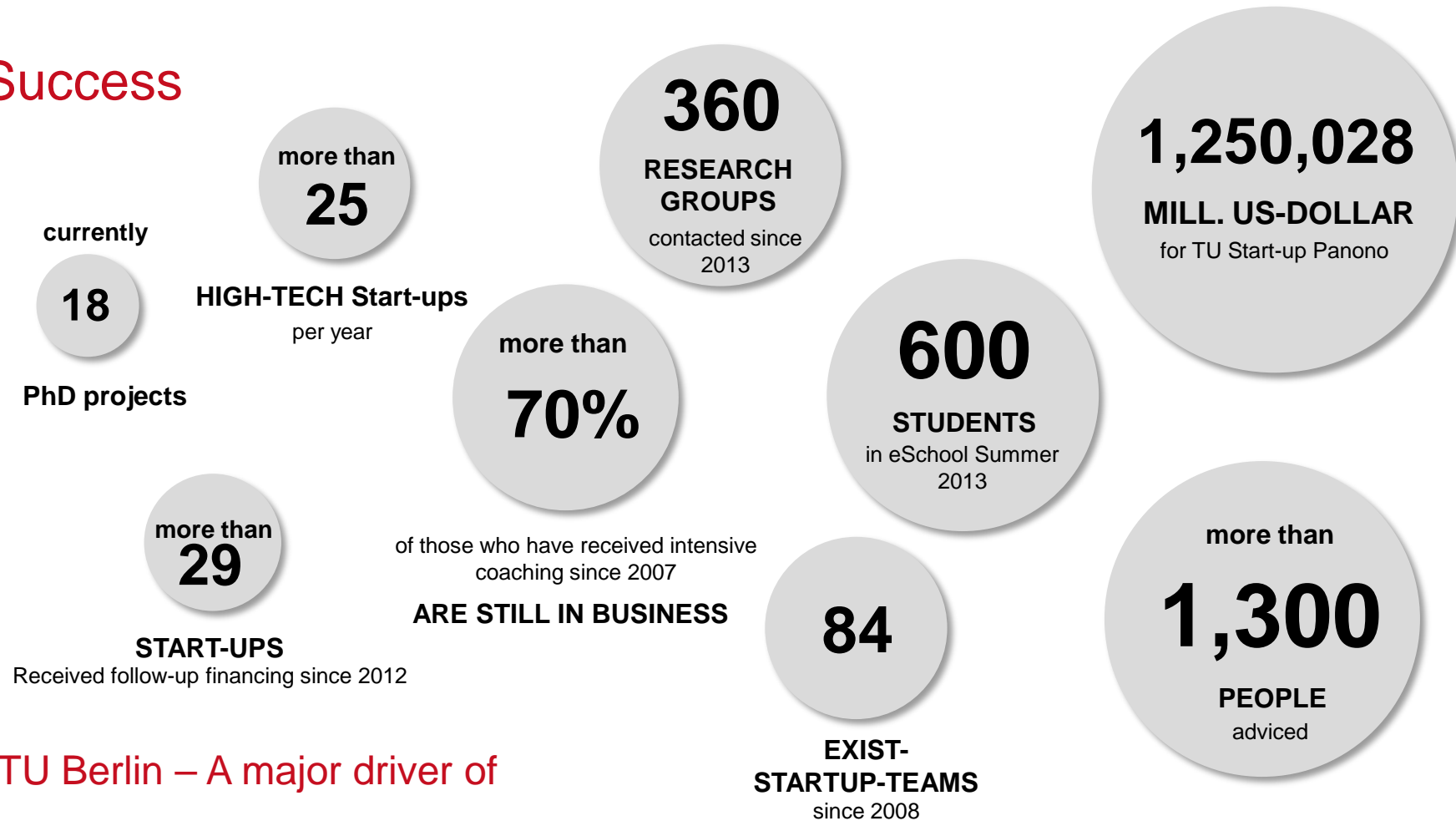
Selected Start-ups II

| Venture/ Idea | Year of foundation | Sector | Professional Background | Sponsorship |
|---------------------------------------|--------------------|--------------------------|---|-----------------------|
| akvola sustainable water treatment | 2013 | Environmental Technology | Process engineering, electrical engineering | EXIST-FT, Climate-KIC |
| cringle money meets friends | 2014 | Mobile | Informatics | EXIST-GS |





Success



TU Berlin – A major driver of
entrepreneurial activities in the Berlin region



Thank you for your attention!

patrick.thurian@tu-berlin.de