Håvard Devold , Teknologidirektør ABB AS, 20.08.2015

Technology and Innovation
Local and university collaborations

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Contents

- Background ABB
- Background Innovation and University Collaboration
- The Norwegian Success model
- Barriers to Innovation

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Innovation
Shaping the world we know today through innovation

CEO Ulrich Spiesshofer

"As a global leader in power and automation technologies, ABB is continuously pioneering reliable, cleaner and more efficient energy and automation solutions, helping its customers increase the productivity of their industrial and infrastructure operations."

1,5 Billion USD invested annually in R&D

Headcount scientists and engineers 8000

70 Universities around the globe collaborating with us

Pioneering technology since 1883

Leadership built on consistent R&D investment

Mission
ABB Norway Technology





- *Profitable product* business – and increase profitability through owning high quality and standardized SW products & tools
- Enabling *profitable industry projects* through high quality products (partnering, system, service business, targeted domain tools)
- Increase scope and *pull-through* in system projects
- *Support Business strategy and growth*
- *Foster Innovation* – through competence, technology & processes

Research Based Innovation

- Drawing on 1.5 bn USD in R&D, Corporate Research etc.
- ABB Norway spends about 35 M$ on R&D, Big D, Small r
- Internal Innovation Board for screening emerging technologies, sparks
- Technology thought leaders meet to explore new technology opportunities.
- Prioritised list of Universities, Engineering Colleges and Research Institutes.

- Full framework of Portfolio responsibility, Product Managers, Development Gate model etc.

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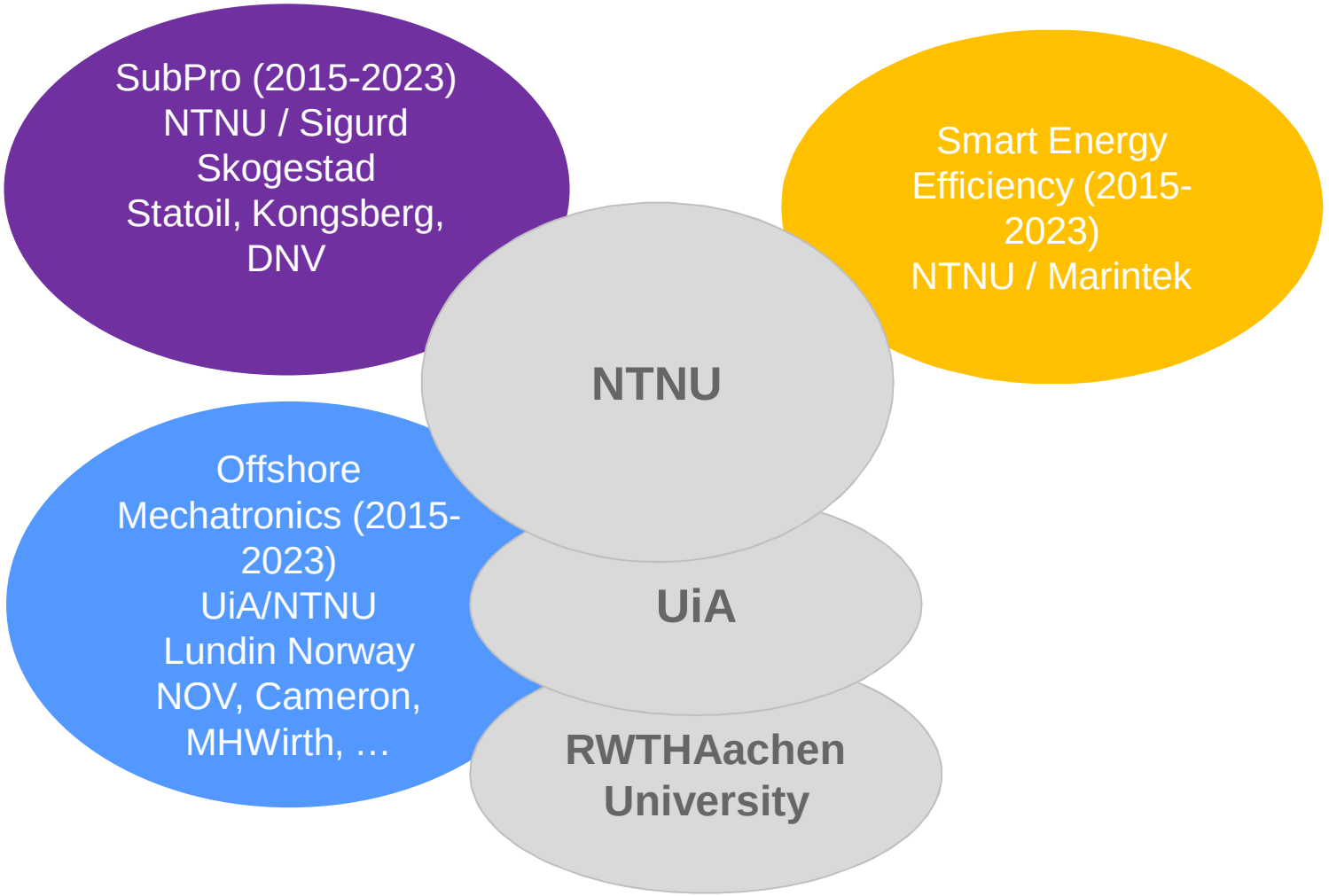
SFIs – Strategic centers for research driven innovation
Achievements 2014



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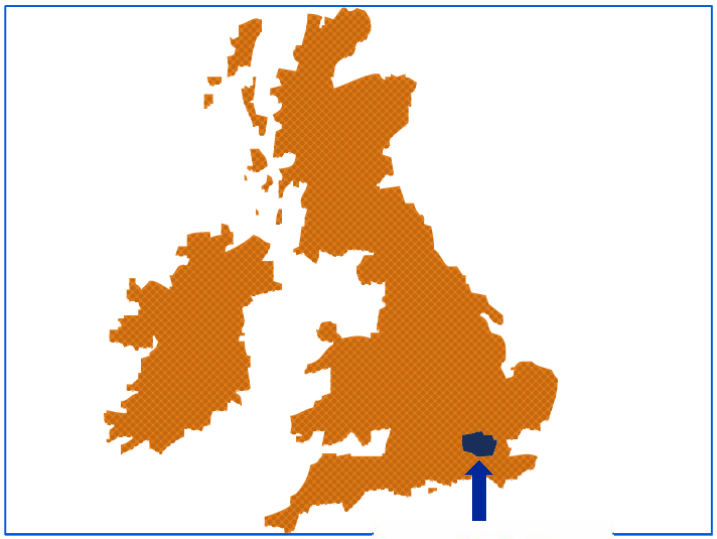
Strategic university collaboration



+ 70 Universiteter innen ABB

NTNU
Main achievements and future activities

NTNU – Trondheim
Norwegian University of
Science and Technology

23.000 students
250 studie programs
371 Ph.D.s in 2013

- Access to M.Sc. and Ph.D. programs
- Recruiting summer students, trainees and new employees
- Strategic collaboration (EU projects, SFIs, …)
- NTNU compressor lab

- Charlotte Skourup holds a 20% position as Associate Professor @ Engineering Cybernetics
  - Teaching
  - Input to strategy process
  - Profiling during student presentations
  - Student supervision
  - Ph.D. evaluation committees

- ABB Benefits and outcome:
  - Access to highly qualified M.Sc. students for projects
  - Recruiting
  - Long-term strategy planning
    - Focused R&D
  - Access to highly qualified scientists in control engineering, cybernetics, marine, chemicals, machine engineering, …

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University of Agder (UiA)
Main achievements and future activities

3.000 students
Large industrial network in oil and gas

- Access to B.Sc. and M.Sc. programs
- Ph.D. dissertation June 2015
- Strategic collaboration (SFI, …)

- David Anisi holds a 20% position as Associate Professor
  - Teaching
  - Student supervision

- Benefits and outcome
  - Access to B.Sc. and M.Sc. students for projects
  - Recruiting
  - Long-term research
    - Focused R&D
  - Access to other universities and industrial partners (oil and gas)

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Imperial College London (ICL)
Main achievements and future activities

- 14.700 students
- 6.100 degrees very year
- Undergraduates from more than 125 countries

- Extended collaboration with ABB sponsored professor Nina Thornhill, Chemical Engineering
  - Secondments both to and from ICL
  - Major contributions to roadmap for «Electrical systems in large industrial sites»
  - Two successful EU projects ended in 2014
- Upcoming activities
  - Two new EU project proposals
  - Ensure projects with ICL Pilot Plant + simulator
  - Define and supervise ABB Ph.D. students

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University collaborations
Achievements 2014

- Secondments with universities
  - Two ABB resources to Imperial College
    - Contribution to roadmap for …
  - Ph.D. student from Imperial College (PMS and simulator)
  - Ph.D. student from Polytechnical University in Krakow
- ABB funded Ph.D. student at UiA
  - Received his Ph.D. degree in June

- Strategic university collaborations
  - Two new EU application submitted by Imperial College
  - SFI Offshore Mechatronics; collaboration with UiA - approved
  - SFI SUBPRO; collaboration with NTNU - approved

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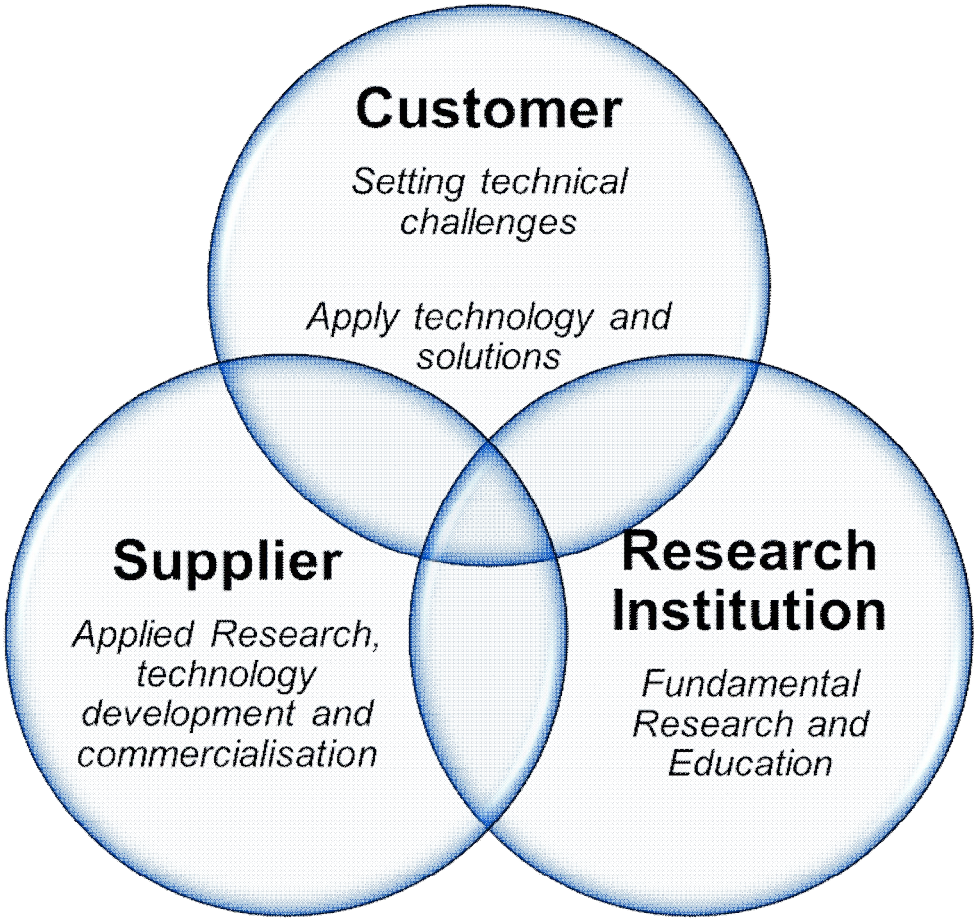
Innovation Partnership Projects
The successful Norwegian Model

- **Opportunities**
  - Commercially focussed R&D
  - Fast track “innovation to implementation”
  - Access to plant for early references
  - Risk sharing
- **Benefits**
  - Early access to technology, access to unique team
  - Network effect
  - Ability to influence development
  - Focus on core business



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Some barriers to discuss

- IP, Confidentiality and NDAs
- Mobility of Key personnel
- Constant pressure and Limited Innovation focus
- Investments in Product maintenance vs Innovation
- Exchange with Industry personnel
- Difficult to Locate key Competencies for emerging Innovation areas.

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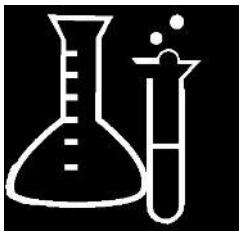
IP, Confidentiality and NDAs



- Dramatically increased use of confidentiality, NDAs and secrecy often limits what we can talk about and with whom.
- Trend that universities want to own results and IPR in joint research projects. Very limiting and e.g. NTNU has started to follow this American trend. Barrier to Innovation leading to commercialization of products.
- «Clubbing» - trend to create exclusive fora with limited information distribution even if R&D has been publicly funded. Often driven by research institutions.

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Mobility of Key Personnel

- Particularly in high activity years, difficult to find experienced / senior personnel.
- Limited exchange between Suppliers, End Users and Acdemia

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Constant pressure and limited Innovation focus

- Limited understanding in many locations of what Innovation means (not the same as FoU/R&D)
- Motivated, committed science personnel driving Innovation not always compatible with academic credit.
- Group Conformity, how to break “out of the box” and get different people to explore alternate routes.
- Often using new graduates, summer internships, ph.d. candidates etc. can lead to challenging conclusions and new directions to explore. (we always have 6-10 summer interns in Oil&Gas)
- Cross discipline skills e.g. across chemical / mechanical / electrical / control.

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Product Maintenance vs Innovation
Cyclic vs Step

- High cost of product maintenance limits reinvestment in Innovative ares
- Long development cycle and payback limits attractiveness
- Limited volume to carry R&D cost depreciation.

- Local Market size vs Major Markets

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Use of Industy in education

- University financed 20% positions to attract experienced Industry technologists to engage in education and mentoring of students.
- => Do not always expect industry to pay.

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Difficult to locate key competencies for emerging innovation areas.

- Established technologies often have clear homes and well known key leaders
- Emerging fields are often claimed by many institutions, with few possessing any significant knowledge.
- examples
  - Insect farming
  - Seabed Mining
  - Service Robots
  - Closed systems fishfarming

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