Background:

- Master in Technology Management (MTM):

"Research Collaboration and Knowledge Transfer in University-Industry Links" (2008)

NTNU, NHH, MIT Sloan
Randi Elisabeth Taxt

• Cand.scient in Cellebiology

• Master in Technology Management

Was: Deputy Director of Research and Strategy, The faculty of mathematics and natural Sciences, UiB

Now: Library Director at the University of Bergen Library

Boston – recognised by many renowned institutions within research and education, innovation (biotech, ICT), Red Sox and lobster!
Executive Master in Technology Management

Studies in Innovation and Strategic Management

- Sloan Fellow Program (mature students)
- Very good lectures (energetic)
- Relevant examples from business and research
- Balanced mix of theory and practical exercises
- Good theory within leadership (and practical's…….)
- Relevant and interesting guest lectures
- Many, many interesting speeches and guests on campus – Sir John Brown (BP), Jack Welch (GE), Steve Jobs (Apple) +++
The “Network” Position
Route 128 Biotechnology Cluster in Boston

Describes how knowledge, creativity, learning and communication can be sources of innovation.


Such clusters often recognised by:

- Co-authorship
- "Star scientists" (a university or two necessary……)
- A lot of collaboration between research institutes
- A high degree of formal competence within the companies (master, PhD)
- Extensive collaboration among companies (also among competitors)
- High degree of mobility within the region

- Personal collaboration
- Knowledge transfer – tacit knowledge
- Social relations

NB! Often difficult to imitate by other regions!
Explicit and non-explicit knowledge

- **Explicit knowledge** – highly codified: manuals, blueprints, recipes, guidance, scientific publications etc.

- **Tacit knowledge** (Polyani, 1956)
  - Humans know a good deal more than they can express verbally
    - Body language
    - Experience
    - Skills

- Transferred from person to person "Sticky" (master - apprenticeship) (Platon)

- Research has shown that tacit knowledge is important for innovation and innovation systems

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Research Collaboration and Knowledge Transfer in University-Industry Links

An empirical study of research collaboration and knowledge transfer between the University of Bergen and industrial companies

Thesis for the Master of Technology Management Programme
Bergen

• "Kremmerby"
• Traditional weak links between industry and science
• Business not knowledge intensive

• Described in studies (Fredriksen og Grønhaug, 1996, etc...)
• What is done?

• Political will: Bergen community, UiB, Bergen Chamber of Commerce
Universitetet i Bergen – strategic plan 2005-2010

Long-term high-quality basic research leads to commercially viable ideas, the establishment of knowledge enterprises and the transfer of competence to established businesses.

Cooperation with the business sector will increase the University’s access to external research funds, give researchers new perspectives on their research and increase the competence and competitiveness of the businesses involved.

Purpose of the study

• The study aims to gain a deeper knowledge in the features of collaborating patterns, knowledge transfer and the type of research conducted in university-industry links.

• The study further aims to shed light on the University of Bergen, and especially the Faculty of Mathematics and Natural sciences, as a source of new knowledge for the neighbouring society.
Questions addressed

1. How do university researchers and their industrial partners collaborate within the university-industry links?

2. How does the knowledge transfer take place between university researchers and their industrial partners?

3. Can any novel results and/or spin offs from the university-industry links be identified?

The linear model of innovation
(The Science Push Mode)

Vannevar Bush, The Endless Frontier, “As we may think” (1945)

1. Basic Research is performed without any thought of practical needs

2. Basic Research is the pacemaker of technological progress

Source: Prof. Karim Lakhani, MIT Sloan
Pasteurs Quadrant – Donald L. Stokes (1997)

<table>
<thead>
<tr>
<th>Quest for fundamental understanding</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure Basic Research (Bohr)</td>
<td></td>
<td></td>
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<tr>
<td>Pure Applied Research (Edison)</td>
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Consideration of use

The “Network” Position
Route 128 Biotechnology Cluster in Boston

Ties:
- R&D collaborations
- Financial links
- Joint commercialization
- Cross-licensing

Entities:
- Pharmaceutical corporations
- Dedicated bio-tech firms
- Venture capital firms
- Universities, research institutes
- Government institutes

Describes how knowledge, creativity, learning and communication can be sources of innovation.

Method

- 7 projects co-financed by private companies at The faculty of mathematics and natural sciences (UiB)
- All the project leaders at UiB were renowned professors within their field
- 16 persons identified (both from university and from the companies)
- Semi-structured interviews were conducted

<table>
<thead>
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<th>Field of Research</th>
<th>Academic entrepreneurship companies</th>
<th>Entrepreneurial companies (SME**)</th>
<th>Large corporations</th>
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<tr>
<td>Total</td>
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<td>1</td>
<td>4</td>
<td>7</td>
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</table>

* Geological, geophysics and mathematical disciplines represented from UiB in the different projects
** Small and medium enterprises

The most important results (all in all very positive)

1. Basic research is important for university-industry links

2. Tacit, or non-codified, channels for knowledge transfer are exceeding explicit or codified channels (Open Science)

3. Informal and long-term relationships between university researchers and their industrial partners seem to be an important trigger for establishment of university-industry links.

4. Formal competence in terms of master- and PhD candidates is crucial for establishment of communication platforms between the research communities and their industrial partners.

5. The radical results and various spin offs reported from the projects studied indicates that the University of Bergen has a lot to offer to local, national and international industry.

6. The University of Bergen is not sufficiently visible for potential collaborating partners outside the academic society. The institution also appears not to market its candidates in an efficient way.
The importance of different channels for knowledge transfer

But also some other observations

- When deliveries where expected from the project:
  - Tough deadlines
  - Restricted freedom
  - Problems with capacity
  - UiB as an unorganised project partner
  - Problems with long term funding
Different focus

Citation Index
Level 2 publications

Dobbef fystasj-opphengsforkoping

You have to hire an employee to take care of each professor. They live in their own world where deadlines don’t exist. It is totally unimportant for them in their everyday life. Science and technology is important for them, but the market’s needs seem unimportant.
This was a prestigious project for the company. Promises about freedom to follow the problems arising during the project was forgotten as the pressure build up for deliverables. The project was very time consuming for me and our contract partners showed little understanding for the academic culture. I will not do this again – there was not enough in it for me……

UiB should market themselves in a more offensive way, both the candidates and as a potential partner for industry
We were very inexperienced and were caught in all traps possible along the path for commercialise our product.

Some advice from the study (interviews)

1. The University in Bergen should foster a culture where the synergy of basic research efforts, scientific excellence and commitments with industry is more valued than today.

2. An office for external relations, like an industrial liaison office, could be established at the University of Bergen.

3. Firms in Bergen could invest more extensively in research and long term relationships with the academic society in Bergen than they do today.

4. Knowledge-based industrial firms should strive to increase the formal competence within the company by increasing the number of masters and PhDs employed.
What innovation models do we use traditionally in Norway?

- The linear innovation model?

Basic research → Applied research → commercialisation

University → research institute → company
An emerging open and distributed innovation system - also in Bergen!!

- This and other studies in the field, points in the direction of an emerging open and distributed innovation system.

- A shift from explicit to tacit knowledge in research based innovation

- This shift in discourse should in turn affect how policy makers think and act when they design new instruments and incentives for research-based innovation.

- They should seek to understand and foster the new emerging networks responsible for novel discovery and innovation.

- Rethinking incentives and adaptation for research-based innovation should in future become an important issue both nationally, locally and at an institutional level.

More question to be addressed

- Think more about networking?
- Think less about organisational barriers?
- More distributed?

- More human mobility?

- A new study about innovation in Bergen?
- Quantitative based?
'What's most important for us is that Harvard stays great and get even greater. If Harvard succeeds in doing that, we will be fine'


Thank you!