IP evaluation and protection

Economic aspects of innovation

in cooperation with TUM-Tech GmbH

Dr. Christian Hackl
Managing Director of TUM-Tech GmbH

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Your speaker – Christian Hackl

β Background
   - Ph.D. in Chemistry

β More than 20 years experience in industry
   (management consulting), CEO of TUM-Tech for
   more than 15 years

β TUM-Tech GmbH:
   - Tech: Technology Transfer (demand oriented)
   - Consulting on innovation management for
     companies and researcher

β Assistant Professor at TUM (Technology and
   Innovation Management)

β Cofounder of start-up (renewable energy)
Overview of series

1. IP strategy
   Five virtual classroom sessions

2. IP evaluation and protection
   Five virtual classroom sessions in June 2018

3. IP value extraction and commercialisation
   Four virtual classroom sessions in October 2018
Series Two - IP evaluation and protection

Module 1: “Innovation processes & systems”

Module 2: “Economic aspects of innovation”

Module 3: “Evaluation dimensions”

Module 4: “Scrutinising the invention”

Module 5: “Patent filing tactics and managing the patent life cycle”
Agenda

1. Analysis of market and technology position
2. Economic relevance
3. Venture capitalists & IP
4. Aligning money, fees, and government support
5. Importance of IP-based industries for the economy
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Product / Technology Life Cycle
Analysis of market position

Source:
Bruce Henderson, BCG-Matrix
Product / Technology Life Cycle

- Development
- Introduction
- Growth
- Maturity
- Decline
Innovation Adoption Curve (Rogers)

Source: http://www.valuebasedmanagement.net/methods Rogers_innovation_adoption_curve.html
Technology-Push vs Market-Pull

Source: Trott, P.: Innovation management and new product development, Pearson: 2017
GE-McKinsey technology portfolio

Source: Adapted from “Enduring ideas: the GE-McKinsey nine-box matrix” (www.mckinsey.com)

Further option:
Market priority = Market attractiveness vs own market position
Technology priority = Techn. attractiveness vs own techn. position
Analysis of innovation portfolio

Source:
Agenda

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Why are IPR important for your business?

- Protects your technology / product and business (against competitors, copycats)
- Secures your upfront R&D investment
- Provides “non-financial” (brand, reputation) and financial advantages (price premium)
- Allows for additional revenues (e.g. licensing)
- Increases company valuation (security for loans)
- …
Importance of patents for your business

It is not about being proud of a patent hanging on the wall …
It is about using a patent as a commercial tool
Importance of IP for your business

“Innovation without protection is philanthropy”

Marx Blaxill

“Just because you invent it doesn’t mean you get the money for it”

Jim Balsillie (former CEO of Research in Motion)

Source:
Marx Blaxill: author of book “The Invisible Edge”
Jim Balsillie: former CEO of Research in Motion (BlackBerry)
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1. Analysis of market and technology position
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3. Venture capitalists (VCs) & IP
4. Aligning money, fees, and government support
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Cyclic model of innovation

Source: Berkhout: Connecting technological capabilities with market needs using a cyclic innovation model, 2010
Importance of IPR for start-ups

How important or unimportant is each of the following in your company’s ability to capture competitive advantage from its technology inventions?

Source:

1,332 early-stage technology companies founded 1998 - 2008
Importance of patents for start-ups

How important or unimportant have the following been to your company in seeking patent protection in the United States?  

- Prevent others from copying our products or services: 4
- Improve chances of securing investment: 3
- Improve chances / quality of liquidity (e.g., IPO / acquisition): 3
- Enhance company reputation / product image: 3
- Improve negotiating position with other companies (e.g., cross-licenses): 3
- Prevent patent infringement actions against us: 3
- Obtain licensing revenues: 2

(1=Not at all important; 2=Slightly important; 3=Moderately important; 4=Very important)

1,332 early-stage technology companies founded 1998 - 2008
Start-up financing phases

Start-up financing phases (biotech)

Source:
www.universityaffairs.ca
(adapted from Wikipedia)
Importance of patents for VCs

**Situation of VC**

- Information asymmetry between VC and start-up
- Information decision at high degree of uncertainty
  - No track record
  - No revenues
  - High risk
- Problem of securing investment
  - In case of success
  - In case of failure

**Value add of patent**

- Help overcome information asymmetries
- Lower uncertainty (to a certain extent)
  - Signal for novel and inventive technology
  - Seal of quality
- Economic benefit
  - In case of success
  - In case of failure (VC owns patent)

Source: Harhoff, D.: the role of patents and licenses in securing external finance for innovation. EIB Papers, Vol 14 (2)
Cumulative probability of success of start-ups

Source:
Subsample of 587 VC backed start-ups (post-investment)
Probability of success of start-ups

- With patent: 30%
- Without patent: 8%
- Patent premium: 22%

Source:
Subsample of 587 VC backed start-ups (post-investment), 2007 till 2012
Importance of patents for funding – case studies

Recycling waste heat to cool down the planet

A renewable energy company founded in 2008, Orcan Energy offers standard components for heat power generation that recycle waste heat by turning it into electricity, using the Organic Rankine Cycle (ORC), a process similar to that used in steam engines. Having started as a spin-off from the Technical University of Munich (TUM) in Germany, Orcan now has 65 employees. Patents are “Patent protection is critical when it comes to venture capital funding for early-stage technology companies”

Andreas Schuster
Co-founder and CTO, Orcan Energy

Using red algae to fight the flu

Founded in 2006, Marinomed is an Austrian biopharmaceutical spin-off from the Veterinary University of Vienna. The company’s main technology platform is based on the natural polymer Caraghees, which is isolated from red algae and is active against respiratory viruses. As a drug discovery “Marinomed is an IP-driven company. It is vital that we own and manage the IP associated with our products.”

Andreas Grossauer
CEO, Marinomed

Source:
www.epo.org, case studies

Two out of a series of 12 case studies (produced by the EPO in 2017)
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4. **Aligning money, fees, and government support**
5. Importance of IP-based industries for the economy
Funding of innovation (company perspective)

- **Aligning of R&D-budget** is critical task
- Not one-time task, but **ongoing**
- Based on constant evaluation of R&D-projects, e.g. along important **stage gates**
- Fees for **IP-protection** have to be budgeted as well
- Public funding for innovation (various levels): sometimes **IP-strategy is prerequisite for public funding**
Stage Gate - Process

Source: www.stage-gate.com
Robert Cooper
# Priorisation of innovation budget

## Four Spending Choices for Today vs. Tomorrow

<table>
<thead>
<tr>
<th></th>
<th>Benefits</th>
<th>Management System</th>
<th>Market Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily operations</td>
<td>Deliver results, sustain success</td>
<td>Within existing organization, ROI</td>
<td>Within existing value network and customers</td>
</tr>
<tr>
<td>turbulence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incremental</td>
<td>Faster, cheaper (efficiency)</td>
<td>Within existing organization, ROI</td>
<td>Within existing value network and customers</td>
</tr>
<tr>
<td>improvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustaining</td>
<td>Better (effectiveness)</td>
<td>Extraordinary structures (e.g., program office) to</td>
<td>Within existing value network and customers</td>
</tr>
<tr>
<td>innovations</td>
<td></td>
<td>manage across functions and boundaries, ROI,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>experimentation</td>
<td></td>
</tr>
<tr>
<td>Disruptive</td>
<td>Growth (transformation)</td>
<td>Autonomous units to incubate opportunities, venture</td>
<td>New value networks and customers</td>
</tr>
<tr>
<td>innovations</td>
<td></td>
<td>funding, experimentation</td>
<td></td>
</tr>
</tbody>
</table>

Source: Power, B.: How to prioritize your innovation budget. HBR 2014
Triple helix model for innovation

Source: Trott, P.: Innovation management and new product development, Pearson: 2017
Role of the state in innovation

Source: Trott, P.: Innovation management and new product development, Pearson: 2017
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Value creation

Innovation creates value in various dimensions:

- Societal value
- Economic value (nation)
- Consumer Surplus
- Financial value (company)
Economic value creation (nation): IP-intensive industries...

- ... create jobs at all skill levels
- ... pay their workers higher salaries
- ... invest more in R&D to drive innovation
- ... create new products and services
  - strengthening competitiveness
- ... drive American exports
- ... exports helped moderate U.S. trade deficits

Source:
The Impact of Innovation and the Role of IPR on US. Productivity, Competitiveness, Jobs, Wages, and Exports. N. Pham, 2010
Importance of patent protection for R&D

Equivalent subsidy rate of patents by industry

<table>
<thead>
<tr>
<th>Industry</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmaceutical</td>
<td>22%</td>
</tr>
<tr>
<td>Industrial Chemicals</td>
<td>14%</td>
</tr>
<tr>
<td>Food, kindred and tobacco products</td>
<td>2%</td>
</tr>
<tr>
<td>Semi-conductors</td>
<td>23%</td>
</tr>
<tr>
<td>Electronic Components</td>
<td>13%</td>
</tr>
<tr>
<td>Communication Equipment</td>
<td>39%</td>
</tr>
<tr>
<td>Computer</td>
<td>8%</td>
</tr>
<tr>
<td>Metals</td>
<td>23%</td>
</tr>
<tr>
<td>Rubber Products</td>
<td>19%</td>
</tr>
<tr>
<td>Aircraft and Missiles</td>
<td>4%</td>
</tr>
<tr>
<td>Instruments</td>
<td>16%</td>
</tr>
<tr>
<td>Medical Instruments</td>
<td>21%</td>
</tr>
</tbody>
</table>

Role of IPR is important, but industry-specific

Source: Ménière, Yann: Patents and Innovation: Friend or Foes. CERNA 2006

Value of patents represents x% of the investment in R&D. Estimate of how much of R&D expenditure can be recouped through patents or subsidy that firms would need to maintain current level of R&D in absence of patents.
Importance of IPR for the economy

Comparison of average wage (€/week)

Source:
Intellectual property rights intensive industries and economic performance in the European Union; EPO 2018
www.epo.org/ipr-intensive-industries
Value creation

Source:
The Impact of Innovation and the Role of IPR on US. Productivity, Competitiveness, Jobs, Wages, and Exports. N. Pham, 2010
Value creation

Source:
The Impact of Innovation and the Role of IPR on US. Productivity, Competitiveness, Jobs, Wages, and Exports. N. Pham, 2010
Global innovation index

Source: Cornell, INSEAD, WIPO: The Global Innovation Index 2015

The Global Innovation Index Score is computed by taking the average of the scores in two sub-indices:

– the Innovation Input Index
– the Innovation Output Index

Bubble size: population