Knowledge Transfer & Innovation in Europe: Policy and Governance Challenges

Prof. Bruno van Pottelsberghe

Dean, SBS-EM, ULB
Chairman, Knowledge Transfer Committee, ULB
Former Chief Economist of the European Patent Office
"I'm an idea man."
A knowledge transfer success for....
Compared to American universities, European ones seem less successful in transferring academic knowledge into economic outcomes.

Table: Commercialization performance
European and American universities, FY 2008

<table>
<thead>
<tr>
<th></th>
<th>EU</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priority patent filings</td>
<td>2,951 (10)</td>
<td>12,920 (67.6)</td>
</tr>
<tr>
<td>Licenses/options executed</td>
<td>3,574 (12)</td>
<td>5,039 (26)</td>
</tr>
<tr>
<td>Spin-off created</td>
<td>480 (2)</td>
<td>595 (3)</td>
</tr>
</tbody>
</table>

Source: Average per university in parenthesis. ProTon and AUTM Surveys (ProTon, 2011)
• Metrics: patent system designs
Different systems...
Total patent filings at 3 major patent offices, 000s, 1980-2008
Global patent warming?
Total patent filings at 3 major patent offices, 1980-2008

- JPO
- USPTO
- EPO
**World Intellectual Property Organization**

**International Bureau**

**International Publication Date**: 27 December 2002 (27.12.2002)

**International Patent Classification**: C12N

**International Application Number**: PCT/US02/08123

**International Filing Date**: 19 March 2002 (19.03.2002)

**Filing Language**: English

**Publication Language**: English

**Priority Data**:
- 60/277,340 21 March 2001 (21.03.2001) US
- 60/331,287 13 November 2001 (13.11.2001) US

**Applicant (for all designated States except US)**: HUMAN GENOME SCIENCES, INC. [US/US]; 9410 Key West Avenue, Rockville, MD 20850 (US).

**Inventors; and**

**Inventors/Applicants (for US only)**: ROSEN, Craig, A. [US/US]; 22400 Rolling Hill Lane, Laytonsville, MD 20882 (US); RUBEN, Steven, M. [US/US]; 18528 Heritage Hills Drive, Olney, MD 20832 (US).


**Designated States (regional)**: ARIPPO patent (GH, GM, KE, LS, MW, MZ, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published**: without international search report and to be republished upon receipt of that report.

---

*3205 Pages 7 Claims Filed at EPO*
## National drafting practices at EPO: cf. Archontopoulos et al. (2007)

<table>
<thead>
<tr>
<th>Priority Country</th>
<th>% of Top 1000 filings in # of claims</th>
<th>% of Top 1000 filings in # of pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>0,3%</td>
<td>0,6%</td>
</tr>
<tr>
<td>France</td>
<td>0,1%</td>
<td>1,2%</td>
</tr>
<tr>
<td>Germany</td>
<td>0,6%</td>
<td>1,2%</td>
</tr>
<tr>
<td>Italy</td>
<td>0,2%</td>
<td>0,0%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>0,1%</td>
<td>0,0%</td>
</tr>
<tr>
<td>Spain</td>
<td>0,2%</td>
<td>0,0%</td>
</tr>
<tr>
<td>Sweden</td>
<td>0,1%</td>
<td>0,0%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0,0%</td>
<td>0,2%</td>
</tr>
<tr>
<td><strong>Continental Europe</strong></td>
<td><strong>1,6%</strong></td>
<td><strong>3,2%</strong></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1,3%</td>
<td>3,4%</td>
</tr>
<tr>
<td>EPO</td>
<td>0,2%</td>
<td>0,5%</td>
</tr>
<tr>
<td><strong>Total Europe</strong></td>
<td><strong>3,1%</strong></td>
<td><strong>7,1%</strong></td>
</tr>
<tr>
<td>Canada</td>
<td>0,2%</td>
<td>0,2%</td>
</tr>
<tr>
<td><strong>USA</strong></td>
<td><strong>82,0%</strong></td>
<td><strong>80,5%</strong></td>
</tr>
<tr>
<td><strong>North America</strong></td>
<td><strong>82,2%</strong></td>
<td><strong>80,7%</strong></td>
</tr>
<tr>
<td>Japan</td>
<td>4,4%</td>
<td>8,7%</td>
</tr>
<tr>
<td>Other</td>
<td>10,3%</td>
<td>3,5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100,0%</strong></td>
<td><strong>100,0%</strong></td>
</tr>
</tbody>
</table>
Global patent warming?
Number of claims filed at 3 patent offices, (Million), 1980-2008

Common trend but structural differences
<table>
<thead>
<tr>
<th></th>
<th>U. S.</th>
<th>Europe/Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Process</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Use</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Method of doing business</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Software (algorithm)</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Theories</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Human genes</td>
<td>✓</td>
<td>X</td>
</tr>
</tbody>
</table>
Figure 1: A simplified picture of the European patent system

Firm Z creates a new invention...

Commercial exploitation?

Yes

Keep secret?

No

Patent it?

Yes

...and decides to file a patent...

...then at the EPO

...if granted it must be validated, translated and renewed in the relevant member states
Patenting costs
(10 y, fees and translation costs)

Source: van Pottelsberghe and Mejer, 2010

Renewal fees (up to 10th)
Translation cost
Procedural cost

Bruno van Pottelsberghe, The quality factor in patent systems, May 2010
Figure 3: Relative patent costs (cumulated cost per million capita, €s)

- **Renewal fees (up to 10th)**
- **Translation cost**
- **Procedural cost**

*EPO-13* (6) stands for a European patent validated in 13 (6) countries.

Do not expect much from the new ‘deal’ (Beside the nice Newspapers headings) - step but only ‘first’

3 issues: three layers? Fees?
litigation process & costs
The New Deal: adding a third layer

- National
- European
- EU now
- Real EU?
All patents are not equal.

United States Patent

Treany

Patent No.: US 6,805,657 B2
Date of Patent: Oct. 19, 2004

5,896,740 A * 11/1999 Seeger .................. 280/87021
6,053,835 A 2/2000 Hills ......................... 482/800
6,447,186 B1 * 8/2001 Lam ....................... 280/87021

OTHER PUBLICATIONS

* died by examiner

Primary Examiner—Nicholas D. Lucchesi
Assistant Examiner—Tom Nguyen
Attorney, Agent, or Firm—Kenneth S. Watkins, Jr.

ABSTRACT


20 Claims, 5 Drawing Sheets

Figure 9

United States Patent Application Publication

Patent Application No.: US 2006/0014125 A1
Date of Publication: Jan. 19, 2006

5896740 A * 11/1999 Seeger .................. 280/87021
6053835 A 2/2000 Hills ......................... 482/800
6447186 B1 * 8/2001 Lam ....................... 280/87021

ABSTRACT

This invention is a training system which enables a human being to acquire sufficient hyperspace energy in order to pull the body out of dimension so that the person can walk through solid objects such as wooden doors.

22 Claims, 5 Drawing Sheets
Quality index and the relative demand for patent rights (claims filed per 000 researchers), 2008
MIND THE GAP?

- Metrics: patent system designs: subject matter, cost, complexity, quality
- Regulations on academic inventions
Late 1990s mark shift in university IP ownership policies in Europe toward university ownership (i.e. à la Bayh-Dole Act)
Share of university-owned and university-invented patents in total EPO filings, by country (1994-2002)

<table>
<thead>
<tr>
<th></th>
<th>BE</th>
<th>FR</th>
<th>IT</th>
<th>NL</th>
<th>SE</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owned</td>
<td>3.1%</td>
<td>0.3%</td>
<td>0.4%</td>
<td>1.0%</td>
<td>0.3%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Invented</td>
<td>6.5%</td>
<td>5.1%</td>
<td>4.0%</td>
<td>4.3%</td>
<td>6.2%</td>
<td>6.0%</td>
</tr>
</tbody>
</table>

Note: University owned implies that university is an applicant. University invented implies that inventor is an academic scholar.

- When considering a broader definition of academic-invented patents, university contribution increases to 4-6% and the gap between EU and US gets smaller.
Grace period allows the publication of an invention and still being able to file a patent for one year.

- **EPO**: NO
- **USPTO**: 12 months
- **JPO**: 6 months

Essentially aims at allowing scientists to publish and still have access to patentability.
MIND THE GAP?

• Metrics: patent system designs: **subject matter, cost, complexity, quality**

• Regulations on academic inventions: **Univ. Ownership & Grace period**

• Governance & managing people’s expectations
RWB: support to TT

- TTO structure (1995)
- Patents fund (1995)
- POC fund (2010)
- MIRVAL project (FSE, RW)
- ...

LIEU: Liaison Entreprises Universités

Feder, Union Européenne, Wallonie, Fédération Wallonie-Bruxelles
LIEU activities: Spin-offs creation

~1000 patents families

→ 60% are active
  → 32% are licensed or sold
  → 50% to spin-offs
ORGANIZATION AND MANAGEMENT OF KNOWLEDGE TRANSFER

**UNIVERSITY/PRO**
- Institutional factors
  - Size
  - Disciplinary composition
  - Autonomy
  - Culture towards TT
- Academic Research
  - Productivity
  - Quality & Multidisciplinary

**TECHNOLOGY TRANSFER OFFICE**
- Mission
- Resources
- Practices and Policies
  - Governance

**LOCAL ENVIRONMENT**
- High-tech demand
- Financial market conditions
- Policies promoting local development
Academic KT: various designs

- ULB-TTO: Close Proximity with admin and with Researchers
  - Serving exclusively the University and its Hospital
  - Embedded in the University Central Administration as a Service of the Research Department
  - Reporting to the Valorisation Board: Decision-Making Committee for KT

- 3 incubators (Brussels, Nivelles, Charleroi)

- Entrepreneurship Center

- Theodorus: the ULB investment fund
Identifying feasible organizational configurations

<table>
<thead>
<tr>
<th>Structural dimension</th>
<th>Values</th>
<th>a1</th>
<th>a2</th>
<th>b1</th>
<th>b2</th>
<th>b3</th>
<th>b4</th>
<th>c1</th>
<th>c2</th>
<th>d1</th>
<th>d2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Degree of discipline specialization</strong></td>
<td>Discipline-integrated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Discipline-specialized</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Degree of task specialization</strong></td>
<td>Fully integrated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Forward integrated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Backward integrated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IP specialized</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><strong>Level of autonomy</strong></td>
<td>Independent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dependent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td><strong>Degree of exclusivity</strong></td>
<td>Exclusive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-exclusive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### We theoretically identify four major TTO types

<table>
<thead>
<tr>
<th>(a) Degree of discipline spec.</th>
<th>Discipline-integrated</th>
<th>Discipline-specialized</th>
</tr>
</thead>
<tbody>
<tr>
<td>(c) Level of autonomy granted</td>
<td>Dependent</td>
<td>Independent</td>
</tr>
<tr>
<td>(d) Degree of exclusivity</td>
<td>Exclusive</td>
<td>Non-exclusive</td>
</tr>
<tr>
<td>TTO Type</td>
<td>I. Classical TTO</td>
<td>II. Autonomous TTO</td>
</tr>
</tbody>
</table>

- Each TTO type has strengths and weaknesses (depends on university and environment)
- Performance measurement should take into account the typology
Antibodies blocking innovation
Large firms vs Universities

You get back to that goddamn cubicle and start thinking outside the box!
• **The most challenging managerial decisions:**
  – Governance of the proof of concept (third parties?)
  – Governance of the spin-off (is the researcher good?)
  – Is the scientist an entrepreneur? Or a CTO? Who decides?
Creative tensions

1. Researcher vs advisor
2. Researcher vs BP vs control...
3. Researcher vs TTO
4. Researcher vs TTO vs Investors
5. Researcher vs TTO vs Investors vs manager/incubator
6. Researcher vs investors
MIND THE GAP?

- Metrics: patent system designs: **subject matter, cost, complexity, quality**
- Regulations on academic inventions: **Univ. Ownership & Grace period**
- Governance & managing people’s expectations: **managerial responsibility must be clarified, clarifies rules, milestone defined, foster training services for TTO staff, create incentives for professional TTO staff**
Develop your own PERSONAL mindset towards innovation

If you’re not failing every now and again, it’s a sign you’re not doing anything innovative.
Main references


