Solvay Brussels School of Economics and Management

# Knowledge Transfer & Innovation in Europe: Policy and Governance Challenges


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Former Chief Economist of the European Patent Office




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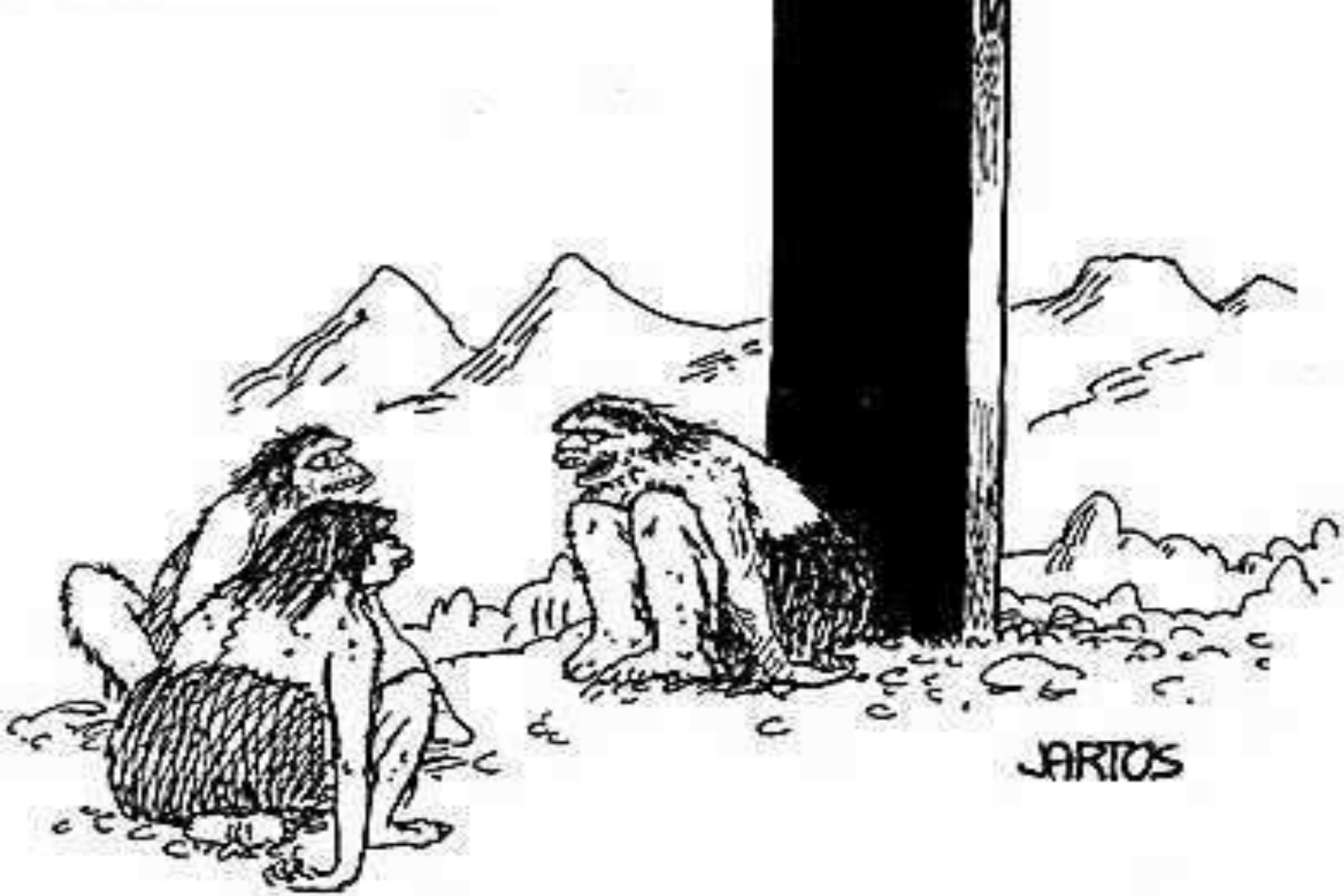


"I'm an idea man."

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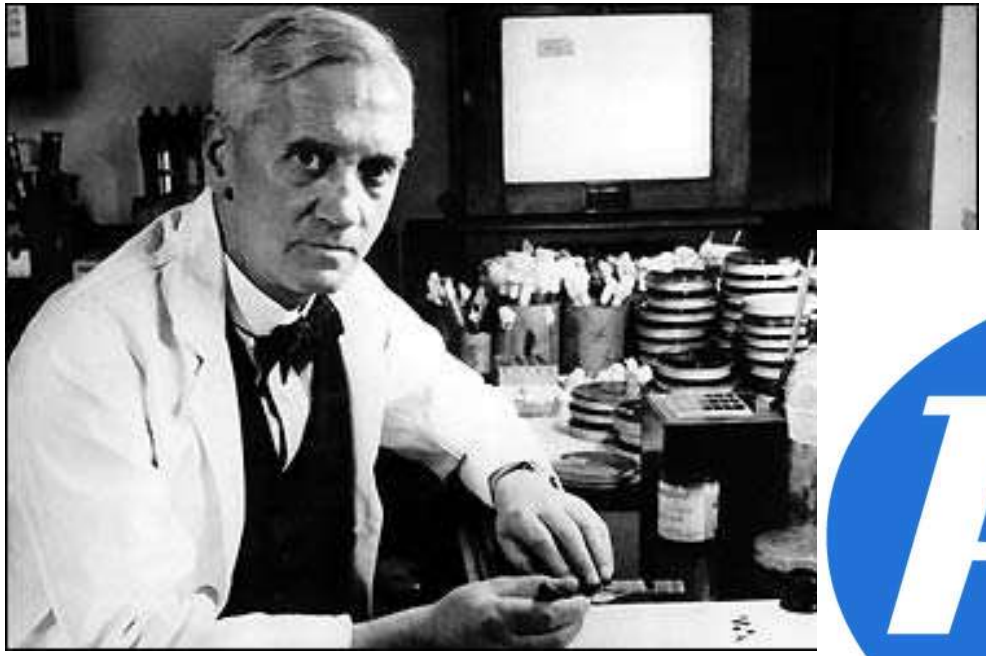
# A knowledge transfer success for….



Pfizer



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# KNOWLEDGE TRANSFER'S "OBSERVED" PERFORMANCE

**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**

| | EU | US |
|---|---|---|
| Priority patent filings | 2,951 (10) | 12,920 (67.6) |
| Licenses/options executed | 3,574 (12) | 5,039 (26) |
| Spin-off created | 480 (2) | 595 (3) |

Source: Average per university in parenthesis. ProTon and AUTM Surveys (ProTon, 2011)

# MIND THE GAP?

- Metrics: patent system designs

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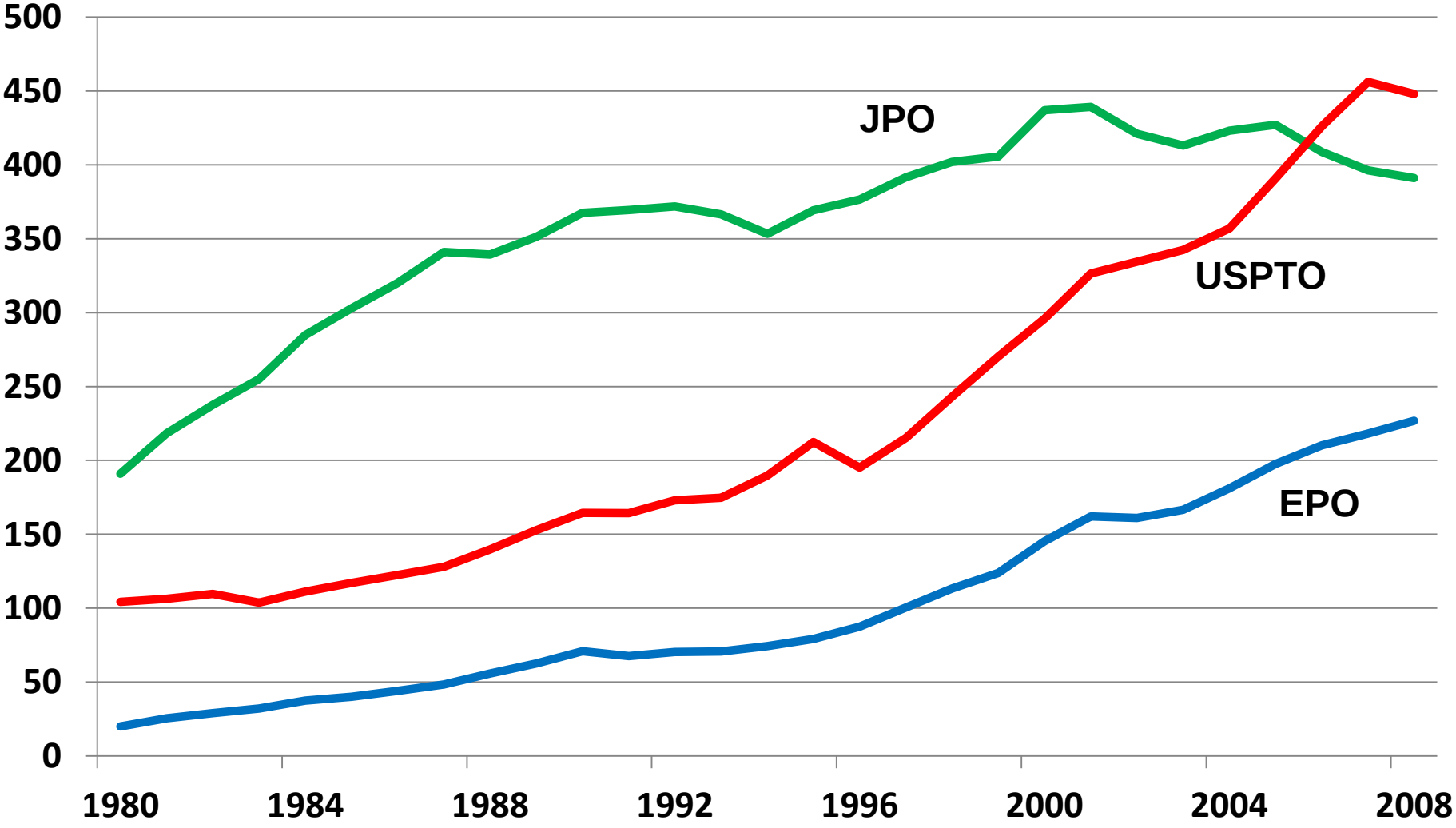
# Different systems…

## Total patent filings at 3 major patent offices, 000s, 1980-2008



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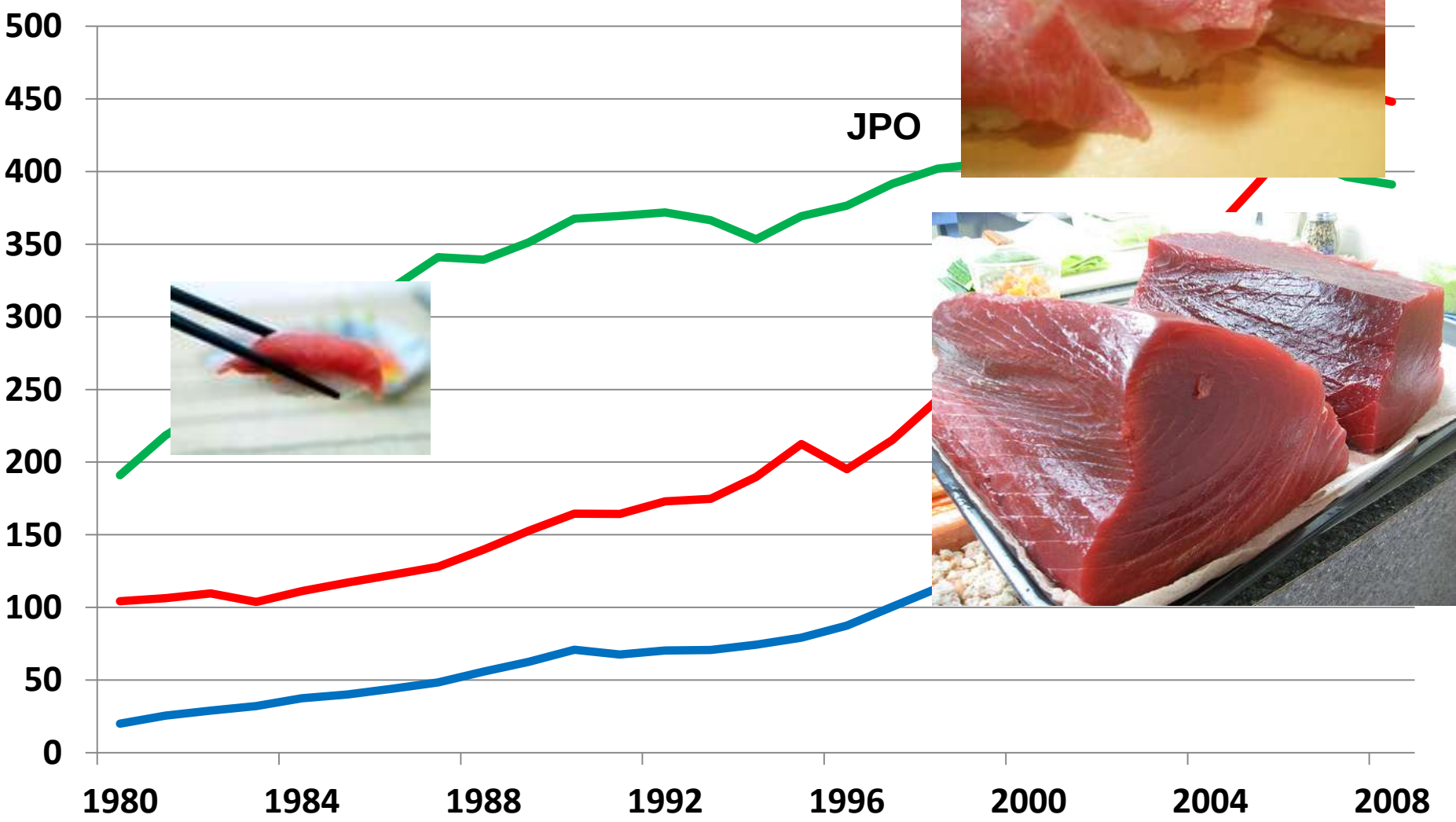
# Global patent warming?

## Total patent filings at 3 major p



(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
27 December 2002 (27.12.2002)

PCT

(10) International Publication Number
WO 02/102993 A2

(51) International Patent Classification[7]: C12N

(21) International Application Number: PCT/US02/08123

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

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

| | | |
|---|---|---|
| 60/277,340 | 21 March 2001 (21.03.2001) | US |
| 60/306,171 | 19 July 2001 (19.07.2001) | US |
| 60/331,287 | 13 November 2001 (13.11.2001) | US |

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

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

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, 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*
— *with sequenc*
*rately in elec*
*the Internati*

**3205 Pages**
**7 Claims**
**Filed at EPO**

# National drafting practices at EPO: cf. Archontopoulos et al. (2007)

| Priority Country | % of Top 1000 filings in # of claims | % of Top 1000 filings in # of pages |
|---|---|---|
| Denmark | 0,3% | 0,6% |
| France | 0,1% | 1,2% |
| Germany | 0,6% | 1,2% |
| Italy | 0,2% | 0,0% |
| Netherlands | 0,1% | 0,0% |
| Spain | 0,2% | 0,0% |
| Sweden | 0,1% | 0,0% |
| Switzerland | 0,0% | 0,2% |
| ***Continental Europe*** | ***1,6%*** | ***3,2%*** |
| United Kingdom | 1,3% | 3,4% |
| EPO | 0,2% | 0,5% |
| ***Total Europe*** | ***3,1%*** | ***7,1%*** |
| Canada | 0,2% | 0,2% |
| **USA** | **82,0%** | **80,5%** |
| ***North America*** | ***82,2%*** | ***80,7%*** |
| Japan | 4,4% | 8,7% |
| Other | 10,3% | 3,5% |
| **Total** | **100,0%** | **100,0%** |

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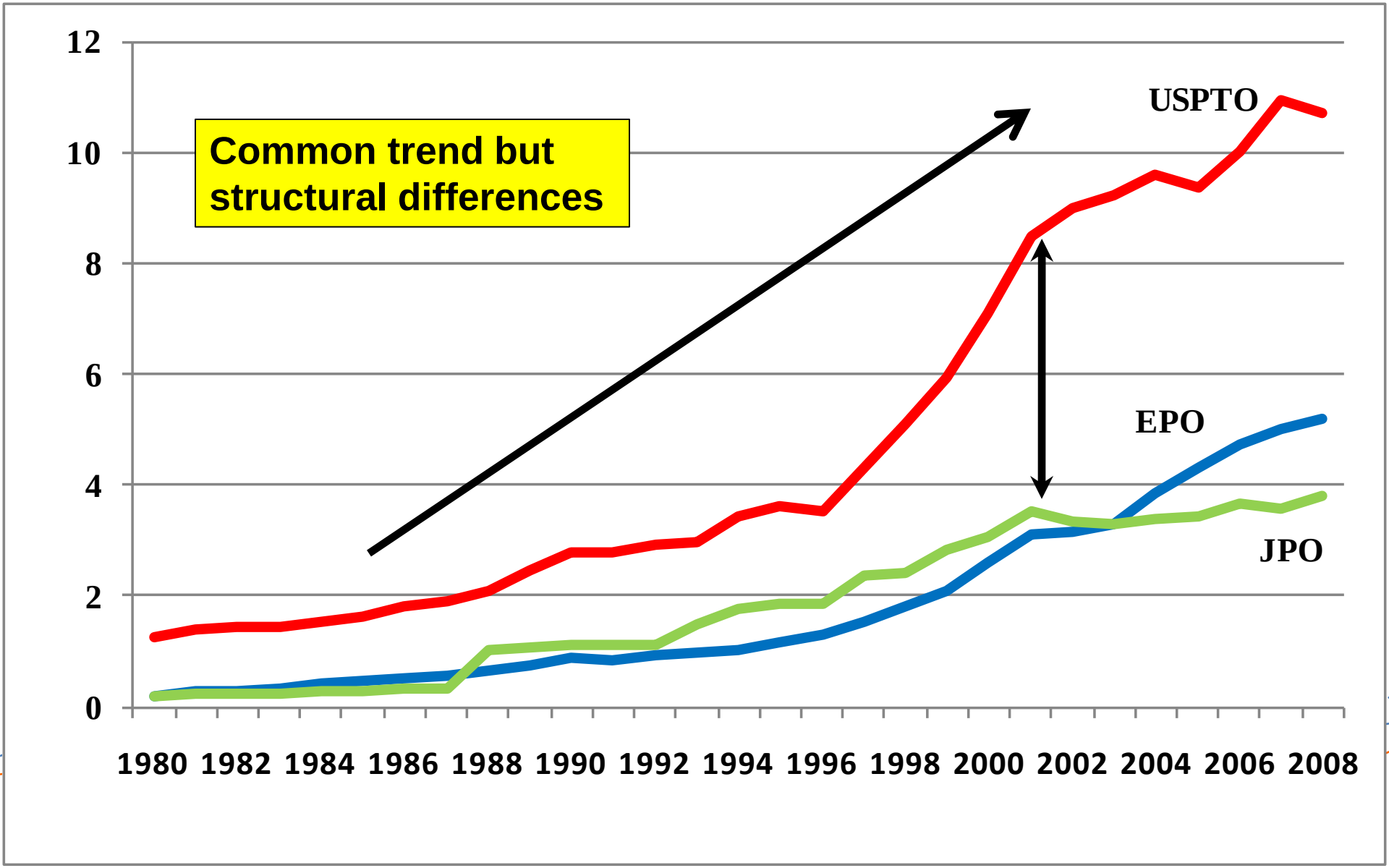
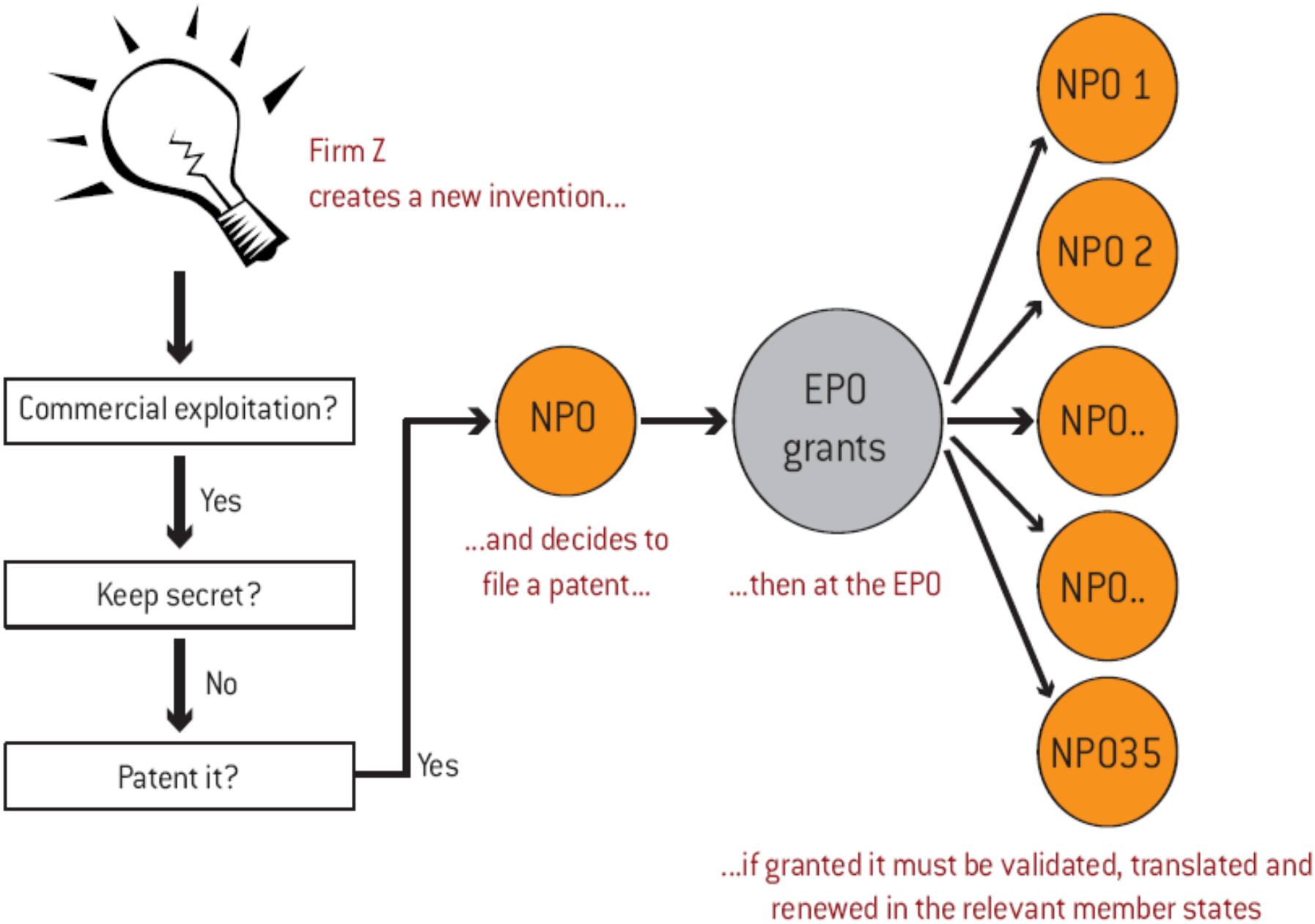
# Global patent warming?

## Number of claims filed at 3 patent offices, (Million), 1980-2008



| | U. S. | Europe/Japan |
|---|---|---|
| • Substance | ✓ | ✓ |
| • Process | ✓ | ✓ |
| • Use | ✓ | ✓ |
| • Method of doing business | ✓ | X |
| • Software (algorithm) | ✓ | X |
| • Theories | ✓ | X |
| • Human genes | ✓ | X |

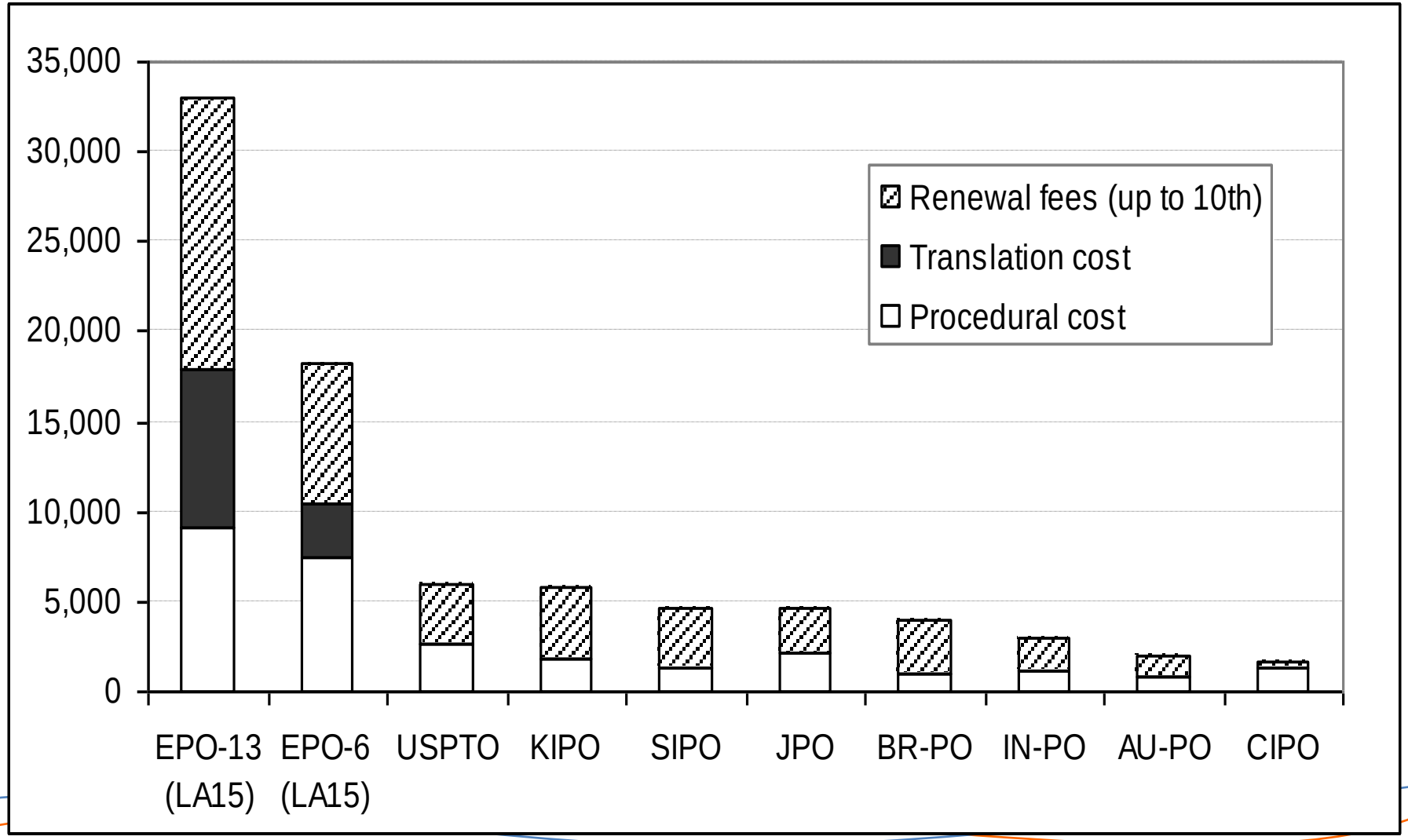
Figure 1: A simplified picture of the European patent system



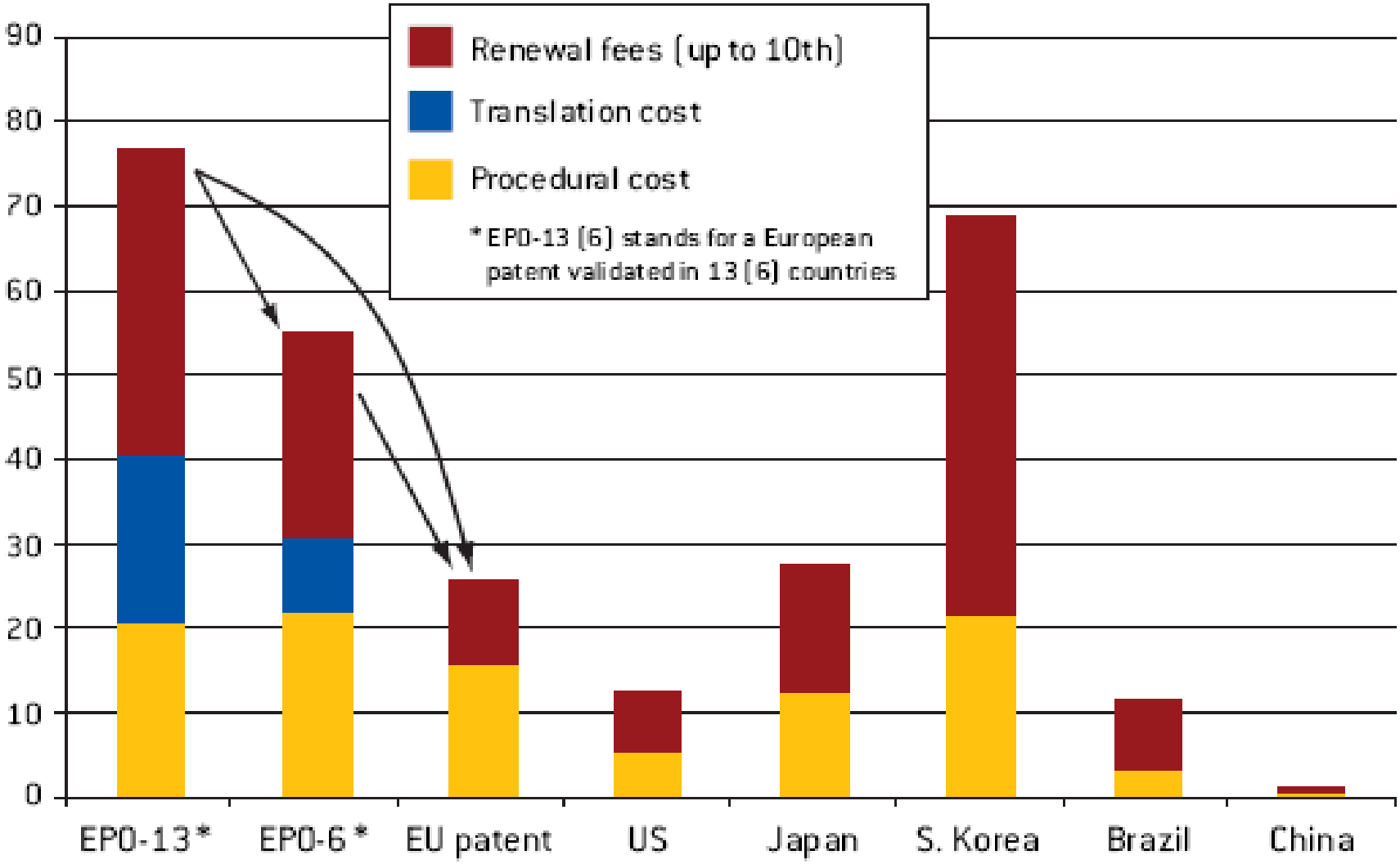
Source: van Pottelsberghe and Mejer, 2010

# Patenting costs

# (10 y, fees and translation costs)



## Figure 3: Relative patent costs (cumulated cost per million capita, €s)




Source: Bruegel based on van Pottelsberghe and Mejer (2008) and Danguy and van Pottelsberghe (2009). Figures refer to 2008.

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# Do not expect much from the new ‘deal’
# (Beside the nice Newspapers headings)

but only

3 issues: three layers? Fees? litigation process & costs

(a

‘first’)



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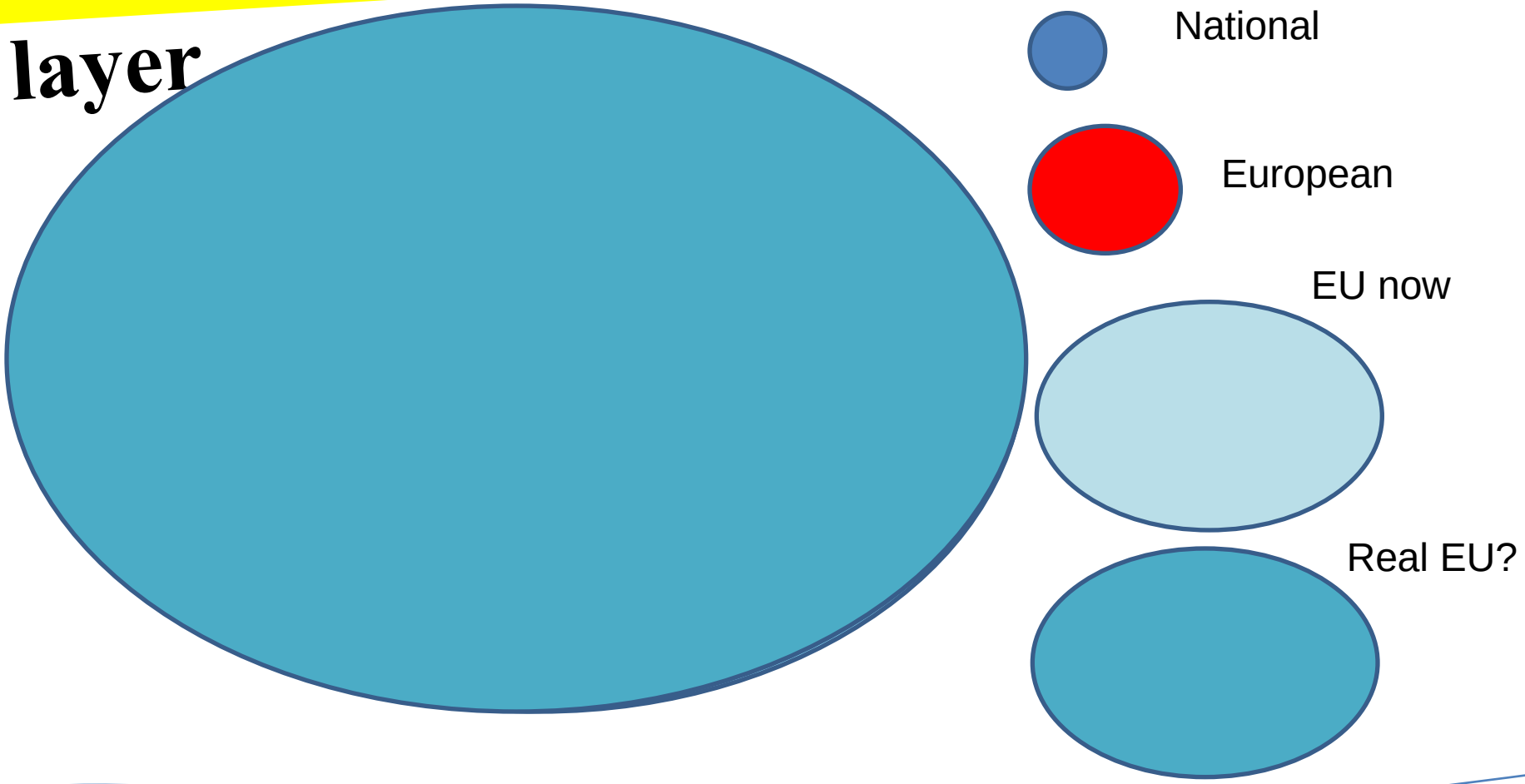
# The New Deal: adding a third layer



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# All patents are not equal

US006805657B2

(12) **United States Patent**
**Trenary**

(10) **Patent No.: US 6,805,657 B2**
(45) **Date of Patent: Oct. 19, 2004**

(54) **BODY-CONNECTED BIKE**

[illegible] Newkirk, OK (US) 74647

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/288,182**

(22) Filed: **Nov. 5, 2002**

(65) **Prior Publication Data**

US 2004/0087416 A1 May 6, 2004

(51) **Int. Cl.**[7] ..... **A63B 71/00**

(52) **U.S. Cl.** ..... **482/51**; 482/68; D21/423; 280/87.01

(58) **Field of Search** ..... 482/51, 68, 79, 482/80, 114, 132; D21/423; 280/87.01

(56) **References Cited**

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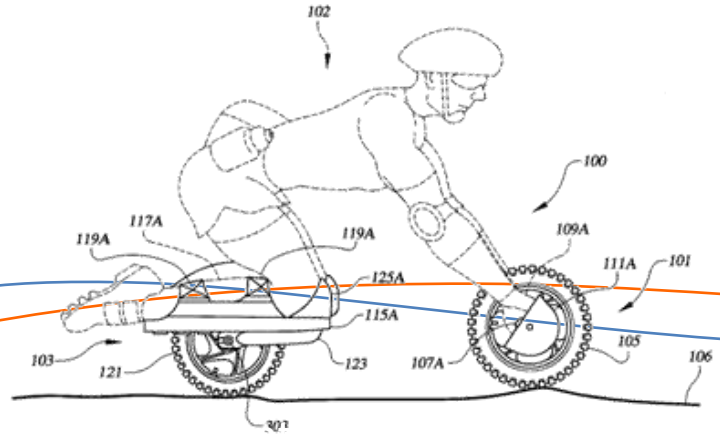
* cited by examiner

*Primary Examiner*—Nicholas D. Lucchesi
*Assistant Examiner*—Tam Nguyen
(74) *Attorney, Agent, or Firm*—Kenneth S. Watkins, Jr.

(57) **ABSTRACT**

A body-connected bike comprises a front roller assembly [**101**] and a separate rear roller assembly [**103**]. The front roller assembly comprises a single front wheel [**105**] and handgrips [**107A, 107B**] on either side of the front wheel. The rear roller assembly comprises a single rear wheel [**121**] supporting lower leg support platforms [**115A, 115B**] on either side of the rear wheel. A rider [**102**] utilizes the apparatus by grasping the front handgrips [**107A, 107B**] with the lower legs secured by straps [**119A, 119B**] to the rear roller assembly. The body of the rider acts as a connecting means between the front and rear roller assemblies and allows high-performance riding, exercise and competition.

**20 Claims, 5 Drawing Sheets**




US 20060014125A1

(19) **United States**
(12) **Patent Application Publication**
**St. Clair**

(10) **Pub. No.: US 2006/0014125 A1**
(43) **Pub. Date: Jan. 19, 2006**

(54) **WALKING THROUGH WALLS TRAINING SYSTEM**

(76) Inventor: **John Quincy St. Clair**, San Juan, PR (US)

Correspondence Address:
**JOHN ST. CLAIR**
**4A**
**52 KINGS COURT**
**SAN JUAN, PR 00911 (US)**

(21) Appl. No.: **10/890,635**

(22) Filed: **Jul. 14, 2004**

**Publication Classification**

(51) **Int. Cl.**
*G09B 19/00* (2006.01)

(52) **U.S. Cl.** ..... **434/258**

(57) **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.

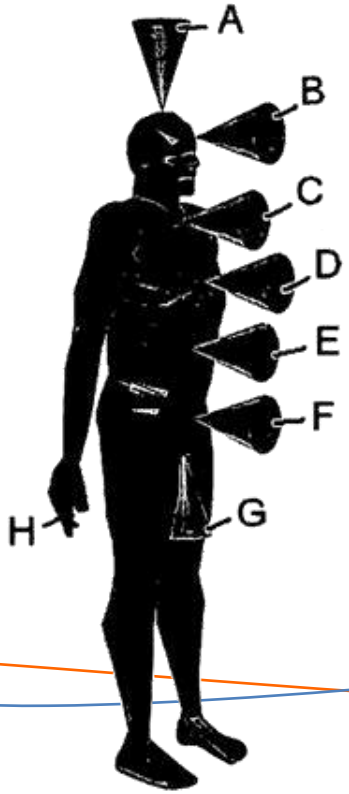
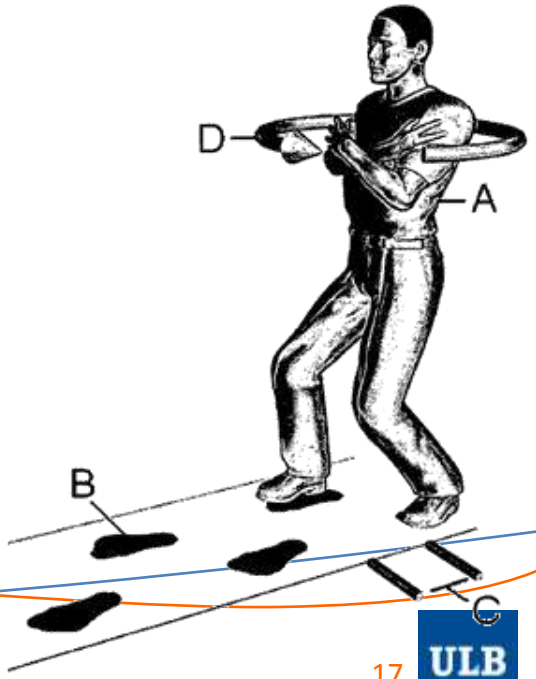



**Figure 9**



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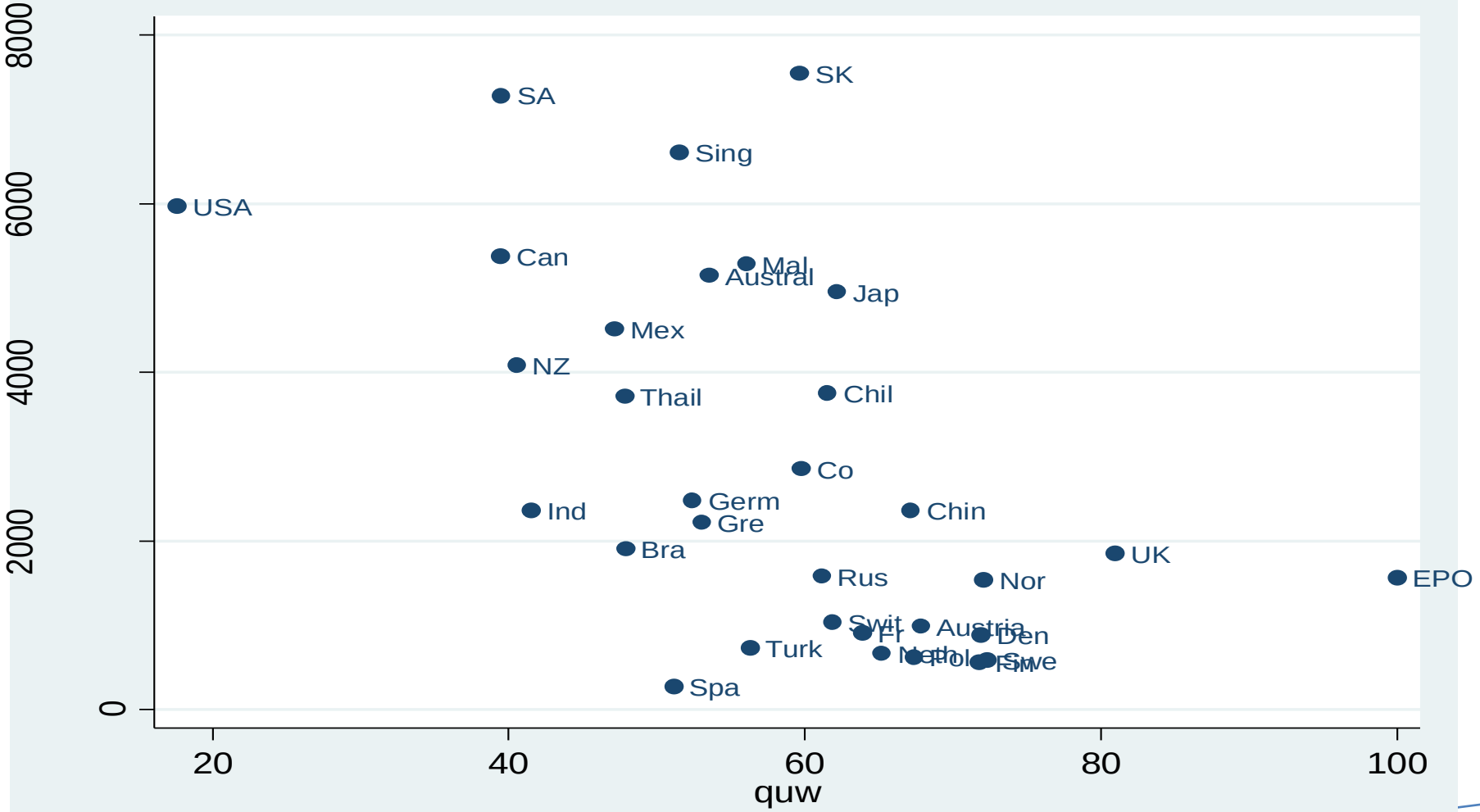
# Quality index and the relative demand for patent rights (claims filed per 000 researchers), 2008

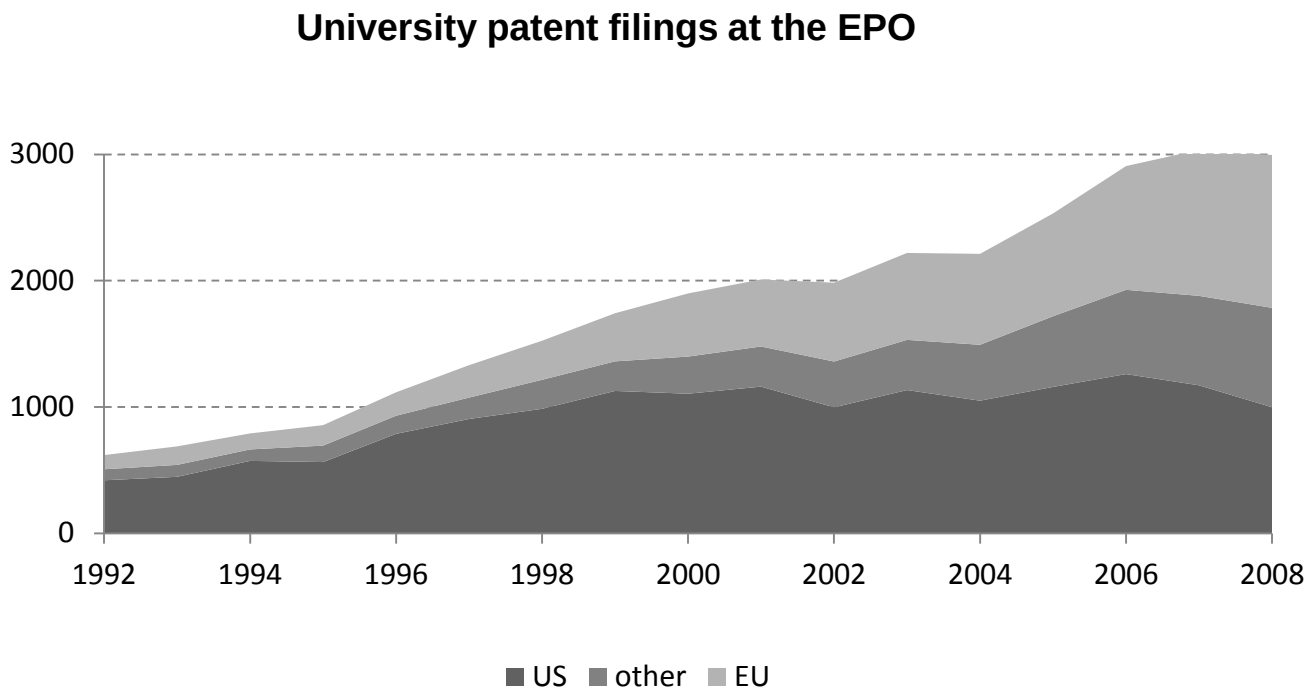


# MIND THE GAP?

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

- Regulations on academic inventions

# OWNERSHIP OF ACADEMIC INVENTIONS




- **Late 1990s mark shift in university IP ownership policies in Europe toward university ownership (i.e. *à la Bayh-Dole Act)***

# PATENTING PERFORMANCE REVISITED

**Share of university-owned and university-invented patents in total EPO filings, by country (1994-2002)**

| | BE | FR | IT | NL | SE | US |
|---|---|---|---|---|---|---|
| Owned | 3.1% | 0.3% | 0.4% | 1.0% | 0.3% | 4.0% |
| Invented | 6.5% | 5.1% | 4.0% | 4.3% | 6.2% | 6.0% |

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

- When considering 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 | USPTO | JPO |
| --- | --- | --- |
| NO | 12 months | 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

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# RWB: support to TT

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

LIEU
LIAISON
ENTREPRISES
UNIVERSITÉS

FEDER
UNION EUROPEENNE
Wallonie
FÉDÉRATION WALLONIE-BRUXELLES
LE FONDS EUROPEEN DE DEVELOPPEMENT REGIONAL, LA WALLONIE
ET LA FEDERATION WALLONIE-BRUXELLES INVESTISSENT DANS VOTRE AVENIR.

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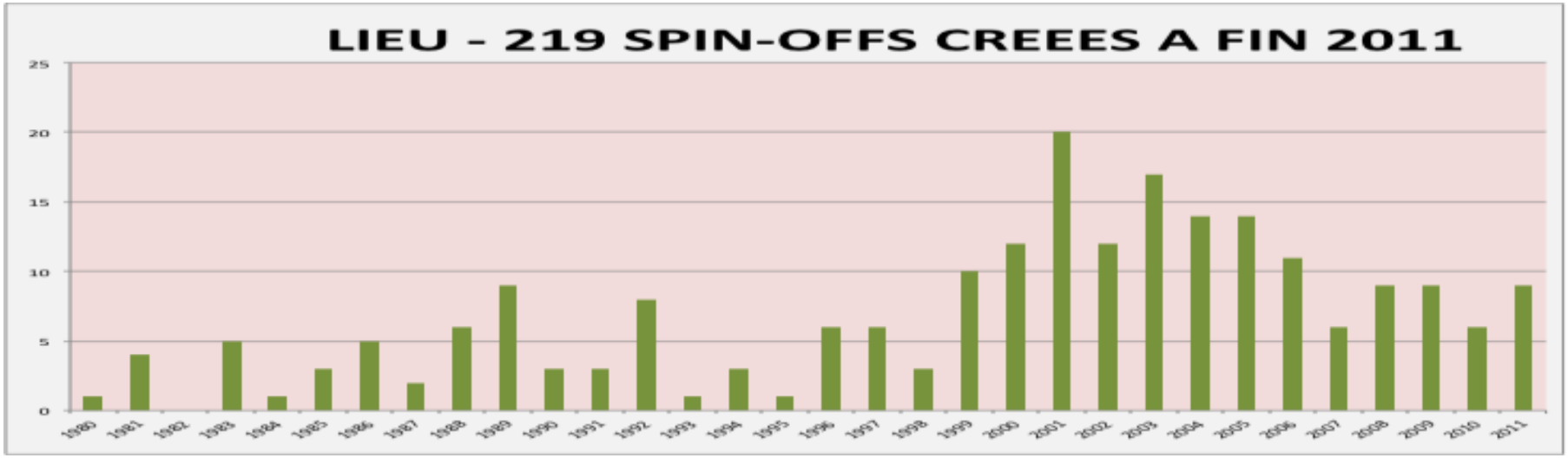
# LIEU activities: Spin-offs creation




**~1000 patents families**

→60% are active

→ 32% are licensed or sold

→ 50 % to **spin-off**s

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# 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

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# 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**

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# Identifying feasible organizational configurations

| *Structural dimension* | Values | | $a_1$ | $a_2$ | $b_1$ | $b_2$ | $b_3$ | $b_4$ | $c_1$ | $c_2$ | $d_1$ | $d_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Degree of discipline specialization* | Discipline-integrated | $a_1$ | | | | | | | | | | |
| | Discipline-specialized | $a_2$ | | | | | | 1 | | 2 | 3 | |
| *Degree of task specialization* | Fully integrated | $b_1$ | | | | | | | | | | |
| | Forward integrated | $b_2$ | | | | | | | | | | |
| | Backward integrated | $b_3$ | | | | | | | | | | 6 |
| | IP specialized | $b_4$ | | | | | | | | 4 | 5 | |
| *Level of autonomy* | Independent | $c_1$ | | | | | | | | | | |
| | Dependent | $c_2$ | | | | | | | | | | 7 |
| *Degree of exclusivity* | Exclusive | $d_1$ | | | | | | | | | | |
| | Non-exclusive | $d_2$ | | | | | | | | | | |

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# Result: TTO typology

- **We theoretically identify four major TTO types**

| (a) Degree of discipline spec. | Discipline-integrated | | | | | | | | | Discipline-specialized | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (c) Level of autonomy granted | Dependent | | | Independent | | | | | | | |
| (d) Degree of exclusivity | Exclusive | | | | | | Non-exclusive | | | | |
| (b) Degree of task spec. | Fully integ. | Backw. integ. | Forw. integrated | Fully integ. | Backw. integ. | Forw. integ. | Fully integ. | Forw. integ. | IP spec. | Fully integr. | Forw. integr. |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| **TTO Type** | **I. Classical TTO** | | | **II. Autonomous TTO** | | | **III. Discipline-integrated TTA** | | | **IV. Discipline-specialized TTA** | |

- **Each TTO type has strengths and weaknesses (depends on university and environment)**
- **Performance measurement should take into account the typology**



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# Antibodies blocking innovation
# Large firms vs Universities


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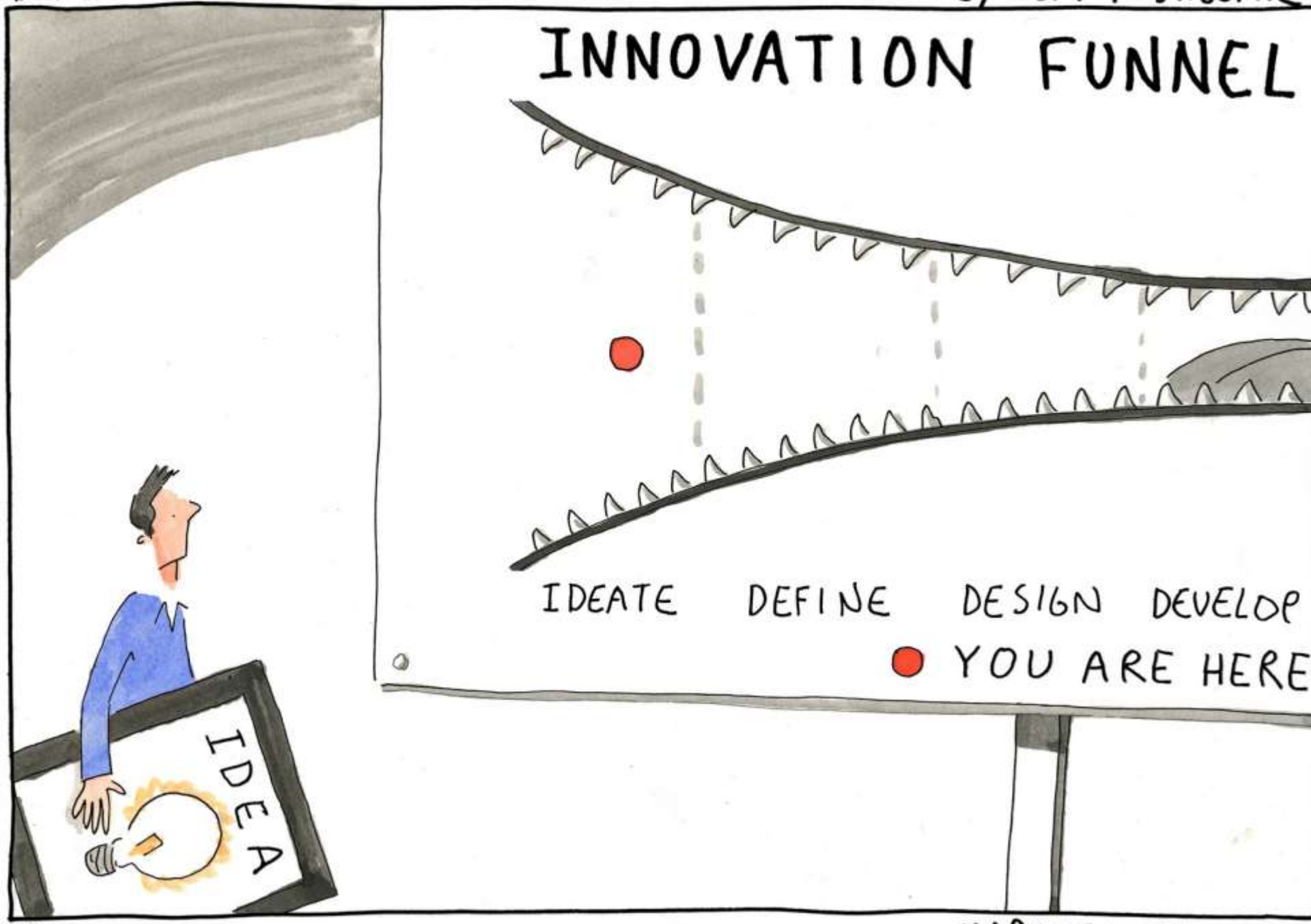
by Tom Fishburne



- **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?

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# Creative tensions


**Researcher *vs* advisor**

**Researcher *vs* BP *vs* control…**

**Researcher *vs* TTO**

**Researcher *vs* TTO *vs* Investors *vs* manager/ incubator**

**Researcher *vs* investors**

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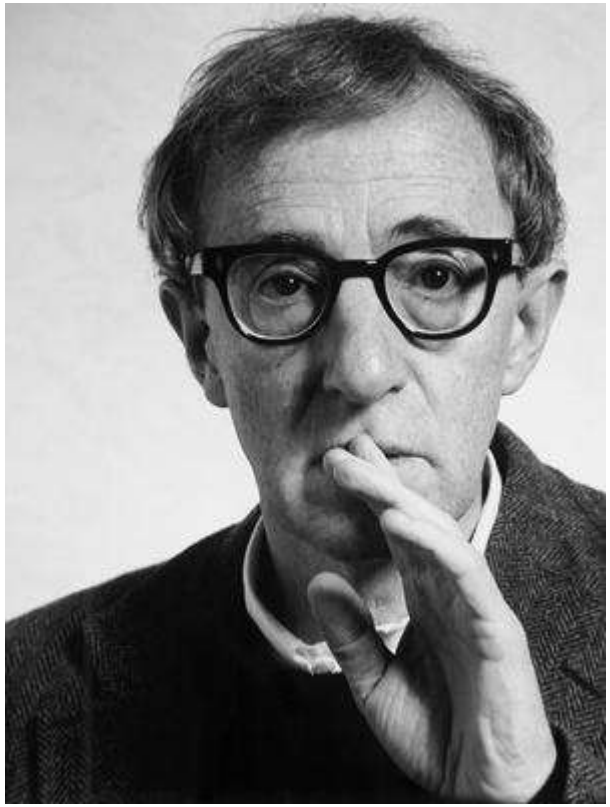
# MIND THE GAP?

- 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***



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