

***University and Innovation:
Insights from Innovation Research
Lessons from Leuven***

Münster Workshop

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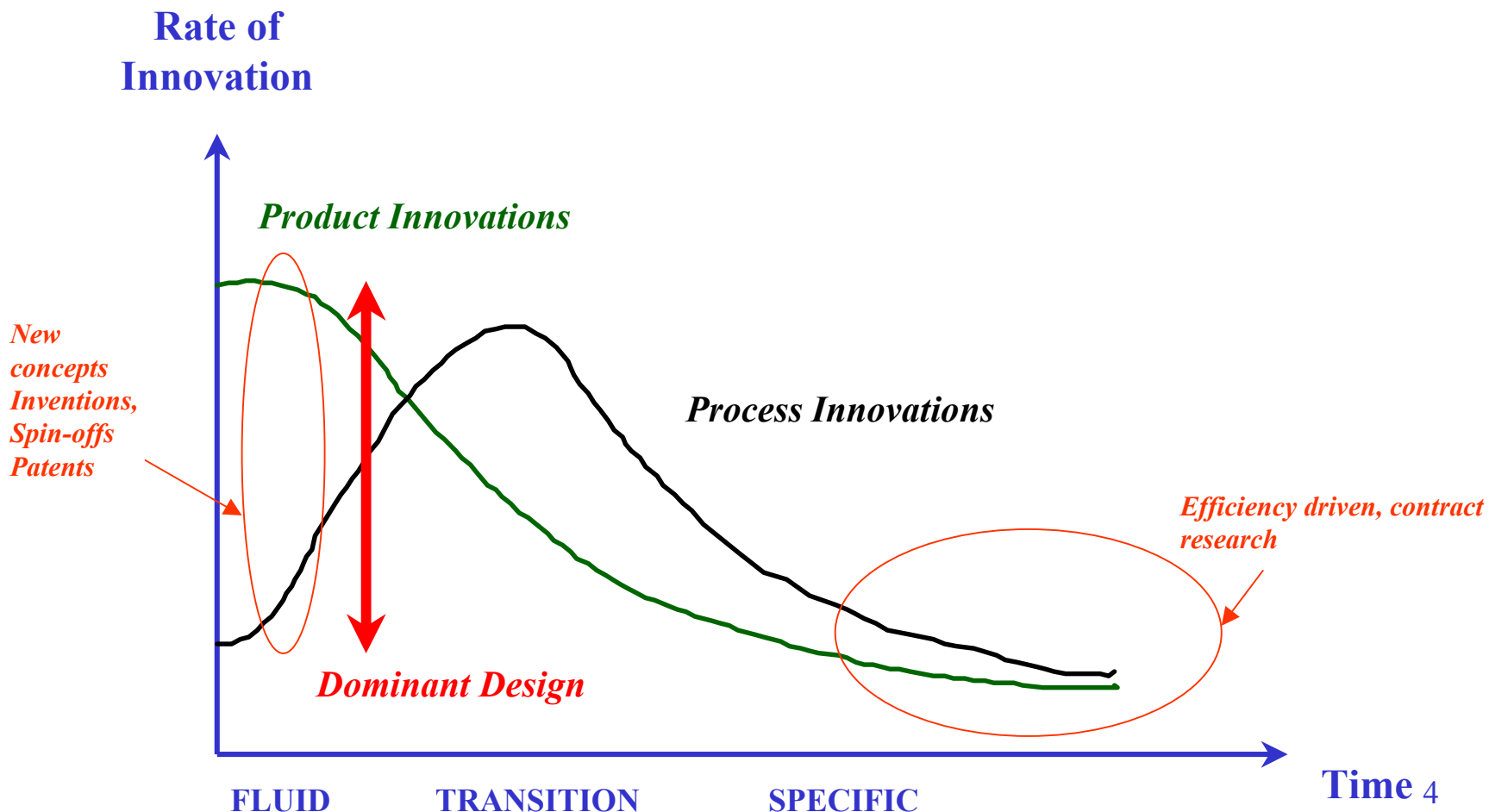
K.U. Leuven R&D

I. Setting the stage

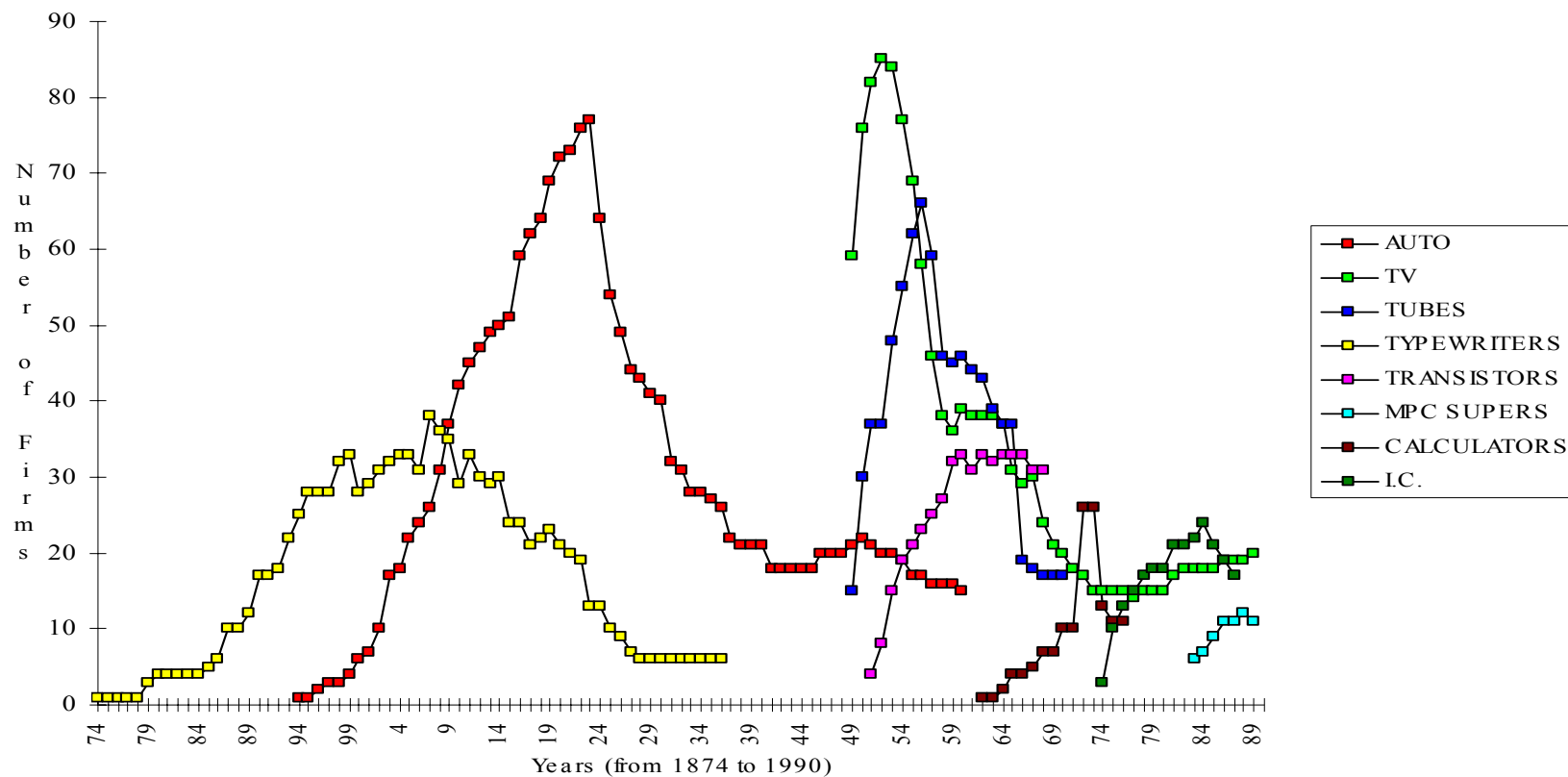
Innovation and competition: Why?

- **Major drivers of competition:**
 - efficiency (60-70s)
 - quality (70-80s)
 - flexibility (80s-90s)
 - innovation (90s-00s)
 - venturing (00s-...):
 - U.S. anno 2000: the complementary roles of industrial innovation >< entrepreneurial innovation
 - productivity anno 2000 = efficiency + innovation, or **“one cannot shrink to greatness”**

Innovation and industry dynamics, how can universities intervene?



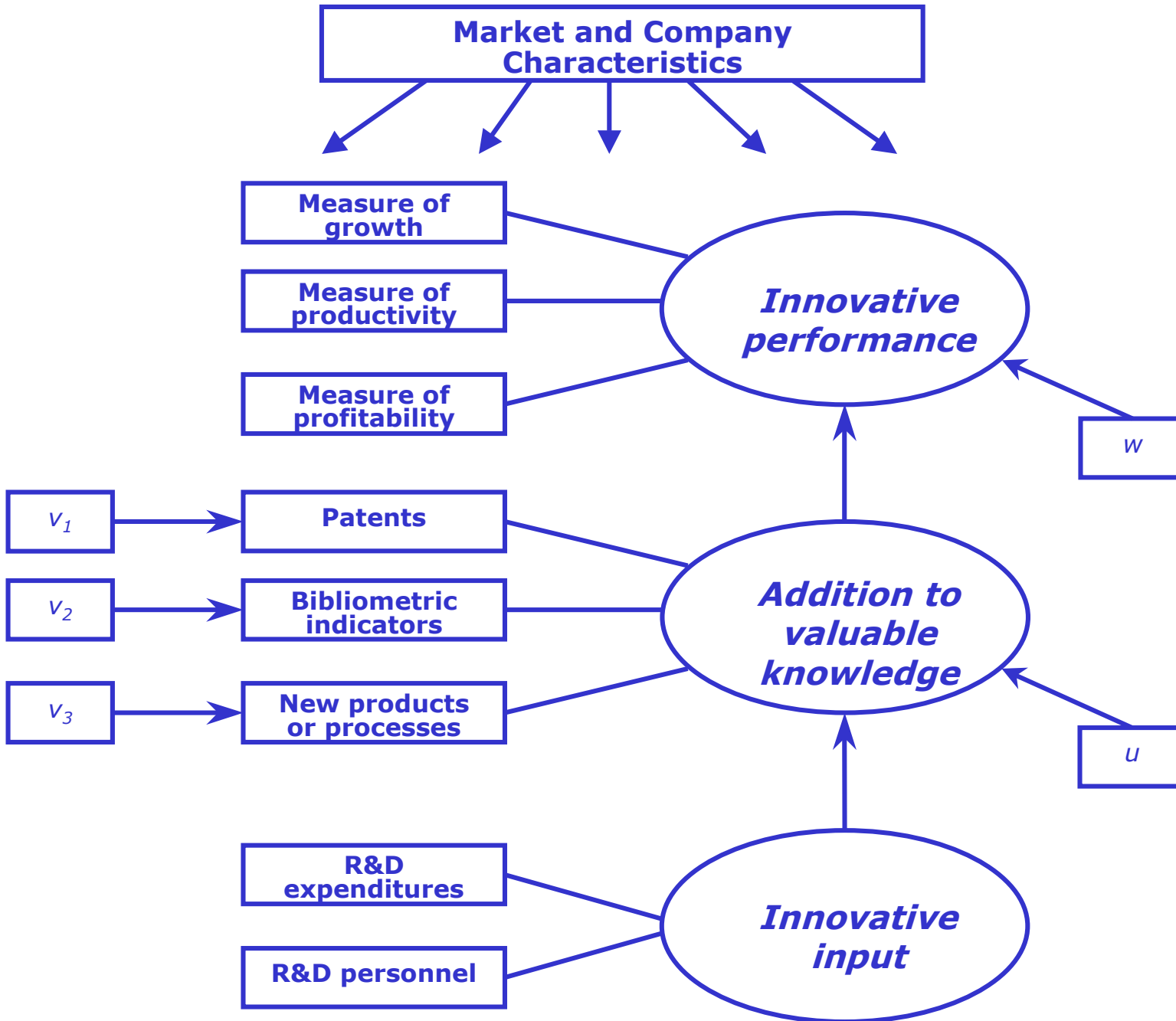
Innovation and industry dynamics, how can universities intervene?



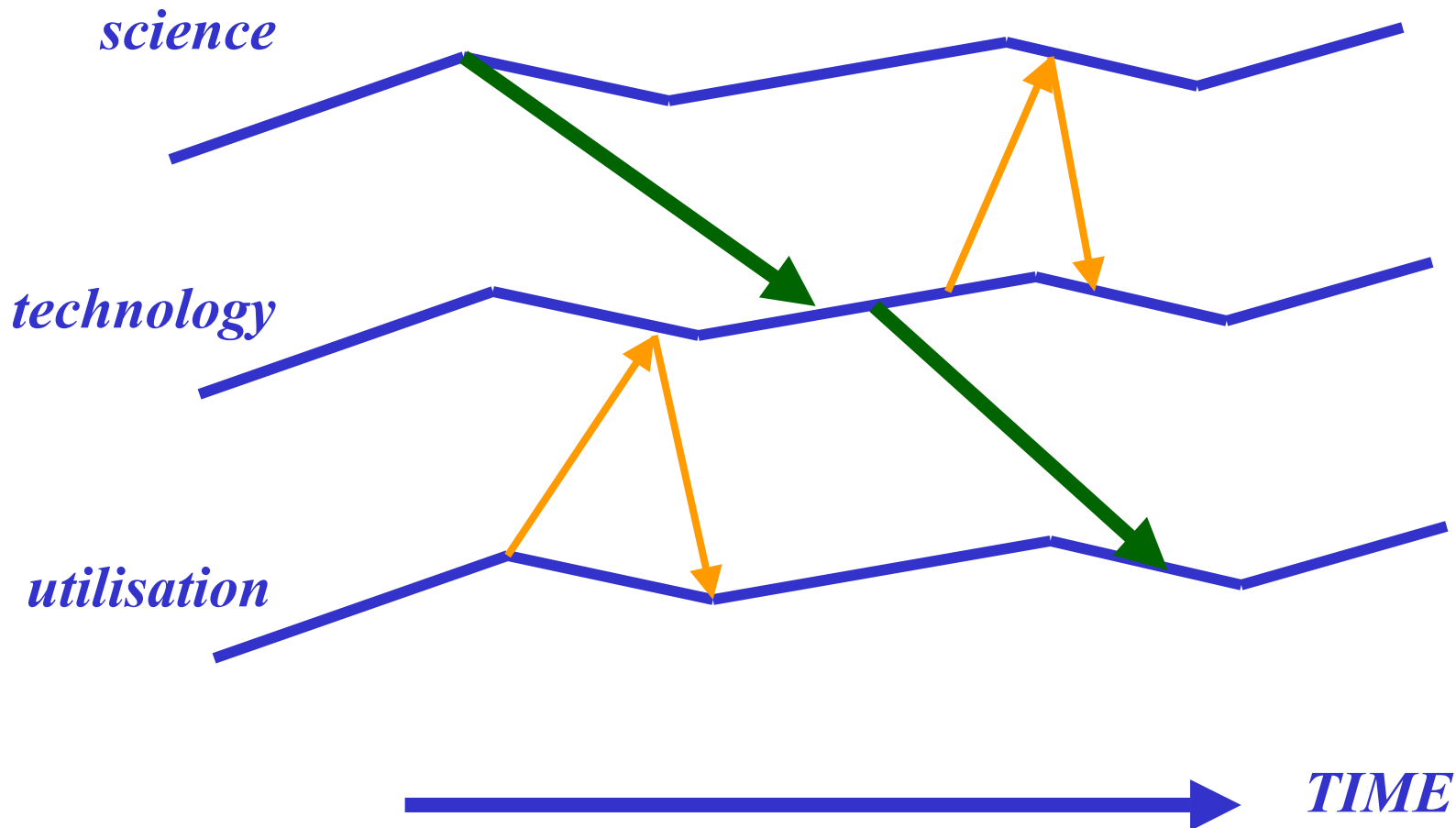
Would you have invested?



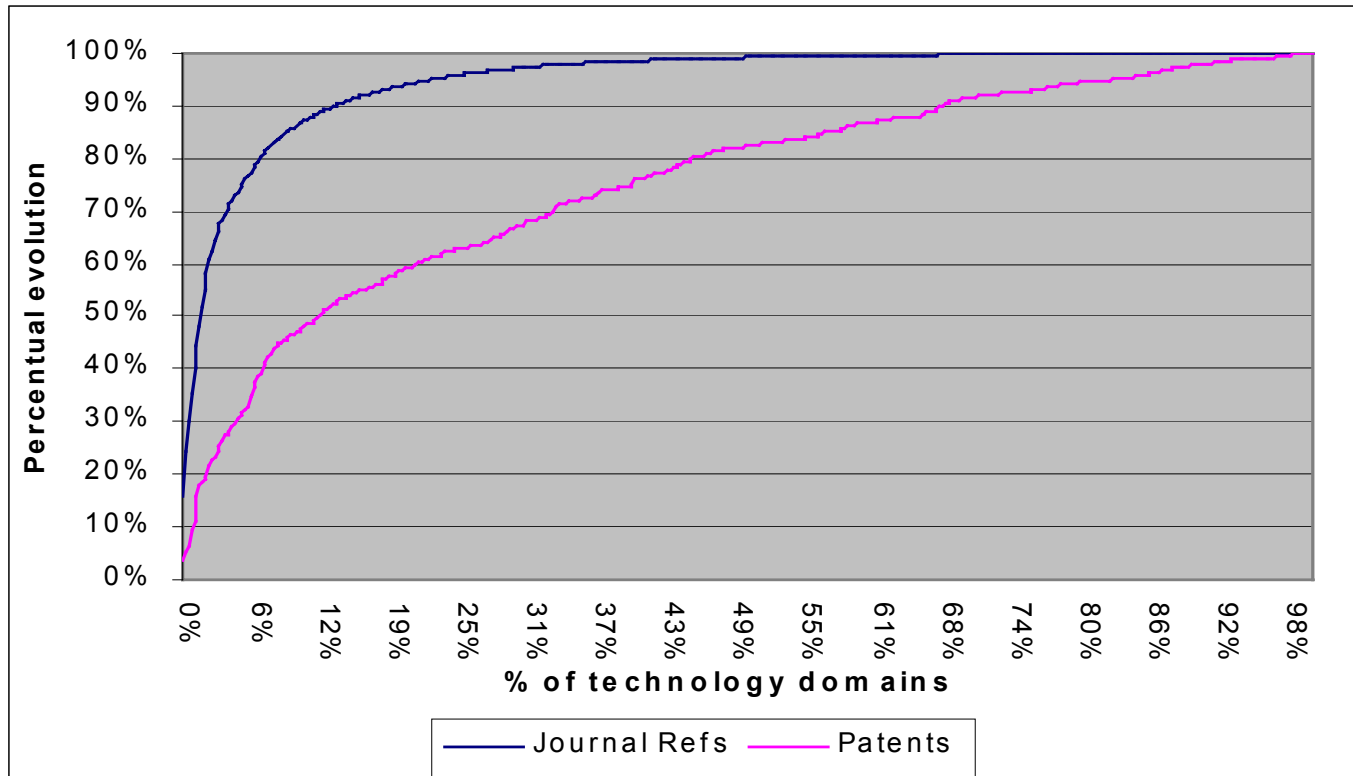
Microsoft Corporation, 1978



Science, technology, and utilisation: pathways for action and training

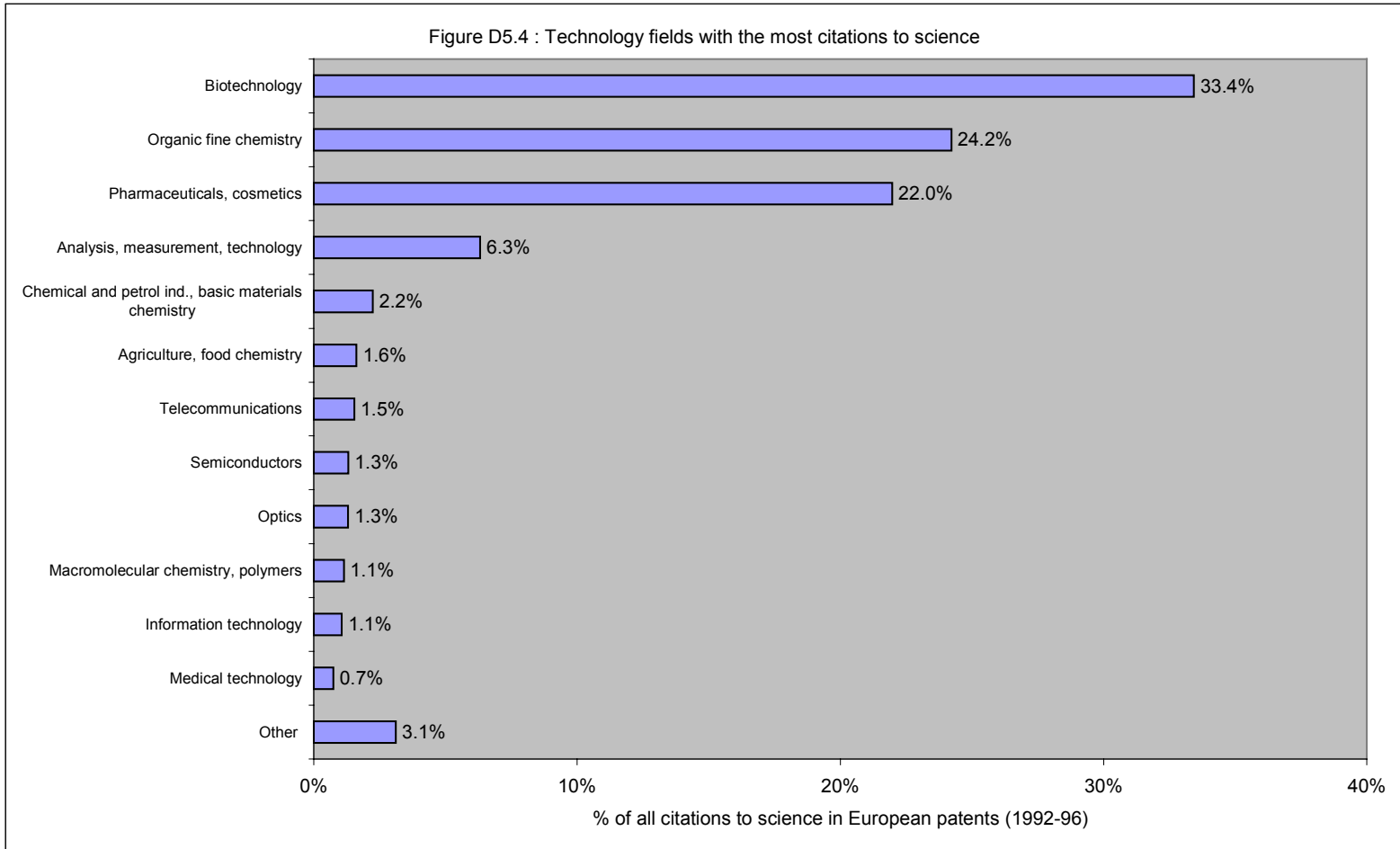


Science - Technology - Utilization: A skewed pathway (Verbeek, Debackere, Luwel et al., 2001)



20% of all technology fields account for 90% of all science-technology interactions using citation data from patent to literature databases 9

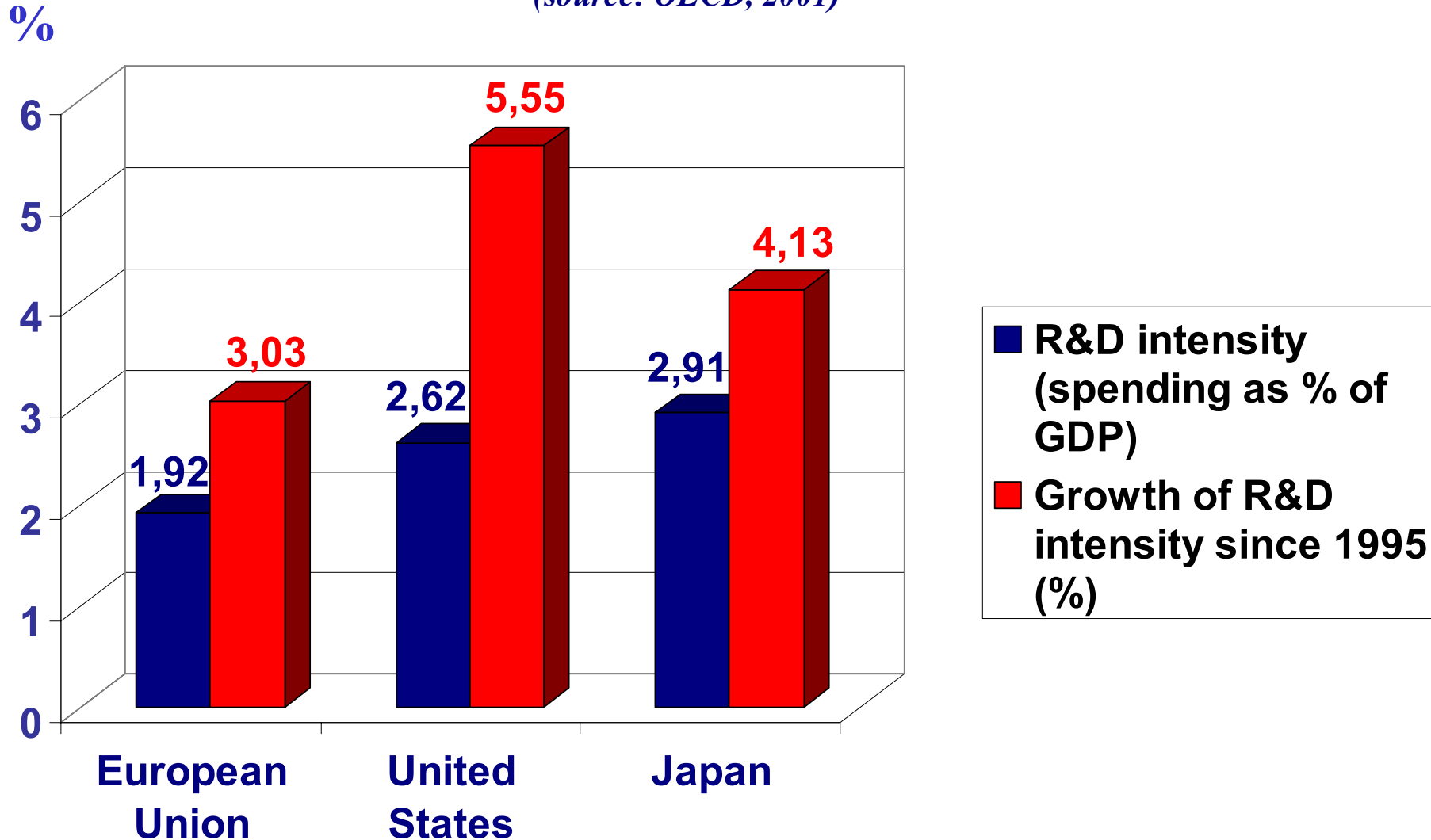
Scientific Excellence in Patents



II. European issues

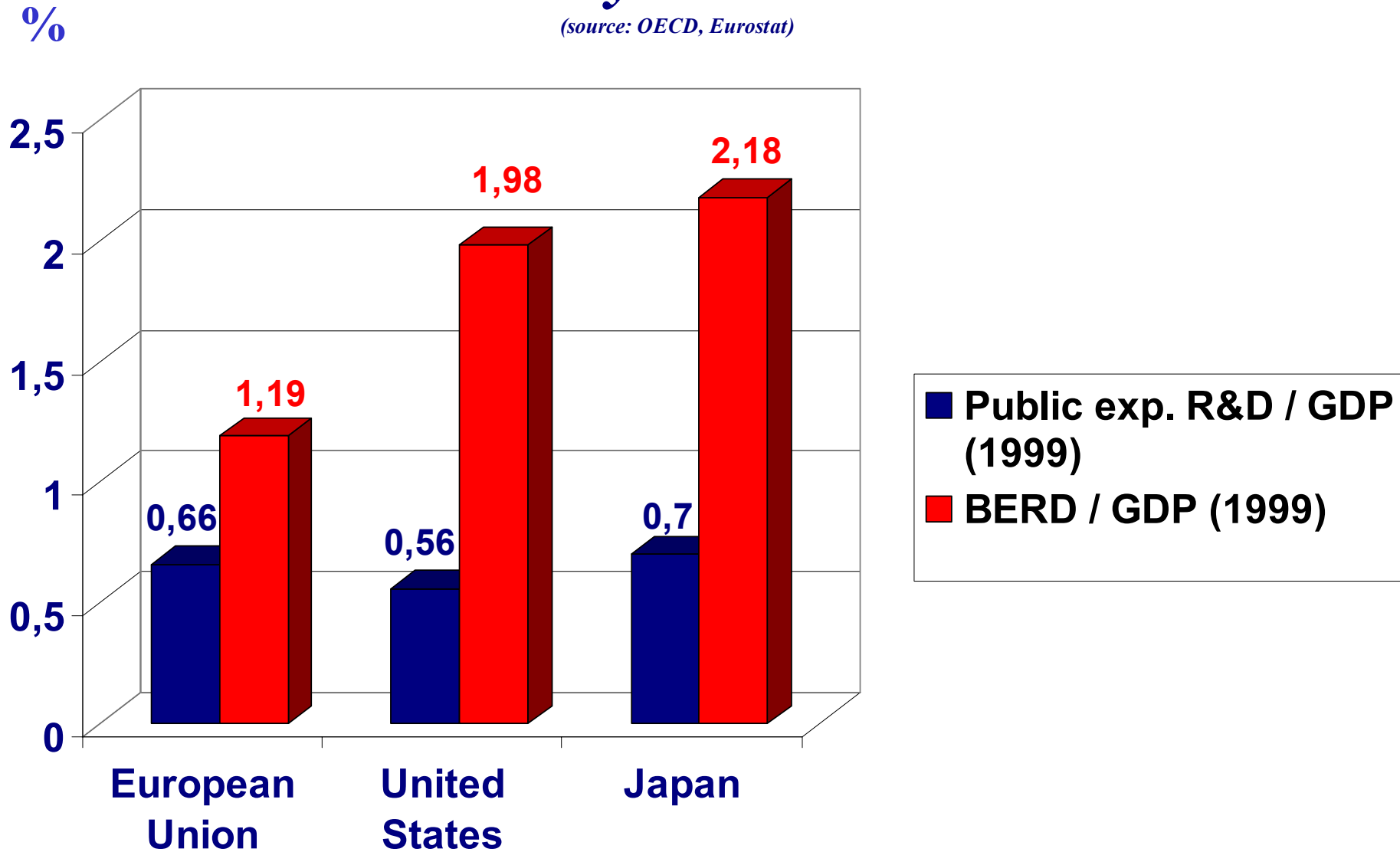
R&D Intensity in 2000

(source: OECD, 2001)



R&D Intensity Partitioned 1999

(source: OECD, Eurostat)

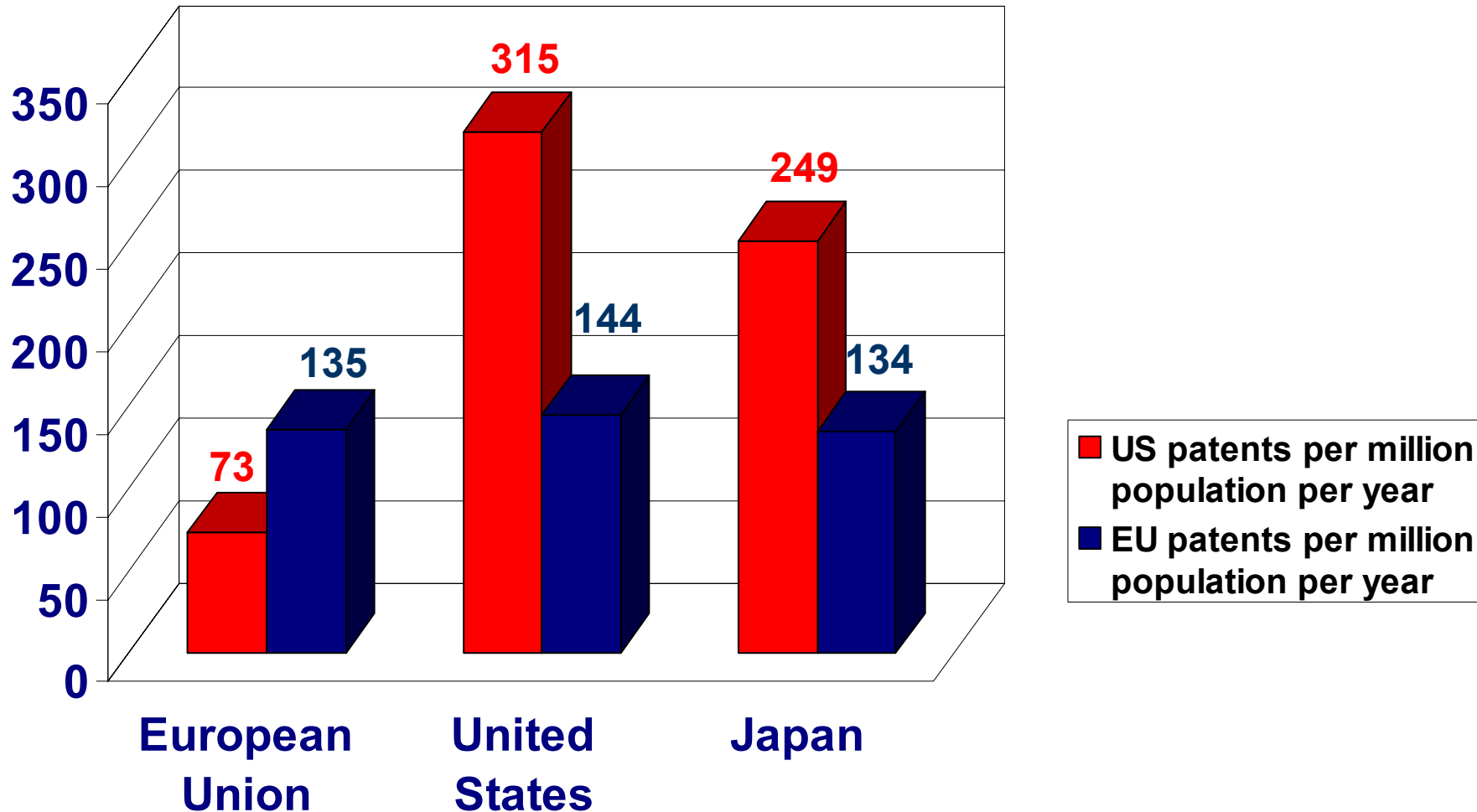


The responsibility of corporate R&D

- 📄 **Corporate R&D is an engine to both industrial innovation and entrepreneurial innovation.**
- 📄 **Public R&D funding should be regarded as a complement and not as a substitute for (large) corporate R&D funding (make-and-buy instead of make-or-buy).**
- 📄 **(Large) companies should be aggressive pursuers of R&D and technology development.**
- 📄 **==> Business R&D in EU is insufficient.**

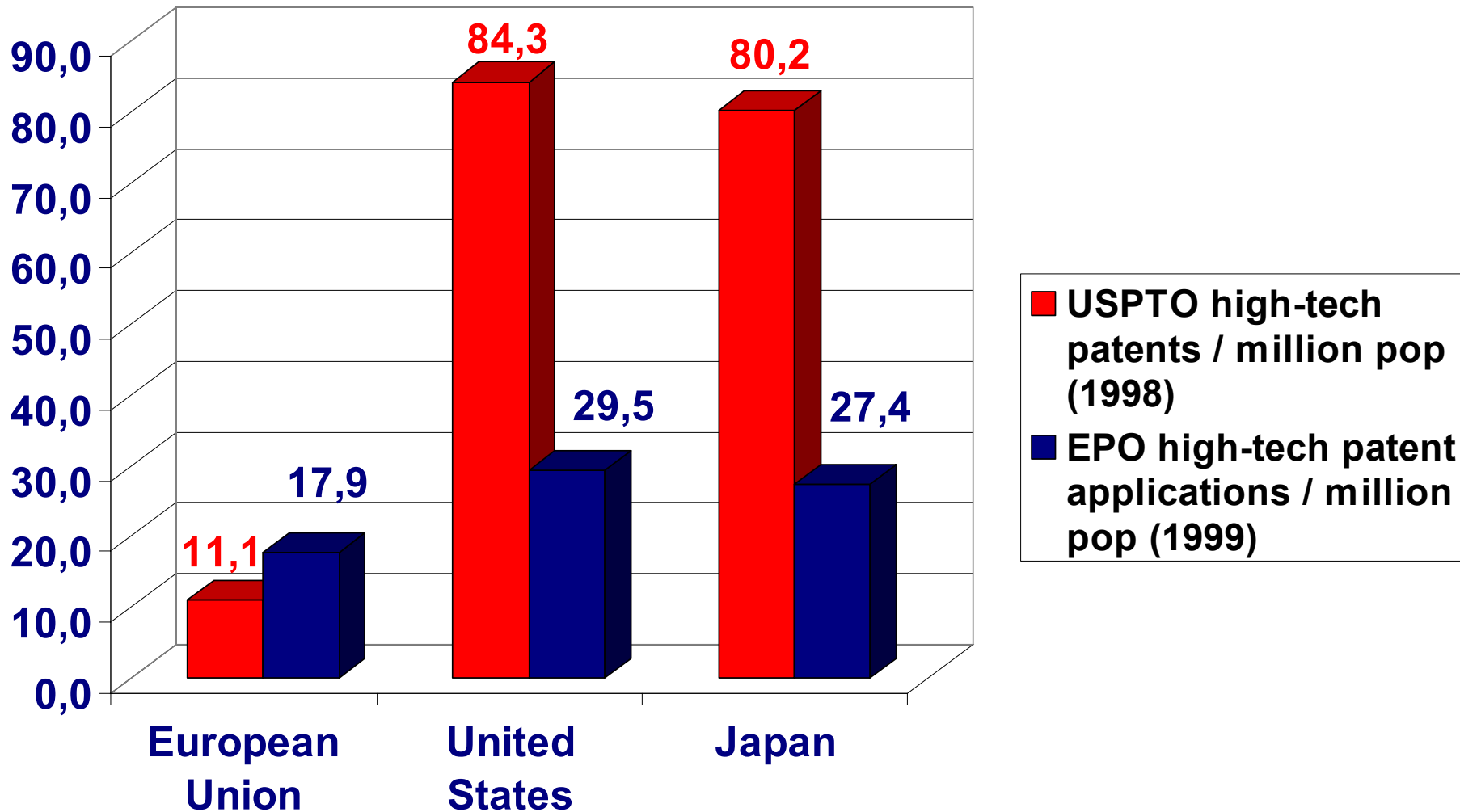
All Patents Granted per Million Population

(source: Eurostat, 2001)




High-Tech Patenting Behaviour

(source: Eurostat, 2001)



The spin-offs of corporate R&D: Link to the entrepreneurial drive

 **Four winners of the Medal of the US
National Academy of Engineering:**

David Packard

from General Electric to found HP

Kenneth Olson

from IBM to found DEC

Gordon Bell

from DEC to Microsoft

Steve Wozniak

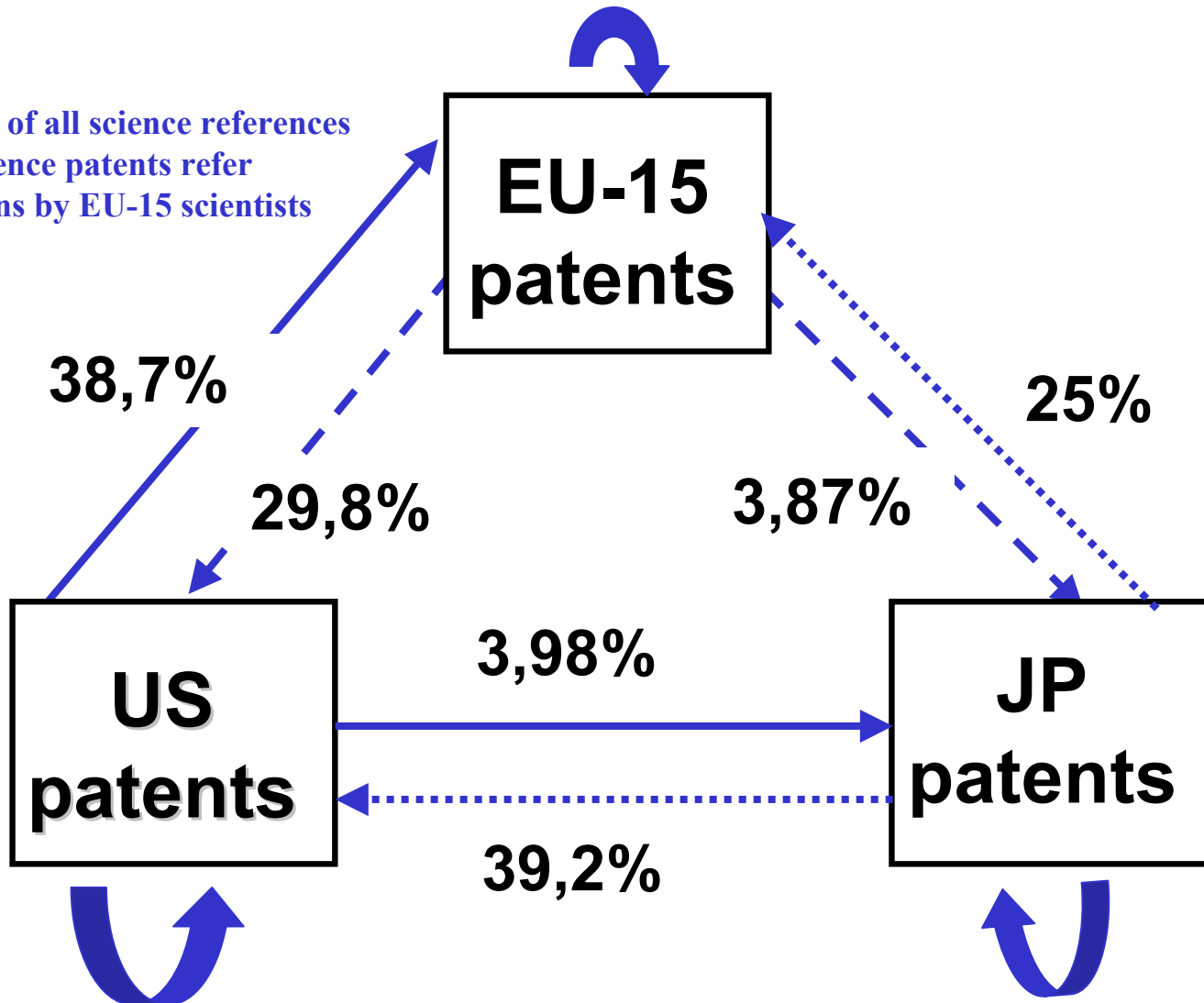
from Xerox/HP to co-found Apple

But ... science base of technology?

E.g. Life Sciences (Debackere, Luwel et al., E.C., 2001)

Legend:

E.g.: 38,67% of all science references in US life science patents refer to publications by EU-15 scientists



III. Role of the university

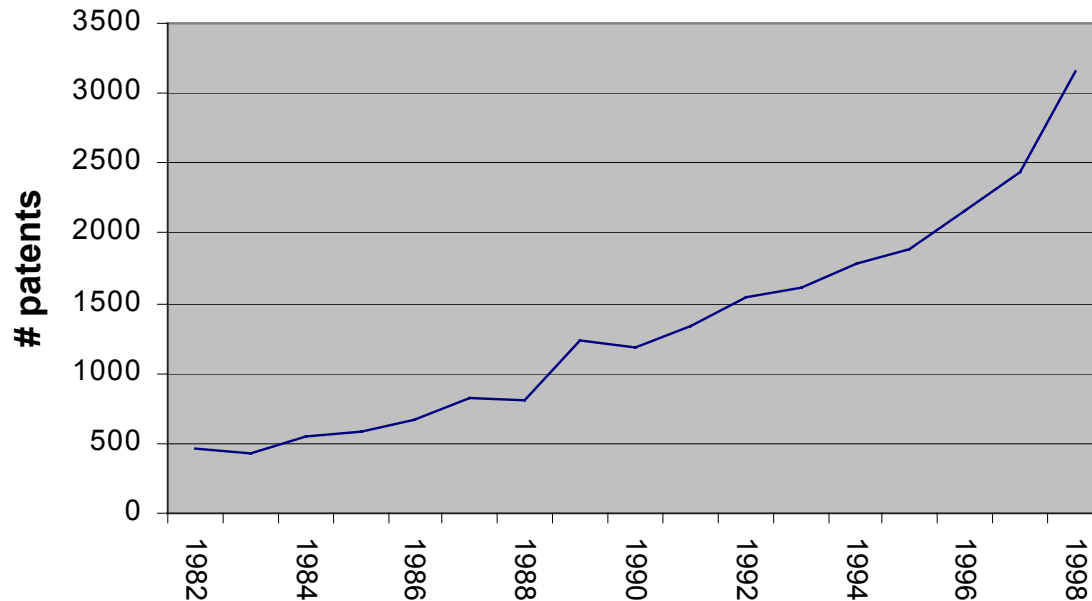
Vision-Mission on TT

- Technology transfer is not the “raison d’être” of a university. However, if conducted, it has to be conducted professionally, thus business-like;
- Hence, **one objective**: maximizing the commercial value of the academic IP for the university as a shareholder;
- In order to maximize value, you have to **assist** in creating it!
- And ... you need an appropriate institutional context (IP-regulation and ownership issues, possibility to participate financially, “fair return” ...)!

Vision-Mission on TT

- **From vision to structure:**
 - allowing for the necessary autonomy for TT operations;
 - professionalizing the TT operations;
 - combining the cross-fertilization/trinity of contract research, IP management and spin-off creation;
 - active role in co-creating enabling mechanisms (venture capital, network fora, ...);
 - incentivizing faculty via appropriate organization structures and systems.

Patents awarded to academic institutions (U.S.)



The evolution of university patenting in the U.S. since the Bayh-Dole Act (data: 1982-1998)

Based on: *Science and Engineering Indicators 2002 (NSF)*

<i>Breakdown</i>	<i># Patents (1998)</i>
All academic institutions	3.151
Public	1.824
Private	1.300
100 largest patenting, 1990s	2.920
Public	1.699
Private	1.221
Percentage of all patents awarded to 100 largest	92,7

From vision to structure

Propensity to commercialise

High

Low

No strategic intent

Strategic intent

Supportive incentive structure
Strategic intent

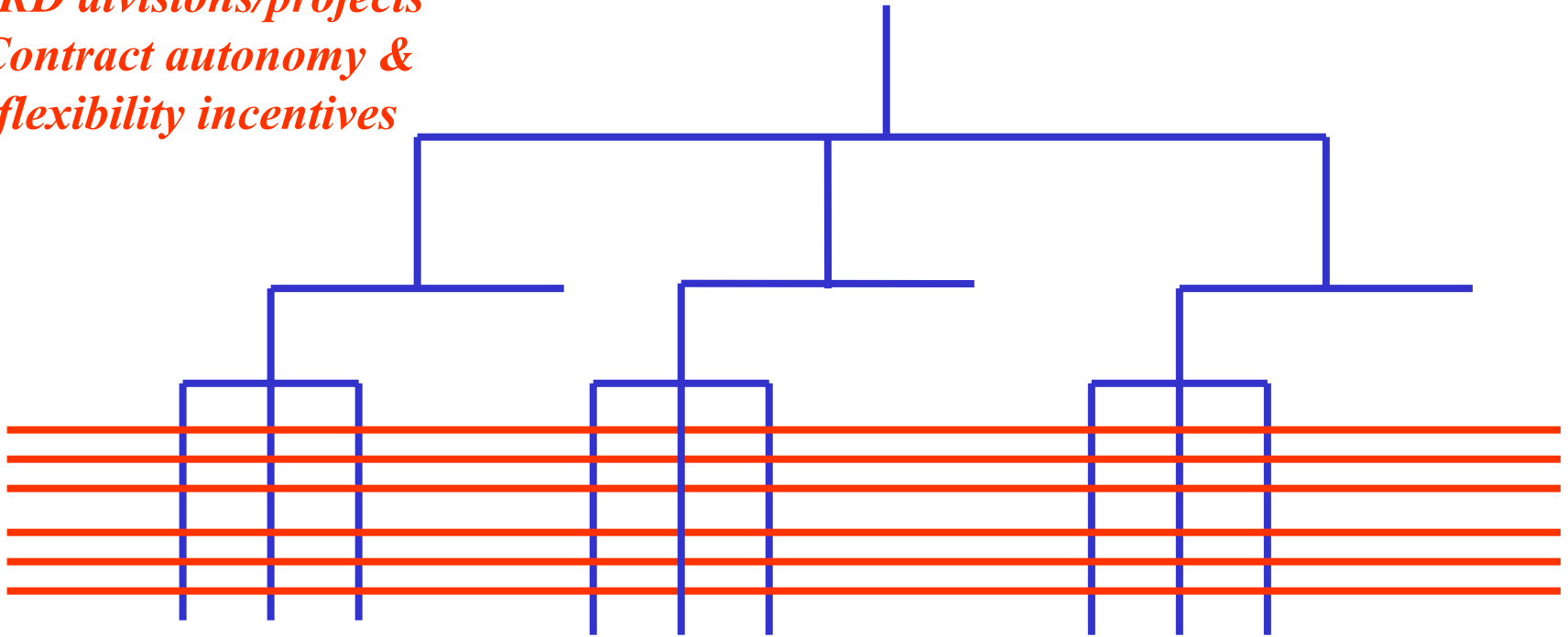
Hierarchical Structure

Multidivisional Structure

Matrix Structure

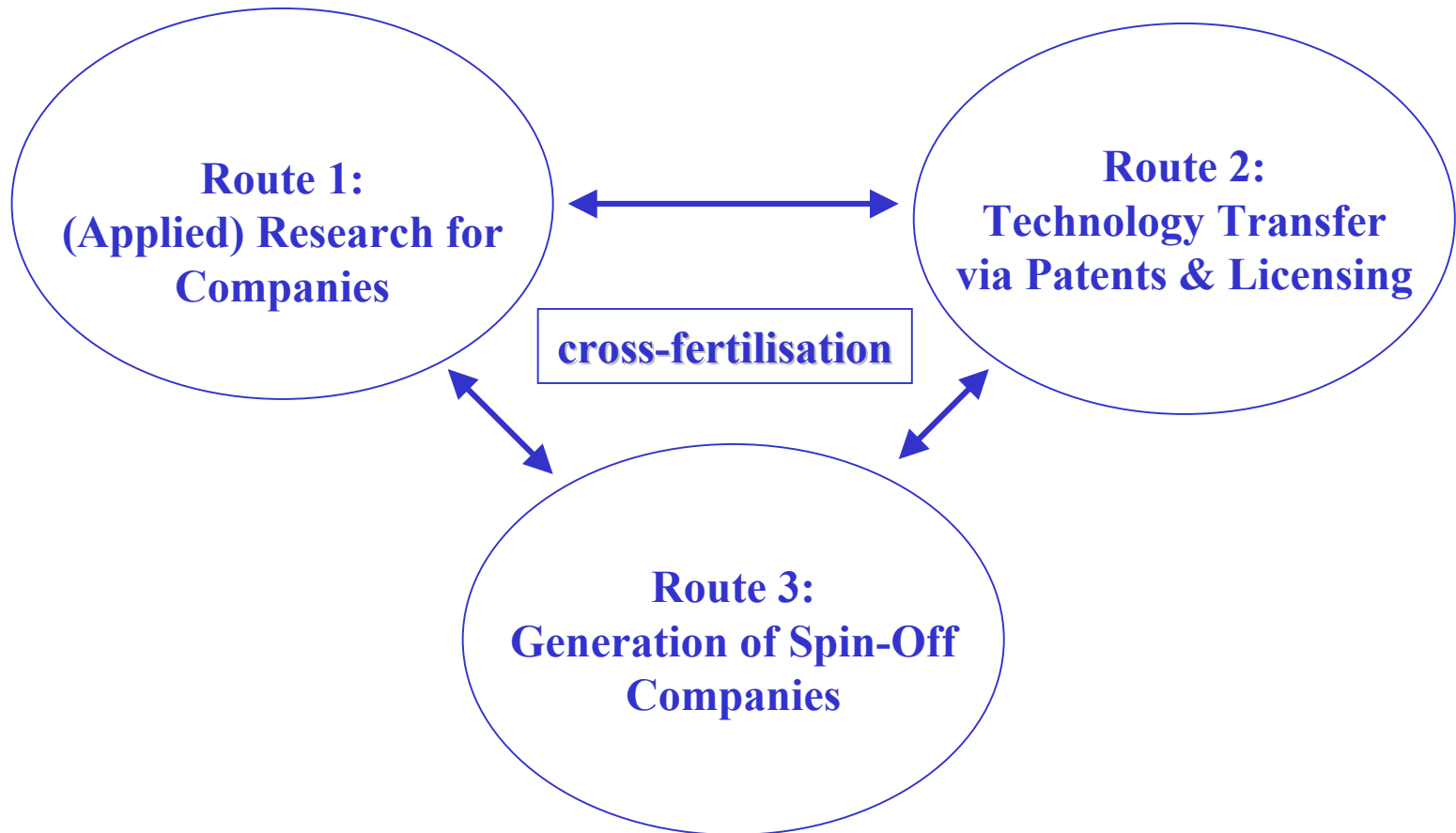
Structuring the pathways: matrix thinking at K.U. Leuven

*LRD divisions/projects
Contract autonomy &
flexibility incentives*

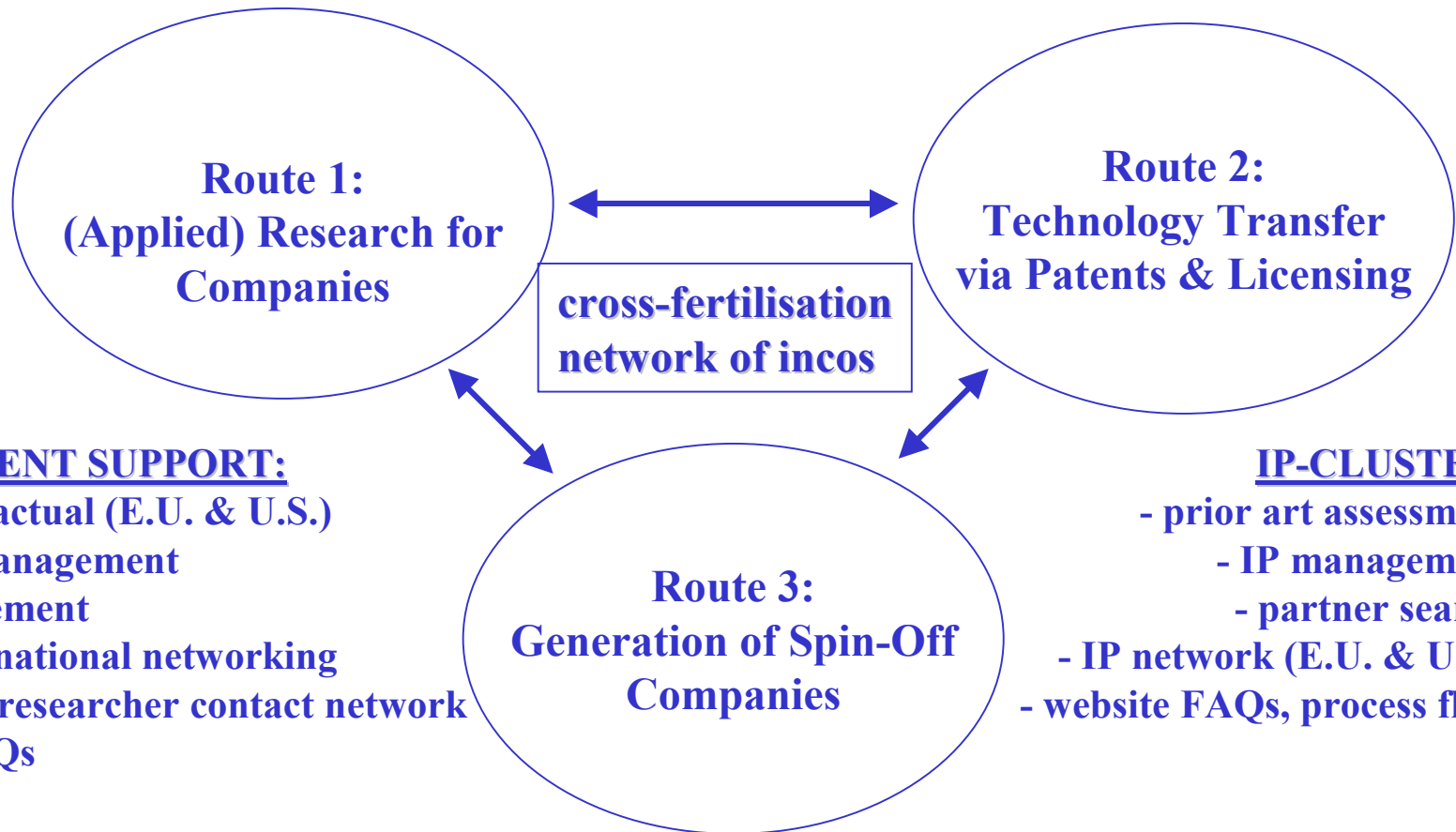


*Faculties, departments, research groups:
international quality in research,
teaching performance*

Organising the pathways:



Implementing the pathways:



**Route 1:
(Applied) Research for
Companies**

**Route 2:
Technology Transfer
via Patents & Licensing**

**cross-fertilisation
network of incos**

**Route 3:
Generation of Spin-Off
Companies**

MANAGEMENT SUPPORT:

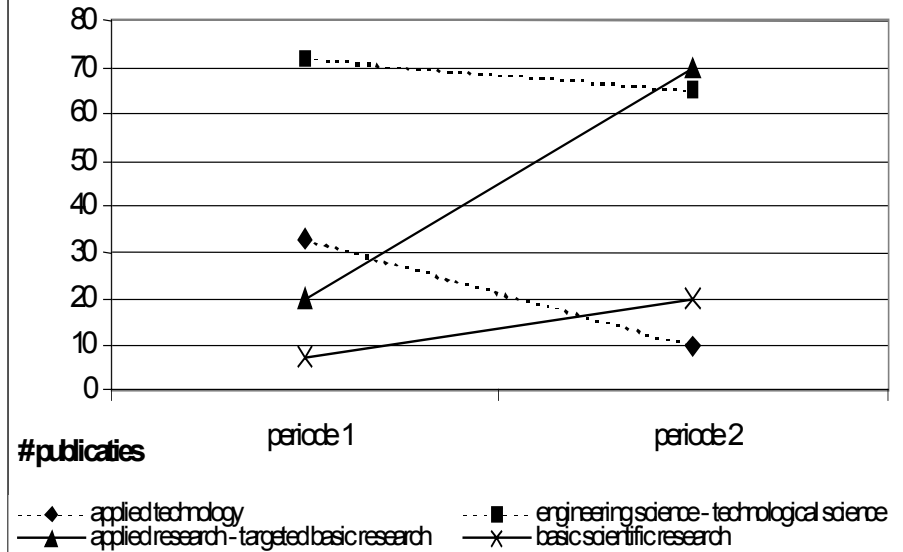
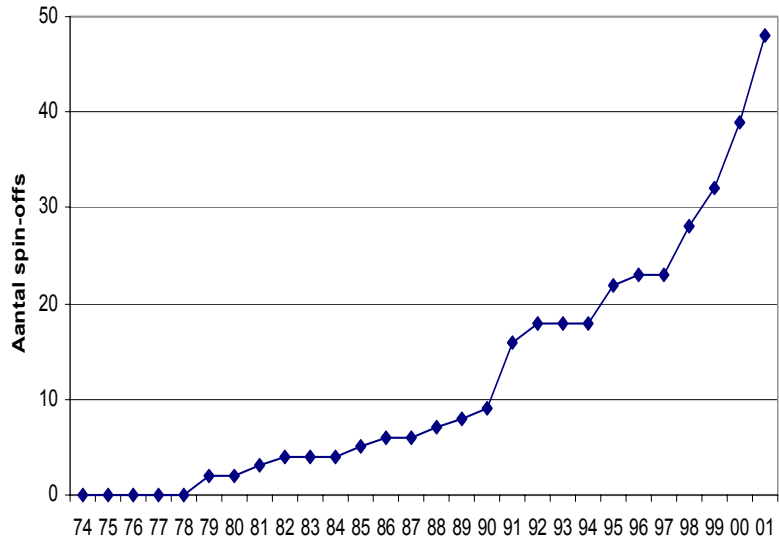
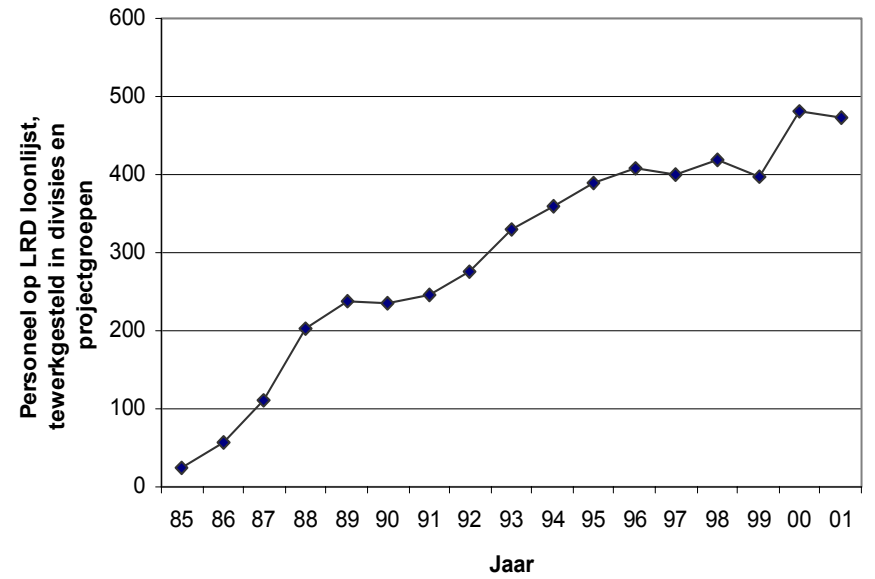
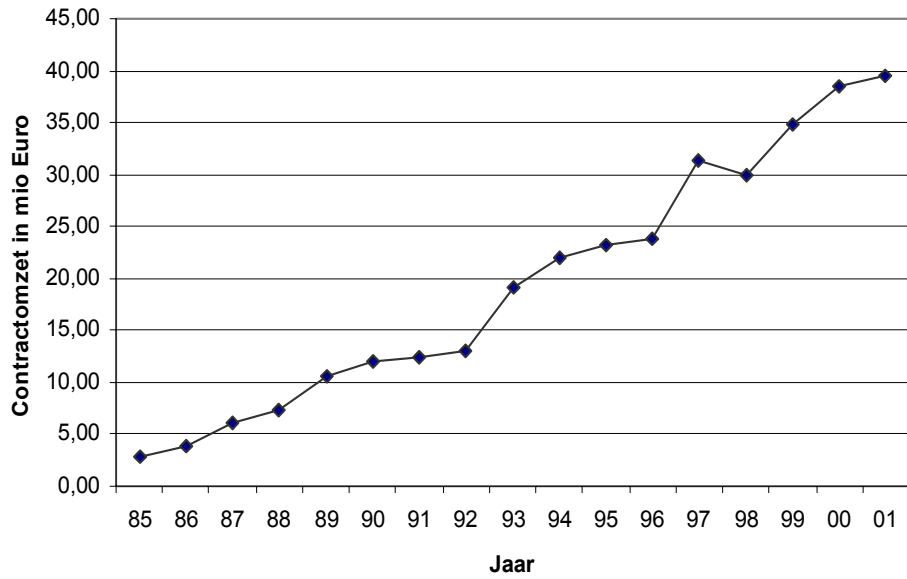
- legal, contractual (E.U. & U.S.)
- financial management
- HR management
- active international networking
- reliance on researcher contact network
- website FAQs

IP-CLUSTER:

- prior art assessment
- IP management
- partner search
- IP network (E.U. & U.S.)
- website FAQs, process flow

INCUBATOR ACTIVITIES:

- business plan development, website, FAQs
- equity via allied venturing fund GFF-I, GFF-II, Ventana, Capricorn, TCP ...
- coaching further business model development
- incubator and research park development
- regional network fora (Leuven.Inc)





Gemma Frisius-Fonds:

Recently, K.U.Leuven has taken several additional initiatives to live up to its responsibilities. These include an inter-faculty course 'Introduction to Entrepreneurship', and the formation of the Gemma Frisius Fund (together with the 'Generale Bank' Group and the 'Almanij-KBC' Group) to provide venture capital. The first few years of activity have clearly demonstrated that these initiatives are really serving a need.

Research and education will always be the prime objectives of any university, rather than the creation of spin-offs. As a matter of fact, spin-offs can only thrive if research quality is given due importance. Without attaining international research quality standards, the results cannot be exploited at all. If, however, a high level of quality is reached, starting spin-offs is self-evident.

We hope this brochure will convince its readers of the diversity, originality and professional approach of K.U.Leuven's spin-offs, and that it even functions as a source of inspiration for future initiatives. As for the companies themselves, we wish them a safe journey on stormy industrial seas.

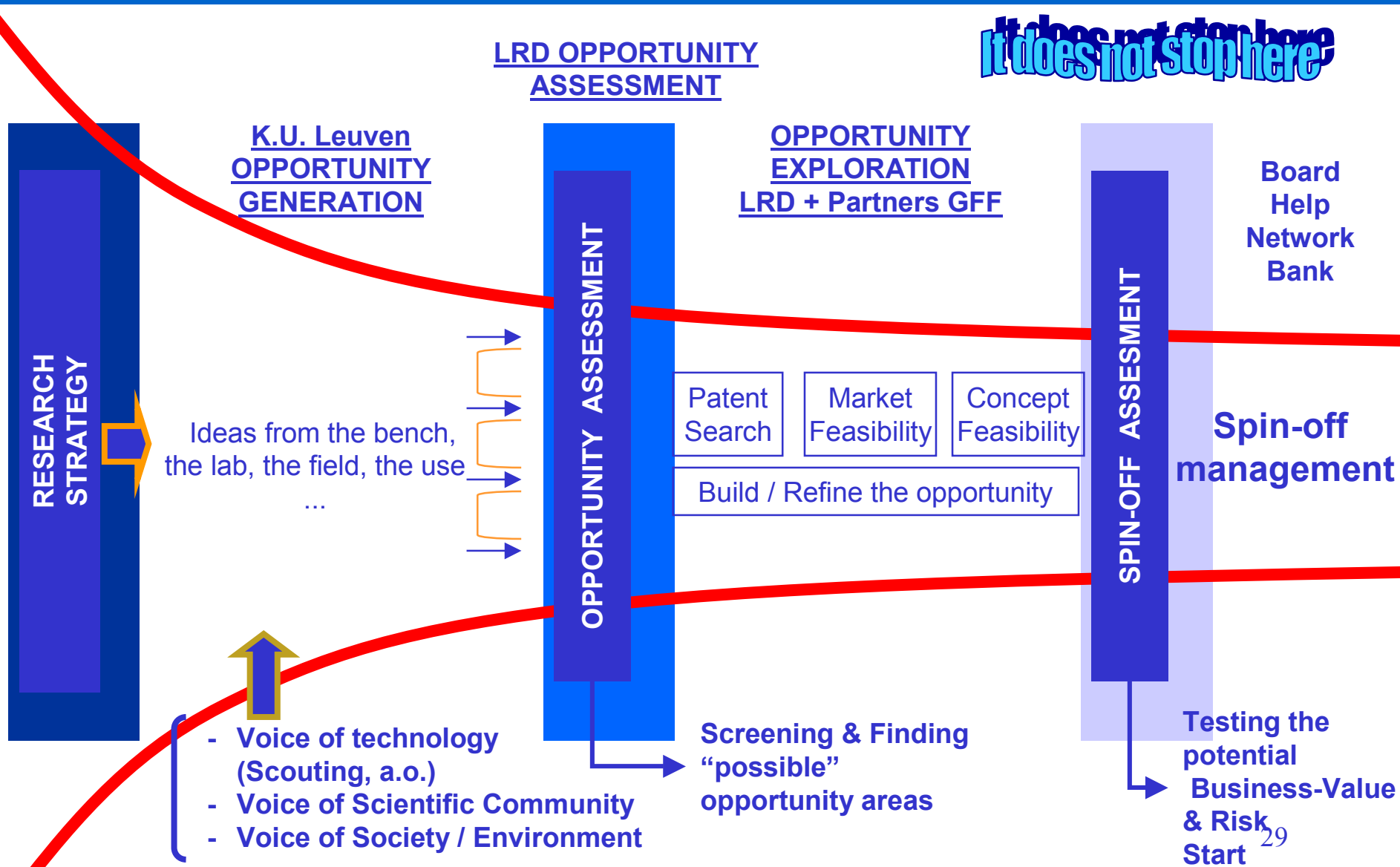
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Prof. R. De Bondt
Chairman
K.U.Leuven R&D

Prof. A. Oosterlinck
Rector
K.U.Leuven



THE SPIN-OFF FUNNEL



IV. “Glocal” role of universities

Interaction as success factor:

D.V. = Log (Innovation count at regional level)
 N = 125 U.S. Metropolitan Statistical Areas,
 *= Coefficients significant at p=0.01-level
 Standard errors in parentheses
 (Source: Varga, 1999)

Model	OLS Full	OLS Intermediate	OLS Final
Constant	-0.230* (0.183)	-0.315* (0.157)	-0.381* (0.154)
LOG(RD: industrial RD employment)	0.270* (0.056)	0.283* (0.054)	0.295* (0.054)
LOG(URD: university RD expenditures)	-0.302* (0.141)	-0.190* (0.067)	-0.186* (0.067)
LOG(Concentration high tech)*LOG(URD)	0.185* (0.036)	0.184* (0.036)	0.188* (0.036)
LOG(Pres. business service)*LOG(URD)	0.081* (0.015)	0.085* (0.014)	0.088* (0.014)
LOG(Enrollment)*LOG(URD)	0.026 (0.029)		
RANK*LOG(URD)	0.033 (0.020)	0.035 (0.020)	
LOG(% large firms)*LOG(URD)	-0.094* (0.025)	-0.096* (0.025)	-0.098* (0.025)
R ² -adjusted	0.737	0.738	0.733

Leuven.Inc:

- **Growing business models requires networking**
- **Hence ... Leuven.Inc:**
 - **mission: network organization for the Leuven region**
 - **founded November 1999:**
 - **founders: EASICS, Capricorn Venture Partners, ICOS, Krypton, LMS, Materialise, Option International**
 - **founding sponsors: Arthur Andersen, IMEC, K.U. Leuven R&D, KBC-Investco, VIV-Fortis**
 - **>500 members as of 05/2002**
 - **linked to Cambridge network via wwweb and other activities**
 - **pool and stream of events supportive of network development**

Conclusion:

Local ingredients for success

- **University (and IMEC) as incubator and facilitator**
- **Appropriate mix of knowledge-intensive high-tech start-ups and established companies**
- **Professional support infrastructure and environment, including risk capital**
- **Incubator facilities and research parks, fostering a knowledge-intensive business texture**
- **Partnership between all actors involved, including the city of Leuven and the province**