University Industry Knowledge Transfer

Turning Knowledge into Innovation

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PI –Commercialization of Academic Research Results (Vinnova/Marie S. Curie)

Post-doctoral Researcher, Max Planck Institute of Economics, Jena, Germany

Commercialization of public research at Max Planck Society
Docent in Strategy/Research Policy Business Administration

PhD in Innovation Engineering @ LTH

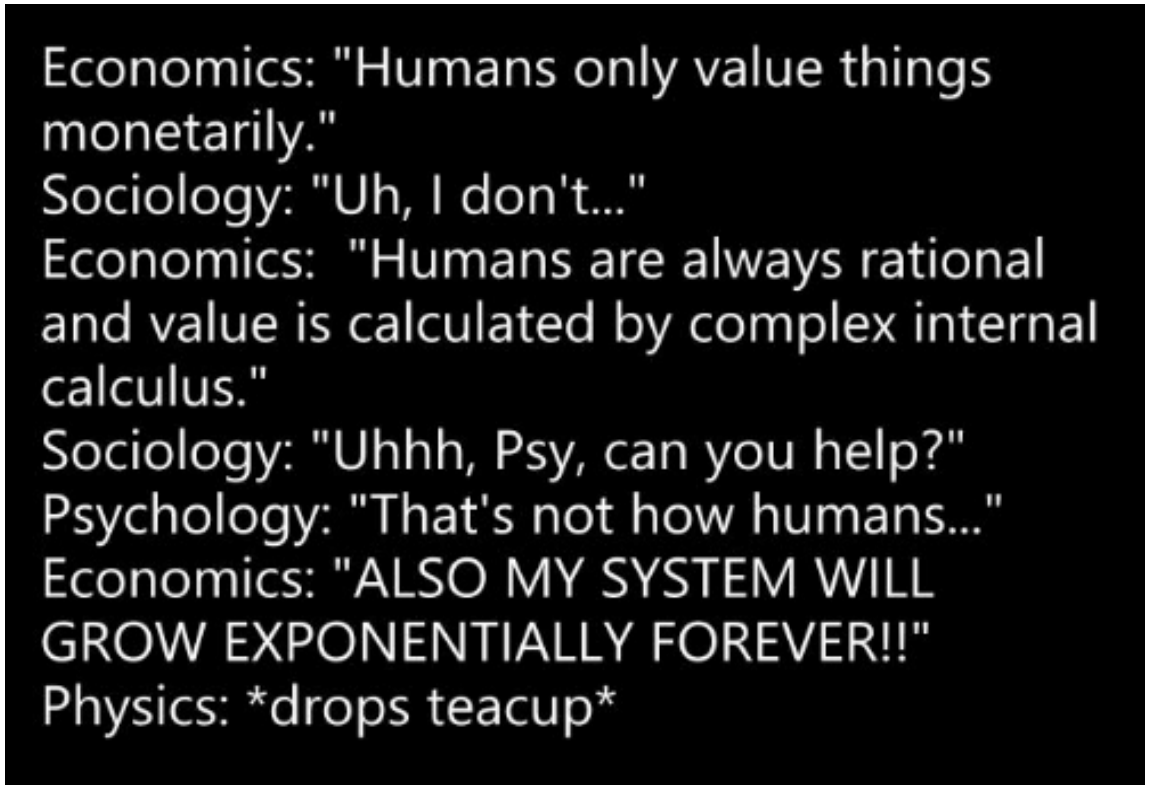
Identification of academic inventors/entrepreneurs and patent at Lund University

MSc. Science-Tech. Policy at Technion Haifa, Israel

BSc. METU Ankara, Turkey

What comes to your mind?

- Research
- Knowledge
- Development
- Innovation
- Entrepreneurship (scientific)



GSM™

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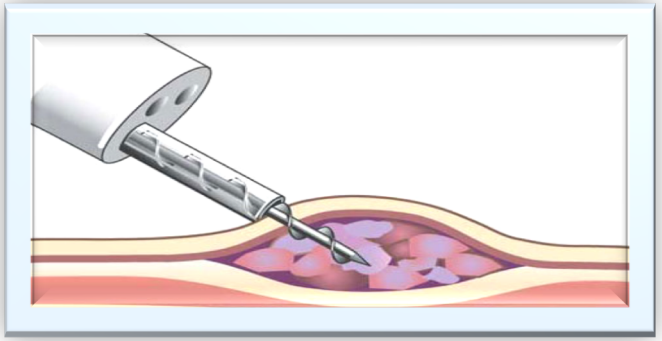


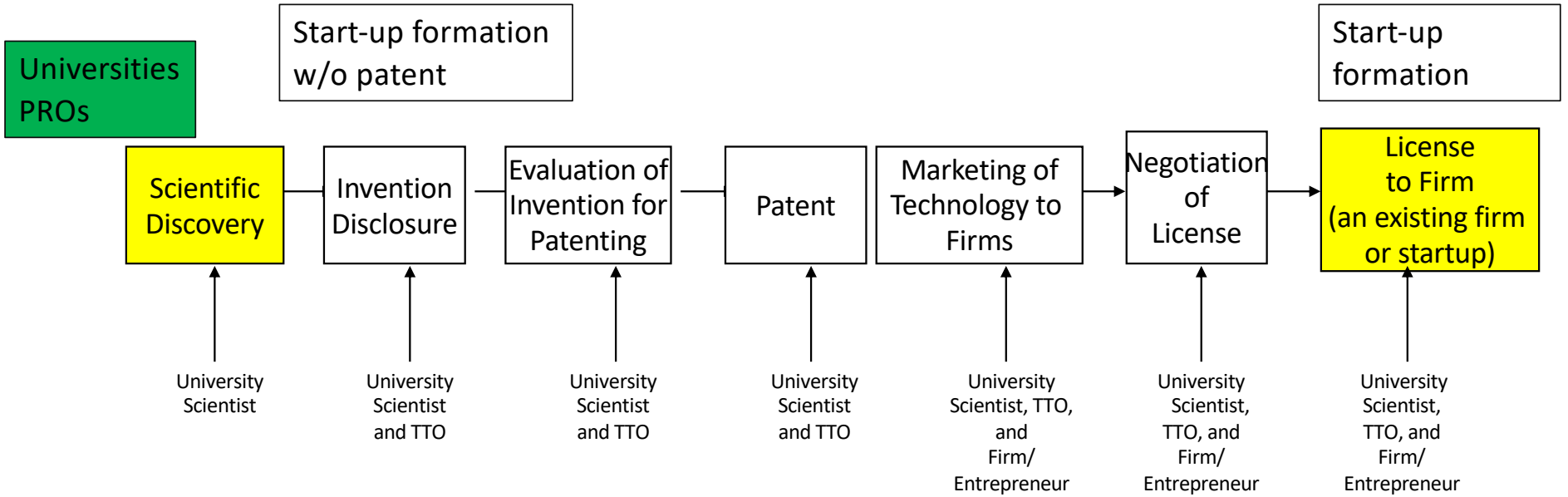
Knowledge based Economy

- Scientific research & industrial development and long-run growth.
- Universities: the seed-beds of scientific research
- Public policy focus on innovation
- Innovation?

Where does Innovation Come?

- Creativity?
- Imagination?
- Euroka moment helps?
  - To what extent?
- Scientists often have full of ideas and some identify lots of opportunities but they weren't products until they were shaped by experimentation

Knowledge transfer in theory



From lab to market: Cherry Tomatoes!

A total of over $1 Billion in sales over the past 20 years

The Hebrew Univ. of J.

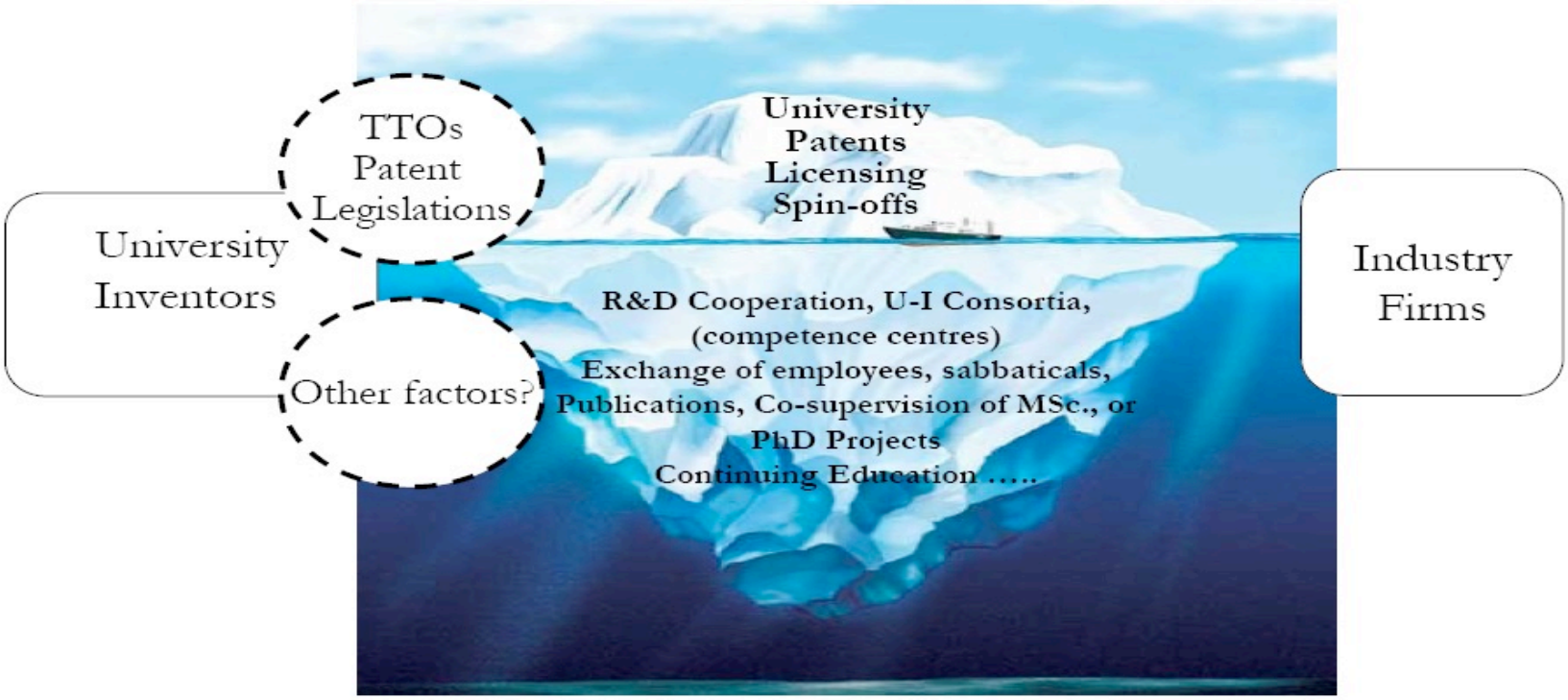
12-year research

- Prof. Nachum Kedar and Prof. Haim Rabinowich breeding program using wild Peruvian tomato species to create a sweet snack tomato with excellent ripening time and shelf time

Top two seed companiesHazera and Zeraim Gedera

Marks & Spencer's demand

Knowledge transfer in reality



Schumpeter's distinction between "Invention" and "innovation"

- An **'invention'** is an idea, a sketch or model for a new or improved device, product, process or system.
  - It has not yet entered to economic system, and most inventions never do so.
- An **'innovation'** is accomplished only with the first commercial transaction
  - "Social and economic utility not only science for fun" or "knowledge for its own sake"
- **Commercialization**

Reasons to Innovate

- Competition
- Science & Technology
- Market
- Legislation
- Human Nature

From Science to Innovation

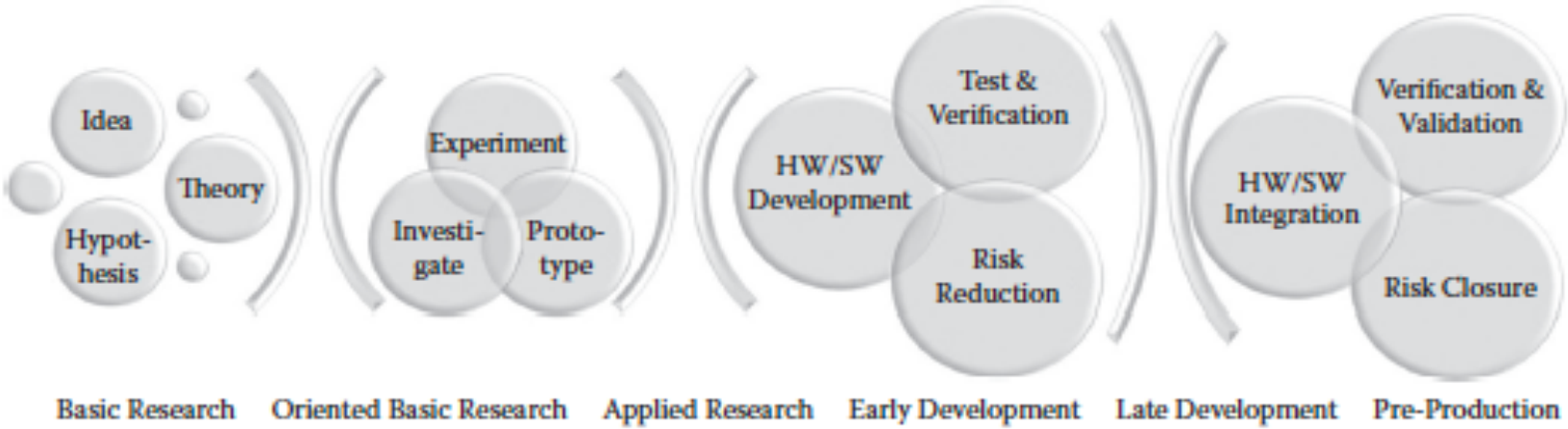
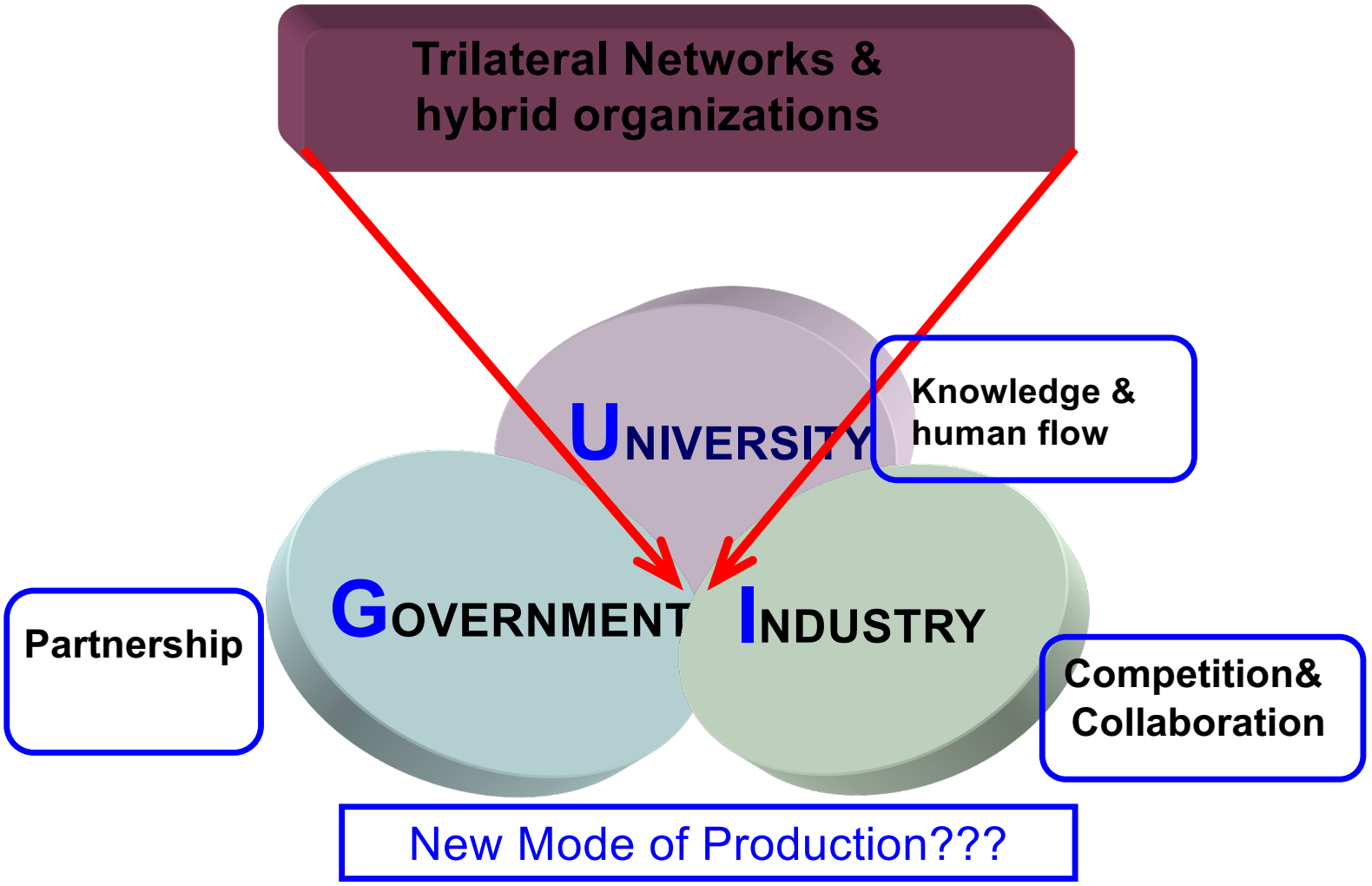


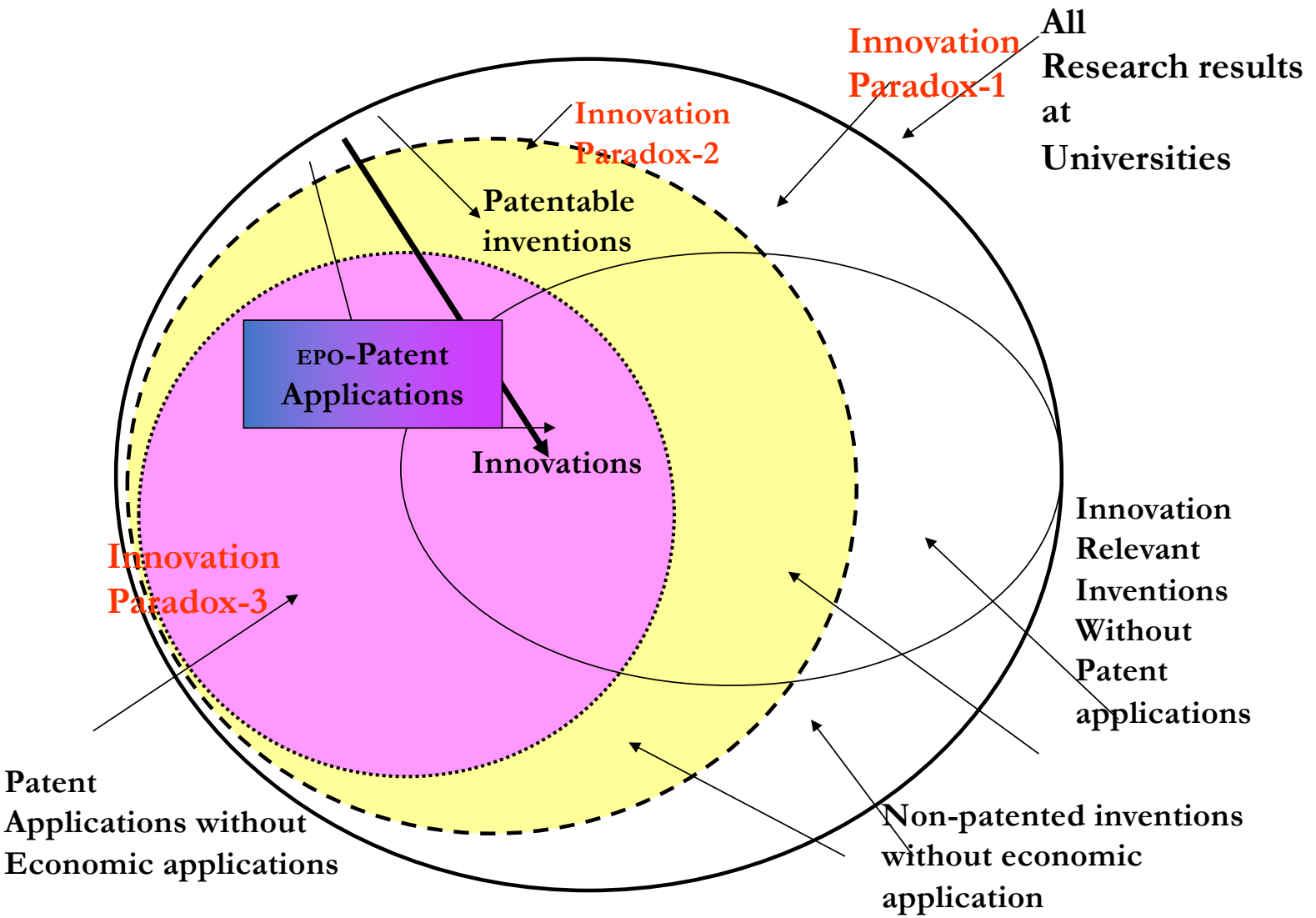
FIGURE 3.2
R&D progression.

Issues

- Can a university be an “entrepreneur, i.e. commercializing research results in the form of innovation”?
- Benefits and risks of patent-focused strategies for technology transfer

Role of Government in Systemic Model??





Patents, inventions, innovations, based on Grupp, 1998

Intellectual Property Governance at US universities

- In the 1970s…
  - **$75 billion spent** (per year) in government sponsored R&D
  - Federal government held approximately **28,000 patents**
  - **Fewer than 5% of those were licensed** to industry for development/commercial products
  - Companies did not have exclusive rights

Bayh-Dole Act

- This Act created a **uniform federal patent policy** that allowed universities to retain rights to any patents resulting from government funded research and to license these patents on an **exclusive** or **non – exclusive** basis (Sampat, Mowery 2003)

How US universities convert research into innovation?

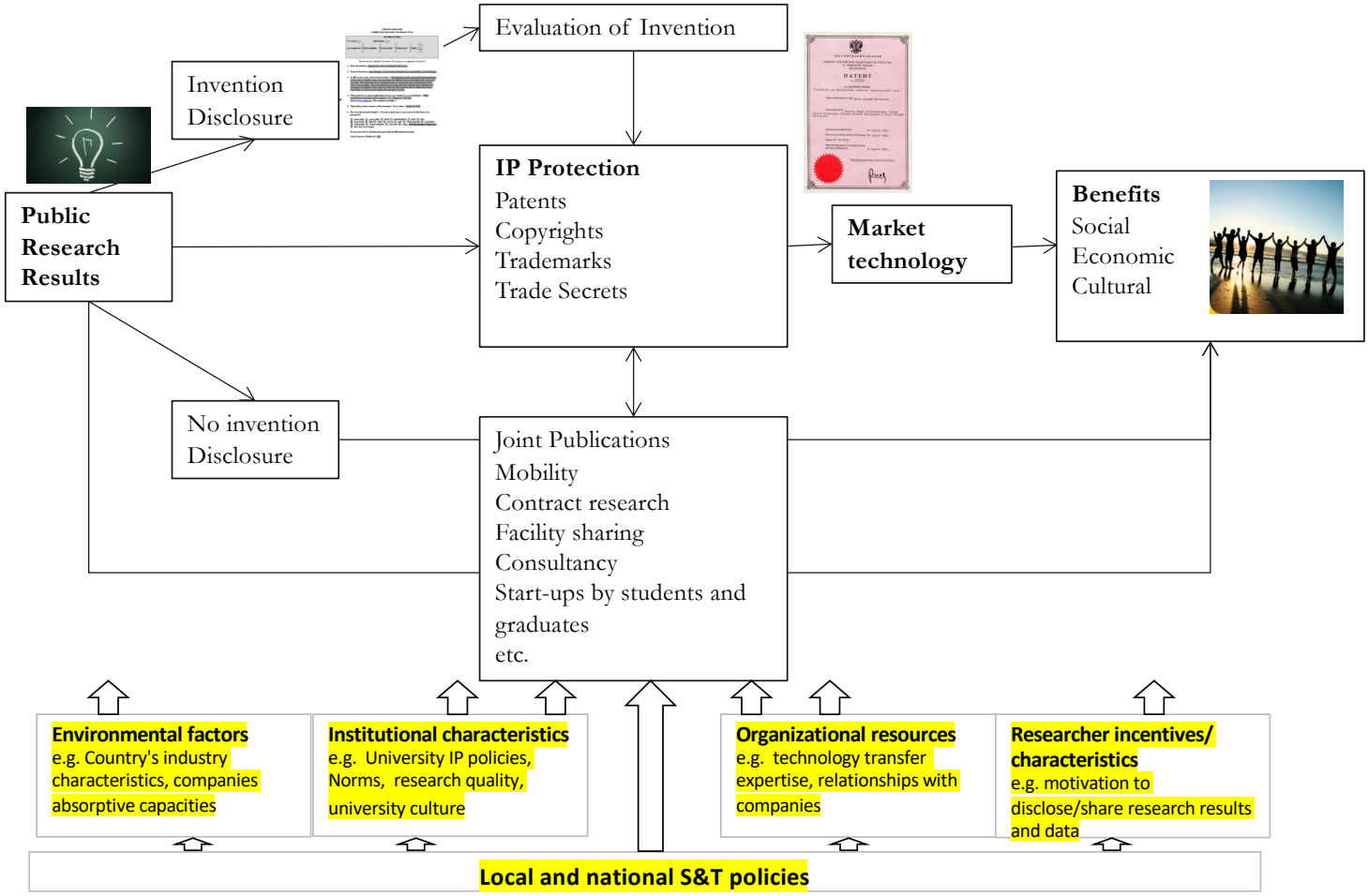
- Since Bayh-Dole, if they think an invention can be commercialized, they patent it.
- Universities then license the patent to industry, which will further develop and market the invention.
- Universities may grant either exclusive or non-exclusive licenses to industry.
- An exclusive license gives a single company the sole right to develop and sell the invention.
- A non-exclusive license allows many companies to use and sell the invention.
- In either case, universities receive royalties and/or other payments in exchange for the license.

Governance of Innovation at Universities

Yale claims that “The primary goal of commercializing Yale inventions is to disseminate and develop knowledge for the public good”.

Yale calls generating revenue a subsidiary goal.

From Knowledge to Innovation



From Knowledge to Innovation

- **Extent of direct personal involvement (relational intensity):** For example, a publication is associated with low relational intensity, while joint research would have a high relational intensity. Agree or Not
- **Significance to industry.** When seen from the perspective of industry, the relative importance of channels varies. Business surveys show that publications and collaborative research are rated highly significant, while patent and licensing- based channels are rated low. Agree or not?
- **Degree of knowledge finalisation:** The degree to which a research project provides a specific goal or can be contained in deliverables as opposed to producing public sector knowledge and/or enlarging the stock of knowledge whose outcomes are difficult to measure/anticipate (e.g. conferencing). Agree or not?
- **Degree of formalisation.** Channel formalisation refers to the extent to which the interaction is institutionalised and/or guided by formal rules and procedures.

Sector & Scientific field

There are also interdisciplinary differences in the intensity of transfer and commercialisation channels used.

WHY?

Beyond US?

- How do we do it in Sweden, France, Denmark, ….

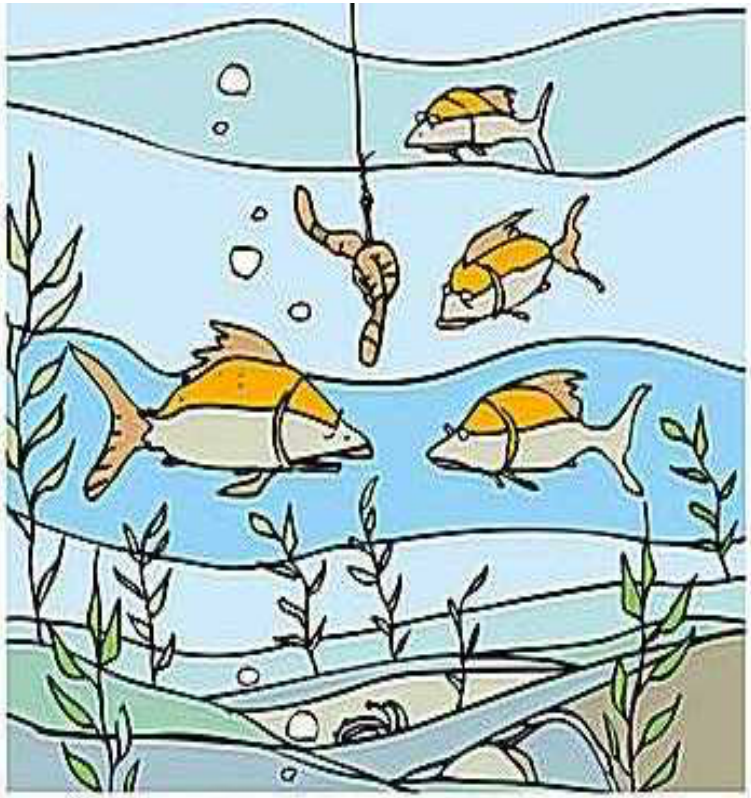
EU

- EU universities have little or no tradition of self-administration:
  - traditionally left IPR management decisions in their professors' hands, who in turn have left them in their business/govt sponsors' hands or form IP-companies
  - End of "Professor's Privilege"-Exception in: "Italy,Austria, Denmark, Norway, Germany, Japan, Canada …"
  - Sweden kept Professor's Privilege + TTOs
  - Not always one-to-one adoption but an "emulation" of the "Bayh-Dole model and TTOs."
- A "patent-centered" model of technology transfer.

European Paradox

“European Paradox”: Europe is not receiving an adequate return on its investments into research and technology because of less and slower commercialisation of research results.

- Very little reliable historical data
- Institutional differences require a new method

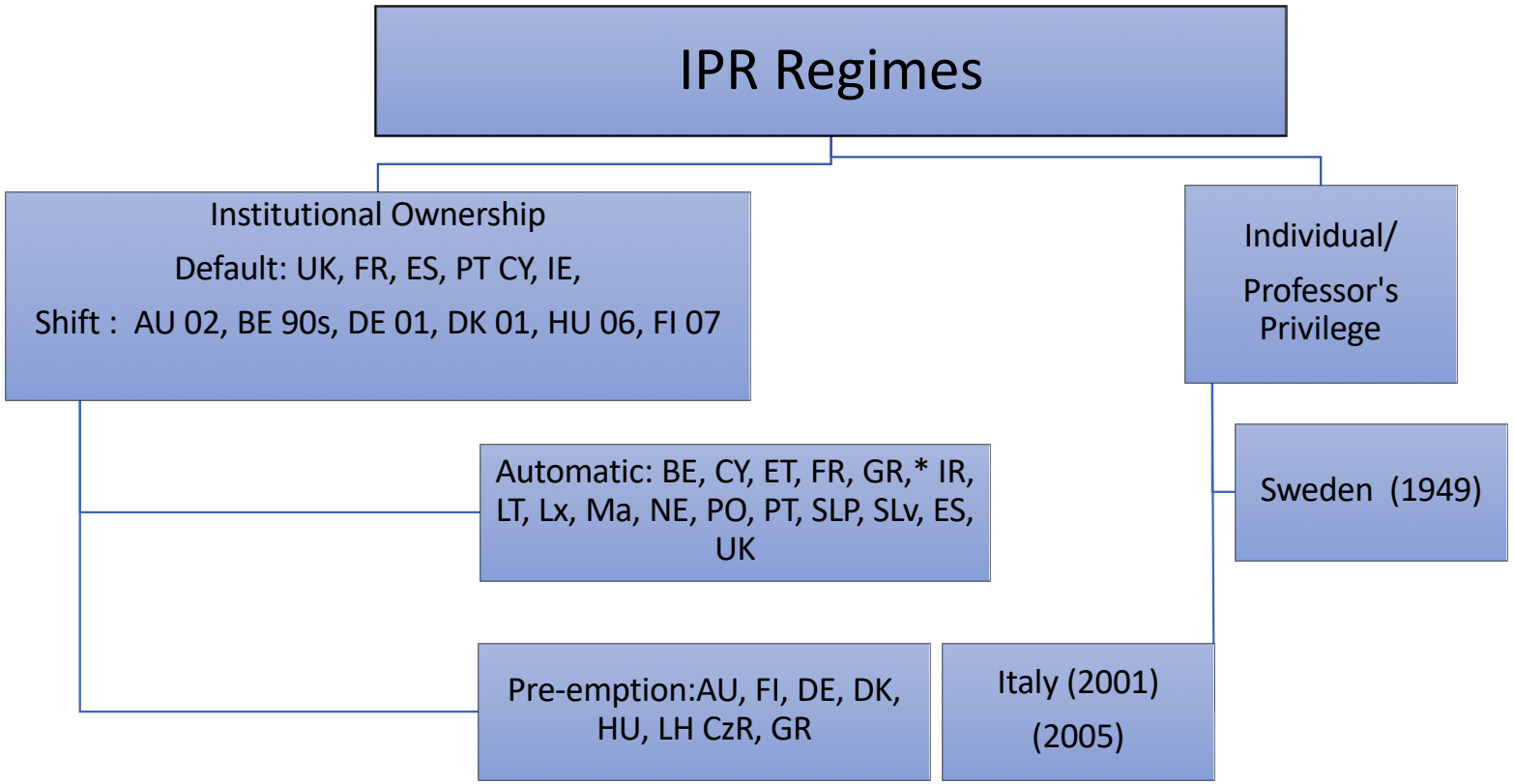


“Sure, it looks good. Too good. Trust me, there’s always a catch.”

Arguments

- Optimistic view: Academic Entrepreneurship
- Pesimistic view: Academic capitalisim

IP Regimes at European Universities



Audretsch & Göktepe-Hultén 2015 The Chicago handbook of university technology transfer and academic entrepreneurship

European Universities contribution to Innovation

- **University-owned**
- **University-invented**

- Sweden- Lund University
  - 458 patents, 250, only 36 owned by TTOs
- Finland
  - 530 USPTO patents, 285 inventors, 36 owned by the TTOs
- Belgium
  - 362 USPTO patents, 120 TTOs
- France (Univ. L. Pasteur)
  - 463 National patents 62 owned by TTOs-Univ. PROs
- Patval Database
  - 82% University-invented; 18% University-owned.

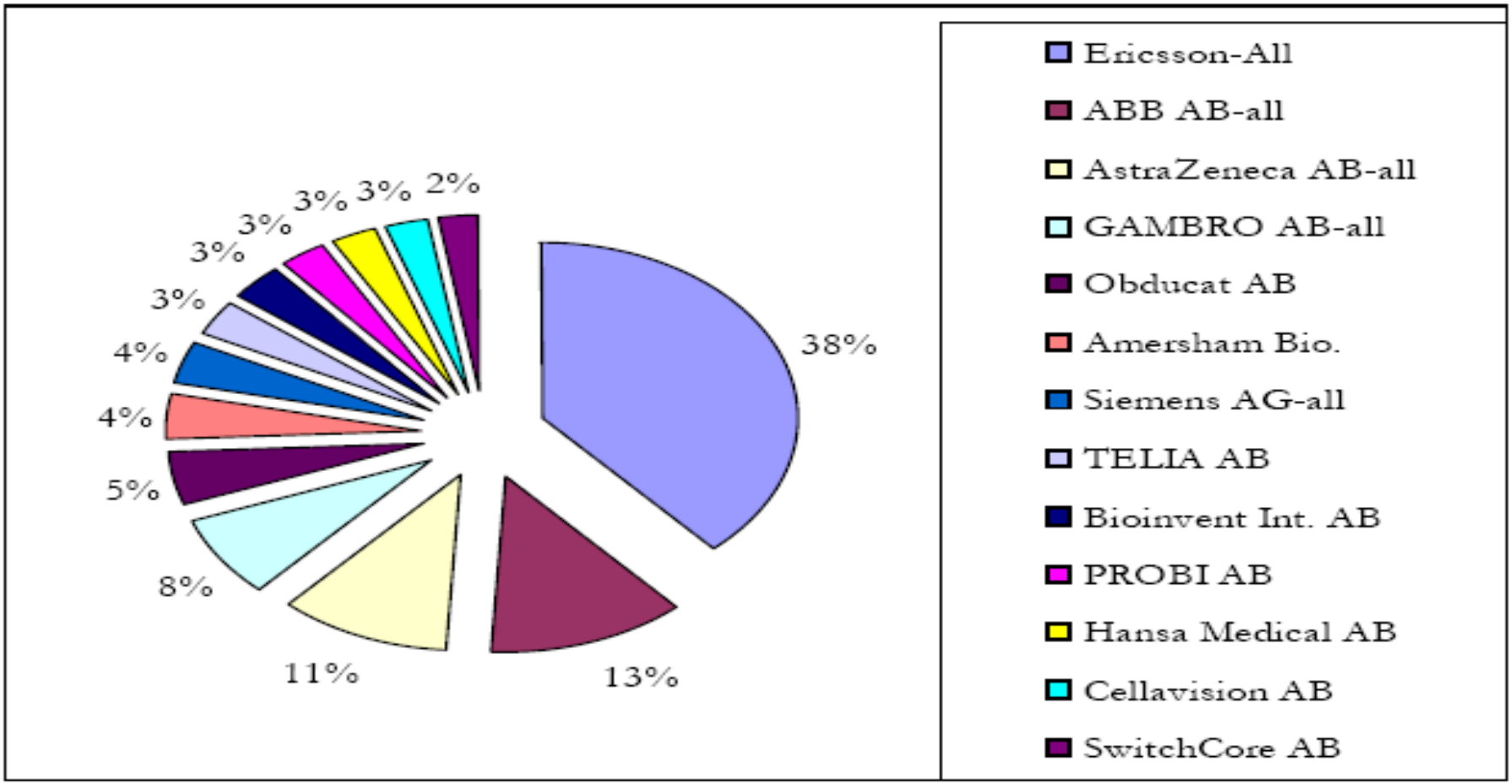
Sweden

APPLICANTS	*PATs*	*MAIN CLASS*
ABB	151	Equipment and electrical machines
Ericsson	114	Telecommunications
Pharmacia UpJohn	75	Pharmacology and cosmetics
AstraZeneca	40	Pharmacology and cosmetics
Telia	27	Information Technologies
Siemens	25	Medical technologies
Karolinska-TTO	19	Biotechnologies
A & Science Invest	17	Pharmacology and cosmetics
Sandvik	16	Materials, Metallurgy
Kvaerner Pulping	13	Materials treatment

Keinsdatabase

Lissoni et al. Keins Database

Usual suspects!



Snapshot from Keins Data

France

CNRS	220	Biotech., Medical technology
INSERM	99	Biotech., Organic Chemistry
Total	72	Macromolecular Chemistry, Thermal Processes

Italy

APPLICANTS	*PATs*	*MAIN CLASS*
ST-Microelectronicss	143	Semiconductors
CNR	111	Chemistry, Materials
ENI	97	Chemistry, Materials

The Netherlands

APPLICANTS	*PATs*	*MAIN CLASS*
Philips	236	Electronics
Unilever	98	Pharmacology - Biotechnologies
Leiden University	73	Pharmacology - Biotechnologies

Finland

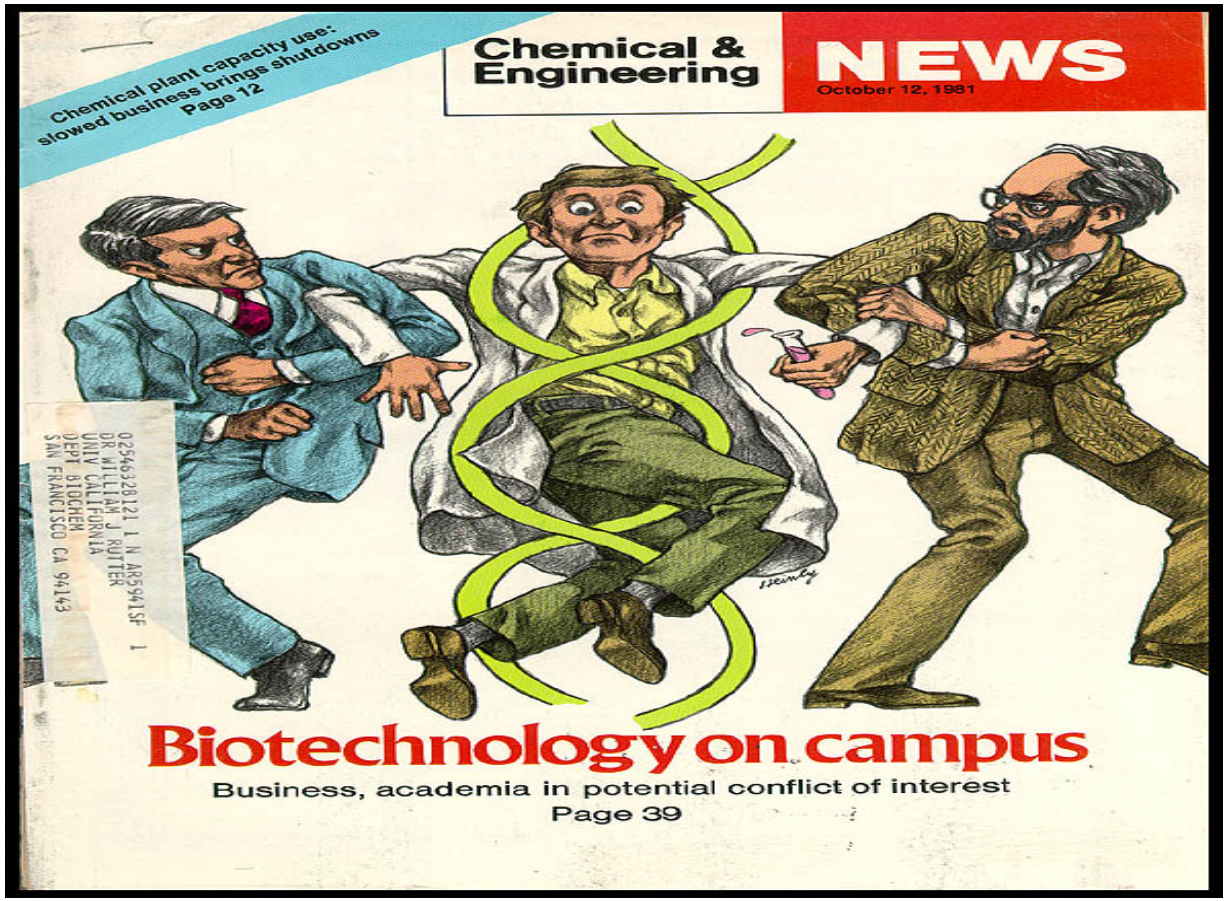
Keinsdatabase

European Uni-Ind Knowledge transfer

Source	% Rating Source As “Important” or “Very Important”
Publications and reports	41.2
Informal interaction	35.6
Meetings and conferences	35.1
Consulting	31.8
Contract research	20.9
Recent hires	19.6
Cooperative R&D projects	17.9
Patents	17.5
Licenses	9.5
Personnel exchange	5.8

Scientists

- Who owns the research results?
- Nature of research?

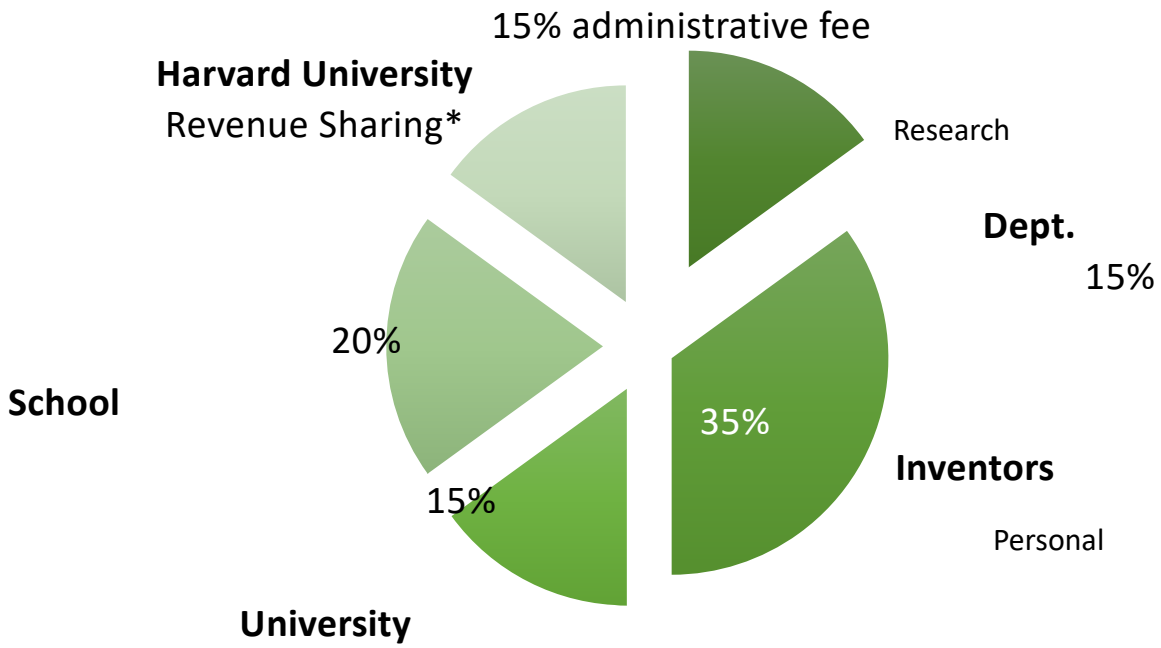


Possible shortcomings of university patenting

1. Publishing versus patenting;
2. Teaching quality;
3. Possible negative impact upon the culture of ‘open science’;
4. Threat to future academic investigation;
5. Divert research resources from long term fundamental research questions.
6. Major impediments to innovation from universities

IP – Who owns what?

- Inventors are owners unless there is a contractual arrangement



Inventors vs. Authors

- Authorship is NOT the same as inventorship

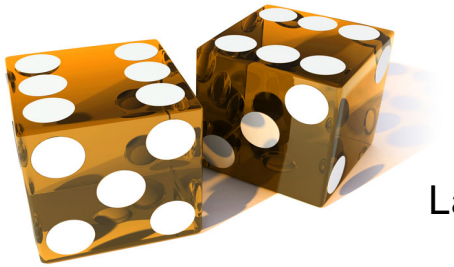
Concerns?

Choice not Coercion

Loss Analysis of Compulsory TT Model

Conflict

Motivational Fatigue



Complacency

Lack of Resources

TT is not a strategic business model for all universities with limited research grants

Innovation Leadership Scientists

- The major channel for knowledge transfer remains the placement of students
- Those who generate ideas and inventions (i.e. from professors to students), have relevant incentives
- Change in incentive structures with agencies and ministries in charge of academic incentives
- Government oversight of academic incentives could help here to remedy imbalances and conflicts

Universities & Innovation Governance

US universities have been slow to develop more flexible IP management policies.

Tech company stopped graduate recruitment following patent infringement

From: HR Team Communications [hrteamcommunications@micron.com]
Sent: Monday, January 14, 2013 3:35 PM
To: Multiple-Recipients
Subject: Micron's student recruitment at the University of Illinois

Dear Professor:

I write to inform you of a change in Micron's student recruitment at the University of Illinois ("UIUC"). Because Micron remains a defendant in a patent infringement lawsuit that UIUC filed against Micron in Federal court in Illinois on December 5, 2011, effective immediately, Micron will no longer recruit UIUC students for open positions at any of Micron's world-wide facilities.

When the case was first filed, Micron expressed to UIUC counsel the company's strong dismay that despite the long-term synergies resulting from collaboration and partnership between Micron and UIUC, UIUC had chosen to file suit against Micron. UIUC counsel continues to refuse to dismiss the case even though the case has now been stayed indefinitely, pending resolution of a Micron petition filed with the Patent & Trademark Office regarding the validity of the three UIUC patents asserted.

As you know, Micron has long enjoyed a close relationship with UIUC. Among other things, Micron has hired numerous UIUC engineering students for both full-time and internship positions. In addition, the Micron Foundation has endowed chairs at the College of Engineering and has sponsored student scholarships and professor research. However, because UIUC's suit imposes costs and risks on Micron that are inconsistent with collaborative relationships among Micron, UIUC and its students, Micron must regrettably indefinitely suspend its recruitment of UIUC students and likewise suspend participation in other joint activities.

Sincerely,

Michelle Burks
Academic Program Manager
Micron Technology, Inc.

Ideas?

- Alternative models of technology transfer the road to heaven?

Discussion

Think about the department (research group) you work for.

Does your work environment promote creativity, innovativeness?

Thank you very much!

- Q&A

Lecture notes presented at French and Swedish School on Energy Materials, 13-17 May 2019. For more information please use devrim.goktepe-Hulten@fek.lu.se