SCIENTIFIC RESEARCH METHODOLOGIES AND TECHNIQUES

Unit 11: INTELLECTUAL PROPERTY RIGHTS

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PhD PROGRAM IN ELECTRICAL AND COMPUTER ENGINEERING

1. CONCEPTS

Base concepts

Intellectual property: Encompasses all tangible and intangible products of human mind: ideas, inventions, technologies, artworks, music and literature, that are intangible when first created, but that may become valuable in tangible form as products

> *Intellectual property refers to creations of the mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce.* *WIPO*

Intellectual property rights (IPR) - rights granted to creators and owners of works that are the result of human intellectual creativity. These works can be in the industrial, scientific, literary or artistic domains, thereby providing an incentive for the author or inventor to develop and share the information rather than keep it secret.

These include:

- Patent
- Utility model
- Trademark
- Copyright
- Design model
- Etc.

Discovery vs invention

A discovery is not a invention.

A discovery is a matter of observation and cognition of nature; an invention corresponds to something new that has not previously been provided for in nature.

> e.g. H.C. Ørsted *discovered* the electromagnetic field; the electric motor was *invented*.

Inventions are new solutions to technical problems.
These new solutions are ideas and can be protected as such.
Protection granted to the inventor (e.g. Patent) is protection against any use of the invention without authorization of the owner.

Copyright protects only the **form of expression of ideas**, not the ideas themselves.

Justification for IPR

- IPRs as financial incentives
- Justified when the creator's investment is costly and highly risky
- Considered in the developed world as catalysts for economic development and modernization
    - encourage innovation
    - economic and cultural enrichment
- Prevention of problems due to piracy and counterfeiting (health sector)
- Natural and human right (author's moral right)

Balance between incentives to future production and the preservation of the public domain ?

Developed vs developing countries?

E-commerce raises a number of legal issues regarding the validity, legal effect and enforceability of transactions, privacy, security, protection of ideas, brands of goods and services in an on-line environment etc.

Peer-to-peer communication techniques have made difficult the definition of what is an *on-line private user*
→ issues of balance between individual liberty and free non-market exchange values versus commercial distribution rights

(Nega, 2005)

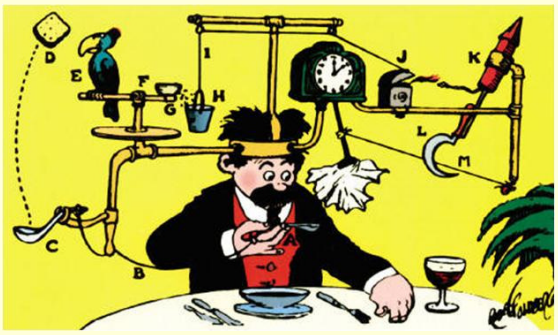
2. PROTECTION MECHANISMS

Types of IPR

Industrial property:

- **inventions (patents)**
- **trademarks**
- **industrial designs**
- **geographic indications of source**

Duration: generally 20 years



Copyright (or authors rights):

- **literary and artistic works** such as novels, poems and plays, films, musical works
- **artistic works** such as drawings, paintings, photographs and sculptures, and architectural designs.

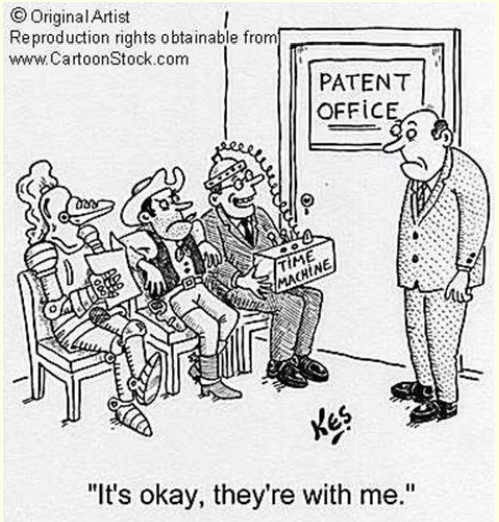
Duration: life of autor + 50 years (approx.)

Patents

Protection of inventions that solved an existing "technical" problem.
New solutions are, in essence, **ideas** and are protected as such.

Discovering something that already exists in nature, e.g. a previously unknown plant variety, is not an invention. The process for extraction of a new substance from a plant maybe an invention.
WIPO

Patents are intended to provide incentives to individuals, offering them recognition for their creativity and material reward for their marketable inventions ... if it is exploited !



Patents ...

Conditions of patentability:

- *Industrial Applicability (utility).* The invention must be of practical use, or capable of some kind of industrial application.

- *Novelty.* It must show some new characteristic that is not known in the body of existing knowledge (referred to as **prior art**) in its technical field.

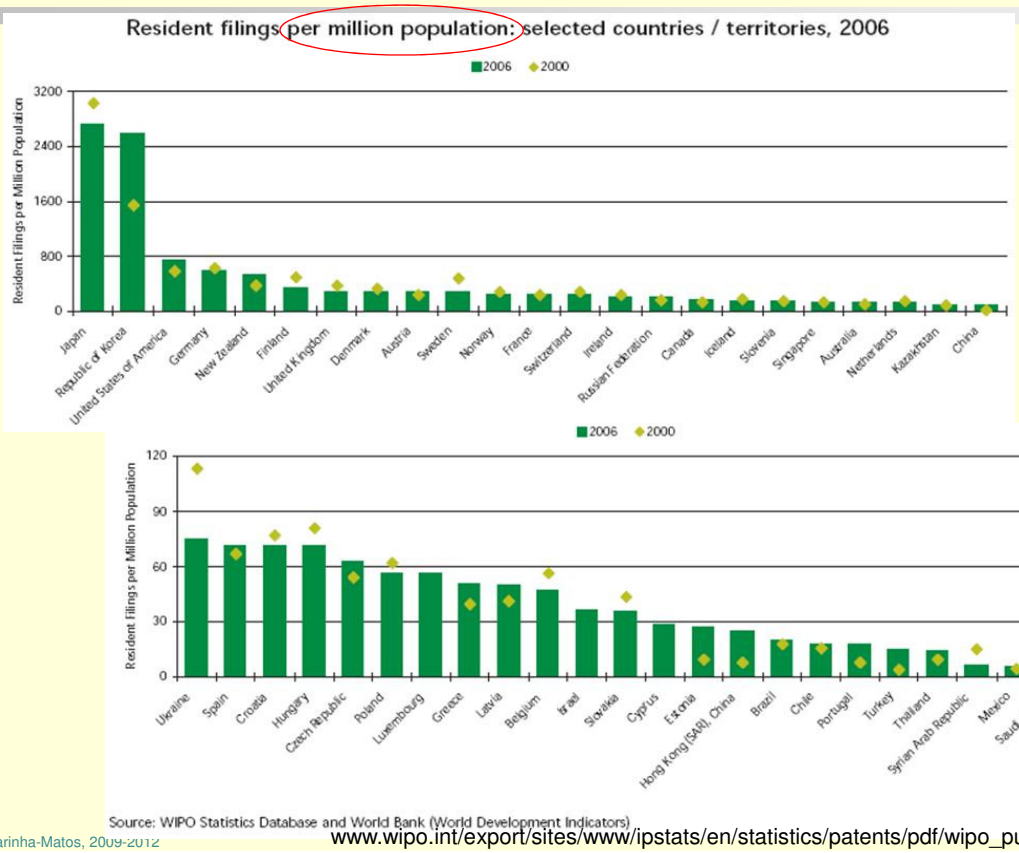
- *Inventive step (non-obviousness).* It must show an inventive step that could not be deduced by a person with average knowledge of the technical field.

- *Patentable subject matter.* The invention must fall within the scope of patentable subject matter as defined by national law. This varies from one country to another. Many countries exclude from patentablility such subject matter as scientific theories, mathematical methods, plant or animal varieties, discoveries of natural substances, methods for medical treatment (as opposed to medical products), and any invention where prevention of its commercial exploitation is necessary to protect public order, good morals or public health.

Conditions are not the same in every country ...

www.wipo.int/freepublications/en/intproperty/895/wipo_pub_895.pdf

Patents ...



Source: WIPO Statistics Database and World Bank (World Development Indicators)

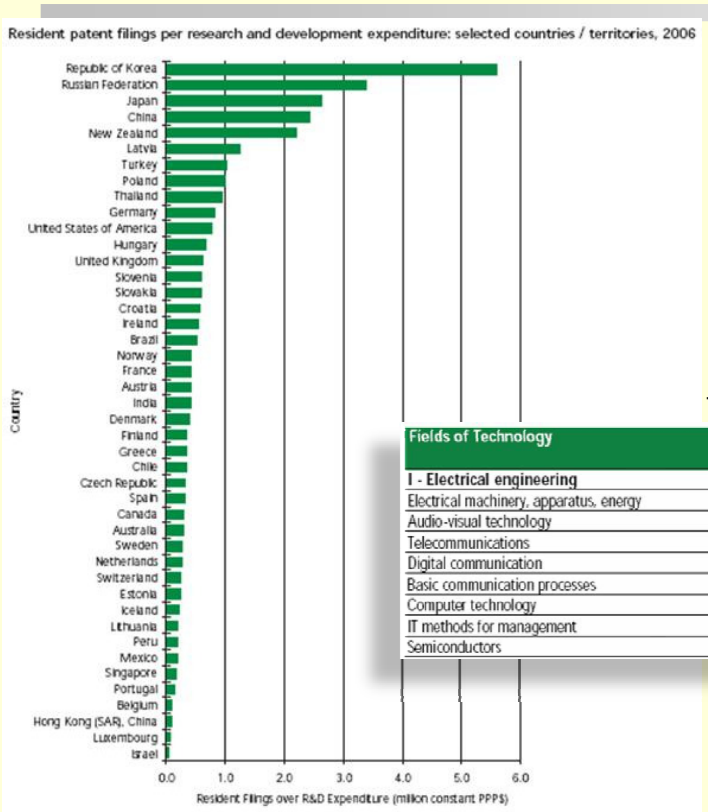
www.wipo.int/export/sites/www/ipstats/en/statistics/patents/pdf/wipo_pub_931.pdf

Patents ...

Granted per country

# 1	Japan:	994 per million people
# 2	Korea, South:	779 per million people
# 3	United States:	289 per million people
# 4	Sweden:	271 per million people
# 5	Germany:	235 per million people
# 6	France:	205 per million people
# 7	Luxembourg:	202 per million people
# 8	Netherlands:	189 per million people
# 9	Finland:	187 per million people
# 10	Switzerland:	183 per million people
# 11	Austria:	165 per million people
# 12	Russia:	131 per million people
# 13	Ireland:	106 per million people
# 14	Slovenia:	105 per million people
= 15	Norway:	103 per million people
= 15	New Zealand:	103 per million people
# 17	Ukraine:	84 per million people
# 18	United Kingdom:	82 per million people
# 19	Australia:	75 per million people
# 20	Israel:	74 per million people
# 21	Belgium:	72 per million people
= 22	Romania:	71 per million people
= 22	Latvia:	71 per million people
# 24	Georgia:	67 per million people
# 25	Mongolia:	56 per million people
# 26	Kazakhstan:	55 per million people
# 27	Denmark:	52 per million people
# 28	Belarus:	50 per million people
# 29	Spain:	42 per million people
# 30	Canada:	31 per million people
# 31	Poland:	30 per million people
# 32	Czech Republic:	28 per million people
# 33	Lithuania:	27 per million people
# 34	Hungary:	26 per million people
# 35	Uzbekistan:	25 per million people
# 36	Slovakia:	24 per million people
# 37	Bulgaria:	23 per million people
# 38	Malta:	18 per million people
# 39	Iceland:	15 per million people
# 40	Kyrgyzstan:	14 per million people
# 41	Italy:	13 per million people
# 42	Turkmenistan:	10 per million people
# 43	Croatia:	9 per million people
= 44	Singapore:	8 per million people
= 44	Armenia:	8 per million people
= 44	Argentina:	8 per million people
# 47	Portugal:	6 per million people
# 48	Morocco:	3 per million people
= 49	Brazil:	2 per million people
= 49	Tajikistan:	2 per million people
= 49	Uruguay:	2 per million people
= 52	Gambia, The:	1 per million people
= 52	Colombia:	1 per million people
= 52	Botswana:	1 per million people
= 52	India:	1 per million people
= 52	Estonia:	1 per million people
= 52	Mexico:	1 per million people
= 52	China:	1 per million people
= 52	Iran:	1 per million people
= 52	Thailand:	1 per million people
	Weighted average:	90.7 per million people

Patents ...



Total number of patent filings by field of technology

Fields of Technology	Year of Filing					Annual
	2001	2002	2003	2004	2005	Growth
I - Electrical engineering						
Electrical machinery, apparatus, energy	101,276	98,673	101,959	114,426	121,350	4.6%
Audio-visual technology	90,401	84,928	91,405	106,765	109,253	4.8%
Telecommunications	96,631	91,313	94,867	105,652	116,770	4.8%
Digital communication	44,017	42,977	45,076	48,995	50,069	3.3%
Basic communication processes	21,889	20,651	20,653	21,691	21,671	-0.2%
Computer technology	117,545	111,675	116,656	132,787	144,594	5.3%
IT methods for management	34,070	25,110	21,615	21,267	22,579	-9.8%
Semiconductors	78,398	78,729	81,411	89,548	95,107	4.9%

Patent applications by country (Last data: 2008)

Rank	Country	No. of Patent Applications
1	Japan	502,054
2	United States	400,769
3	China	203,481
4	South Korea	172,342
5	Germany	135,748
6	France	47,597
7	United Kingdom	42,296
8	Russia	29,176
9	Switzerland	26,640
10	Netherlands	25,927
11	Italy	21,911
12	Canada	21,330
13	Sweden	17,051
14	Australia	11,230
15	Finland	10,133
16	Israel	9,877
17	Spain	8,277
18	Denmark	7,719
19	Austria	7,711
20	Belgium	7,592

Patents granted by country (Last data: 2008)

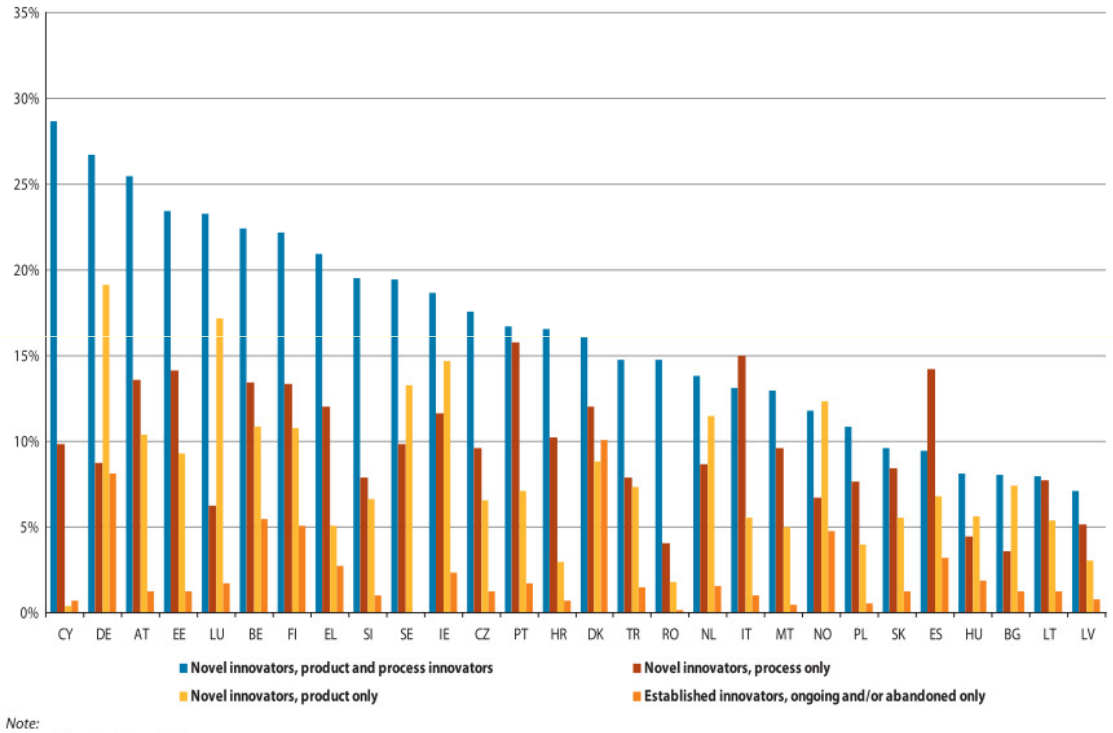
Rank	Country	No. of Patents Granted
1	Japan	239,338
2	United States	146,871
3	South Korea	79,652
4	Germany	53,752
5	China	48,814
6	France	25,535
7	Russia	22,870
8	Italy	12,789
9	United Kingdom	12,162
10	Switzerland	11,291
11	Netherlands	11,103
12	Canada	8,188
13	Sweden	7,453
14	Finland	4,675
15	Australia	4,386
16	Spain	3,636
17	Belgium	2,948
18	Israel	2,665
19	Denmark	2,347
20	Austria	2,306

Patents in force (Last data: 2008, mixed)

Rank	Country	No. of Patents in Force
1	United States	1,872,872
2	Japan	1,270,367
3	China	828,054
4	South Korea	624,419
5	United Kingdom	599,062
6	Germany	509,879
7	France	438,926
8	Europe	268,384 (E.P.O.)
9	Hong Kong	227,918
10	Spain	166,079
11	Russia	147,067
12	Canada	121,889
13	Australia	107,708
14	Sweden	105,571
15	Belgium	87,189 (2003)
16	Ireland	78,761
17	Mexico	73,076
18	Monaco	50,392
19	Luxembourg	49,947
20	Finland	47,070

[Wikipedia]

Figure 5.7: Breakdown of innovators by type of innovator — 2006 (as a percentage of all enterprises)

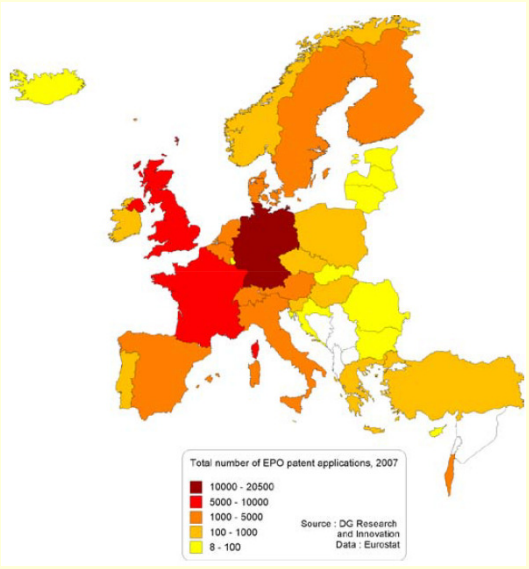


Note:
Data missing for FR and UK.
SE: unreliable data for established innovators, ongoing and/or abandoned only.

Source: Eurostat, Community Innovation Statistics 2006 (inn_cis5_prod)

EPO applications

2007

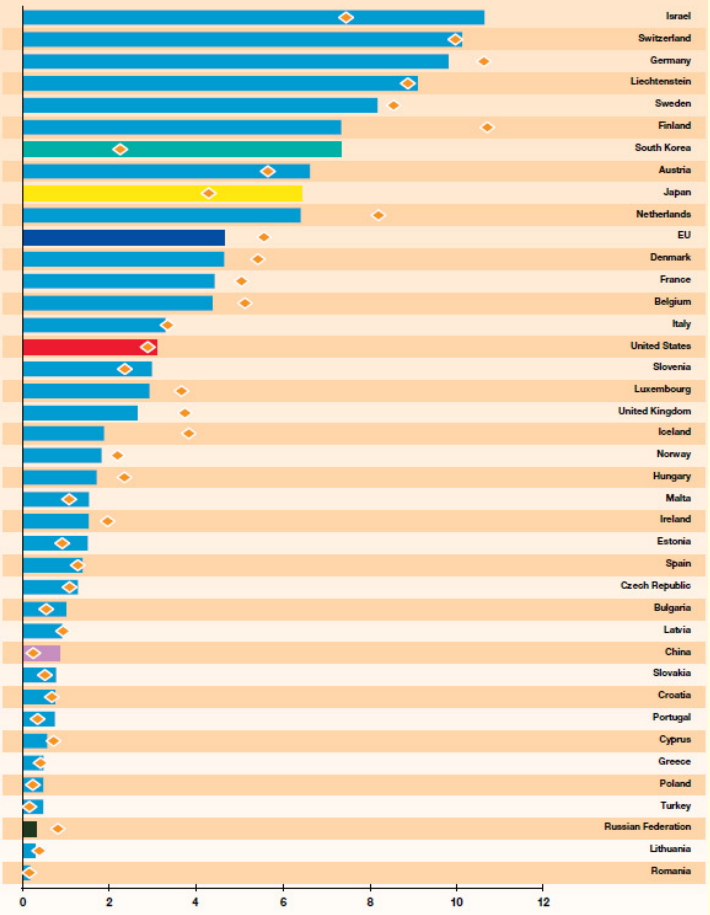


2007(1) ◆ 2000

Source: DG Research and Innovation
Data: Eurostat
Notes: (1) The values for 2007 are estimates.
(2) Fractional counting; priority year.
(3) LI: 2006.

Innovation Union Competitiveness Report 2011

FIGURE I.6.7 EPO patent applications(1) by inventor's country of residence(2) per billion GDP (current euro), 2000 and 2007(3)



Relationship to publications?

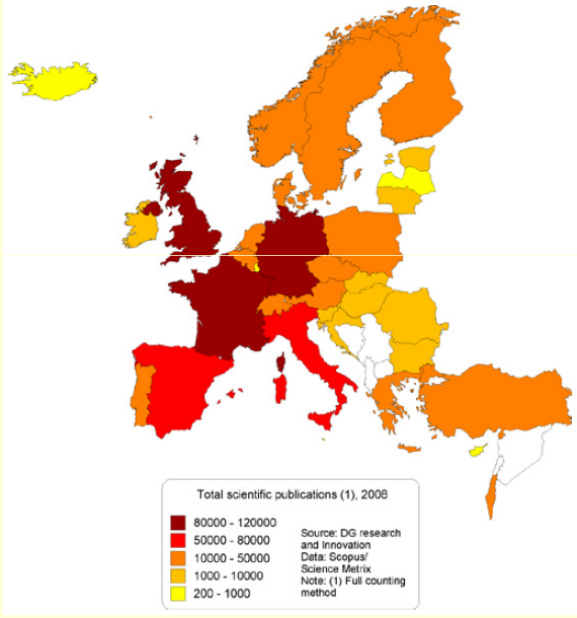


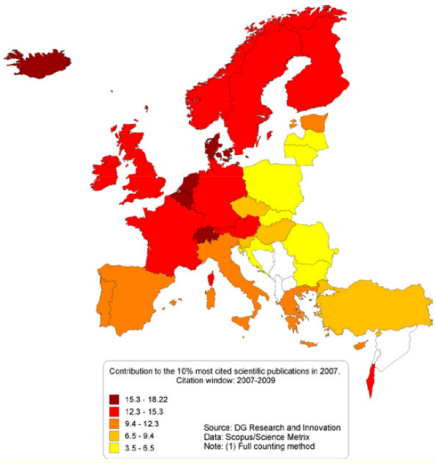
TABLE I.6.1 Scientific publications

	Total scientific publications(1)			Scientific publications within the 10% most cited scientific publications worldwide(1)		
	2000	2008	Average annual growth (%) 2000-2008	2000	2007	Average annual growth (%) 2000-2007
Belgium	11 820	20 285	7.0	1401	2787	10.3
Bulgaria	1925	2896	5.2	95	165	8.2
Czech Republic	5781	11 894	9.4	353	743	11.2
Denmark	8896	13 260	5.1	1327	2092	6.7
Germany	77 958	111 288	4.5	9085	13 576	5.9
Estonia	603	1392	11.0	41	132	18.2
Ireland	3178	7799	11.9	345	904	14.8
Greece	5924	13 855	11.2	459	1299	16.0
Spain	27 089	52 664	8.7	2347	5317	12.4
France	57 081	81 911	4.6	6049	9030	5.9
Italy	38 708	63 408	6.4	3816	6858	8.7
Cyprus	197	801	19.2	10	66	30.9
Latvia	359	613	6.9	18	16	-1.8
Lithuania	612	2065	16.4	42	96	12.6
Luxembourg	90	503	24.0	5	38	33.7
Hungary	5164	7419	4.6	335	560	7.6
Malta	50	223	20.5	3	15	25.6
Netherlands	22 181	35 425	6.0	3207	5383	7.7
Austria	7967	14 225	7.5	946	1754	9.2
Poland	13 022	24 121	8.0	609	1210	10.3
Portugal	3804	10 781	13.9	317	949	16.9
Romania	2456	6967	13.9	120	278	12.7
Slovenia	1926	3701	8.5	102	284	15.8
Slovakia	2405	3968	6.5	90	204	12.4
Finland	8358	12 606	5.3	1028	1471	5.2
Sweden	17 409	22 976	3.5	2259	3117	4.7
United Kingdom	84 422	117 742	4.2	10 512	15 691	5.9
EU	367 207	546 837	5.1	37 150	55 557	5.9
Iceland	322	759	11.3	47	106	12.4
Norway	5978	10 963	7.9	674	1368	10.6
Switzerland	16 027	26 009	6.2	2563	4236	7.4
Croatia	1884	3882	9.5	52	170	18.5
Turkey	7246	23 092	15.6	326	1475	24.1
Israel	10 709	15 279	4.5	1207	1862	6.4

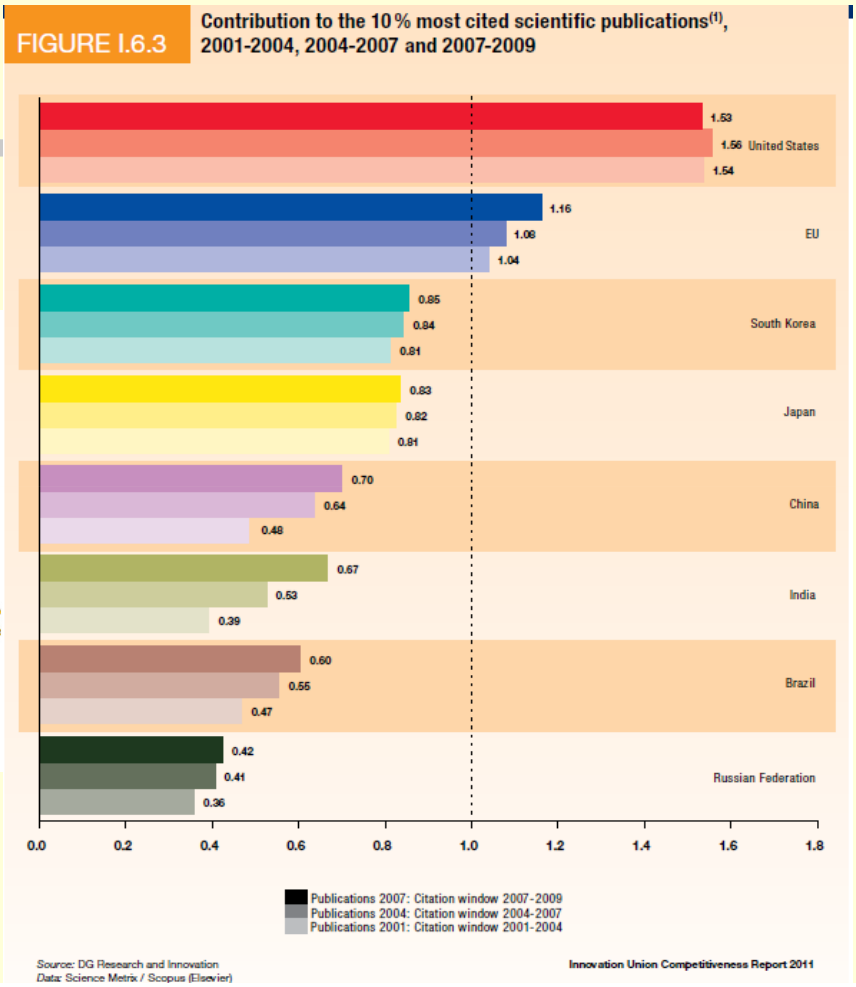
Source: DG Research and Innovation
Data: Science Metrix / Scopus (Elsevier)
Note: (1) Full counting method.

Innovation Union Competitiveness Report 2011

Most cited publications?



Contribution to the 10 % most cited scientific publications as % of total national publications, 2007



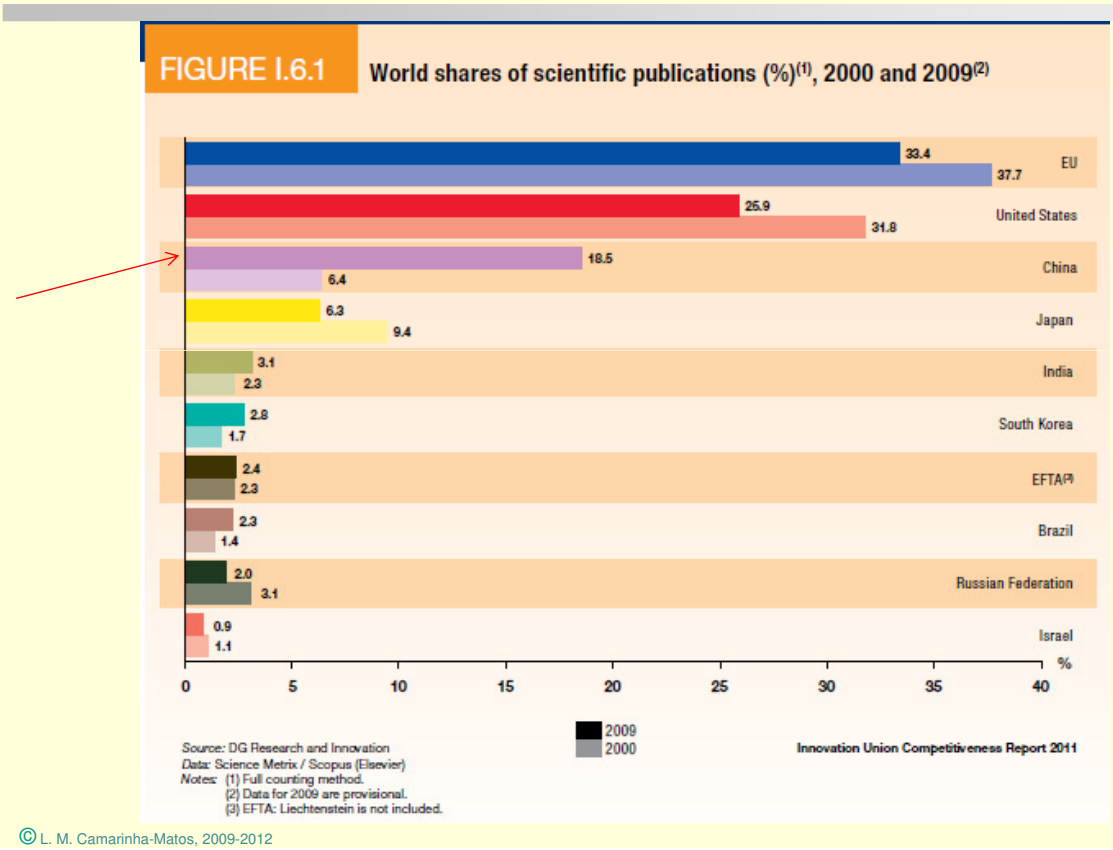
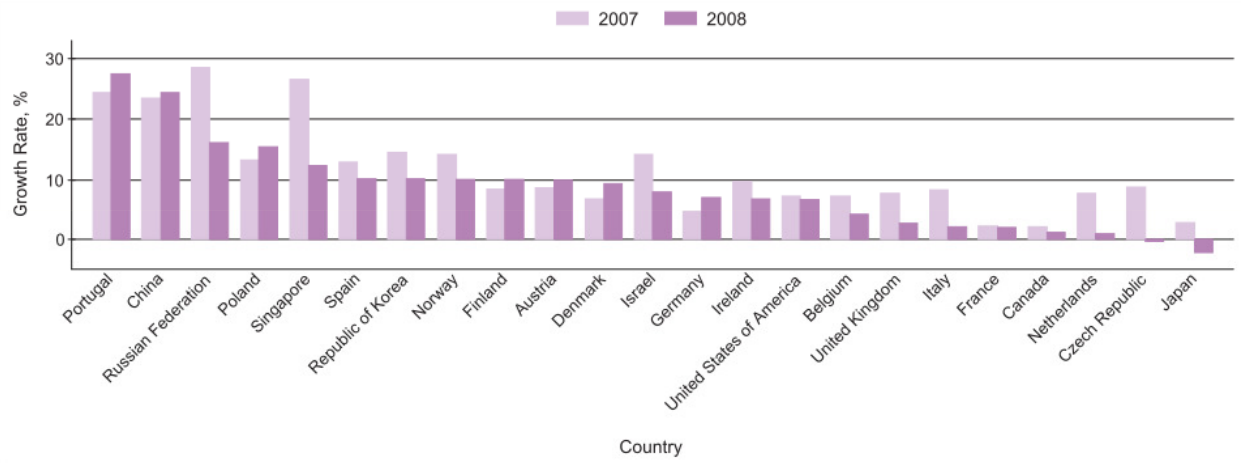


Figure 5: Real R&D expenditure growth rate (%)



Note: R&D data refer to gross domestic expenditure on R&D.

Source: WIPO, based on data from the OECD, June 2010

http://www.wipo.int/export/sites/www/ipstats/en/statistics/patents/pdf/941_2010.pdf

Patents and scientific research?

"Manuel Jalon Corominas is the man who 50 years ago in 1956 patented the wringing mechanism for a mop. Of course mops had existed before, the first patent was taken out by an Afro-American (he was black & his parents were slaves) Thomas Stewart in 1893.
But Stewart had overlooked the problem of "dirty water". Manuel Jalon Corominas solved that by inventing the "one piece wringer" which included a bucket and side attachment to wring a wet mop and offer whomever did the mopping an opportunity to change the water. This revolutionised mopping".

http://www.indymedia.ie/article/77333

Patent or publish?

Are these mutually exclusive?

Patent AND Publish

BUT ... Get the sequence right!

Patent THEN Publish

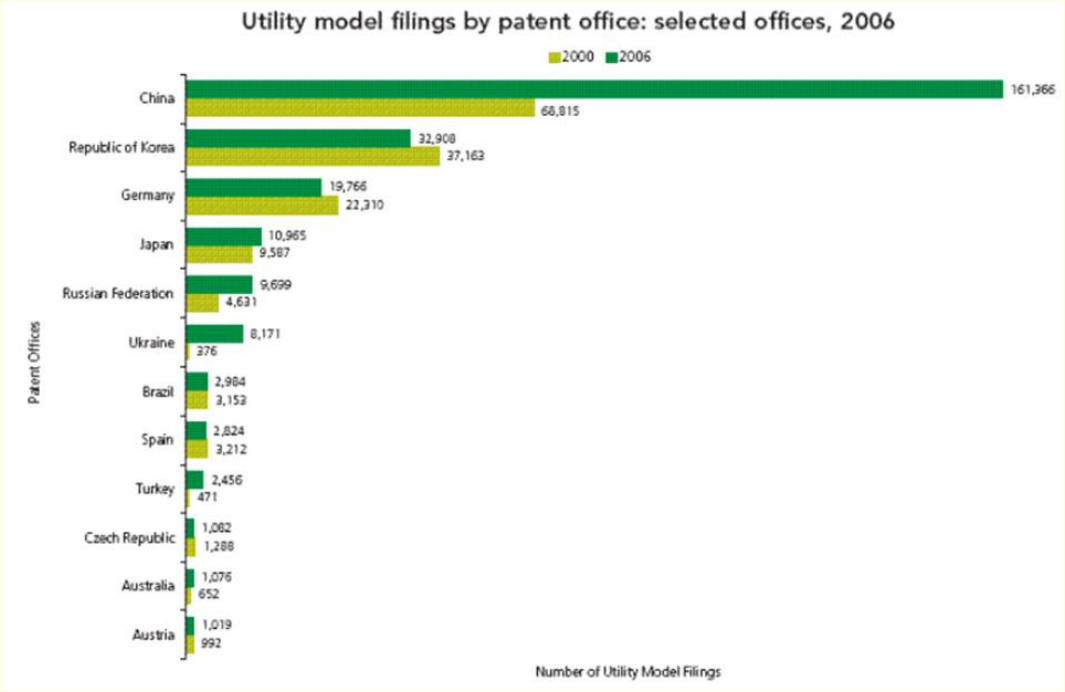
Utility models

Utility model – a title for protection of technically less complex inventions or for inventions that have a short commercial life.

Similar to the patent, but usually has a shorter term (often 6 or 10 years) and less stringent patentability requirements
… More suited to what may be considered as "incremental inventions"
... Particularly suited for SMEs that make "minor" improvements to, and adaptations of, existing products.

Examples:
Devices having a short life cycle, embodying a creative idea applicable to the shape, structure or other technological aspects of a product, while typically showing potential for early implementation and marketing – examples could include an improved device capable of reducing the amount of water used to flush a toilet or, a bottle cork remover capable of faster operation than known devices

Utility models ...



www.wipo.int/ipstats/en/statistics/patents/wipo_pub_931.html#a12

Around 30 countries have laws for utility models.

Industrial designs

Industrial designs – the ornamental or esthetic creations determining the appearance of industrial products

This right is granted to protect the original, ornamental and non-functional features of a product that result from a design activity.

Designs may be protected if:

- they are *novel*, that is if no identical design has been made available to the public;
- they have *individual character*, that is the "informed user" would find it different from other designs which are available to the public.

Trademarks

Trademark – a sign, or combination of signs, that distinguishes the goods or services of one enterprise from those of another

Copyright

Copyright - a protection related to literary and artistic creations, such as books, music, paintings and sculptures, films and technology-based works such as computer programs and electronic databases.

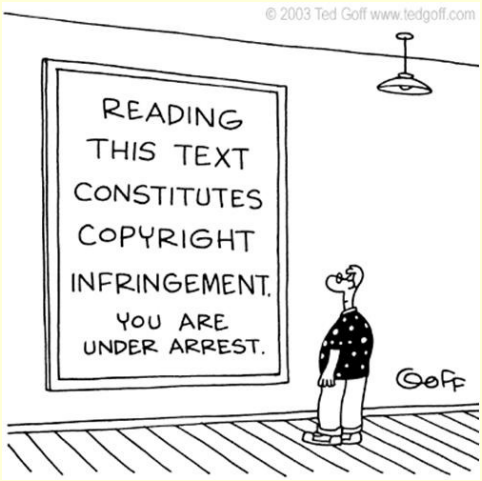
WIPO

It is not ideas but their expression that are protected by copyright law.

Copyright owner: The first owner of copyright in a work is the person who created the work.

Copyright emerges with the creation of the work; i.e. no application is needed…

©



Copyright ...

Works protected by copyright (Berne Convention):

- books, pamphlets and other writings;
- lectures, addresses, sermons;
- dramatic or dramatico-musical works;
- choreographic works and entertainments in dumb show;
- musical compositions with or without words;
- cinematographic works to which are assimilated works expressed by a process analogous to cinematography;
- works of drawing, painting, architecture, sculpture, engraving and lithography;
- photographic works, to which are assimilated works expressed by a process analogous to photography;
- works of applied art; illustrations, maps, plans, sketches and three-dimensional works relative to geography, topography, architecture or science;
- "translations, adaptations, arrangements of music and other alterations of a literary or artistic work, which are to be protected as original works without prejudice to the copyright in the original work."
- "collections of literary or artistic works such as encyclopaedias and anthologies which, by reason of the selection and arrangement of their contents, constitute intellectual creations, are to be protected as such, without prejudice to the copyright in each of the works forming part of such collections."

Other works:

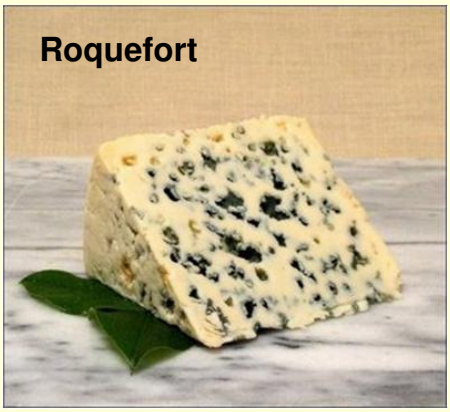
Computer Programs

Multimedia productions

www.wipo.int/freepublications/en/intproperty/909/wipo_pub_909.pdf

Geographical indication

Geographical indication – a sign used on goods that have a specific geographical origin and possess qualities or a reputation that are due to that place of origin.



Trade secrets / Secret formulation

Trade secret - a formula, practice, process, design, instrument, pattern, or compilation of information which is not generally known or reasonably ascertainable, by which a business can obtain an economic advantage over competitors or customers.
In some jurisdictions, such secrets are referred to as "confidential information" or "classified information". Wikipedia

A company can protect its confidential information through non-compete and non-disclosure contracts with its employees (within the constraints of employment law, including only restraint that is reasonable in geographic and time scope).

Multiple protection

Bringing it all together
IPR Example

Remember: A product may have more than one form of IP protection

- **Patent** - ring pull
- **Confidential information** - recipe, ingredients
- **Trade Mark** – Coca-cola brand
- **Design** - Colour, artwork
- **Copyright** – typographical arrangement of text

[Weir, 2008]

IPR in collaborative projects

Example: EC-funded projects in FP7

Foreground resulting from the project is owned by the participant generating it. When foreground is generated jointly (i.e. where the separate parts of some result cannot be attributed to different participants), it will be jointly owned, unless the participants concerned agree on a different solution

Joint owners must agree among themselves on the allocation and the terms of exercising the ownership of the foreground. In the absence of such an agreement (or pending its conclusion), a default joint ownership regime applies.

ftp://ftp.cordis.lu/pub/fp7/docs/ipr_en.pdf

IPR in collaborative projects ...

Transfers of ownership of foreground are allowed, though the obligations regarding that foreground must be passed on to the transferee. In principle, as long as the participant concerned is required to grant access rights, notification must be given to the other participants, during which time they have the right to object. However, they may agree in advance that no prior notification is necessary with regard to a specifically identified third party.

Valuable foreground should be protected. Protection is not mandatory in all cases, though the decision *not to protect foreground should preferably be made in consultation with the other* participants, which may wish to take ownership. If valuable foreground is left unprotected, the Commission may take ownership.

Each participant shall ensure that the foreground it owns is disseminated as swiftly as possible. However, any dissemination (including publications or on web-pages) should be delayed until a decision about its possible protection has been made (through IPR or trade secrets). The other participants may object to the dissemination activity if their legitimate interests.

ftp://ftp.cordis.lu/pub/fp7/docs/ipr_en.pdf
http://www.ipr-helpdesk.org/

EC FP7 – Notification requirements

	Notifications to the Commission	Objections by the Commission	Notifications to other participants	Objections by other participants
Dissemination of foreground (incl. publications)	No (except where foreground is capable of industrial or commercial application and is not protected – Article 44.2 RfP / Article II.28.3 of GA)		Yes (Article 46.4 RfP / Article II.30.3 of GA)	
Transfer of ownership of foreground	No (except if a special clause is inserted in GA – Article 42.5 RfP – but remember Article 18.6 RfP[40])	No in most cases Yes, for transfers to third parties in "non-associated" third countries (Article 43 RfP / Article II.27.4 of GA)	Yes – prior notice (except in case of : – "authorised" transfers to a specifically identified third party under Article 42.3 RfP / Article II.27.2 of GA, or – overriding confidentiality obligations such as in M&A (Article 42.3 RfP / Article II.27.2 of GA))	Yes, if the access rights of other participants are affected (Article 42.4 RfP)
Granting of licences to third parties		No in most cases Yes, for granting exclusive licences to third parties in "non-associated" third countries (Article 43 RfP / Article II.32.8 of GA)	No (except where access rights are affected (Article 48.5 RfP / Article II.32.3 of GA) or under the default joint ownership regime (Article 40.2 RfP / Article II.26.2 of GA))	No

EC FP7 – Access rights

	Projects	Access rights to *background*	Access rights to *foreground*
For implementing the project	General	Yes, if a participant needs them for carrying out its own work under the project (Article 49.1-2 RfP ; Article II.33.1-2 of GA)	
		Royalty-free, unless otherwise agreed before acceding to the grant agreement (Article 49.2 RfP ; Article II.33.2 of GA)	Royalty-free (Article 49.1 RfP ; Article II.33.1 of GA)
	FRAs	Royalty-free (Article 51.1 RfP)	
	ABSGs	Access to the background of RTD Performers is always royalty-free (Article 49.2 RfP, last sentence)	
For use purposes (exploitation + further research)	General	Yes, if a participant needs them for using its own foreground (Article 50.1-2 RfP ; Article II.34.1-2 of GA)	
		Either royalty-free, or on fair and reasonable conditions to be agreed (Article 50.1-2 RfP ; Article II.34.1-2 of GA)	
	FRAs	For further R&D : royalty-free For other use purposes (exploitation) : Royalty-free, unless otherwise agreed in the grant agreement (Article 51.1 RfP)	
	ABSGs	RTD Performers shall grant access on a royalty-free basis, or on fair and reasonable conditions to be agreed prior to signing of the grant agreement (Article 50.6 RfP)	ARs may be granted to RTD Performers on fair and reasonable conditions for further R&D purposes (see Article 50.5 RfP)

General = all cooperative projects
FRAs = Frontier research actions
ABSGs = Actions for the benefit of specific groups

IPR on digital content

The "explosion" of availability of digital content has opened a Pandora's box of issues about intellectual property rights.

New protection schemes

New business models

How to make money from something that is (apparently) available for free?

... There are companies making a lot of money selling water !

Fair use

- Allow certain types of copying and use with or without owner consent, e.g., for critical review, teaching
- A debate over access to conference proceedings from organizations like IFIP, IFAC, etc

3. RIGHTS IDENTIFICATION

Identification of contributions

Ownership

- Knowledge resulting from a collaborative R&D project is property of contributing partners
- When a piece of knowledge is the result of several contributions (joint ownership), it is important to determine the level of contribution of each partner

In this process it is important to distinguish between the pre-existing knowledge and the knowledge generated by the project.

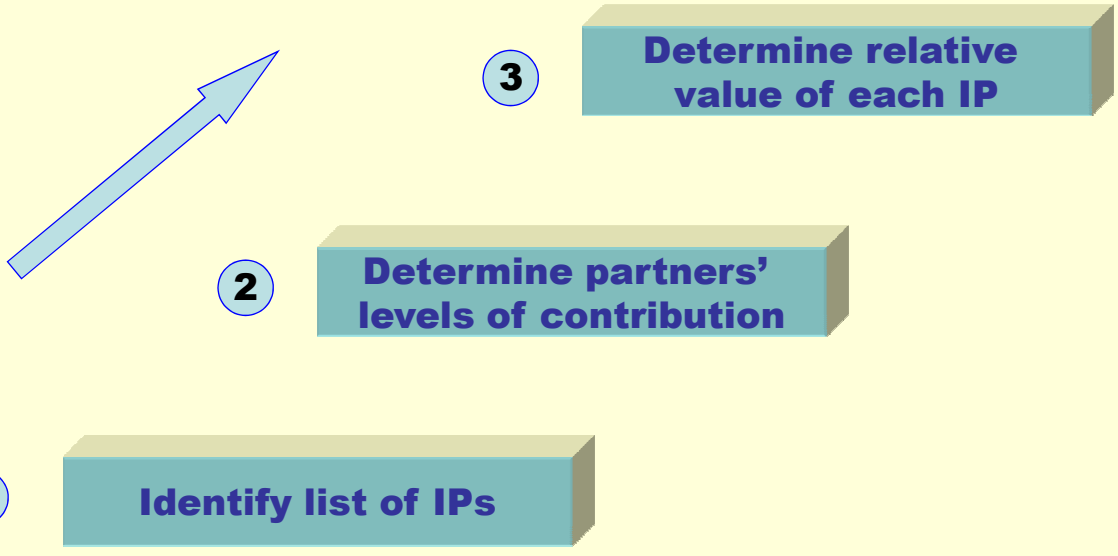
European Commission /FP7 definitions:

"Background" - is information and knowledge (including inventions, databases, etc.) held by the participants prior to their accession to the grant agreement, as well as any IPR which are needed for carrying out the project or for using foreground.

"Foreground" - means the results, including information, materials and knowledge, generated in a given project, whether or not they can be protected. It includes IPR, similar forms of protections and unprotected know-how.

PRODNET project approach

[Camarinha-Matos, Afsarmanesh, 2000]



PRODNET approach: Identification of IPs

Some principles:

- The real intellectual value of an R&D project lies on the original ideas / architectures / approaches / models and not only on concrete software modules.
- Programming a software module is an activity that can be trivially pursued once a concept / model is specified.
- The long-term competitive advantage of companies depends more on the know-how and ideas, than on particular software components that might have a very short life.

IP	*Title*	Main partner
1	***BASIC INTELLECTUAL PROPERTIES***	
1.1	"PRODNET" Brand Name & Logo	Partner 5
1.2	RTD Project Management Knowledge	Partner 5
2	***ARCHITECTURES AND MODELS***	
2.1	PRODNET Basic Architecture	Partner 5
2.2	PRODNET Hierarchical Coordination Architecture	Partner 5
2.3	PRODNET DBP Management	Partner 8
2.4	PRODNET DBP Models	Partner 8
2.5	Workflow-based Services Coordination	Partner 5
2.6	Distributed and Federated Information Management	Partner 6
2.7	Integration STEP / EDI	Partner 2
2.8	PRODNET Communications Infrastructure Architecture	Partner 7
2.9	Partners Search and Selection Architecture	Partner 5
2.10	Imprecise & Incomplete Orders Management	Partner 1
2.11	Socio-organizational recommendations for VE implantation	Partner 5
2.12	Edition and configuration of DBP and related ACF	Partner 8
3	***SOFTWARE MODULES***	
3.1	PPC	Partner 1
3.2	EDI Module	Partner 2
3.3	STEP Module	Partner 3
3.4	LCM	Partner 5
3.5	DIMS	Partner 6
3.6	PCI	Partner 7
3.7	LCF	Partner 5
3.8	DBPMS	Partner 8

PRODNET approach: Definition of contributions

Resources allocated by each partner to the task that produced the IP are **not** a good measure of innovation and intellectual contribution !

SUGGESTED STEPS:

1. Produce a description of the IP, clearly identifying what it includes
2. Define a list of contributing items that led to the IP and decide on the relative weight of each of these items
3. Determine the contributors and the amount (in percentage) of their contribution to each item
4. Elaborate a table calculating the level of contribution of each partner

PRODNET approach: Example 1

IP 2.1 – PRODNET Basic Architecture

Description: The basic architecture includes: 1) division of a node (VE member) in two modules (internal module and PRODNET Cooperation Layer - PCL), 2) basic decomposition of PCL into several components, 3) identification of main information and control flows, and 4) identification of classes of VEs and roles played by each VE component.

Criteria to define levels of contribution:

1. Initial characterization of the problem area. [15%]
2. Definition of the basic solution approach. [20%]
3. Detailed refinement of the architecture approach. [25%]
4. General contributions to the discussion (mostly in technical meetings). [20%]
5. Technical coordination of the architecture development. [15%]

Table of contributions:

		Partner 1	Partner 5	Partner 2	Partner 6	Partner 7	Partner 4	Partner 8	Partner 9
IP2.1- 1	15%	40%	60%						
IP2.1- 2	20%		70%		30%				
IP2.1- 3	30%		25%		25%	25%		25%	
IP2.1- 4	20%	5%	25%	10%	25%	5%	5%	20%	5%
IP2.1- 5	15%		100%						
IP2.1 Level		7.00%	50.50%	2.00%	18.50%	8.50%	1.00%	11.50%	1.00%

PRODNET approach: Example 2

IP 2.5 - Workflow-based Services Coordination

Description: This IP refers to the workflow-based approach for coordination of processes and activities inside PCL. It includes the coordination architecture, specialized workflow engine architecture, structuring of services (taxonomies of core and auxiliary services), control flow mechanisms, services invocation mechanisms, supporting information models, interfacing rules, and a set of examples of workflow plans (designed for demonstrators).

Criteria to define levels of contribution:

1. Contribution to the main concepts. [30 %]
2. Services specification. [25 %]
3. Contributions to the interfacing principles. [20 %]
4. Design of example workflows (demonstrators). [10 %]
5. Technical coordination of activity. [15 %]

Table of contributions:

		Partner 1	Partner 5	Partner 2	Partner 6	Partner 7	Partner 4	Partner 8	Partner 9	Partner 3
IP2.5- 1	30%		90%		10%					
IP2.5- 2	25%		40%	25%		35%				
IP2.5- 3	20%	5%	30%	20%	15%	30%				
IP2.5- 4	10%	10%	15%	10%	15%	10%	10%	10%	10%	10%
IP2.5- 5	15%		100%							
IP2.5 Level		2.0%	59.5%	11.3%	7.5%	15.8%	1.0%	1.0%	1.0%	1.0%

PRODNET approach: Example 3

IP 3.4 – Local Coordination Module

Description: Specification and logical design of the software module for local coordination (workflow-based), including the implementation approach, interfacing rules, supporting information models, illustrative examples (demonstrator-related), assessment of results, and a prototype implementation.

Criteria to define levels of contribution:

1. Software specification and design. [20 %]
2. Interfacing specification. [20 %]
3. Example of workflow plans and assessment. [5 %]
4. Prototype development. [40 %]
5. Technical coordination of activity. [15 %]

Table of contributions:

		Partner 1	Partner 5	Partner 2	Partner 6	Partner 7	Partner 4	Partner 8	Partner 9	Partner 3
IP3.4- 1	20%		100%							
IP3.4- 2	20%		40%	15%	20%	25%				
IP3.4- 3	5%	11%	11%	11%	11%	11%	11%	11%	11%	11%
IP3.4- 4	40%		100%							
IP3.4- 5	15%		100%							
P3.4 Level		0.6%	83.6%	3.6%	4.6%	5.6%	0.6%	0.6%	0.6%	0.6%

4. IP EXPLOITATION

PRODNET approach: Exploitation

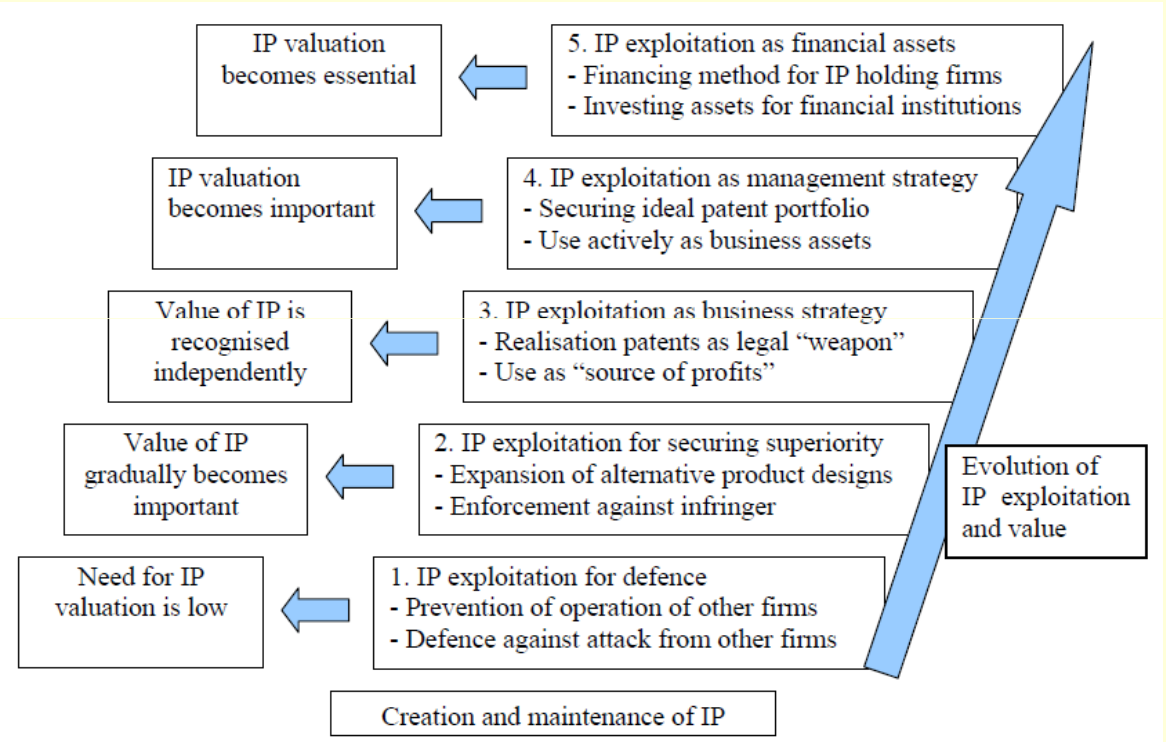
Although R&D is a very important phase in the innovation process, the post-research phase of transforming the created knowledge into products requires considerable efforts and investments

Productization process:
robust re-implementation of components, application of quality procedures and other regulations, documentation development, training materials development, systems integration, marketing planning, etc.

The distribution of benefits has to take into account not only the initial contribution to the IP, but also the role played in the subsequent phases.

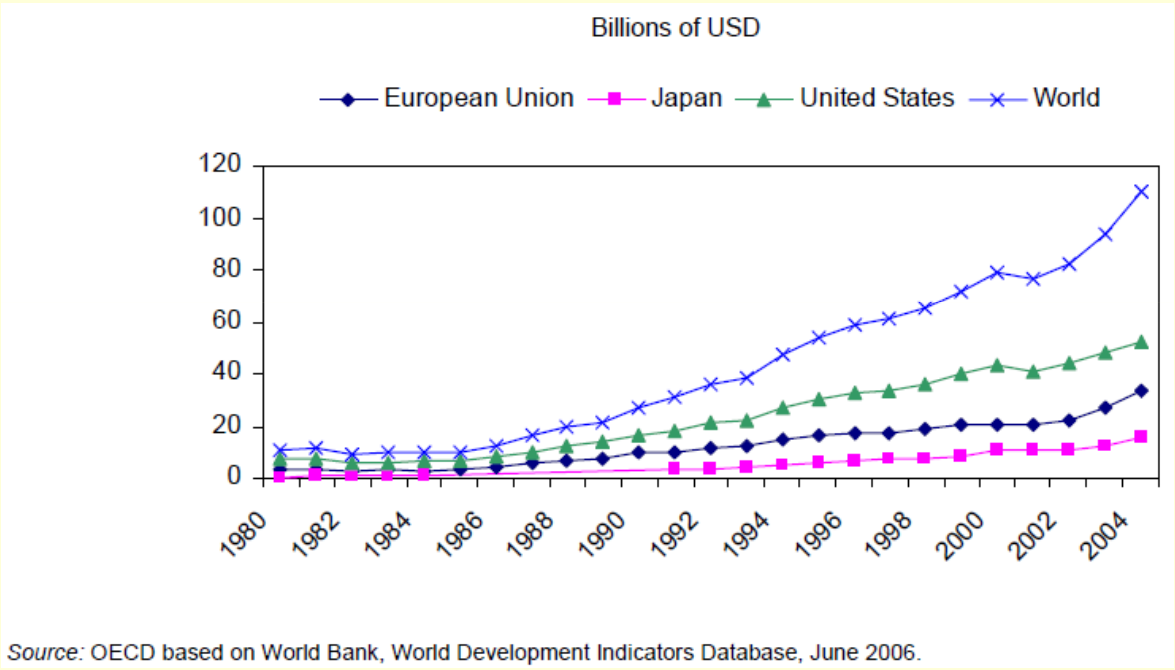
- **Identification of roles and responsibilities in the full life cycle of the product**
- **Understanding the nature and role of academic institutions vs. industry organizations**

Evolution of IP exploitation



[Kamiyama et al. 2006]

Receipts from international licensing



Source: OECD based on World Bank, World Development Indicators Database, June 2006.

[Kamiyama et al. 2006]

Comparison of the three main quantitative patent valuation approach

	Cost approach	*Income approach*	*Market approach*
Advantages	Objective and consistent. Reliability of historic cost data. If a recent acquisition cost of patent exists it is a reliable indicator of value.	Theoretically superior to other approaches as focused on future earnings or cash flow. Consistency can be achieved facilitating comparison across a patent portfolio. Widely accepted and concepts widely understood.	Practical approach which makes use of prices actually paid for comparable assets. Variety of market-based approaches such as comparable companies, comparable transactions or a premium price-earnings-multiple approach allows comparison.
Disadvantages	No correlation between expenditure on an asset and its value. Difficult to distinguish between 'normal' operating expenses and patent investment expenditure. Subjective nature of estimate of costs of replacement and some patents may not be replaceable.	Requires subjective cash flow allocation. Translation of theory into practice requires assumptions which are limiting. Relevant information is not always readily accessible from internal reporting systems.	Given the uniqueness of patents, third party arm's length transactions involving similar patents are infrequent. Transactions involving the shares of companies owning patents are more frequent but allocating value between the business and the patent is difficult.
Typical use	Only used in limited circumstances (*e.g.* when the replacement cost can be estimated with a reasonable degree of reliability and confidence). Cost is, however, a relevant benchmark where a patent has recently been acquired.	Primary valuation methodology and the most widely used where information of an appropriate quality can be obtained. The limiting nature of the assumptions needs to be understood and where possible scenario analysis should be performed.	Eextremely important indicator of value, if information on recent transactions involving patents exists. However, in practice sufficient information is rarely disclosed and this methodology is used as a cross check on other more theoretical methodologies.

Source: Zieger and Scheffer, 2005.

[Kamiyama et al. 2006]

IP developed in public institutions

Example: University of Aberdeen, UK

1. By law (e.g. the Patents Act (1977) and the Copyright, Designs and Patents Act (1988)) the University owns the intellectual property rights (IPR) generated by its employees, provided that these are developed in the course of their normal duties. This applies to all employees, and in the case of registered students is covered under the policy for student IP.
The University has a policy to reward and encourage employees to bring forward new inventions and developments and to share with them, and the Colleges, the proceeds of exploitation. This policy is reflected within this document.

6. Net income from licensing or sale of technology (i.e. after all IP protection and exploitation costs have been met) is shared 1/3 to the inventor(s) (employees or students who have assigned their intellectual property rights to the University), 1/3 to the Colleges(s) and 1/3 to be retained centrally for strategic purposes. The inventor's share may be taken as a personal reward, in which case it is subject to income tax and additional National Insurance payments, or it can be put into a nominated discretionary account according the normal University procedures for discretionary funds.

IP developed in public institutions

Example: University of Ulster, UK

Staff Incentives and Benefits

- Revenue division from royalty licences
  - Inventors – 5% gross annual revenue
  - Costs incurred are then deducted
  - Net revenue (up to £25k) is divided as follows

Inventors	50%
Research Inst / School	30%
Office of Innovation	20%

  - Net revenue (over £25k) is divided as follows

Inventors	33%
Research Inst / School	34%
Office of Innovation	33%

- Equity Participation in joint ventures and spin-outs
- Career progression
- Can lead to further collaborative research projects

[Weir, 2008]

IP developed in public institutions

Example: University of Porto, PT

The University keeps the ownership of the IP generated by its academic staff, researchers and other employees

... But rewards them with 60% of the net profits !

Example: IST, PT

Industrial Property
In cases where the item of industrial property gives rise to profitable commercial exploitation, either through the granting of licences for its exploitation or through its sale, any revenue will, in the first instance, be used to reimburse up to 100% the costs borne by IST.

Once the above costs have been covered, either the inventor(s) are under an obligation to disclose or not, 50% of the revenue will go to IST and 50% to the inventor(s).

IP developed in public institutions

Example: New University of Lisbon, PT

The University keeps the ownership of the IP generated by its members in the context of any research or teaching activity

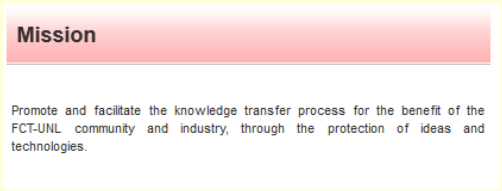
... Rewards them with 30-55% of the net profits depending on how profitable it is!
... The amounts can be negotiated between the inventor and the university

University members must inform the University, within 3 months, of any invention / creation that can be subject to IPR protection.

Author rights (literary, artistic, multimedia, computer programs, ...) belong to the author.

Regulation Nº 15 542/2005
28 June 2005 (Rector)
DR Nº 136, 18 July 2005

IP ... FCT-UNL



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