

IP strategy & management

Patenting inventions – from idea to commercialization

Hellenic Industrial Property Organization, Help-Forward, STEP-C, EPO

Athens/Heraklion, 26th / 27th of November 2013

Dr. Alexandros Papaderos

TUM. Dimensions

13 Faculties

156 Degree Courses

~ **32 500** Students, 33% Female Students, 18% Internat'l Students

~ **10 000** First-year Students

~ **5 140** Graduates

911 Doctorates completed

~ **5 000** Publications in peer-reviewed journals

478 Professors (incl. hospital)

~ **5 800 Scientific Staff Members (incl. hospital)**

~ **3 200 Non-Scientific Staff Members (not incl. hospital)**

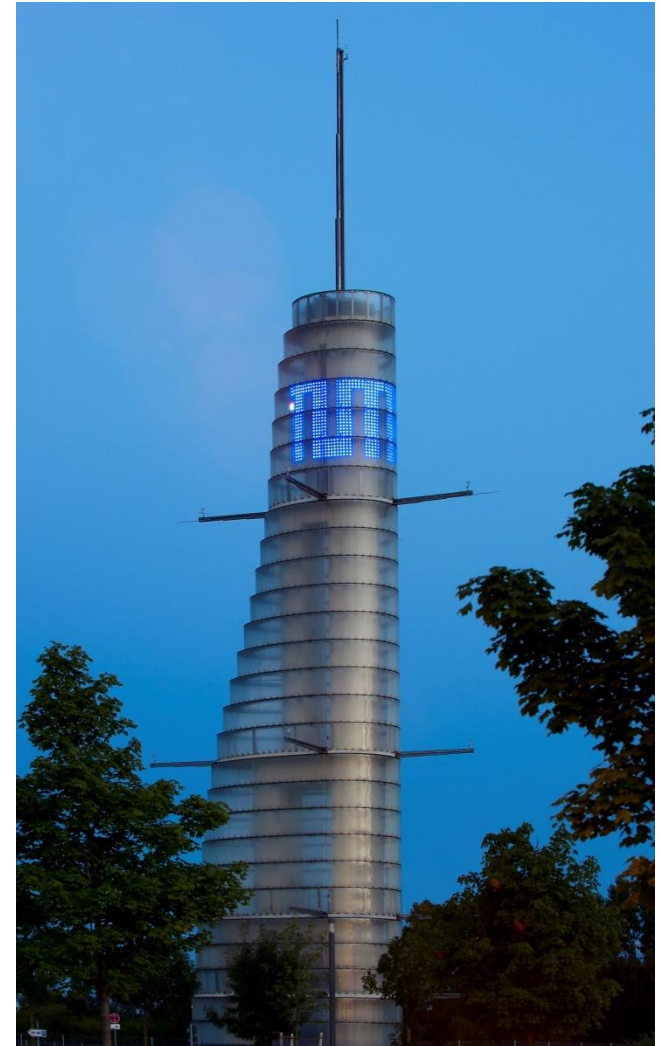
€1095 Mio Total Budget

< 1 000 Research Agreements per year

~ **180** Invention disclosures per year

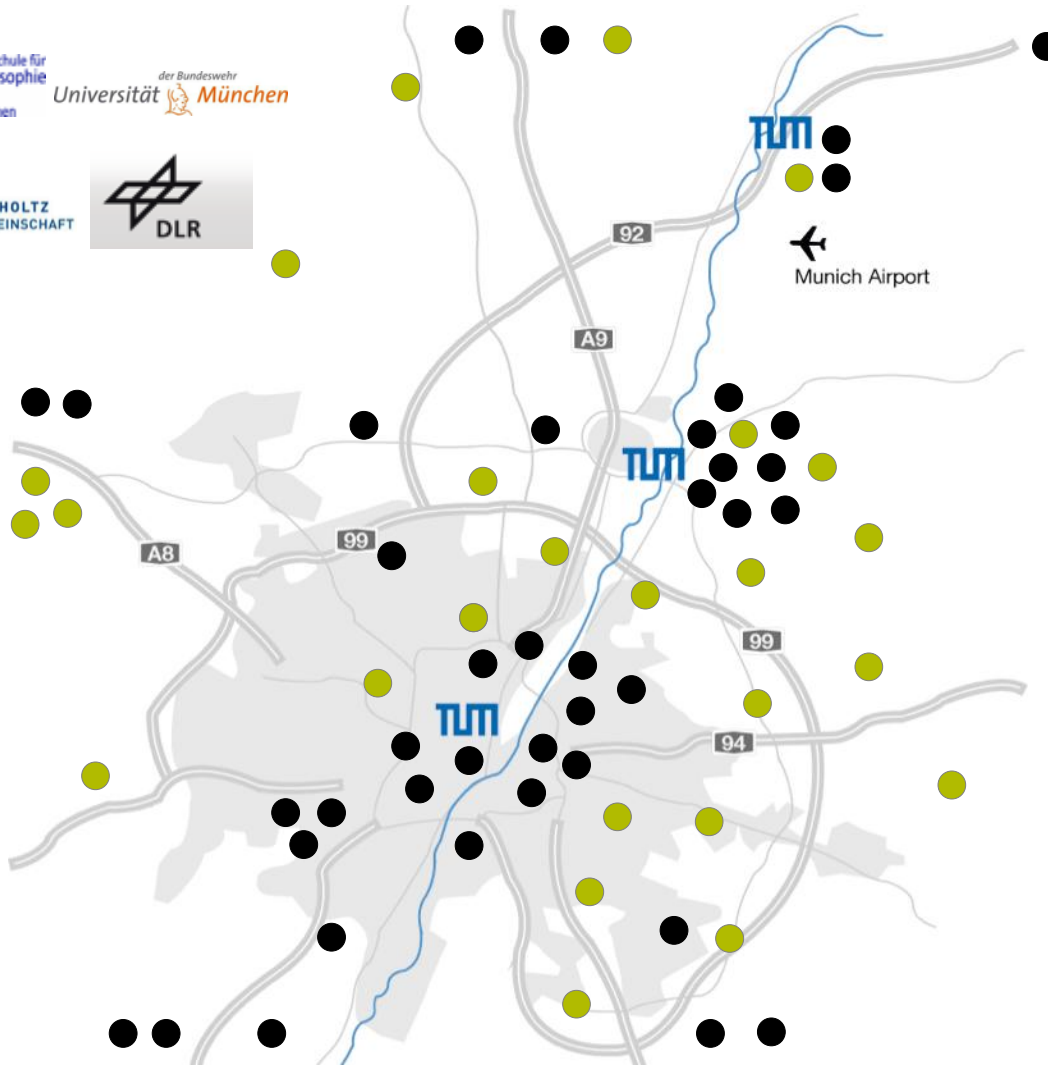
46 Patents filed (2012)

~ **221** Patent families



Munich Metropolitan Region

● Research Network



● Industry Network



University Mission

(Bavarian Higher Education Law)

“... act together with economic and professional practice and promote knowledge and technology transfer. “

Mission statement of TUM

“...TUM....proactively brings results from fundamental research into market-oriented innovation processes ... TUM initiates the founding of growth-oriented startup companies by its members and supports them...”

TUM IP Policy

„...the commercialization of research results is part of the mission of TUM.“

Knowledge and Technology Transfer is made...

...through people

- Examples:
 - conference attendance and/or presentations
 - doctoral and postdoctoral theses in industry
 - consultancy services
- Benefits
 - latest trends
 - contacts
 - exchange of experiences

...through collaboration

- Examples:
 - contract research
 - co-operations
 - strategic alliances
- Benefits
 - access to external expertise and equipment
 - creation of centres of scientific excellence
 - establishment of long-termed relationships

...through IPR

- Examples:
 - commercialization
 - start-up or spin-of companies
- Benefits
 - financial income
 - reputation
 - proof of competence

TUM Office for Research and Innovation

Head of Unit / Deputy Head

Sandra Lazic / Dr. Alexandros Papaderos

Back Office

Research Funding Support

National Research Projects

International Research
Funding

TUM Talent Factory

TUM Emeriti of Excellence

Research Cooperations

Project Management
TUM-KAUST

Project Management
GIST-TUM Asia/ TUM
CREATE

KIC Coordination

TUM – Research
Information System

Technology Transfer

TUMentrepreneurship

Entrepreneurship
Culture

Entrepreneurship
Networks

TUM Start-up
Coaching

Patents and Licences

Industry Liaison Office

Equity Management

Scouting & Incubation
– Munich Biotech
Cluster m⁴

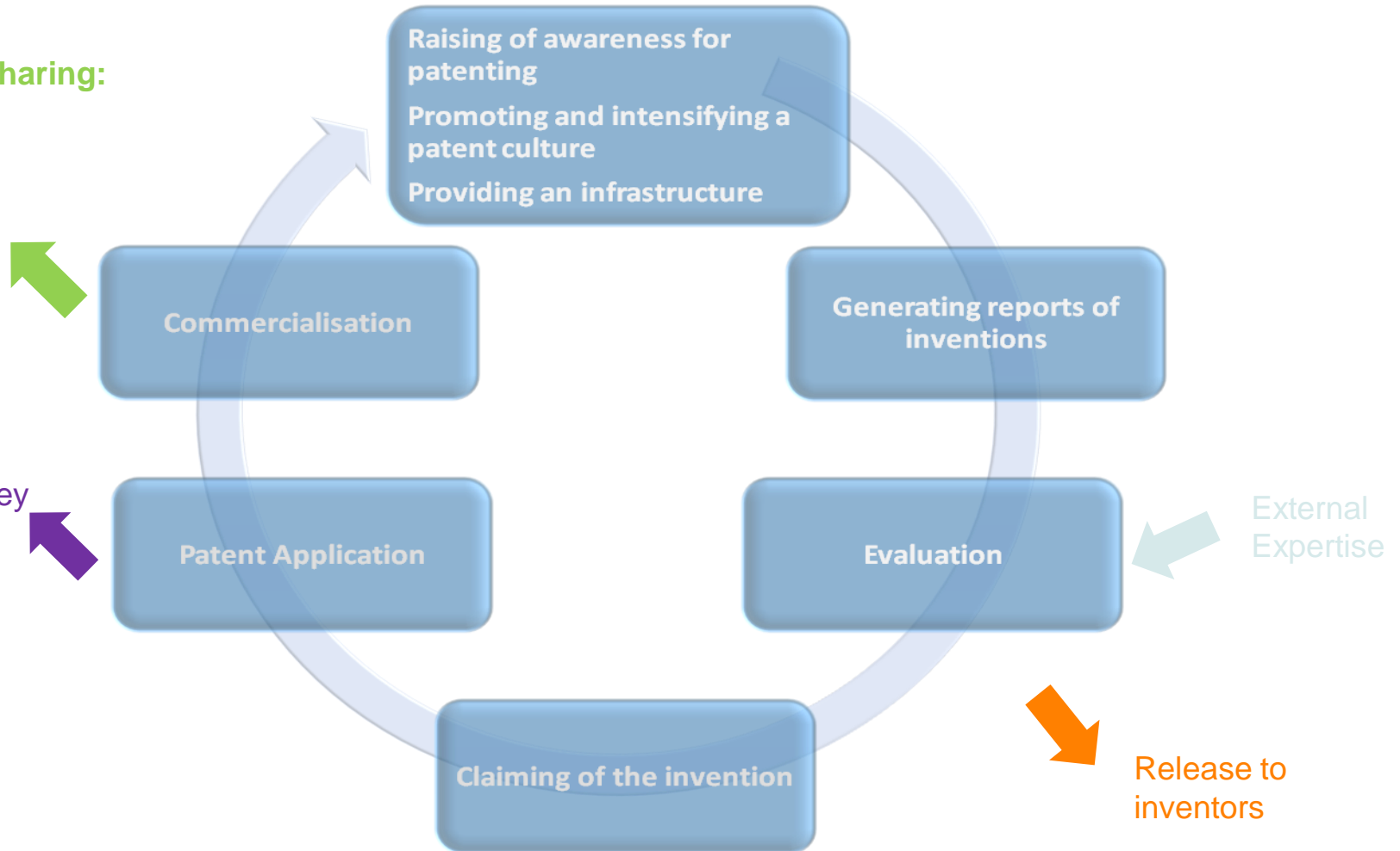
in close collaboration with:

- *the TUM Administration (e.g. the TUM Legal Office)*
- *incubators, commercialization agencies, consultants, funding institutions*

Life cycle of an invention in academia

Revenue sharing:

Inventor
Institute
University



Patent strategy in academia

- ▣ reasons for patenting a university invention: **commercialization (95 %)**, **strategic considerations (5 %)**
- ▣ when you want to patent an invention, **it is all about its economic potential**: will the user of the patent have a benefit from using it?
- ▣ it doesn't count if your invention is **excellent science** or how much **time and money** you have already invested
- ▣ to figure out the **economic value is the most difficult part in the valuation of inventions**
- ▣ the most important reason for a Technology Transfer Office to reject and release invention is that **the expected revenues will not cover the patent protection costs**
- ▣ university inventions: **prognosis is very difficult** because they are often immature

Patent strategy in business

Patents as tools for

- **Protection:** ownership of ideas/products/processes against others
- **Licensing-out, cross-licensing:** generating revenues, market penetration , access to other technologies
- **M&A, patent portfolio transfer:** negotiating chips & deal makers, assets on the company accounts, means to impress investors & share-holders
- **Future developments:** pointing the way for others in business
- **Blocking/litigating:** building barriers to rivals
- **Reputation/proof of competence:** improving sales numbers, promoting company image

Patents are part of the business strategy.

Patents - The Distribution of Patent Uses

	Internal use	Licensing	Crosslicensing	Licensing & use	Blocking competitors	Sleeping patents	Total
Large companies	49,93%	3,03%	3,03%	3,22%	21,72%	19,06%	100,00%
Medium-sized companies	65,62%	5,38%	1,20%	3,59%	13,90%	10,31%	100,00%
Small companies	55,78%	14,97%	3,89%	6,90%	9,62%	8,84%	100,00%
Private research institutions	16,60%	35,42%	0,00%	6,25%	18,75%	22,92%	100,00%
Public research institutions	21,74%	23,19%	4,35%	5,80%	10,87%	34,06%	100,00%
Universities	26,25%	22,50%	5,00%	5,00%	13,75%	27,50%	100,00%
Total	50,53%	6,17%	3,06%	3,92%	18,83%	17,50%	100,00%

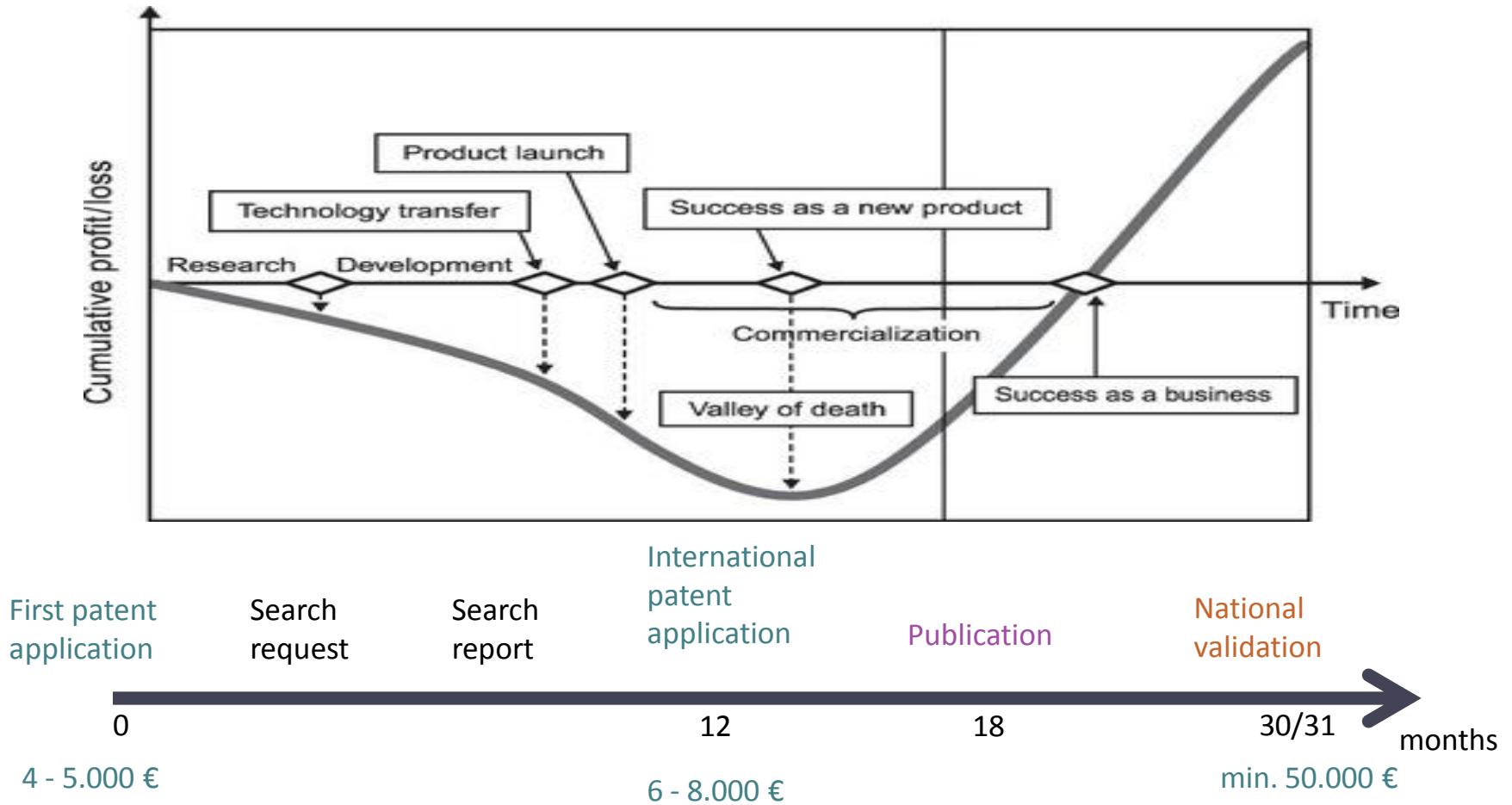
Patent strategy: questions to be asked

- What kind of IP do you already have?
- What kind of IP do you need?
- Do you need a patent?
- How to obtain this patent?
- How does the new patent fit in your business?
- How are you going to use the new patent?
- Can you defend or enforce your new patent? How?
- What alternatives do you have?

Patent strategy: costs and essential markets

- ▣ Patents need a certain **market penetration** in order to bring financial benefits
- ▣ Their commercialization should at least cover the **invested costs**: research and development , production, marketing, patenting
- ▣ They should be protected in **key markets for manufacture and sale** but also where copies might be produced
- ▣ If there is already **a licensee**, it is useful and sometimes part of the licensing deal to discuss with him the patenting strategy
- ▣ Patents need to be continuously valued – but realistically
- ▣ Patents should be abandoned if they cost more money than they bring in
- ▣ Patents are not to be used as academic publications – from the cost point of view

Patent strategy: the right point in time



Patent strategy: collaboration with others

Closed Innovation Principles	Open Innovation Principles
The smart people in our field work for us.	Not all the smart people work for us. We need to work with smart people inside and outside our company.
To profit from R&D, we must discover it, develop it, and ship it ourselves.	External R&D can create significant value; internal R&D is needed to claim some portion of that value.
If we discover it ourselves, we will get it to market first.	We don't have to originate the research to profit on it.
The company that gets an innovation to market first will win.	Building a better business model is better than getting to market first.
If we create the most and the best ideas in the industry, we will win.	We make the best use of internal and external ideas, we will win.
We should control our IP, so that our competitors don't profit from our ideas.	We should profit from others' use of our IP, and we should buy others' IP whenever it advances our own business model.

Patent strategy: collaboration with others

Myth: *Open Innovation needs no patents!*

Reality: Open Innovation without clear ownership settlements for IP imposes uncertainty, risk and high costs for business activities

IP regulations in R&D agreements:

- help clarify ownership of (joint) research results
- ease their management and commercialization
- facilitate the diffusion of innovation

Patent strategy: the role of patent information

- 80 % of the technical information is included in patents, **not** in academic and technical journals
- A huge amount of information, which is published in patents is **not protected** and can be used freely (not granted claims in force in the relevant territory!)
- Information included in patents is a source of commercial information, leading to customers, suppliers and new partners, as well as warning about developments by rivals and changes in the market

IP evaluation and valuation

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Industrial Rights, Help-Forward, STEP-C, EPO

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Introduction

- Patents and IPR are items of negotiations and transactions
- Especially licensing and assignment of IPR are now common in business
- IPR are also used as collateral for debt or as assets in patent funds
- Therefore using IPR in the market requires knowing its value and the importance of valuation of intangibles is getting increasingly important
- A number of methods have been developed in order to value IPR
- Several tools have been created by public organizations and private companies
for supporting IPR valuations

Evaluation of IP

- Evaluation of IP relies on the analysis of data with the purpose of rating the IP, i.e. of determining its importance
- The data cover the aspects that can influence the value of an IP asset
 - Legal aspects (e.g. information about the legal status of a patent)
 - Technology level of the innovation (e.g. comparison to the actual state of the art)
 - Information about the market (e.g. where are the markets for the patent?)
 - Information about the patent owner (e.g. what is the current situation of the company?)

Valuation of IP: why is it important?

- Valuation of IP should be part of the good management within an organization.
- It means that you should know the economic value and importance of the IP you have created
- This information helps taking strategic decisions and can facilitate commercialization and transactions of IP.
- Examples of business situations where valuation is important:
 - M&A, joint venture or bankruptcy
 - Raising funds through venture capital or banks
 - Accounting and taxation
 - Licensing or assignment of IP
 - Support in court proceedings or arbitration
 - Support in internal decision making

Methodologies of IP valuation

The cost-based method

Principle: direct relation between the **costs** expended in the development of the IP and its economic value.

➤ Costs considered:

- Direct costs (i.e. labour, material and management)
- Opportunity costs (lost profits due to delays in market entrance or investment opportunities lost with the aim of developing the asset)

➤ Measurement of the costs:

- all costs associated with the purchase or development of a reproduction of the IP
- all costs that would be spent to obtain IP with similar use or function.

Methodologies of IP valuation

The market-based method

- Principle: estimation of the value based on **market transactions** of comparable IP
- estimation is performed in terms of utility, technological specificity and property
- the perception of the IP by the market plays a role
- Information on comparable or similar transactions may be accessed in the following sources:
 - company annual reports
 - specialised online databases
 - in publications dedicated to licensing and royalties
 - in court decisions concerning damages.

Methodologies of IP valuation

The income-based method

Principle: the value of an asset is related to the (expected) income flows it generates

- The expected income has to be estimated and the result is discounted by an appropriate discount factor with the objective to adjust it to the present circumstances and therefore to determine the present value of the intellectual property.
- Calculation of the future cash flows:
 - Discounted cash flow method: mostly based on the business plan of the company that exploits or intends to exploit the asset.
 - Relief-from-royalty method: value of IP is considered as the value of the royalty payments which, as owner of the IP, the company will not have to pay

IP exploitation - Case studies

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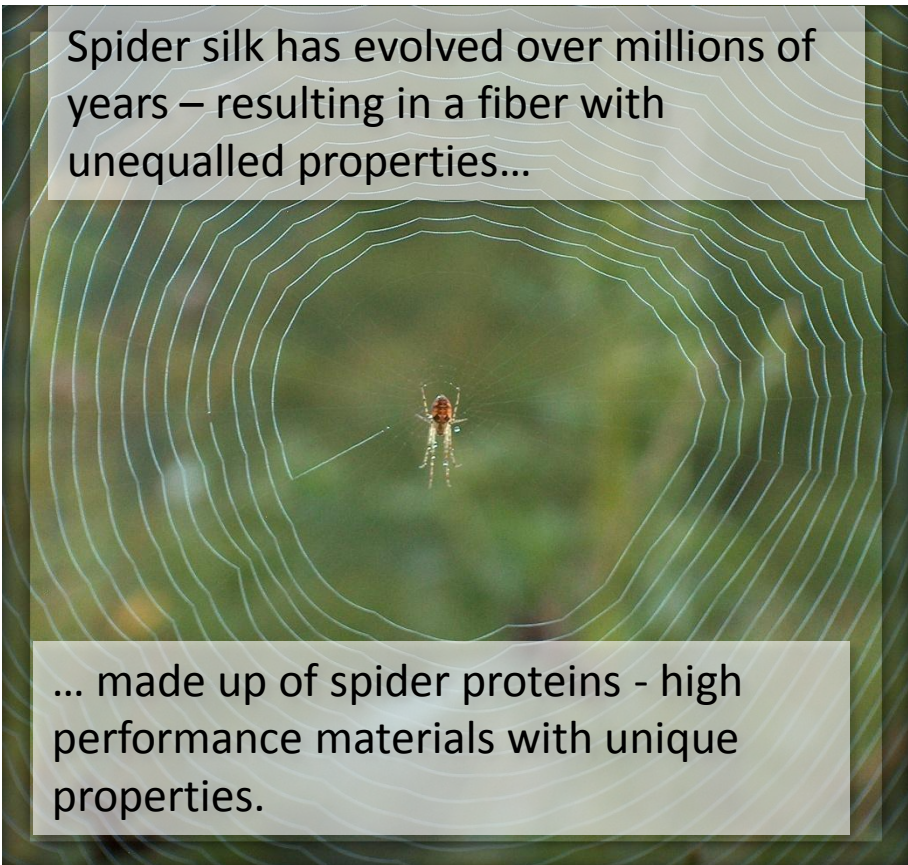
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Factors hindering commercialization

- Technology maturity
- Gap between university supply and industry demand for technologies
- Clueless and reluctant researchers
- Unreasonable expectations about the value of IP
- Underestimation of future R&D-efforts
- Underestimation of market risk
- Bureaucratic and complex transfer mechanisms
- Inexperienced staff at Technology Transfer Offices

Case study: IPR and setting up a start-up

...a fascinating material: **spider silk**



Spider silk has evolved over millions of years – resulting in a fiber with unequalled properties...

... made up of spider proteins - high performance materials with unique properties.

- High toughness
- High ductility
- Low density
- Monodisperse polymer
- Hypoallergenic
- Well-tolerated
- Breathable
- Modifiable
- Transparent
- UV-resistant
- Biodegradable
- Sustainable

Case study: IPR and setting up a start-up

Main invention: [synthesis of spider silk proteins by bacteria](#)

New Materials for Industrial Applications

Based on Tailor-made Performance Proteins:
Cleantech Biopolymers for High-Tech Products



Silkbeads

Particles for Medical
Technology and
Industrial
Applications



Nonwoven

Nonwoven for
Medical Technology
and Industrial
Applications



Films & Coatings

Modifiable Films
and Coatings
made of silk



Fibers

High
Performance
Fibers and
Monofilaments

(L1) Version 100927

Case study: IPR and setting up a start-up

- ▣ from the very beginning thoughts about the **commercialisation strategy**
- ▣ because of the enormous possibilities of the (growing) patent portfolio: **no “one stop shop” solution**
- ▣ luckily a lot of possible applications = **a lot of markets**
- ▣ **high-tech portfolio**, which might come too early for the market?
- ▣ **commercial applications** have to be developed
- ▣ negotiating with **many different commercialisation partners** would take too long

“attractive technology is looking for feasible business model for the purpose of building the future together“

Case study: IPR and setting up a start-up

- only reasonable commercialisation route for TUM: choose the (uncertain but exciting) way of **setting up a company** with the purpose of **developing the technology** for the different applications/markets



- **AMSilk GmbH** was founded in October 2008

Case study: IPR and setting up start-up

AMSilk GmbH company outline

- Incorporated in 2008; in Planegg (near Munich), Germany
- Management: two of the co-founders with business and scientific background, main inventor in the Advisory Board
- Shareholders: TUM, AT Newtec GmbH, MIG Fonds AG
- Close cooperations with several leading universities and companies world-wide
- Industrial scale production through leading service providers
- Extensive patent and trademark portfolio and several licenses

Mission of AMSilk: Industrial scale production of spider silk as high performance material and the development of specific spider silk applications

AMSilk is
a spin-off
of the
Technische Universität München



Case study: licensing of an invention

Invention: specific brewing method (in compliance to the German Purity Law)

- ▣ beer containing xanthohumol: Xan Wheat Beer and Xan Wellness Drink
- ▣ Xanthohumol from hop can dispose free radicals due to its antioxidant nature and can thus contribute to keep the somatic cells healthy
- ▣ concentration of the natural active ingredient xanthohumol is up to 15 times higher in the XAN Wheat Beer and up to 50 times higher in the alcohol-free XAN Wellness drink in comparison to usual wheat beers



Case study: licensing of an invention

- ▣ first contact with the inventors (professor, research assistant, student) in October 2002 and consultations about the further steps due to an impending disclosure of the invention: participation in a conference in January 2003 (Annual Brewing Technology Seminar in Weihenstephan near Munich)
- ▣ Report of Invention shortly after the consultation, evaluation of the invention
- ▣ recommendation to claim the invention and file a patent application at the German Patent and Trade Mark Office (GPTMO)
- ▣ first contacts with breweries (November 2002), signing of Non-Disclosure Agreements and commission of the patent attorneys to start with the preparations of the patent application

Case study: licensing of an invention

- ▣ assignment of the invention part of the student to TUM (November 2002)
- ▣ filing of the patent application at the GPTMO (December 2002) and request for examination
- ▣ September 2003: no PCT application, release of the invention (inventors can file international patent applications)
- ▣ October 2003: first examination communication from the GPTMO, notice of opposition, 3 relevant documents, “the claimed solution to the objective technical problem is obvious for the skilled person in view of the state of the art in general“
- ▣ February 2004: reply to the first examination communication

Case study: licensing of an invention

- ▣ from the middle of November 2002: negotiations with 4 breweries
- ▣ April 2004: signing of a non-exclusive Licence Agreement with the State Brewery Weihenstephan (SBW), first revenues in July 2004 (upfront payments)
- ▣ June 2004: patent application is published
- ▣ November 2004: request of SBW for an exclusive licence due to the positive development of the sales figures
- ▣ November 2005: signing of an exclusive Licence Agreement with SBW
- ▣ April 2006: second examination communication from the GPTMO, arguments of the TUM couldn't convince the examiner
- ▣ August 2006: reply to the second examination communication

Case study: licensing of an invention

- ▣ July 2006: inventors inform TUM that a patent was granted to another brewery in May 2006 (priority date 07.05.2003)
- ▣ the patent describes a similar process to produce xanthohumol containing beer
- ▣ August 2006: TUM/SBW file an opposition against the patent
- ▣ April 2007: reply of the GPTMO to TUM/SBW in regards of the opposition and to the second examination communication
- ▣ June 2007: hearing before the GPTMO
- ▣ August 2007: after the hearing the claims of the opposing patent are limited, but the patent is still valid
- ▣ August 2007: SBW again files an appeal before the German Federal Patent Court, which at that time promised to handle the case in early 2010....
- ▣ September 2008: TUM patent is granted by the GPTMO!
- ▣ June 2013: the German Federal Patent Court invites the parties to a court hearing

Lessons learned

- involve always (and as early as possible) the legal and technology transfer staff of your organization
- don't start working with third parties without a contract - prioritize contract negotiations
- define, document and secure background rights
- consider IP that is privately owned by students or researchers and that is maybe needed for your research
- document the research project progress (laboratory notebooks)
- don't rely (only) on personal relationships

Thank you for listening!

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Dr. Alexandros Papaderos

- ▣ biology studies at the Ruhr-Universität Bochum, Germany
- ▣ diploma thesis at the KFA-Research Center Jülich GmbH, Germany
- ▣ doctoral thesis at the GSF-National Research Center for Environment and Health GmbH, Neuherberg, Germany
- ▣ Scientific Consultant for a Bavarian financial institution (Stadtsparkasse München)
- ▣ Inventor Consultant for the Technische Universität München (TUM).
 - ▣ Main working field as an Inventor Consultant:
 - establishment of the patent and licensing system at the TUM,
 - consultancy for the TUM-inventors,
 - assistance in the identification of patentable research results,
 - patenting and commercial exploitation of TUM-inventions.
- ▣ Deputy Head of the TUM Office for Research and Innovation and Head of TUM Patents & Licenses
 - ▣ Patent Manager for the Faculty of Medicine and the Center of Life and Food Sciences Weihenstephan