Managing a technology transfer office

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WIPO training webinar

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Agenda

1: Establishing the context for a TT Office

- Research vs. Industry
- IP Policy
- The TT Process

2: TT Office

- Tasks
- Staff
- Sustainable Funding
- Political Commitment and Support of national Authorities
- Clear Mandate
- Customized Model – Private or Public Entity?
- Income or Impact
- Raising awareness

3: Revenue Sharing Models

Establishing the context

Research versus Industry

IP Policy

The TT Process

1: R&D: Academia vs. industry

Research: Open science

- ***Publication of discoveries & R&D results***
  - Scientific recognition
  - Value in copyrights
- ***R&D to meet scientific programme objectives***
  - Long-term
  - Best possible solution within budgetary constrains
- ***R&D results: Technology***
  - IP rights to use internally
- ***Highly collaborative***
  - Memorandum of Understanding (MoU)
- ***Unclear IP situation***
  - Joint ownership of R&D results
  - Complex dissemination
- ***Funding***
  - Public
  - Quality of research program

Industry: In/out sourcing technology

- ***Protection of innovations & know-how***
  - Required to facilitate industrial dissemination
  - Value in IP rights (patents, etc.)
- ***R&D to increase market share***
  - Short-term
  - Best cost-effective solution
- ***R&D results: Products (prototypes)***
  - IP rights to manufacture
- ***Highly competive***
  - Licence and/or partnership agreement
- ***Clear IP situation***
  - Clear ownership of R&D results
  - Dissemination based on manufacturing
- ***Financing***
  - Private with public support (EU, National funds)
  - Product market potential

Softening of above statements when moving from Fundamental →→ Applied research

2: What is an IP Policy?

What are the missions of the institution?

Education

Research, applied research

Develop prototypes

What can the institution do with the IP generated by its staff?

Publish/protect

Make available

Exploit (Transfer, commercialise)

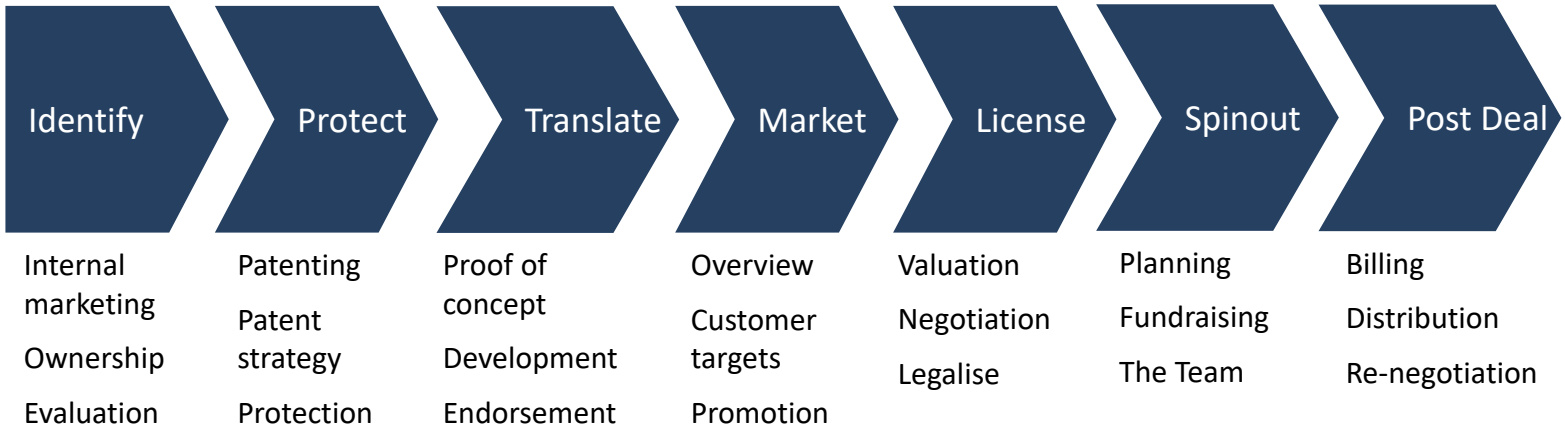
How can the institution support IP related activities

File patents

Commercialisation of IP

Industry-academia collaborations

TT Process*



Generalist TT Manager — *Cradle to grave*

IP Specialist | **Commercialisation Manager** | **Spin-out Manager** | **Post-deal Manager** — *Role Specialisations*

Courtesy of O. Spasic/WIPO

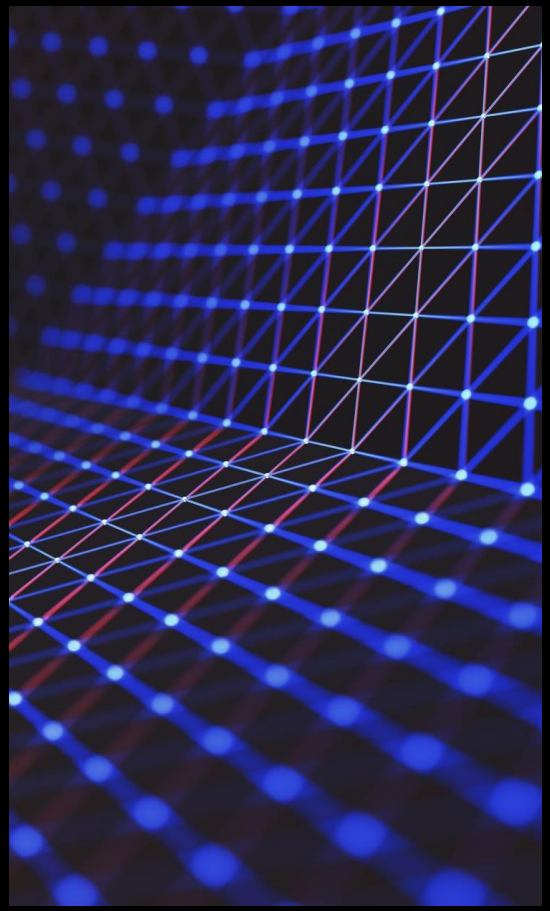
The TT Process in practice

Ideal Case

Not applicable to TT through TT partnerships

Recommendations: for any new IP

- 1: Create a TT case
- 2: Assign a TT Officer in charge of the execution of the TT process
- 3: Set-up a team of experts to address the case's needs
  - Team can evolve with time
- 4: Use TT cases progress/status in reporting



TT Office

Mission

Tasks

Staff

Sustainable Funding

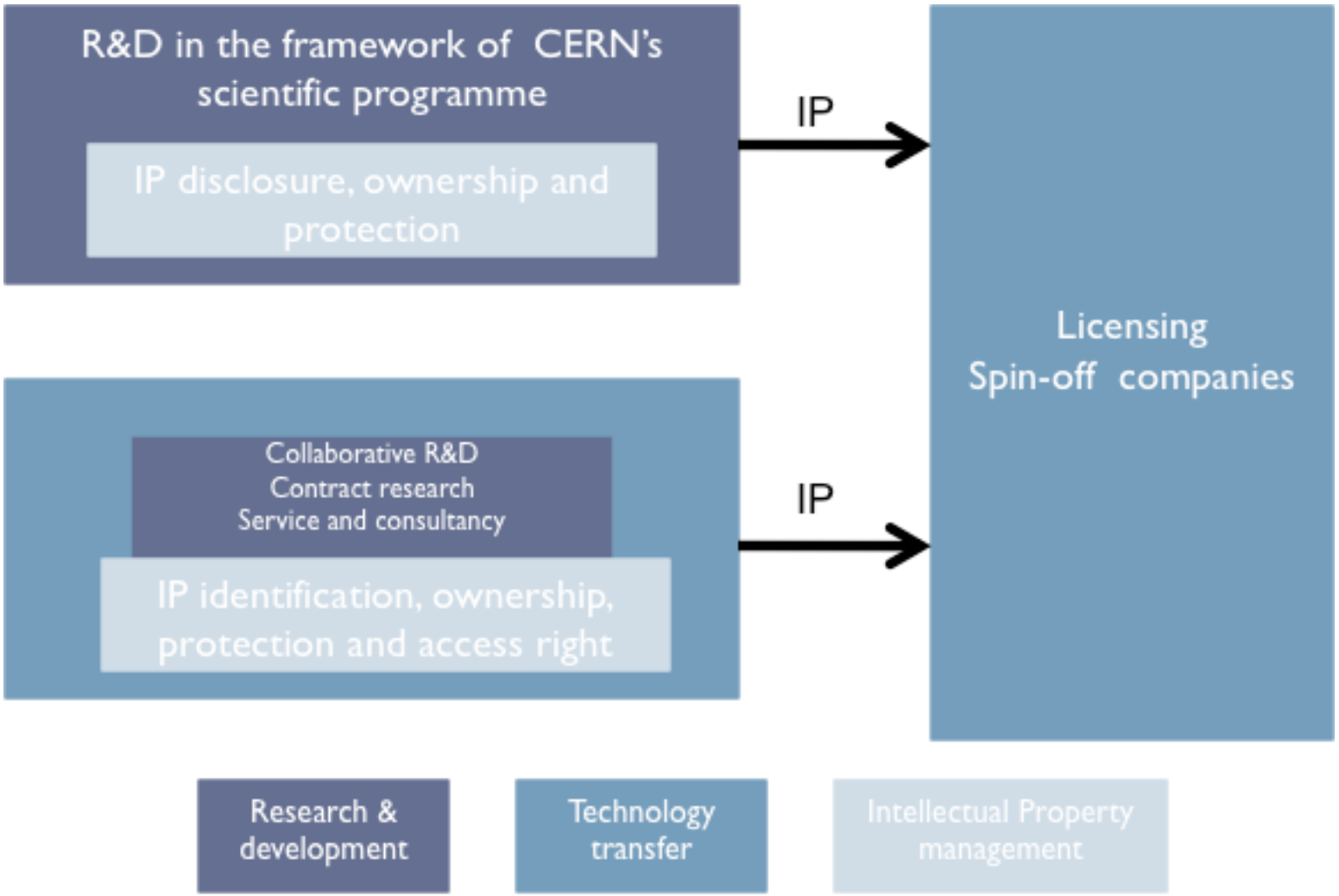
Political Commitment and Support of national Authorities

Clear Mandate

Customized Model – Private or Public Entity?

Income or Impact

TT and related IP management



Depending on your institutional policy
Your TT Office can be involved in all the above!

2.1: Mission of TTO

To address all the Knowledge Transfer aspects related to your institution

- **Passive Role**:
  - Knowledge transfer during the execution of the research programme
- **Intermediate Role**:
  - Procurement
- **Active Role**:
  - TT activities ➔ Main tasks (see following slides)

2.2: Tasks of TT Office

Provide **support** for all TT activities of the institution

- → See IP Policy

Clear **mandate** known to all staff in institution

- Optimize IP strategy: publish/protect
- Handles copyrights, trademarks, patents, designs, etc.

Tasks can cover part or all the following activities:

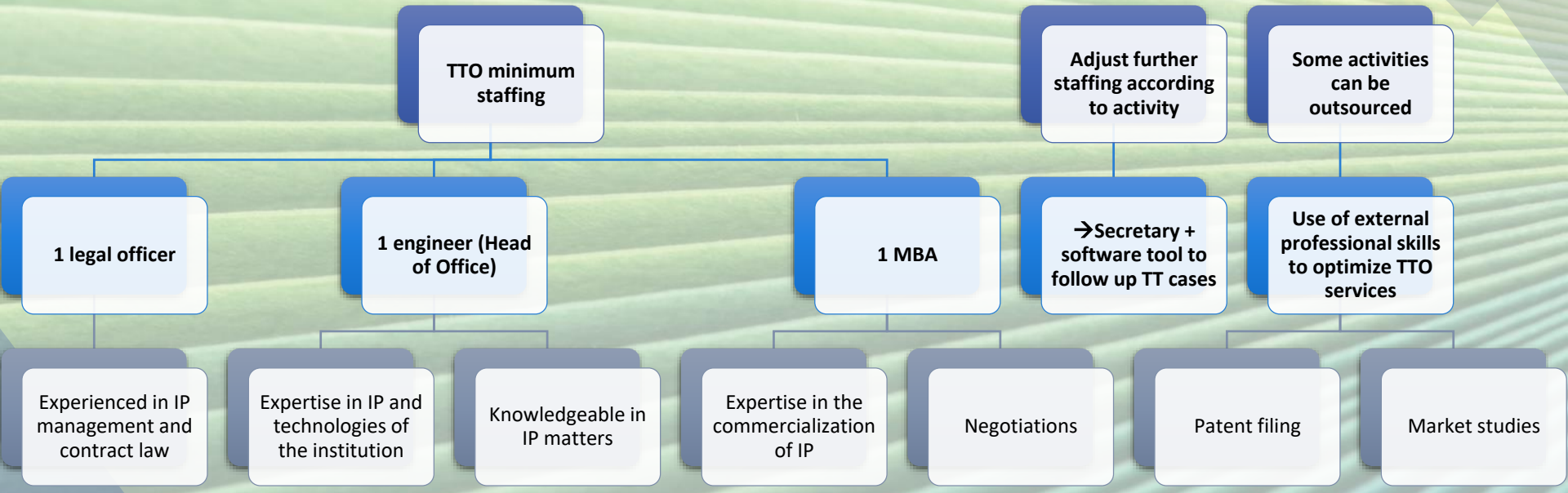
- Management of IP (Patent filing, trademarks, copyrights, etc.)
- Generation and sharing of IP
  - R&D partnership agreement
  - Contract research agreement
- Commercial exploitation of IP
  - Licensing (& spin-off companies)
  - Services and consultancy

In charge of the **TT process** incl. negotiations, contract elicitation, signature and follow-up

Reports directly to Management

- Ideally → Director of Innovation, IP and TT

2.3: Professional Staff



2.4: Sustainable funding

A TTO cannot operate without a **proper budget**

TTO within RI	Budget devoted to IP protection and commercialisation	
	Part of the income resulting from commercialisation	Depends on the redistribution scheme (By law with/without refinements from RI)
	Fees for drafting collaborative R&D and contract research agreements	
	Fees from service and consultancy contracts	
	(Additional) Grants to enhance TT activities	
TTO outside RI (separate legal entity)	Company capital	
	Part of the income resulting from IP commercialisation	Depends on the redistribution scheme
	(Additional) Grants to enhance TT activities	

2.5: Political Commitment & Support of National Authorities

At national level → Required by law!

- Part of the RI's budget devoted to TT activities
- Favourable incentive scheme
  - Refinements at the RI's level to address research specificities

Within RI:

- Raise awareness of the scientists on the importance of KT
  - For RI itself
  - Politician and Public at large
- Communication
  - Scientists must consult the TT Office prior to publishing
- Recognition mechanisms
  - Reward inventors on patent filing
  - Take into consideration in the advancement scheme
    - Innovation
    - Participation in KT projects

2.6: Clear Mandate

TTO within RI (Conformant to the IP Policy)

- Mandate can evolve with RI's needs and activities
  - Start with the protection and commercialisation of IP
  - → Possible extension to R&D related contractual activities
    - Partnership agreements
    - Collaboration agreements
    - Contract research agreements

TTO outside RI (separate legal entity, contractual arrangement with Institution)

- Clear mandate → Commercialisation of IP
  - Licences
  - Spin-offs
- **➔Patent filing**
- **➔Grant drafting**

2.7: TTO activities in Public/Private entity

TTO within the Research Infrastructure (RI)

- Essentially all activities of previous slides
- Management decision

TTO as a private entity

- Shareholders are normally from the public sector
- Activities normally restricted to the commercialisation of IP
  - Directly resulting from the research programme
  - Resulting from collaborative R&D (if agreed with partners)
- RI normally takes care of IP protection and establishing collaborative R&D and contract research agreements

Funding, mandate and impact will depend on status

2.7: Income vs Impact

TTO within RI

Maximizing Impact is normally the priority

- Enhance RI's visibility
- Recognition as a centre of excellence

→(Mitigated) if part of RI's budget is not from public money

TTO outside RI (Private entity)

Maximize Income is normally the priority

- Better balance sheet
- Reduce TTO operational costs for RI

→(Mitigated) when additional activities are included in the contractual arrangement between RI and TTO

2.7: Income vs Impact

TT can be a good source of income

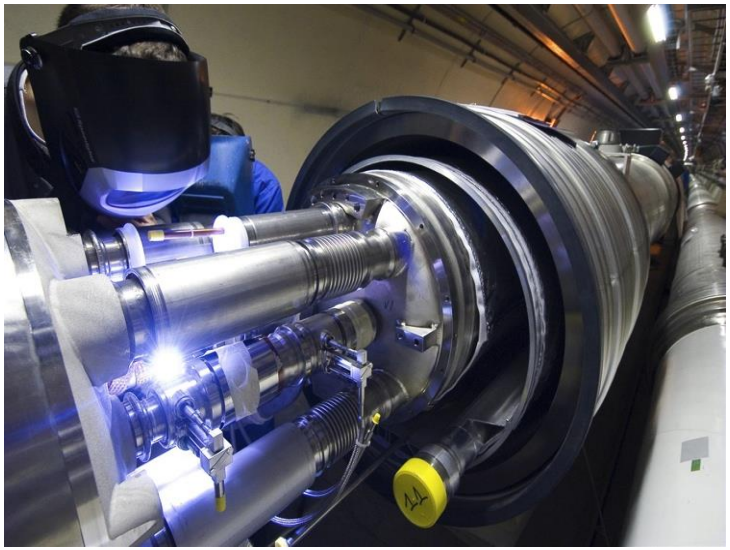
- Ex: EPFL, MIT, etc.

TT is NOT the main source of impact!

- Ex: Procurement in RI

BUT: TTO must operate in agreement with the IP Policy of the institution

- → TTO reports directly to Top Management!



The complex and sophisticated tools of particle physics are rich sources of new concepts, innovation and groundbreaking technologies, which benefit various applied research disciplines and eventually find their way into many applications that have a significant impact on the knowledge economy and society.

Main impacts of PP on industry and society

Economic benefits

- *More than 30,000 accelerators are active worldwide; Less than 200 are for research purposes.*
- *The impact of the world economy is much larger than just the sales of these accelerators; Products and processes produced have a monetary value that is 100-1000 times larger than the initial capital cost.*
- *All the final products that are processed, treated or inspected by the particle beams of industrial accelerators worldwide. have a collective annual value of more than $500 billion*.*

Application	Total systems	Systems sold/year		
Cancer therapy	9,100	500	1,800	
Ion implantation	9,500	500	1,400	
e^- welding & cutting	4,500	100	150	
e- and X-ray irradiators	2,000	75	130	
Radioisotopes	550	50	70	
Non-destructive testing	650	100	70	
Ion analysis	200	25	30	
Neutron generators	1,000	50	30	
Total	27,500	1,400	3,680	

2007 data

Market growth >= 10%/year

ESGARD: European Steering Group for Accelerator Research and Development

*https://news.fnal.gov/wp-content/uploads/particle-physics_benefits.pdf

2.8: Raising awareness

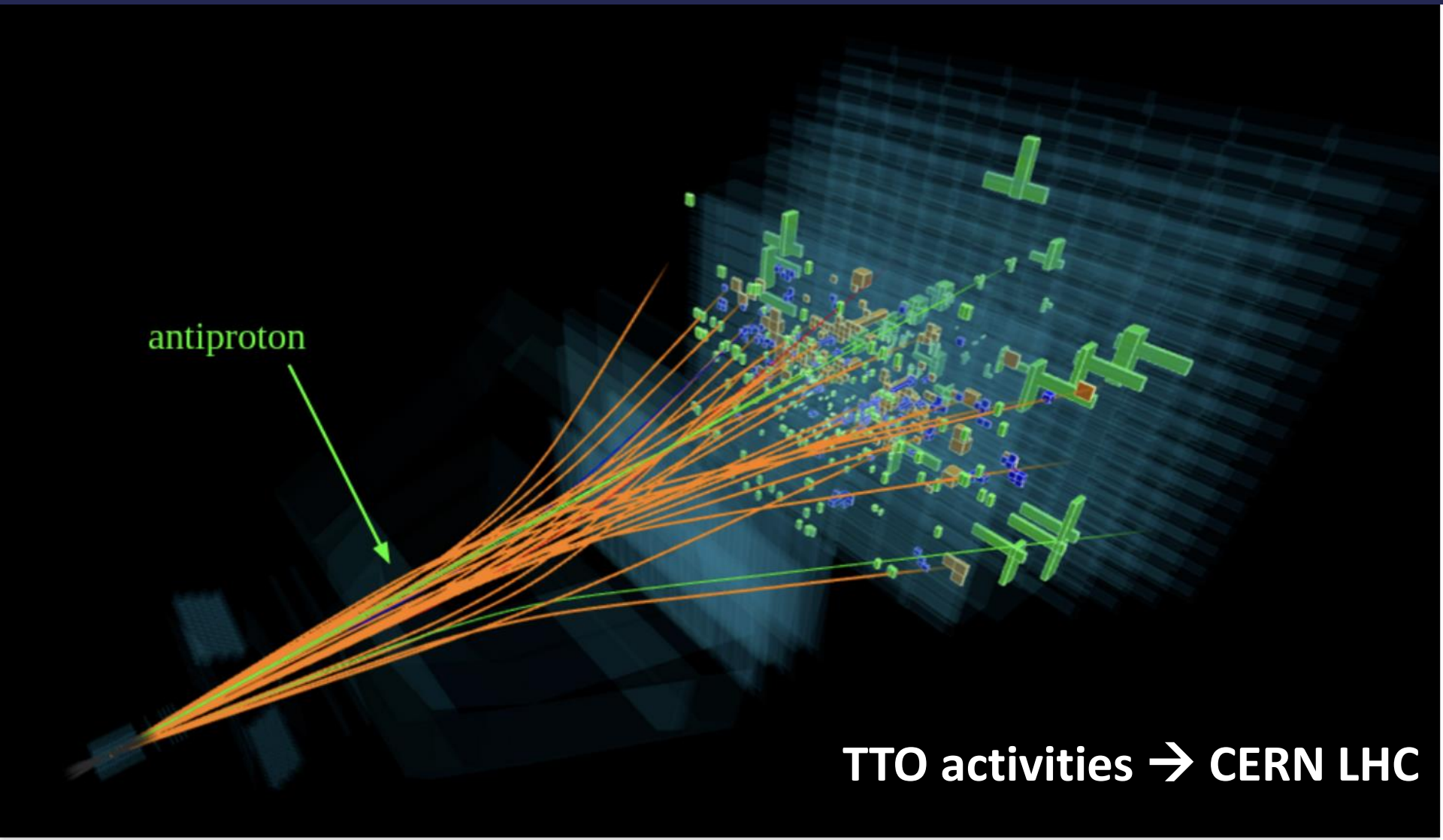
Essential task of the TTO

- In-house awareness: → Improve acceptance of scientists and engineers
- Outside: → Grow a reputation as a center of excellent as IP provider with commercial potential

Tools at your disposal:

- **Use all means at your disposal to communicate on the impact of your science**
- **Organize events that shows your added value to your scientists and engineering**
  - Academia-Industry matching events
    - Pre-commercial procurement
    - Procurement
    - Application oriented
  - Symposium for Early-Stage Researchers
- **Invite social science scientist to assess the economical value of your science**

LHC construction TT statistics

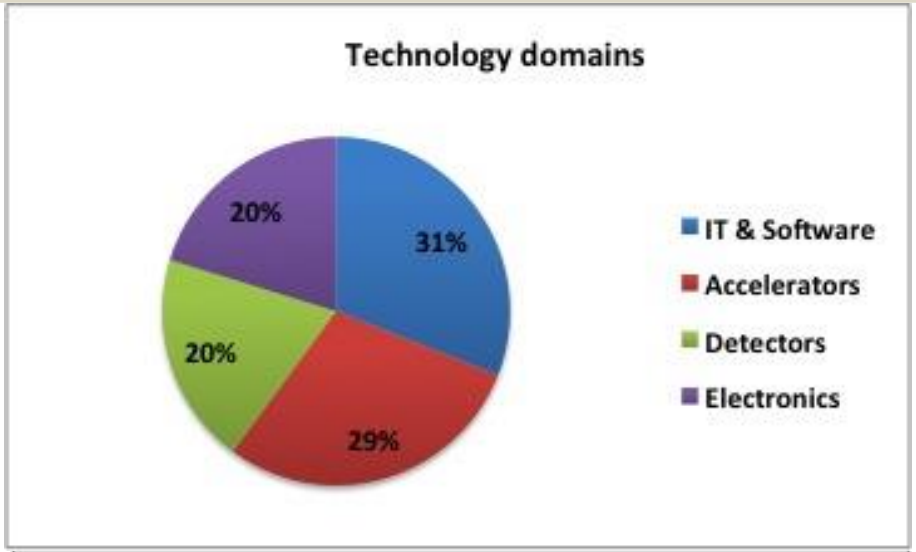


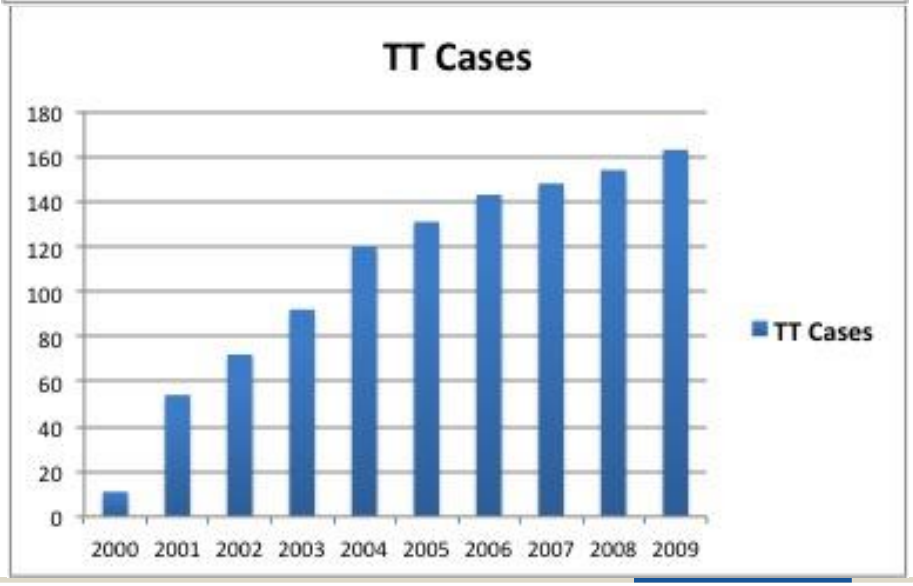
A proton–proton collision event recorded by the LHCb detector, showing the track followed by an antiproton formed in the collision (Image: CERN)

4: CERN technology portfolio

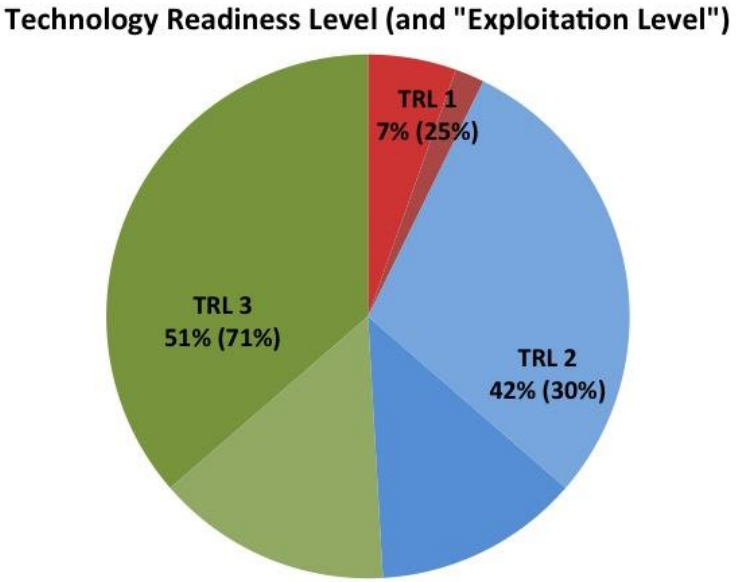
During the period of analysis, 163 TT cases have been recorded:

- More than **90%** are related to the LHC programme
  - Technology/expertise originating from the LHC programme
    - Ex: Mechanics: Diaphragm system used for the assembly of the LHC dipoles
  - Developments carried out to support the LHC programme
    - Ex: IT: Electronic Document Management System (EDMS) used for the handling of the LHC and experiments construction data
- Cases almost evenly distributed across technology domains
  - Accelerators
  - Detectors
  - Electronics
  - IT & software
- Average exploitation level of the technology portfolio: **50%**
- TT cases distribution
  - 00-04: On average 22 new TT cases/year on
  - 05-09: Decreasing to 9/year -> end of LHC construction





Technology readiness and exploitation level



TRL	Simplified Definition
1	Technology application formulated and basic concept demonstrated
2	Functional validation in laboratory environment
3	Representative prototype fully qualified (technology ready to transfer)

51% of the CERN technologies are ready to transfer[1]

The exploitation level decreases with the Technology Readiness Level

- 71% of the technologies with TRL 3 are exploited
- 30% of the technologies with TRL 2 are exploited
- 25% of the technologies with TRL 1 are exploited

Courtesy of E. Chesta/CERN

[1] Active TT cases at the end of 2010

CERN Patent portfolio

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
New patents filed in the corresponding year	1	4	6	3	4	2	6	4	6	4
Total number of patent families	12	15	19	19	23	25	31	32	35	37
Abandoned patent families	2	1	2	3	0	0	0	3	3	2
Total Portfolio cost (in kCHF)	260	260	310	365	370	435	412	545	375	373

37 patents in the CERN portfolio at the end of 2009

- An average of 3.7 new patent applications per year
- **51%** of the patents are related to the LHC programme
- **22%** are in co-ownership (academia, industry: filed as a result of partnerships)
- **40%** of the portfolio is currently licenced
- Starting 2007: Stricter criteria on the commercial potential of the portfolio have been applied

Contractual arrangements

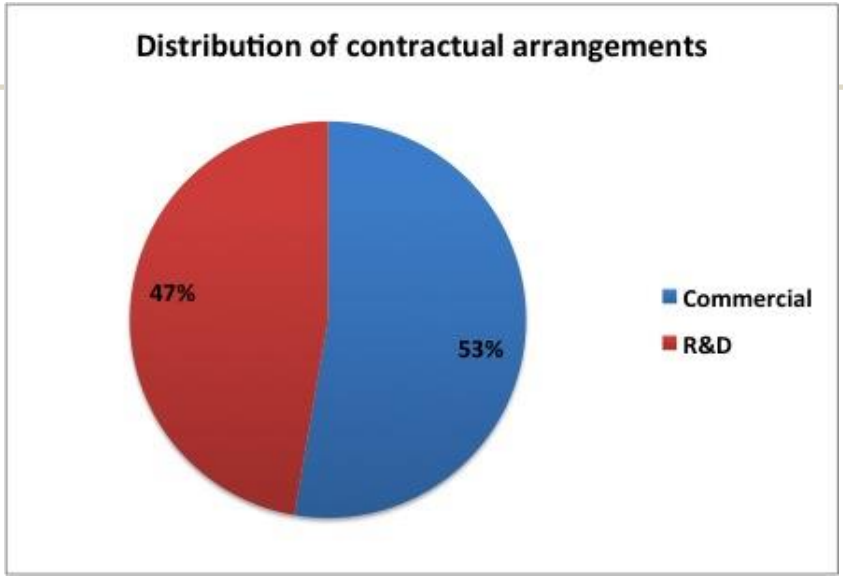
239 contractual arrangements during the period of analysis

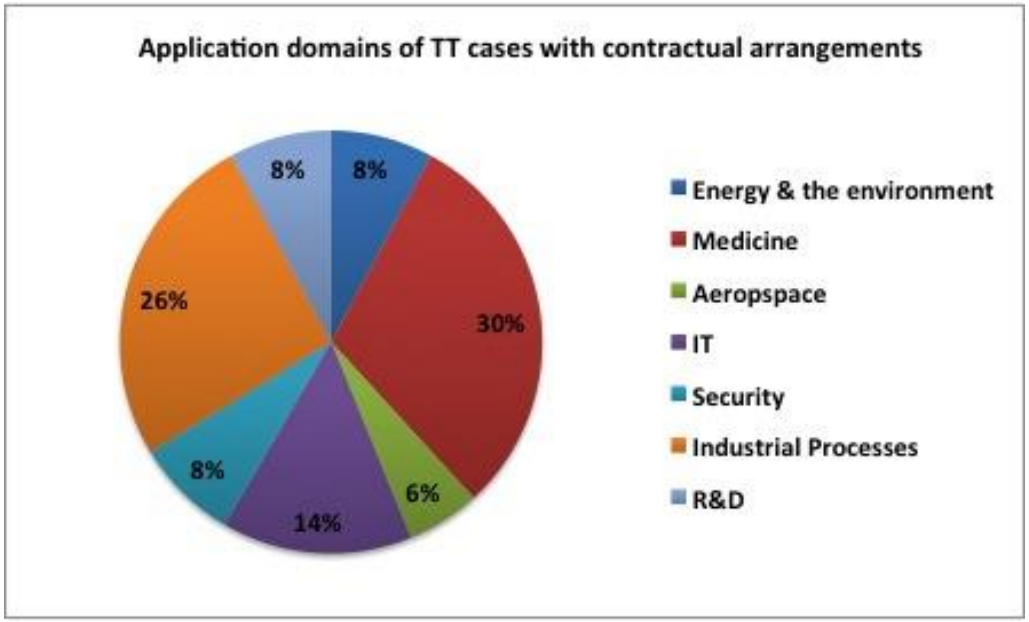
- 82% are still active today

Distribution in two categories

- Commercial **(53%)**
  - Licences
  - Services & consultancy
  - Exploitation of results from R&D projects
- R&D for academia and/or industry **(47%)**
  - Collaborations (academia)
  - R&D Partnerships (industry)
  - R&D Licences

Medicine, industrial processes and IT are the main application domains of CERN technologies (70% of all arrangements)





4: TT lessons learned from the construction of the LHC

A large scale physics research programme boosts innovation

- 90% of the technology disclosures to the KTT group during the period of analysis corresponded to technologies & know-how related to the LHC programme

The LHC programme has fostered a rich variety of technologies and know-how

- Showing effective transfer
  - 50% of the technology portfolio is exploited
- The maturity of the technologies increases the chances of transfer
  - 71% of the technologies with high readiness level (3) are exploited

A large fraction of the CERN know-how and technologies is not patentable

- Patents are not the most suited protection for know-how and electronics
- Complex joint-ownership of developments reduces chances of filing patents
- Results of R&D partnerships with industry are an additional source of patents (co-ownership)

Pooling PP technologies can enhance dissemination prospects

- Various institutions are working on the same technology topic
- Pooling results can make the PP offering more attractive to industry

4: TT Lessons learned (2)

CERN technologies can be used in various domains but a large fraction lacks readiness

- Only 51% of the technologies are at the highest technology readiness level for transfer
- Promoting technologies and know-how is often insufficient to attract industrial interests
- Difficulty to identify pertinent applications where:
  - The technology should be adapted to the needs of industry
  - The use of the technology will definitely give industry a competitive advantage
  - No alternative technology is easily accessible to industry
- Lack of dedicated funds to finance early demonstrators aiming to attract industrial interests

CERN technologies require further applied R&D to increase their market readiness

- About half of the contractual arrangements addresses R&D matters
- About 50% of the annual revenue is for financing R&D activities aiming to get closer to the market

Typical time to market for PP technologies ranges between 8 to 15 years

- Typical R&D project duration ranges between 3 to 5 years
- Commercialisation of products occurs typically 8 to 10 years after patent filing

3: Revenue sharing models

Context for generating revenues/income

Motivations

Context for revenue sharing

Revenue sharing models

Agenda

- 3.1: Context for generating revenues/income
  - → What is to be shared?
- 3.2: Motivations
  - → Why revenues?
  - → Why sharing?
- 3.3: Revenue/income sharing
  - → State vs Institutional level
  - → Beneficiaries
- 3.4: Revenue sharing models

3.1: Context for revenue/income

Agreement between academia and industry involving the generation and exploitation of Intellectual Property

- Generation and sharing of IP
  - R&D partnership agreement
  - Contract research agreement
- Commercial exploitation of IP
  - Licensing (& spin-off companies)
  - Services and consultancy

3.1: Context → What is to be shared?

Generation and sharing of IP

- R&D partnership agreement
  - →Income from industry for the execution of the agreement
  - (-) administrative costs for contract elicitation
- Contract research agreement
  - → Income from industry for the acquisition of IP
  - (-) administrative costs for contract elicitation

ISSUE → Institution accounting system must be able to handle income and Revenue distribution

3.1: Context → What is to be shared?

Commercial exploitation of IP

- Income from licensing
  - →Lump sum & royalties
  - (-) administrative costs for contract elicitation
  - (-) Patent costs
  - (-) Material costs and equipment amortization for transferring the IP
  - (-) staff costs to transfer the IP
- Spin-off
  - → Part or all of the licence income is converted into equities
  - → Income from company revenue distribution

3.1: Shared Commercial exploitation of IP

Services

(Access to RI services)

- →Income related to the execution of the service
- (-) Material costs and equipment amortization
- (-) staff costs to transfer the IP
- *Standard contract →In general No administrative costs*

Consultancy

(If IP of institution involved += licence agreement)

- →Consultant fees
- (-) staff costs to execute the consultancy

3.2: Motivations

Why revenues?

- Income generated is an **indicator** of TT activities
- Income may **contribute** to a % of the total **budget** of an organisation
  - Ex: IMEC (BE), CSEM (CH), VTT (FI) (% not specified)
  - Ex: HILASE (ELI, European RI) 10% of the budget must come from external sources.

Why sharing?

- To sustain TT activities
- To finance incentives

3.3: Context for revenue sharing

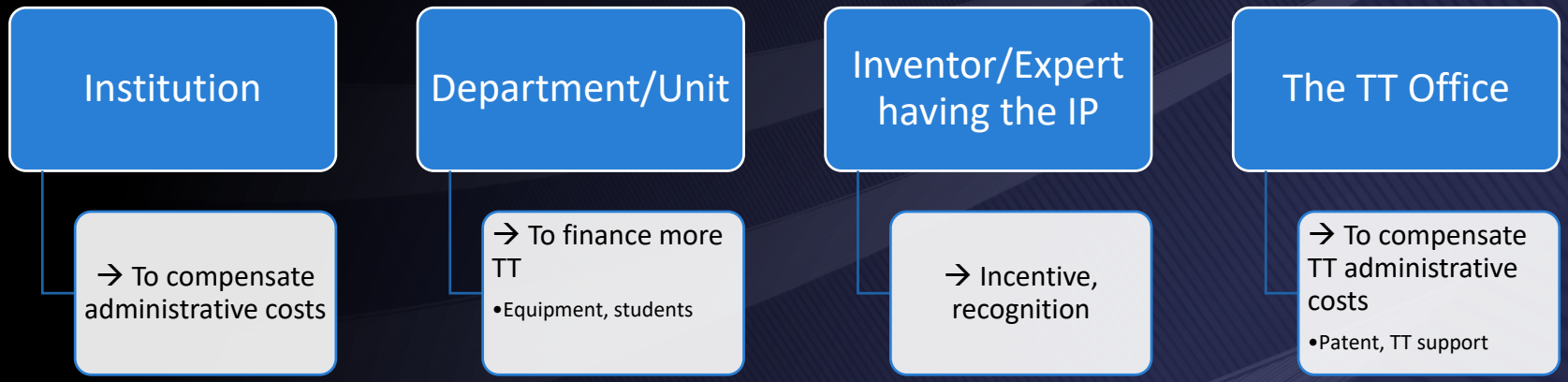
By law

- Revenue sharing in national regulations
  - Explicit: → Germany, federal law → National IP policy (Framework)
    - Small margin for adjustment at the institutional level via the IP policy
  - Principles: → UK, No professor privilege (But Oxford Uni.)
    - Details at the institutional level via the IP Policy

At institutional level

- Flexible implementation in the IP Policy (Ownership, etc.)
  - → Taxes may be an issue
  - → Accounting must be able to comply with policy!

3.3: Revenue sharing beneficiaries



3.4: Revenue sharing models

Models are adjusted to the Policy according to:

- Strategy: Maximizing impact vs Maximizing income
- Incentive: Relative importance given to incentive mechanisms

Examples:

- 1: Classic Model: (One of the first model)
  - ➔ Strong incentive, Maximizing income
- 2: Sweden (Professor privilege)
  - IP vested in professors/inventors
- 3: CSEM (CH), VTT (FI), IMEC (BE)
  - Part of budget from revenues
- 4: CERN: Technology Readiness Level is 2,3
  - Maximizing impact

3.4.1: sharing models → Classic

One of the first model (after the US) (Classic)

- Strong incentive for patenting
  - Cash at filling and more cash at granting
- All costs borne by institutions
- Net revenue distribution typically:
  - 1/3 → Inventor
  - 1/3 → Laboratory
  - 1/3 → Institution
- Priority to inventors for first revenues, lab and institution will compensate their costs thereafter.
- Possible adjustments of the % according to the revenue stream (see next slide).

3.4.2: sharing models →Sweden

First option to professor/inventor

- IP does not belong to the institution
- If professor/inventor cannot exploit IP → Negotiate IP exploitation contract with institution
  - Cost sharing
  - Revenue sharing
- The greater the risks for the IP owner the higher his/her revenue potential
  - Institutional costs must be compensated
  - Costs incurred by prof/inventor's lab for further developments must be compensated by income stream or institution may claim the IP for further exploitation.

3.4.3: sharing models → CSEM, VTT

Large fraction of institution budget generated by contracts with industry (Up to 50% or more)

- R&D partnership + IP exploitation agreement
- Partnership with industry on the development of pre-industrial prototypes using IP owned by institution
- Ex: IMEC: 3-D interconnections for the next generation of Chips

Public & Private contribution to the budget

- IP belongs to the institution
- Incentive scheme tailored to industry practices
  - Bonus, visibility, special privilege, etc.

3.4: sharing models → CERN

IP Policy: TT is one of the mission of the lab

- Visibility → **Maximizing impact**
- No direct financial incentive for inventor
- BUT: Incentive for further TT
  - KT funds to support further TT initiatives
- Cost compensation prior to revenue sharing
- Sharing scheme had to be adjusted to CERN accounting mechanisms

New 3D colour X-rays made possible with CERN technology

Stunning new images pave the way for large-scale human trials, two years on from the first ever 3D colour human X-ray using CERN Medipix3 technology

18 NOVEMBER, 2020 | By Antoine Le Gall

New 3D colour wrist X-ray made possible by the MARS Bioimaging scanner, showing a metallic screw (blue) and K-wire (green). (Image: MARS Bioimaging)