

Europe's technology transfer landscape

The current state, challenges and avenues for development of technology transfer offices

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Foreword

Technology transfer is a matter of increasingly strategic importance for Europe. Despite its extraordinary research base, the challenge remains to turn more of that scientific excellence into technologies, companies and partnerships that strengthen our competitiveness and deliver benefits for society. Across the world, governments are placing greater strategic emphasis on technology transfer as a way to translate research investment into technological and economic capabilities. At a time when technological leadership is increasingly linked to economic security, resilience and growth, improving the journey from research to market has become a strategic priority for Europe.

Patents have an important role to play in that journey. By establishing clear and transferable rights, they facilitate collaboration, licensing and the investment needed to develop early-stage inventions. What happens around the patent – the expertise, funding, incentives, networks and people that move an invention forward – is just as important.

This is precisely the kind of question the European Patent Office's (EPO) Observatory on Patents and Technology was created to explore: putting the EPO's data and expertise at the service of the innovation ecosystem. Our previous studies mapped the growing contribution of European universities, public research organisations and research hospitals to innovation. This study takes the next step. It turns to the technology transfer offices that work within and alongside these institutions to identify promising research, protect intellectual assets and connect technologies with companies, investors and entrepreneurs.

The evidence shows how important this role has become. European universities, public research organisations (PROs) and research hospitals remain major contributors to patenting in strategically important technologies. At the same time, our analysis of the survey conducted by the Association of European Science and Technology Professionals (ASTP) of more than 800 European technology transfer offices (TTOs) reveals a highly diverse landscape. While larger offices manage much more extensive research and invention pipelines and can sustain broader portfolios of specialist capabilities, smaller offices can also perform strongly on individual cases. Interviews with technology transfer professionals show that the challenges extend across the full transfer process: from researcher awareness and reliable patent budgets to technology maturation, specialist skills,

workable transaction rules and access to companies, investors and international markets.

The message is clear: Europe does not need a single TTO model, but it does need stronger and better-connected technology transfer capabilities.

The EPO is already contributing to this effort. The European Patent Academy supports universities, research institutions and technology transfer professionals in developing the skills needed to use IP effectively, while the network of patent information centres (PATLIB) combines local knowledge with patent expertise across our member states. Our data tools from the Observatory also help make Europe's innovation landscape more visible. The Deep Tech Finder helps connect patent-rich European startups with potential investors and partners, while the Data Desk provides accessible patent intelligence on technologies, institutions and trends. Together, these services can help TTOs access information, expertise and connections that would be difficult for every institution to develop on its own.

We hope that this study provides useful evidence for TTO professionals and decision-makers at European, national, regional and institutional level. Understanding where the system is working, where capabilities can be strengthened and where promising inventions still lose momentum is an essential first step towards improving the system.

This work would not have been possible without close collaboration across Europe. I would particularly like to thank ASTP and Fraunhofer ISI, as well as the organisations and technology transfer professionals who shared their knowledge and experience with us.

I also warmly thank the experts from national patent offices that participated in the project, providing relevant input to analyse the diverse European reality of TTOs: Albania, Austria, Belgium, Bosnia and Herzegovina, Croatia, Cyprus, Czech Republic, Finland, France, Germany, Hungary, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Türkiye and the United Kingdom. Their engagement demonstrates the importance attached to this challenge across Europe.

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President, European Patent Office

Contents

Foreword	02
Key findings	08
Recent direct patenting by European research institutions	08
Academic university patenting in international comparison	10
The current status of European TTOs	13
Main takeaways for strengthening technology transfer in Europe	18
1. Introduction	19
1.1 Research institutions are owning more European patents	19
1.2 From academic inventions to institutional responsibility	22
1.3 What are technology transfer offices?	24
1.4 The growing relevance of TTOs	26
1.5 Structure of the study	28
2. Academic patenting in an international comparison	29
2.1 Trends in academic patenting	30
2.2 National and technological diversity	32
2.3 University-industry collaboration and commercialisation	35
2.4 Interpretation of the results	40
3. The current status of European TTOs	43
3.1 Understanding the population of European TTOs	43
3.2 A typology of European TTOs	57
3.3 What determines effectiveness in TTOs?	60
4. Challenges and current responses	67
4.1 The current challenges for technology transfer	67
4.1.1 Awareness and incentives to develop research that reaches the TTO	68
4.1.2 Capacity, specialisation and commercialisation capability	68
4.1.3 Technology maturation and funding	69
4.1.4 Rules for early-stage and uncertain technologies	69
4.1.5 Networks, visibility and internationalisation	70
4.1.6 Benchmarking and performance measurement	70
4.2 Emerging areas of action across Europe	71
4.2.1 Making licensing and spin-off creation simpler and more predictable	71
4.2.2 Embedding valorisation in institutional strategy, incentives and measurement	72
4.2.3 Creating scale around specialist capabilities and technology maturation	72

4.2.4 Making technologies more visible and connecting them with markets.....	76
4.2.5 Building professional capability through learning, peer support and connected networks.....	76
5. Conclusions: six takeaways for strengthening technology transfer in Europe	82
Annex	86
A.1 Questionnaire used for the semi-structured consultations.....	86
A.2 Cluster analysis methodology and detailed profiles.....	88
A.3 Effectiveness analysis – methods and robustness.....	90
A.4 Identification of academic patents and international comparison methodology.....	92
References	94

List of tables and figures

Figures

Figure 1	Number of EP applications with at least one European university, PRO or research hospital as applicant, 2006-2025	09
Figure 2	Direct university filings at the EPO as a share of all academic patent applications by applicant country of origin, 2000-2020	11
Figure 3	Ten-year maintenance rates for direct and indirect academic patents granted by the EPO, with all patents granted by the EPO benchmarks, by applicant origin (priority years 2000-2012)	12
Figure 4	Distribution of European TTO characteristics and activities (averages of FY2017-FY2023) based on ASTP survey evidence	14
Figure 5	Two dominant profiles in the ASTP survey population of European TTOs	15
Figure 6	Comparison of TTO output per invention disclosure and per TTO staff FTE	16
Figure 7	Association between TTO staffing and commercialisation output	17
Figure 1.1	Number of EP applications with at least one European university, PRO or research hospital as applicant, 2006-2025	19
Figure 1.2	Geographical concentration of EP applications involving universities, public research organisations and research hospitals, compared with industry, 2006-2025	20
Figure 1.3	Share of EP applications involving universities, PROs or research hospitals in selected strategic technologies, 2016-2025	21
Figure 1.4	Trends in academic patents at the EPO by different types of European research institutions (EPO, 2025)	22
Figure 1.5	Countries in Europe according to the current national legislation on professor's privilege	23
Figure 1.6	The role of knowledge and technology transfer offices	25
Figure 1.7	Illustration of skills and capabilities required throughout the technology transfer process	26
Figure 2.1	Academic patenting at the EPO from European, US and Canadian universities, 2000-2020	30
Figure 2.2	Share of academic patenting (direct and indirect) among EP applications from European, US and Canadian applicants, 2000-2020	31
Figure 2.3	Direct university filings at the EPO as a share of all academic patent applications by applicant country of origin, 2000-2020	31
Figure 2.4	Academic patenting and direct filing shares in selected European countries, 2020 Academic patenting and direct filing shares at the EPO in selected European applicant countries, 2020	32
Figure 2.5	Share of academic patenting at the EPO from universities by technology field and applicant origin, 2011-2020	33
Figure 2.6	Share of direct academic patenting in total academic patents by technology field, 2011-2020	34
Figure 2.7	Share of academic patents at the EPO co-filed with SMEs and large enterprises, 2011-2020	35
Figure 2.8	Share of academic inventors with a company affiliation among all academic inventors	36

Figure 2.9	Ten-year maintenance rates for all and academic patents granted by the EPO, by applicant origin and priority year.....	38
Figure 2.10	15-year maintenance rates for all and academic patents granted by the EPO, by applicant origin and priority year.....	38
Figure 2.11	Ten-year maintenance rates for direct and indirect academic patents granted by the EPO, by applicant origin (priority years 2000-2012).....	39
Figure 2.12	15-year maintenance rates for direct and indirect academic patents granted by the EPO, by applicant origin (priority years 2000-2007).....	40
Figure 2.13	Unitary uptake rate indicators.....	42
Figure 3.1	Composition of TTOs consulted by the EPO through interviews.....	45
Figure 3.2	European TTOs vary widely in scale – ASTP survey evidence.....	46
Figure 3.3	TTO staffing relative to the research base served – ASTP survey evidence.....	48
Figure 3.4	Selected median indicators across the technology transfer lifecycle – ASTP survey evidence.....	49
Figure 3.5	Share of reporting TTOs with zero commercialisation outcomes – ASTP survey evidence.....	50
Figure 3.6	Distribution of European spin-offs with EP patent applications across growth stages.....	51
Figure 3.7	Top five industry sectors for European spin-offs by country.....	52
Figure 3.8	European spin-offs by European country and growth stage (top 15).....	52
Figure 3.9	Indicative scale represented by reporting TTOs – ASTP survey evidence.....	53
Figure 3.10	Results from the Special Action Plan for Patent Commercialisation and Utilisation (2023-2025), as published by Chinese authorities.....	56
Figure 3.11	Two groups in the ASTP survey population.....	58
Figure 3.12	Relative scale of the two TTO profiles.....	58
Figure 3.13	Median downstream activity by TTO profile.....	59
Figure 3.14	Association between TTO staffing and commercialisation output.....	63
Figure 4.1	Recurring challenge areas identified in the consultation interviews.....	67
Figure 4.2	Distribution of PATLIBs across EPO-member and extension states.....	78
Figure 4.3	Overview of EPO support services and tools to the PATLIB network.....	79
Figure 4.4	Illustration of PATLIB Next Level.....	80
Figure 5.1	Illustration of capacity needs across the technology transfer journey and capabilities that can be shared ...	84
Figure A2.1	Data coverage of key ASTP survey indicators.....	88
Figure A4.1	Identification of academic patents.....	92

Tables

Table 1	Main takeaways	18
Table 3.1	Selected characteristics of European TTOs – ASTP survey evidence	44
Table 3.2	Share of TTO staff FTEs dedicated to each functional area (TTO-level averages, FY2018-FY2023)	48
Table 3.3	US TTO activity by scale of the research base – AUTM survey evidence, FY2017-FY2023	54
Table 3.4	US TTO activity ratios, FY2017-FY2023	55
Table 3.5	Conversion rates by TTO group	61
Table 3.6	Output per TTO staff FTE	62
Table 3.7	Staff FTE association with commercialisation outputs	64
Table 4.1	Selected outputs of the Italian Proof-of-Concept programme, values updated to April 2025.	75
Table A2.1	Full cluster profiles	89
Table A2.2	Full downstream outcomes by cluster	89
Table A3.1	Staff FTE association under alternative pipeline-stage controls	90
Table A3.2	Within-TTO staff FTE association (panel fixed effects)	91

Key findings

Europe's ability to turn its research into technologies, companies and products has moved to the centre of the competitiveness debate. The reports led by Mario Draghi and Enrico Letta identified Europe's innovation gap as a major challenge, while the European Commission's Competitiveness Compass has placed greater emphasis on strengthening Europe's capacity to innovate, scale technologies and reinforce its technological sovereignty.

This makes technology transfer increasingly strategic. Europe already has a strong research base, but excellent science alone does not guarantee that new technologies will reach companies, investors or markets. Promising inventions have to be identified early, assessed, protected where appropriate, developed further and connected with the actors able to bring them towards commercial use.

One of the main instruments facilitating this process are technology transfer offices (TTOs) – units serving universities, public research organisations (PROs) and research hospitals. While they work closely with researchers to help identify inventions and understand their potential, their role extends much further. As a technology moves from the laboratory towards the market, TTOs may need to combine scientific understanding with intellectual-property expertise, proof-of-concept funding, market knowledge, industry and investor contacts, and support for licensing or the creation of new companies. This can be a long process, and the expertise required changes at each stage.

The role of TTOs is becoming more important as European research institutions increasingly own the inventions generated by their researchers. This means that universities, PROs and research hospitals – and thus their TTOs – increasingly carry the responsibility for deciding which technologies to protect, how to develop them and how to connect them with the market.

This development is taking place in a changing international landscape. The United States has a mature technology transfer ecosystem built over several decades, while China is rapidly expanding university patenting and strengthening policy support for the commercialisation of academic inventions. Europe is now at an important moment: its research institutions own more technologies themselves, making the capacity to transfer them increasingly strategic.

How well equipped is Europe to do this? This study provides an overarching assessment of whether Europe's technology transfer capacity is keeping pace with that growing responsibility. It provides a unique perspective by bringing together several sources of evidence: the latest EPO patent data; analysis of direct and indirect academic inventions developed with Fraunhofer ISI; responses from more than 800 European TTOs responding to the ASTP annual survey; and qualitative insights from interviews with 22 technology transfer professionals across Europe and key European research and innovation stakeholder organisations.

Together, the evidence provides a clear diagnosis. TTOs are being asked to manage more technologies and a broader range of activities, while many remain relatively small and cannot realistically maintain every specialised capability internally. The key findings (KF) therefore point both to the importance of sustained TTO capacity and to opportunities for pooling expertise, information, tools and networks across institutions and countries. The six takeaways at the end of this section translate this evidence into practical messages for research institutions, funders and policymakers.

Recent direct patenting by European research institutions

KF1: Direct patenting by European research institutions has grown strongly, but that growth has recently stopped rising

Patenting by European universities, public research organisations and research hospitals increased strongly over the past two decades at the EPO. The number of European patent (EP) applications involving at least one European research institution rose from 3 235 in 2006 to 8 138 in 2023. The share of all EP applications originating from European entities almost doubled, from 4.8% in 2006 to 9.4% in 2022.

The latest figures, however, show a change in this long-term trend. Applications declined to fewer than 8 000 in 2025, to a share of 9.1%. Universities had been the main driver of the previous expansion: their applications more than tripled between 2006 and 2022, from 1 445 to almost 5 000, but remained below that peak in the subsequent years. Applications from PROs recovered to 4 474 in 2025, while those from research hospitals

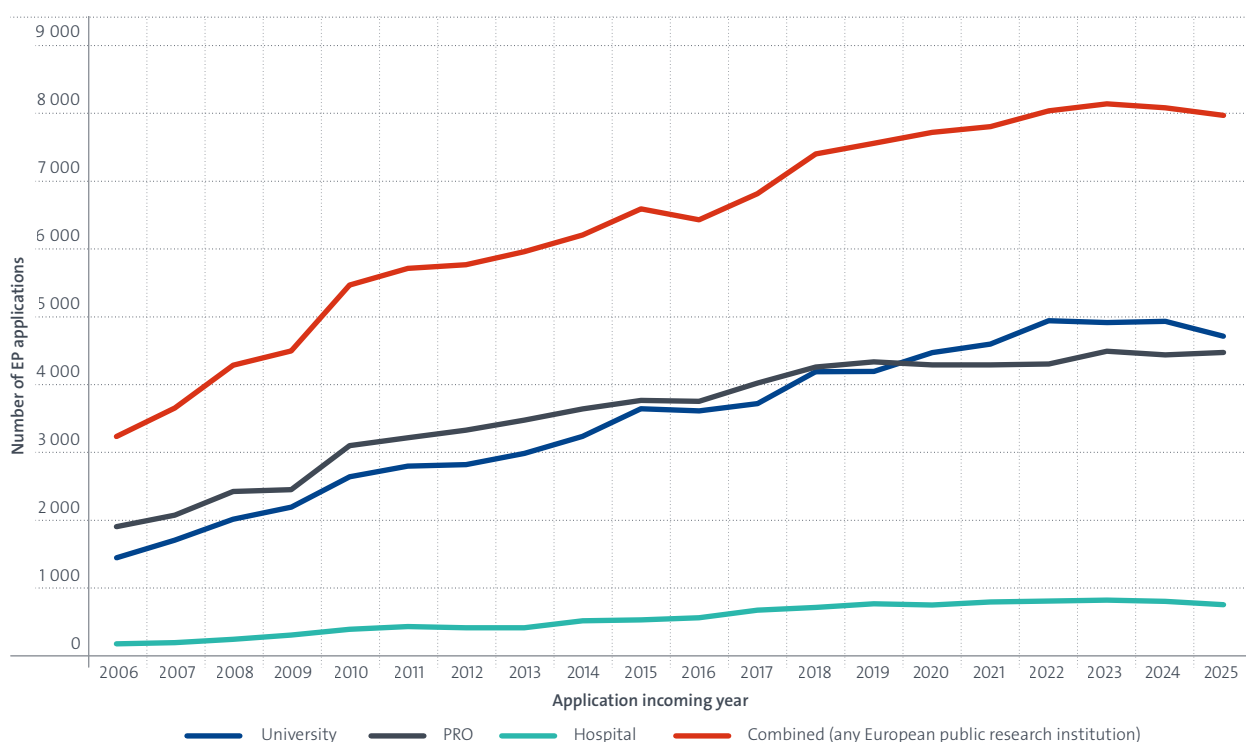
continued to rise gradually to over 820 in 2023, but saw a decline to 755 in 2025. Many of these applications are presented by multiple applicants (co-applicants) from public research institutions, so the combined total does not equal to the sum of the three institution types.

While this does not undo two decades of strong growth, it is the first clear interruption of the near-continuous expansion documented in earlier EPO studies. The interviews with TTO professionals help illustrate why this

development matters, although they do not establish its cause. A number of them describe pressure on patent budgets and the need to make difficult choices about which inventions to protect and for how long. While patent protection is important for attracting investment or licensing a technology, constraints on resources at this early stage can prevent an invention from progressing further towards the market.

Figure 1

Number of EP applications with at least one European university, PRO or research hospital as applicant, 2006-2025



Note: The statistics include published and unpublished patent applications at the EPO. Universities, public research organisations (PROs), and research hospitals were identified specifically for this study using advanced applicant-identification techniques developed by the EPO.

Source: EPO analysis

Academic university patenting in an international comparison

Universities do not always own the inventions created by their researchers. A patent can be filed directly by the university, which then takes responsibility for protecting and commercialising it. However, a university researcher may also be named as an inventor on a patent owned by a company or another organisation, typically as a result of a formal or informal research collaboration. This study refers to these as indirect academic patents.

This distinction matters because direct ownership brings greater responsibility for universities and their TTOs. They must decide which inventions to protect, finance that protection, assess market potential and find companies, investors or entrepreneurs able to develop them further.

The EPO's previous studies on universities and public research organisations showed that academic patenting has grown strongly in Europe (EPO member states) and that universities are the main public research actors increasingly taking direct ownership of inventions. This current study goes one step further by comparing the patenting landscape at the EPO by European and US universities. The United States was chosen because of its long history of university ownership and commercialisation, and the maturity of its technology transfer ecosystem.

KF2: Growing university ownership of patents has reinforced the role of European TTOs

European universities have become much more important patent owners over the past two decades. Academic patents filed at the EPO – patents linked to university researchers, whether owned by the university or another organisation – increased from around 5% of European patents in 2000 to 9% in 2020, close to the US level of around 9.5%. The biggest change is in who owns the patents. By 2020, around half of European academic patents were filed directly by universities, again, broadly the same share as for US academic patents.

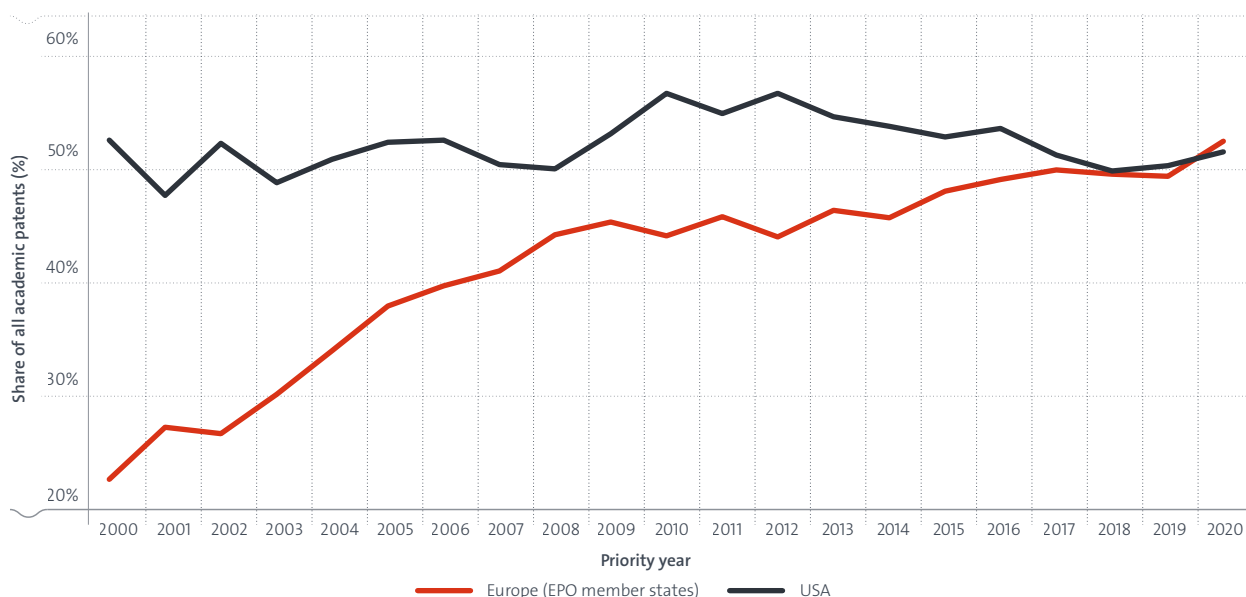
This represents a major shift and is closely linked to changes in IP policies governing publicly funded research across Europe during the 2000s. Universities and their TTOs now take direct responsibility for many more inventions. However, filing the patent application is only the beginning: they may then need to finance further protection, develop the technology, identify industrial partners, market it, negotiate a licence or support the creation of a spin-off.

This change in ownership of academic inventions has gone hand in hand with the professionalisation of technology transfer in European research institutions. The testimonies of interviewed TTOs illustrated this shift. In many institutions, patenting and industry links were previously handled ad-hoc by researchers, legal teams or other university units that were not specialised. Dedicated TTOs have gradually brought these activities together and gained a more strategic role, providing specialised support for licensing, spin-offs and entrepreneurship.

European universities are therefore not only owning more inventions: they have also built more specialised structures to manage them, following a process similar to the institutional development seen in the United States since the 1980s.

Figure 2:

Direct university filings at the EPO as a share of all academic patent applications by applicant country of origin, 2000-2020



Source: EPO – PATSTAT; Elsevier Scopus.

KF3: Evidence suggests a gap in the economic impact of patents owned by European universities

Greater ownership also means managing patents over the longer term. This study therefore looks at how long academic patents granted by the EPO are maintained.

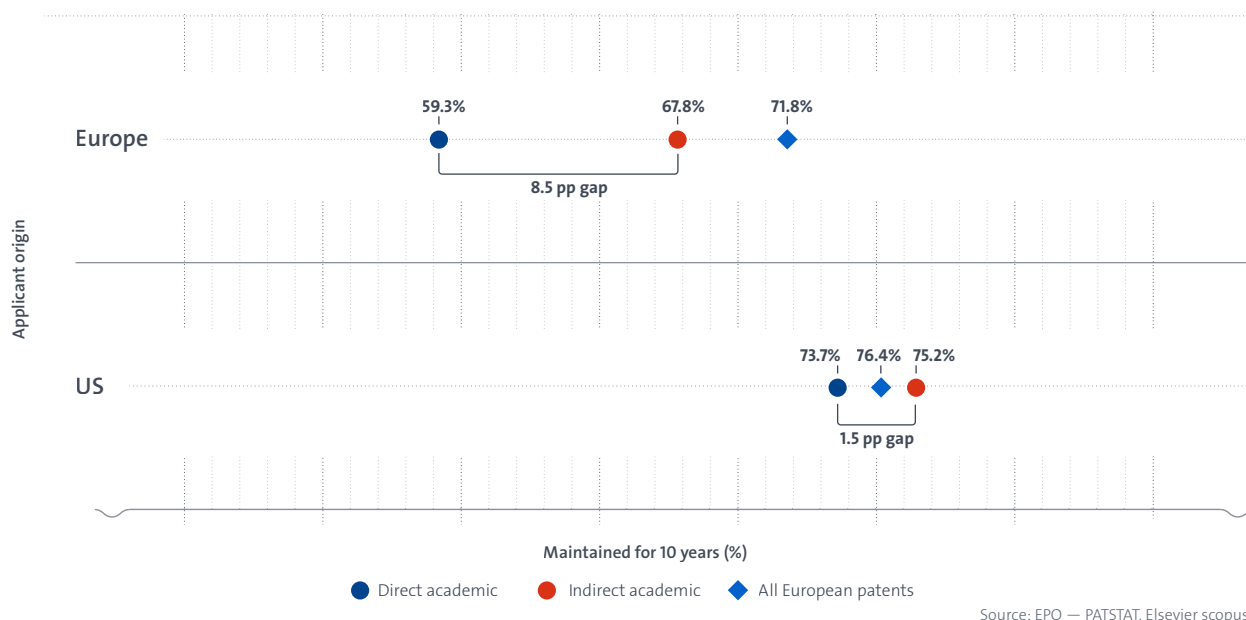
Once a European patent is granted, the patent owner must decide in which countries to maintain protection and pay the corresponding national renewal fees. Since 2023, owners can request unitary effect for their granted European patents, cutting costs and reducing administrative complexity, and thereby enabling more efficient use of the often limited IP budgets of European public research institutions. So-called Unitary Patents provide protection in 18 participating member states through a single system and a single annual renewal fee.

Because patent maintenance involves the payment of annual fees, it is used in this study as a signal of the economic value of an invention. Allowing a patent to lapse can be a sensible decision if its expected value no longer justifies the cost. At the same time, the payment of renewal fees means that the owner still expects some returns for maintaining patent protection. Maintenance is not the same as commercial success, but it provides an indication of whether institutions continue to see enough potential in an invention to keep paying for its protection.

The difference with the United States is substantial. Among directly owned European academic patents granted by the EPO and filed between 2000-2012, just 59.3% were maintained for at least ten years, compared with 73.7% for academic patents from the United States. Within Europe, directly owned academic patents were maintained less often than indirect academic patents, at 59.3% compared with 67.8%. In the United States, the difference was much smaller, at 73.7% compared with 75.2%. These figures, however, need to be interpreted carefully, as universities on the two sides of the Atlantic may follow different IP strategies when patenting at the EPO and maintaining protection in Europe.

Figure 3:

Ten-year maintenance rates for direct and indirect academic patents granted by the EPO, with all patents granted by the EPO benchmarks, by applicant origin (priority years 2000-2012)



The interviews nevertheless illustrate why long-term portfolio management can be difficult. Several TTOs reported pressure on patent budgets and cases where protection had to be limited because resources were not available. Some offices also depend on project-based or temporary funding for IP expenditure or specialised staff, making it harder to commit resources to inventions that may take many years to reach the market.

This is particularly relevant for technologies coming from university laboratories, which are often patented while still at an early stage. They may still need proof-of-concept funding, technical development and time to find the right company or investor. Europe has largely caught up with the US in universities taking ownership of inventions, but the next challenge is having the resources and commercialisation capacity to manage and develop those inventions over the longer term.

The current status of European TTOs

The growing responsibility of research institutions raises a simple question: what capacity do European TTOs have to manage these inventions and bring them to market?

To answer this question, the study uses anonymised survey data from ASTP, the Europe-wide association of knowledge-transfer professionals. Working with ASTP, the EPO analyses for the first time results across several years of its annual survey. The data includes responses from more than 800 European TTOs that reported at least once between 2017 and 2023, providing the most comprehensive picture to date of their staff, research base and activities. Twenty-two interviews with technology transfer professionals complement the survey and help explain what the numbers mean in practice.

KF4: Most European TTOs are small, but differ considerably in their characteristics and responsibilities.

There is no typical European TTO. Offices serve very different universities, PROs and research hospitals and differ greatly in their size, experience and responsibilities. Most are also relatively young: more than half of the TTOs reporting an establishment year were created in 2005 or later, and one quarter in 2012 or later.

Most TTOs are small specialist teams. The median TTO employs 6.7 full-time-equivalent (FTEs) staff – in other words, the equivalent of fewer than seven full-time jobs. Half of the offices employ between 3 and 14.5 FTEs. A much smaller group of large TTOs raises the average to 11.9.

Their activities vary on a similar scale. In a typical year, the median office receives around nine invention disclosures – the formal notification from a researcher that they may have created research results worth protecting or commercialising. At the same time, the median office files around six patent applications, obtains three patent grants, concludes two licensing deals and creates fewer than one spin-off.

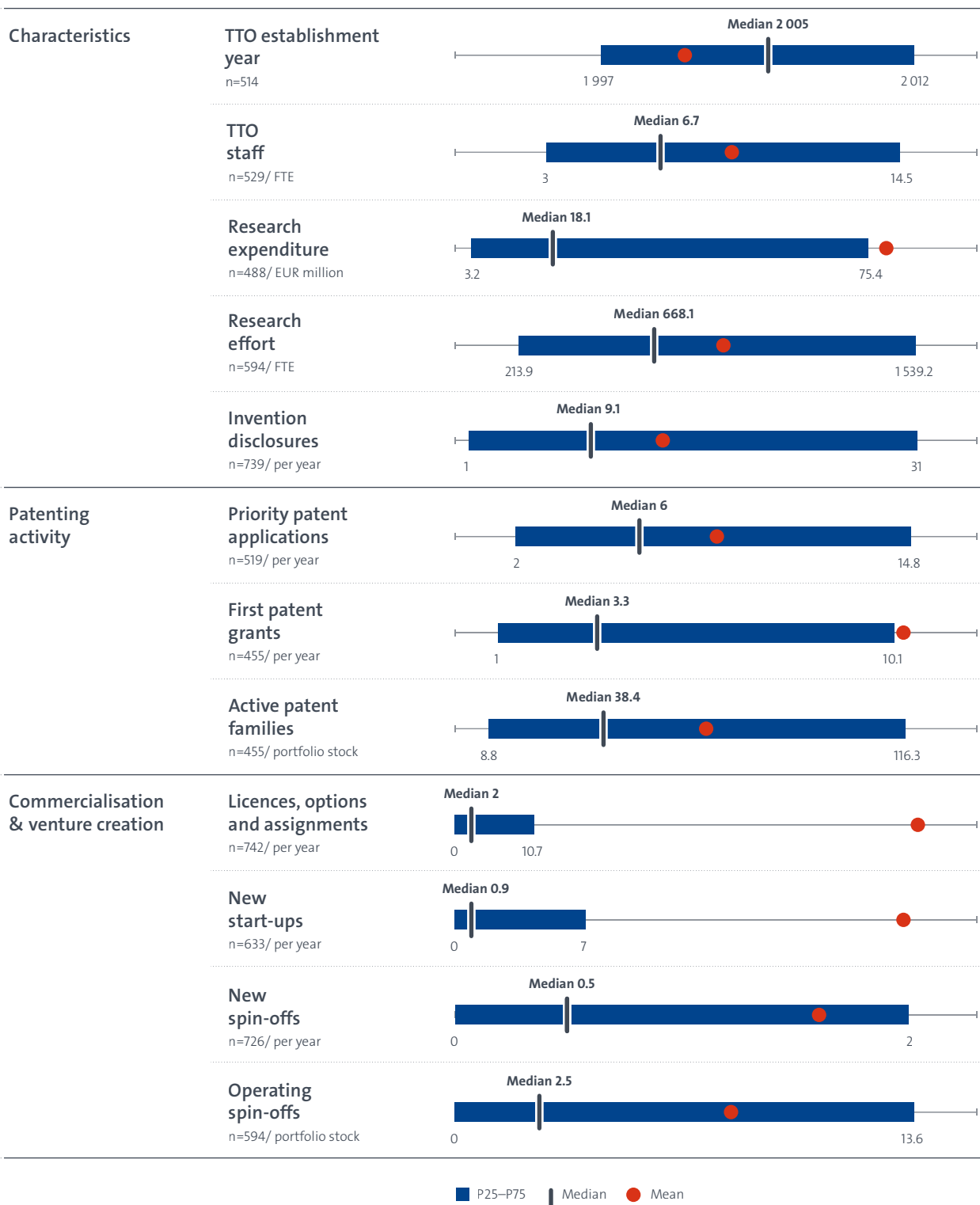
The interviews show how demanding these numbers can be. One office reported around 12 central TTO staff supporting approximately 7 000 researchers. Another described a staff of only five carrying out on-site invention scouting across a research organisation with around 100 000 researchers.

For smaller offices, the same few people may have to cover a wide range of activities. Larger offices can divide these responsibilities among specialists and build deeper expertise in particular technologies, markets or stages of commercialisation.

This diversity matters when comparing TTO performance. A six-person office serving a regional university operates under conditions very different from those of a large organisation with dedicated specialists across multiple several technologies and commercialisation activities.

Figure 4:

Distribution of European TTO characteristics and activities (averages of FY2017-FY2023) based on ASTP survey evidence



Source: EPO analysis based on the ASTP survey data

KF5: Small TTOs can handle individual inventions effectively, but scale makes it easier to build specialised capabilities

To understand these differences better, the study uses cluster analysis to identify two broad groups of European TTOs based on their staffing, the research base they serve and the number of invention disclosures they receive. Small and mid-scale offices represent 732 of the 809 TTOs analysed, or 90.5%. Only 77 offices, or 9.5%, belong to a group of significantly larger TTOs, serving institutions with a large research base.

The differences between them are substantial. The median large-scale TTO has around six times as many staff, serves almost seven times as many researchers backed by research budgets more than 22 times larger, and receives nearly 16 times as many invention disclosures as the median small or mid-scale office.

But being smaller does not automatically mean being less effective with each invention. The study compares how many patents, licences and ventures are produced relative to the number of inventions disclosed to the TTO. For six of the eight metrics, there is no statistically significant difference between the two groups. Put simply, once an invention enters the TTO, a smaller office is not necessarily worse at moving that individual case forward.

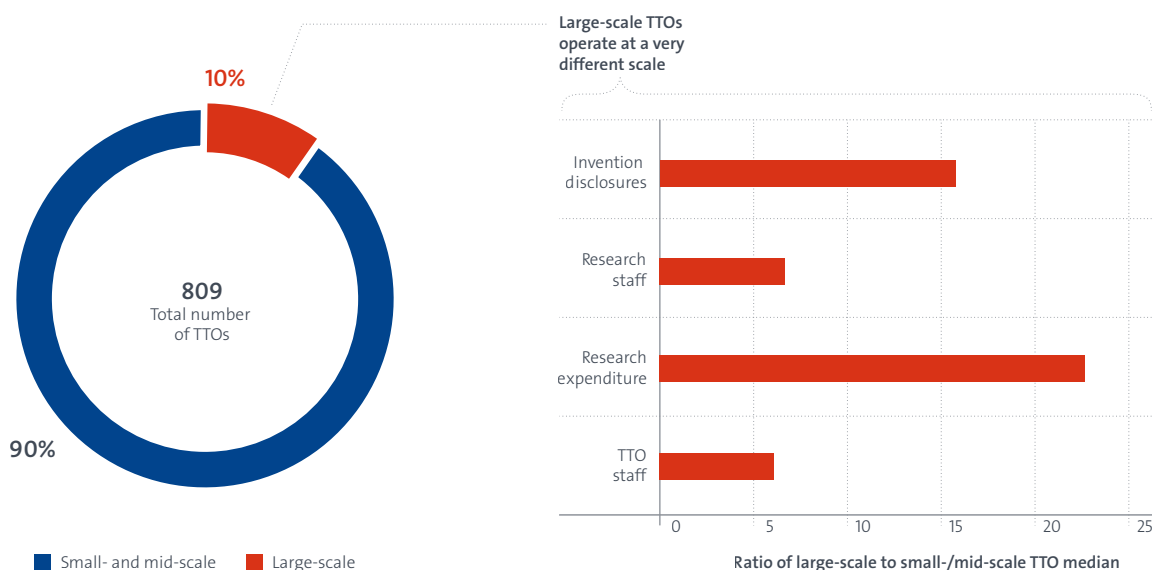
The picture changes when output is compared with the number of TTO staff (see “TTO staff productivity” in Figure 6 below). Large offices produce significantly more patenting, licensing and venture activity per staff member across all eight indicators analysed because they are able to process more invention disclosures.

The interviews help explain why. Scale allows larger offices to scout and manage more cases at the same time and maintain a wider range of specialist capabilities. A small TTO may be very good at working closely with researchers, but the same few people may have to cover patents, contracts, licensing, market analysis and business development. Larger organisations can have specialists in areas such as biotechnology or digital technologies, dedicated licensing and venture teams, staff focused on industry or investors and people whose role is to scout actively for new inventions.

Experience also builds through repetition. Professionals who repeatedly negotiate licences, work with investors or commercialise technologies in the same sector develop contacts, market knowledge and practical expertise that can be difficult to build when an office handles only a few such cases each year.

Figure 5:

Two dominant profiles in the ASTP survey population of European TTOs



Source: EPO analysis based on the ASTP survey data

Figure 6

Comparison of TTO output per invention disclosure and per TTO staff FTE

	Invention conversion Output per invention disclosure	TTO staff productivity Output per TTO staff FTE
Priority patent applications	0.403 ● — 0.471 ↗ Higher for small- and mid-scale TTOs	0.679 ● — 0.902 ↗ Higher for large TTOs
Patents granted	0.253 ● — 0.275 — No significant difference	0.449 ● — 0.784 ↗ Higher for large TTOs
Active patent families	2.92 ● — 3.03 — No significant difference	4.93 ● — 5.91 ↗ Higher for large TTOs
New spin-offs	0.041 ● — 0.048 — No significant difference	0.037 ● — 0.134 ↗ Higher for large TTOs
New startups	0.071 ● — 0.089 — No significant difference	0.015 ● — 0.208 ↗ Higher for large TTOs
New ventures (spin-offs + startups)	0.167 ● — 0.174 — No significant difference	0.161 ● — 0.365 ↗ Higher for large TTOs
Operating spin-offs	0.328 ● — 0.479 ↗ Higher for large TTOs	0.244 ● — 1.336 ↗ Higher for large TTOs
Licenses, options and assignments	0.218 ● — 0.244 — No significant difference	0.202 ● — 0.72 ↗ Higher for large TTOs

● Large TTOs ● Small- and mid-scale TTOs

Note: Significance at 5%; ↗ indicates a statistically significant difference; — indicates no statistically significant difference.

Source: EPO analysis of ASTP survey

KF6: TTO capacity matters for commercialisation

The next question is whether the stronger performance of large TTOs simply reflects the fact that they serve larger research organisations and receive more inventions.

The study examines 256 TTOs with directly reported data on staffing, research expenditure, invention disclosures and country. This makes it possible to account for some of the main differences in the environments in which TTOs operate, such as the research base and the number of invention disclosures, and provide a more like-for-like comparison.

The results show that larger TTO teams are associated with higher levels of all the commercialisation outputs analysed, even after accounting for these differences. A doubling of TTO staff, with the other factors in the analysis held constant, is associated with approximately 53% more new startups, 43% more new ventures, 36% more new spin-offs, 23% more operating spin-offs and 21% more licences, options and assignments.

These are associations, not causal effects. There is no evidence that simply doubling the staff of an individual

TTO would necessarily produce these increases. Larger teams tend to have more mature processes, greater specialist expertise, stronger networks and more accumulated experience.

The interviews show what this additional capacity can make possible. Some offices described moving from waiting for researchers to contact them towards actively scouting for inventions and maintaining regular relationships with research teams. In one case, annual invention disclosures increased from around 15-20 to 55-60 after more systematic scouting was introduced.

Several TTOs also highlighted the importance of commercial expertise. Patent or legal advice can sometimes be purchased externally for an individual case. It is harder to buy, case by case, the continuous knowledge of a sector, companies, investors and potential markets that develops through repeated commercialisation work.

Staff numbers should therefore be understood as a sign of something broader. TTO capacity means not only headcounts, but also experience, specialised skills, stable processes, tools, market knowledge and networks. These capabilities determine how much of the transfer journey an office can realistically undertake.

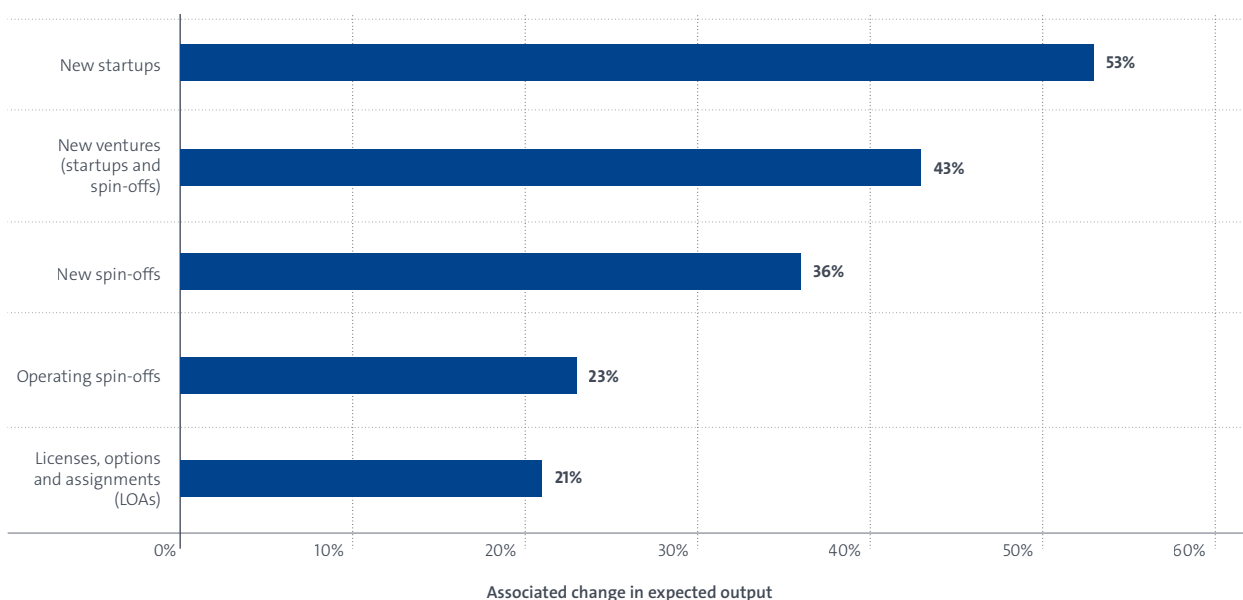
The results also suggest that smaller TTOs do not necessarily need to become large organisations, if they are able to access capabilities they cannot realistically maintain themselves. Some activities depend on being close to researchers. Others – such as specialist market expertise, patent analytics, valuation, investor networks, founder matching or training – can potentially be pooled across institutions.

Researchers are more likely to disclose early – and sometimes sensitive – ideas to people they know and trust, so invention scouting and the first assessment of a technology benefit strongly from local presence. Yet, proof-of-concept funding programmes, investor access, market intelligence, training and international partner search can often operate across multiple institutions or even be subcontracted to external providers. Regulatory sandboxes can complement proof-of-concept support by allowing emerging technologies to be tested under realistic technical, market or regulatory conditions before wider deployment.¹

The question for Europe is therefore not simply how to make every TTO bigger: it is how to ensure that every promising invention can access the capabilities it needs, whether these are available inside the local TTO or through wider national and European networks. The study includes detailed showcases of national initiatives, such as SATT and shared TTO networks, to help stakeholders understand how different models work in practice and identify possible solutions that could be adapted to national and regional contexts.

Figure 7

Association between TTO staffing and commercialisation output



Note: The graph shows the approximate percentage difference in expected output associated with a doubling of staff FTE in cross-sectional negative-binomial models controlling for research expenditure, invention disclosures and country. The estimates are associations, not causal effects.

Source: EPO analysis based on ASTP survey data

¹ See, for example, European Commission, Ensuring EU legislation supports innovation, available at the [European Commission webpage](#) (accessed 25 September 2026).

Main takeaways for strengthening technology transfer in Europe

Taken together, the evidence gives a clear picture. European research institutions are taking greater responsibility for their technologies at a moment when turning research into innovation has become increasingly important for European competitiveness and technological sovereignty.

This makes TTOs strategic actors. However, technology transfer is about much more than filing patent applications. Moving an invention towards the market can require years of technical development, financing, market assessment, partner search and negotiation. Hence, while a patent, licence or spin-off is an important step, it does not automatically mean market success. Whether a technology ultimately becomes a successful product or company also depends on investors, entrepreneurs, companies, regulation and market demand. The study identifies six takeaways:

Table 1

Main takeaways

Takeaway	Message
1. Recognise TTOs as strategic actors	TTOs are not simply administrative units. They are one of the instruments Europe needs to turn public research into technologies, companies and capabilities that can strengthen its competitiveness and technological sovereignty. Governments, funding agencies and research institutions should therefore treat technology transfer capacity as part of Europe's innovation infrastructure and support it accordingly.
2. Policies and support initiatives should reflect the diversity of European TTOs	European TTOs differ greatly in size, maturity, institutional setting and resources. A small office serving one small university faces very different conditions than those of a large TTO supporting a major research organisation or even multiple research organisations. Policies and support therefore need to reflect these different starting points rather than apply one model or one way to measure their success.
3. Strengthen capacity across the whole transfer journey	TTOs need stable resources to achieve impact. This includes: stable staff, reliable budgets (including for IP protection), access to technical, commercial, IP and entrepreneurial expertise and tools required to support inventions, from scouting and proof-of-concept right through to licensing and venture creation.
4. Combine local proximity with shared capabilities	While close contact with researchers is essential for identifying inventions early and supporting them over time, smaller TTOs may not realistically be able to maintain every specialist capability internally. Expertise, training, information, tools, and industry or investor networks can therefore be pooled across institutions and supported at regional, national or European level by institutions such as the EPO, or networks like the ASTP and PATLIB.
5. Build a more connected European market for technology	The right company, investor, entrepreneur or expert may be located in another region or country. Stronger technology visibility, brokerage and cross-border networks can help promising inventions find the partners they need beyond their local ecosystem.
6. Align incentives and focus on long-term impact	Researchers need recognition to engage in technology transfer, while TTO professionals need institutional support and appropriate career structures. Success should also be measured beyond patent counts or licensing income, looking at whether technologies ultimately reach the market, attract investment and generate economic or societal impact.

1. Introduction

Universities, public research organisations and research hospitals are major sources of scientific knowledge and technological invention in Europe. Their research underpins advances in fields ranging from health and biotechnology to digital technologies, clean energy, advanced materials and engineering. Alongside their traditional missions of education and research, these institutions are increasingly expected to contribute to innovation, regional development and the wider application of knowledge.

Previous studies by the EPO Observatory on Patents and Technology have shown that European research institutions are contributing more strongly to the patent system and, importantly, are increasingly taking direct responsibility for protecting and managing inventions generated by their researchers (EPO, 2024; EPO, 2025). This trend shifts more decision-makings on patenting, technology development and commercialisation towards the research institutions themselves and the technology transfer offices (TTOs) that support them.

This report therefore asks a key question: has the institutional capacity to transfer and commercialise academic inventions developed in parallel alongside the growing portfolio of technologies now managed directly by

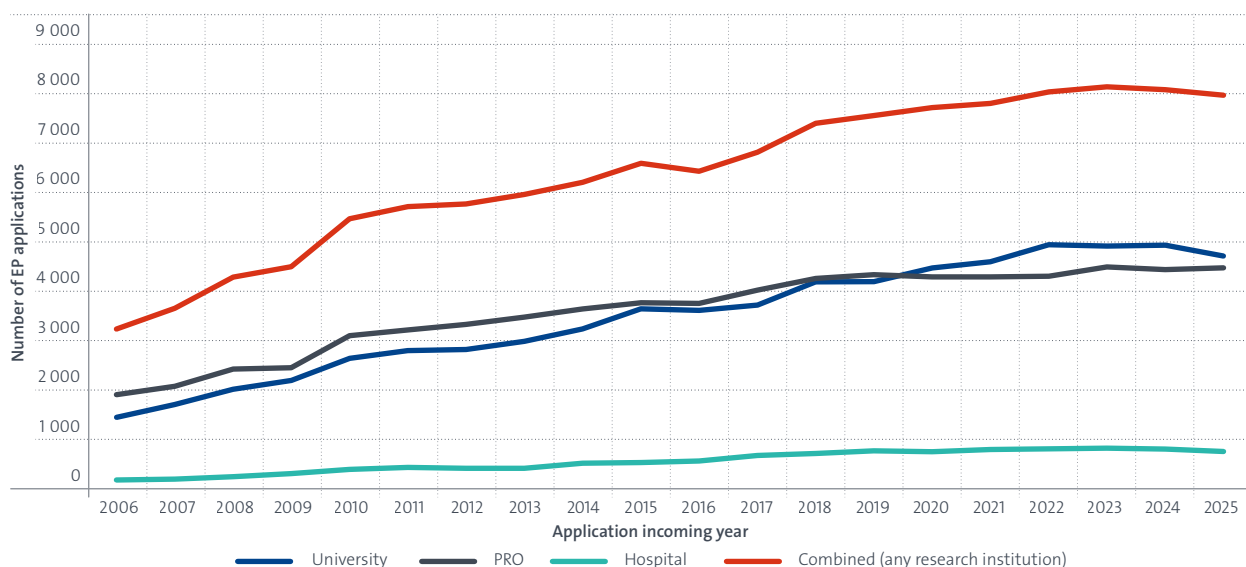
European research institutions? It examines this question by combining patent data with evidence from the ASTP survey with more than 800 European TTOs and consultation interviews with 22 technology transfer professionals. It looks at how TTOs are organised and resourced, how their activities and outcomes differ, and which recurring constraints affect their ability to bring research-based technologies towards the market and wider use.

1.1 Research institutions are owning more European patents

Recent EPO data illustrate the involvement of TTOs from public research institutions in the European patent system. The number of EP applications involving at least one European university, PRO or research hospital as an applicant increased from 3 235 in 2006 to 7 971 in 2025, while their share of all published EP applications from European applicants rose from 4.8% to 9.1%. After almost two decades of sustained growth, these two metrics peaked in 2023 and 2022, respectively, and have since levelled off (Figure 1.1). As many of these applications are presented by two or more different applicants (co-applications) from public research institutions, the combined total does not equal the sum of the three institution types.

Figure 1.1:

Number of EP applications with at least one European university, PRO or research hospital as applicant, 2006-2025

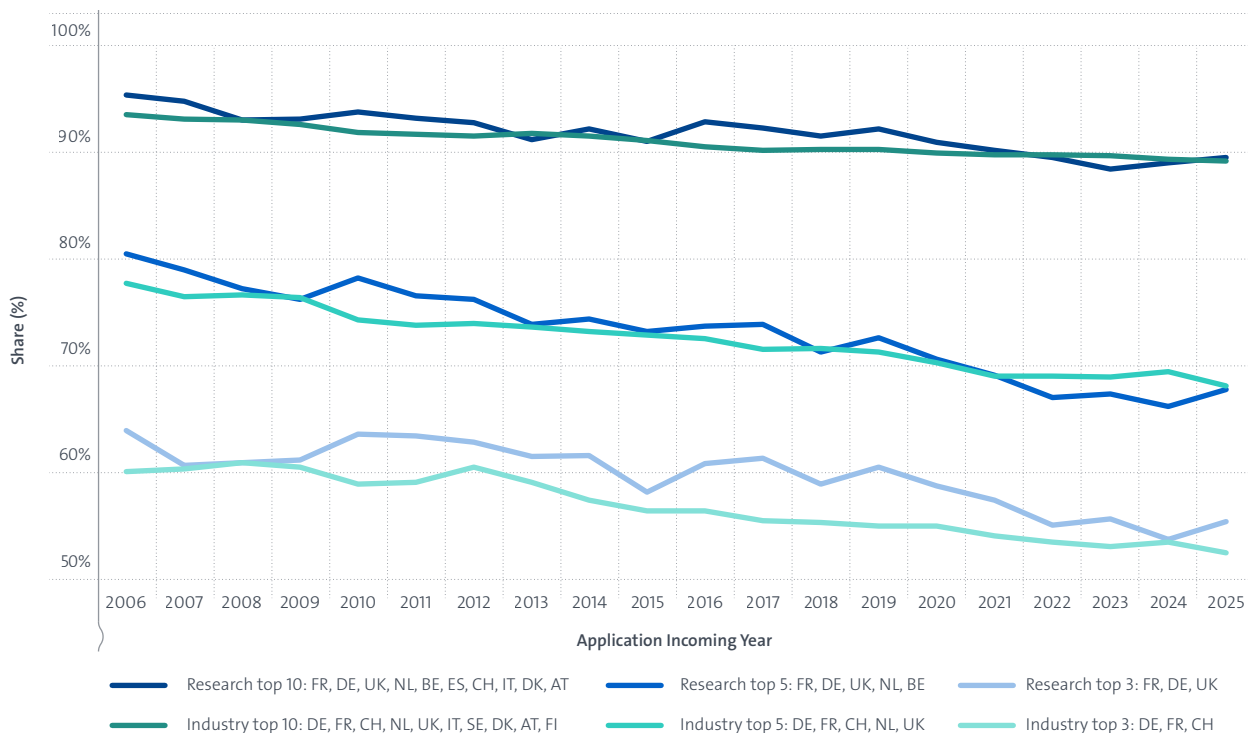


Note: The statistics include published and unpublished patent applications at the EPO. Universities, public research organisations (PROs), and research hospitals were identified specifically for this study using advanced applicant-identification techniques developed by the EPO.

Source: EPO analysis.

Figure 1.2

Geographical concentration of EP applications involving universities, public research organisations and research hospitals, compared with industry, 2006-2025



Source: EPO analysis

Growth has also become more geographically distributed. The share of these applications originating from the three leading countries – France, Germany and the UK – fell from 63.5% in 2006 to 54.9% in 2025 (Figure 1.2), with the shares accounted for by the top five and top ten countries also declining over the same period. This follows a similar pattern as that of companies (indicated as Industry) in the graph above although the country compositions differ. It also means that patenting and technology transfer capabilities are increasingly relevant across a broader range of European research systems.

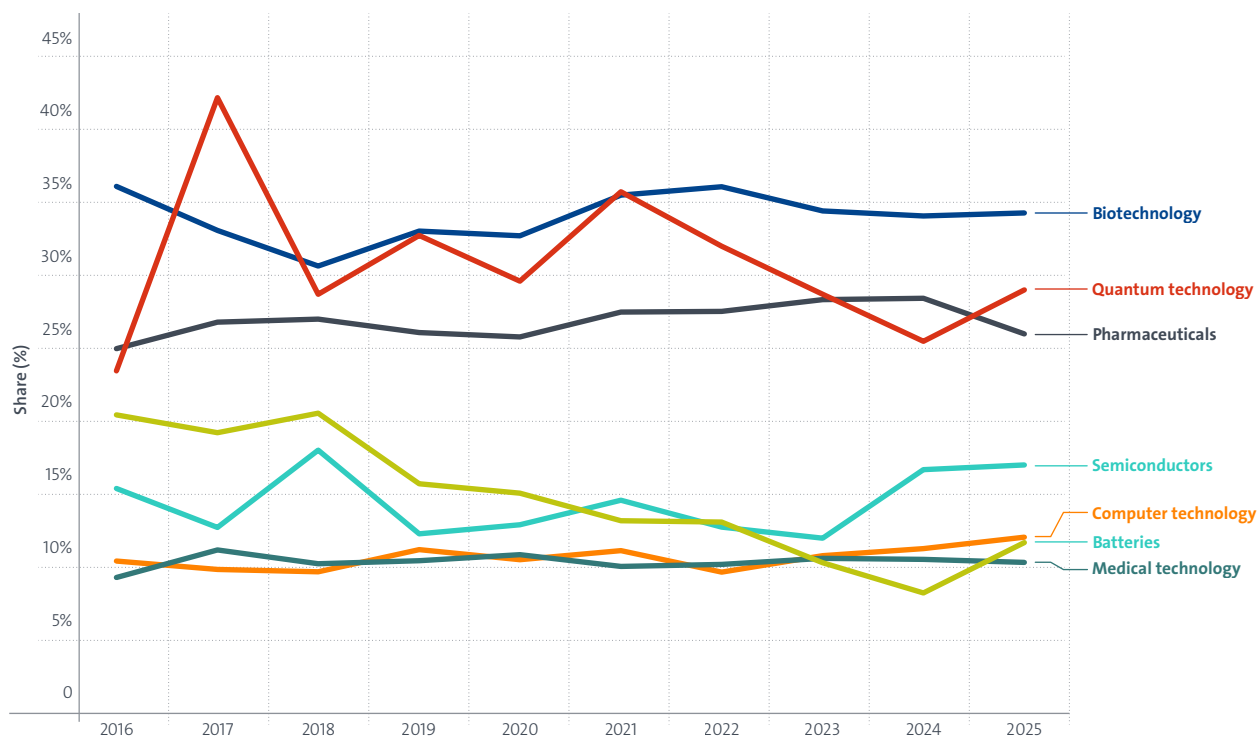
Research institutions are particularly prominent in technologies of strategic importance for Europe. In 2025, they were applicants on 34.4% of European-origin EP applications in biotechnology, 26.1% in pharmaceuticals and 29.1% in quantum technologies, and on at least 10% in each of the seven selected technology fields shown in Figure 1.3 below.

Together, these trends point to a growing and increasingly geographically dispersed portfolio of technologies being managed directly by research institutions. They provide the starting point for the study: as responsibility for these inventions has expanded, so too has the importance of the organisations, resources and capabilities needed to select, protect, develop and transfer them.

Readers can explore these trends in greater detail by country, institution and technology through the EPO Data Desk.

Figure 1.3

Share of EP applications involving universities, PROs or research hospitals in selected strategic technologies, 2016-2025



Source: EPO analysis

Box 1.1: Explore European public research in the EPO Data Desk

This study provides an overview of how universities, public research organisations and research hospitals contribute to European patenting. Want to explore the landscape in more detail? The new EPO Data Desk makes the underlying data directly accessible and interactive.

A dedicated dashboard offers a broader view of institutional participation than traditional EPO statistics. These generally attribute an application to the first applicant, meaning that universities or research organisations appearing later among several co-applicants may not be visible in institution-level statistics. The new Data Desk identifies all contributing applicants, providing a more complete picture of public research involvement in European patent applications and of the collaborations behind it.

Users can explore the data by institution type (university, PRO, and research hospital), country and region, including Europe, the United States, P.R. China, Japan, and the Republic of Korea. In the tool, you are able to:

- rank individual institutions and compare their contribution to European patent applications;
- examine full and fractional counts, including the share of an application attributable to each institution where several applicants are involved;
- see how often an institution appears as the sole applicant or first applicant,
- compare indicators such as applications per institution, average fractional contribution, number of co-applicants and average position among applicants;
- access institution-level factsheets showing an organisation's patenting activity, its most frequent partners and the combinations of institutions with which it files applications.

Explore the EPO Data Desk: datadesk.epo.org

1.2 From academic inventions to institutional responsibility

Direct institutional patenting captures only part of the contribution of public research to the patent system. Academic inventions may be patented directly by universities, PROs or research hospitals, or indirectly by companies, startups and other organisations while naming researchers affiliated with those institutions as inventors. The broader concept of academic patents used in this report captures both routes.

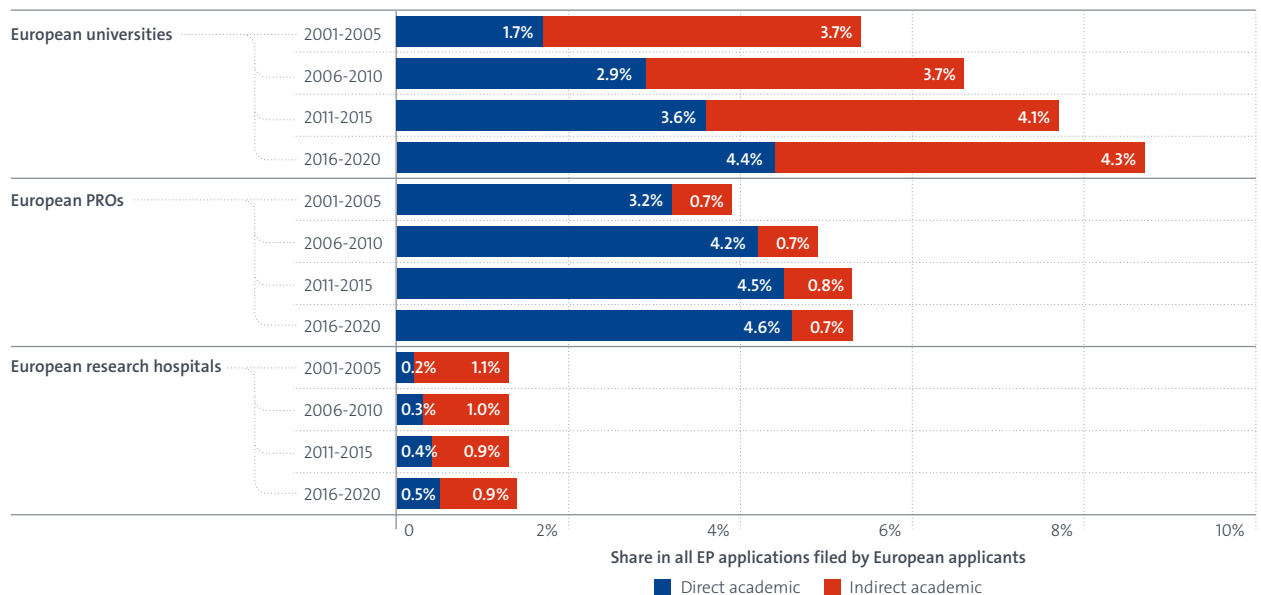
The recent indicators presented in Section 1.1 identify research institutions directly from EPO applicant records and can be updated through 2025. The broader academic patent dataset also identifies indirect academic patents by matching patent inventors with researchers and their affiliations in scientific publication data. Because these patent and publication records require additional time to become sufficiently complete and comparable, this analysis extends only to 2020.

This distinction matters because ownership determines who is responsible for many of the decisions surrounding an invention. Earlier EPO studies showed a strong shift towards direct institutional ownership of university inventions in Europe. In 2001-2005, university inventions accounted for 1.7% of European patent applications directly and 3.7% indirectly; by 2016-2020, the two shares were almost equal, at 4.4% and 4.3% respectively (Figure 1.4) (EPO, 2024). Research institutions have therefore assumed greater responsibility for deciding which inventions to protect, financing patent applications and identifying appropriate routes towards commercialisation.

This transition to more direct academic patenting has partly accompanied reforms transferring ownership of academic inventions from individual researchers to their institutions. Several European countries moved away from systems of “professor’s privilege” towards institutional IP ownership, contributing to the development and professionalisation of dedicated technology transfer structures (Martinez and Sterzi, 2023).

Figure 1.4

Trends in academic patents at the EPO by different types of European research institutions (EPO, 2025)



Source: EPO analysis of ASTP survey

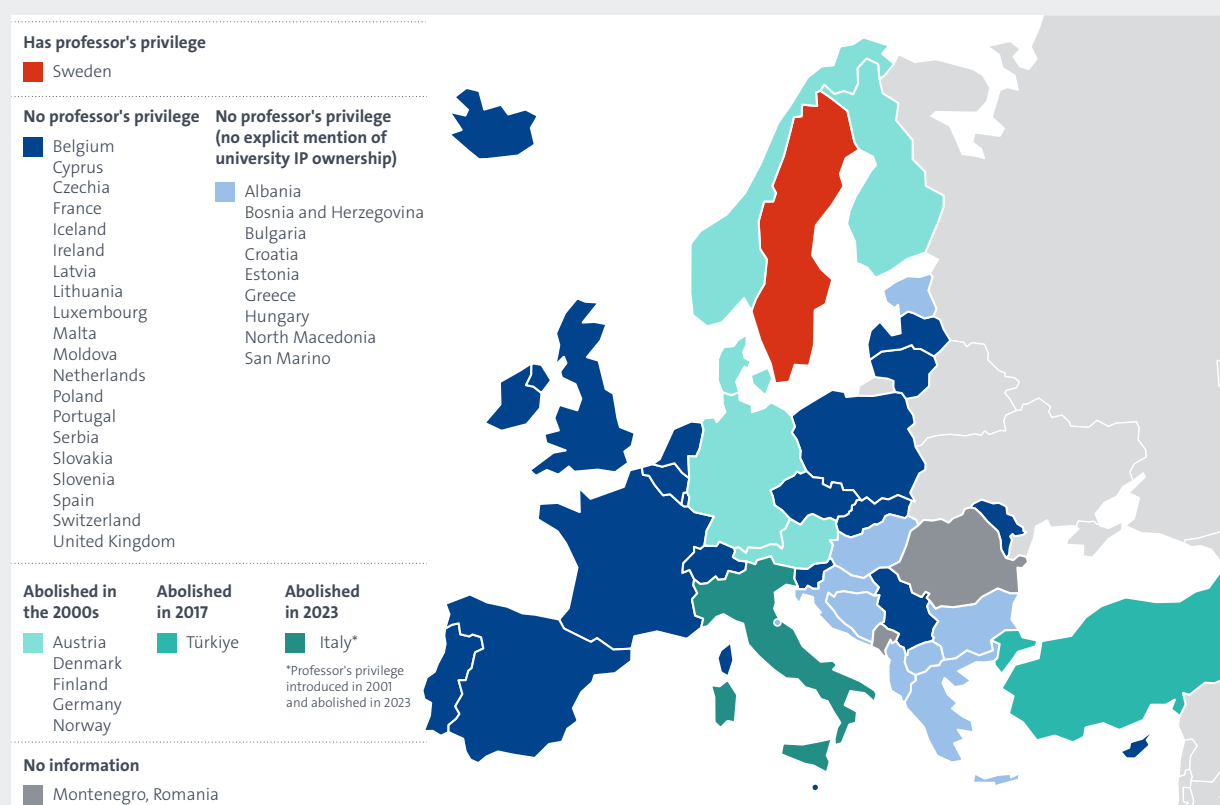
Box 1.2: Abolishment of the professor's privilege in Europe

The move towards institutional ownership began in Nordic and German-speaking countries, where professor's privilege had historically been most common. Denmark abolished it in 2000, followed by Germany, Austria, Norway and Finland between 2001 and 2007. Italy initially moved in the opposite direction by introducing professor's privilege in 2001, but abolished it in late 2023. Sweden remains the principal European country in which the model is retained.

The map below shows the timing of these reforms and the current legal position across Europe. National rules do not, however, always fully determine institutional practice. Some universities apply their own IP policies, including joint ownership or case-by-case arrangements with researchers.

Figure 1.5:

Countries in Europe according to the current national legislation on professor's privilege



Note: For Italy, professor's privilege was introduced in 2001 and then abolished in 2023.

Source: EPO.

Ownership arrangements nevertheless remain diverse across Europe. National legislation, employment rules, funding agreements and institutional policies continue to shape how rights and responsibilities are allocated. Europe can therefore be understood as a multi-level technology transfer system: patent protection has become increasingly integrated at European level, while ownership and commercialisation decisions remain largely national and institutional.

What is common across these different systems is the growing responsibility placed on research institutions themselves. They must decide whether and how inventions should be protected, how protection should be financed, whether further technical validation is needed and which commercialisation route offers the best prospects for bringing the technology into use. These are precisely the functions for which technology transfer offices provide specialised institutional capacity.

1.3 What are technology transfer offices?

TTOs provide much of the specialised capacity required to bring research-based inventions towards use and commercialisation. For the purposes of this study, a TTO is an organisational unit, separate organisation or shared service that supports one or more universities, public research organisations or research hospitals in identifying, evaluating, protecting, managing and transferring research-based inventions and other intellectual assets.

Depending on their mandate and resources, TTOs may receive and assess invention disclosures, develop IP strategies, manage IP portfolios, identify commercial partners, negotiate licences and research agreements, facilitate access to proof-of-concept or technology-maturation funding, and support the creation of spin-offs and startups. Some also work with incubators, investors and corporate partners and contribute to entrepreneurship programmes and local innovation ecosystems (European Commission, 2008; European Commission, 2023).

Technology transfer is not a single transaction or a linear handover from a research institution to a company. Research outputs may require further technical development, protection, market assessment and engagement with external partners before an appropriate transfer route can be identified. Depending on the invention, its maturity and the relevant market, this may involve licensing, collaborative research, venture creation or other forms of partnership.

To show the role of TTOs, various technology and knowledge transfer models have been developed. Figure 1.7 shows a simplified version of the model developed by Holí et al. (2008) and Finne et al. (2011). Research outputs – including technologies, processes, know-how and researcher skills – provide the inputs to knowledge and technology transfer. TTOs and research institutions assess these outputs, develop appropriate IP and commercialisation strategies and support activities such as patenting, licensing, collaborative and contract research, consultancy and spin-off creation. These activities can ultimately contribute to new products and services, companies, investment, employment and further R&D.

Within this process, TTOs act as intermediaries between research institutions and potential users of knowledge. Researchers may have limited information about markets and commercial partners, while companies and investors may find it difficult to identify relevant inventions, establish who owns them or navigate institutional procedures. TTOs can reduce these information, search and transaction costs by assessing technologies, clarifying processes and bringing researchers together with external partners.

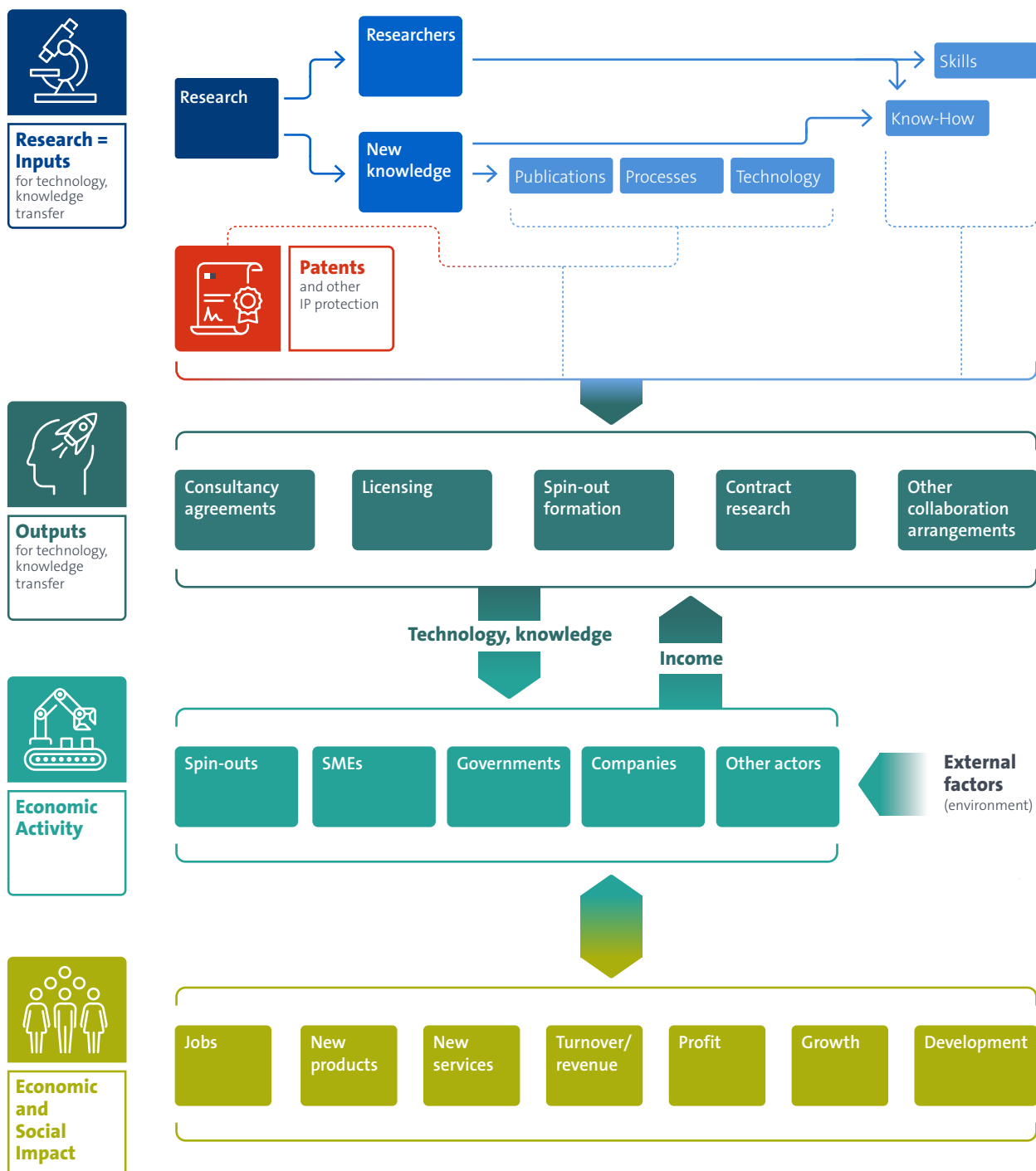
Their purpose is therefore broader than generating licensing income. Very few TTOs recover their operating and IP protection costs through such revenues, and financial returns tend to be highly concentrated in a small number of institutions and inventions (Arnold et al., 2012). Instead, the principal role of technology transfer in public research organisations is to ensure that research-generated knowledge and technologies reach the companies, entrepreneurs and other organisations able to develop and apply them. Licensing income remains a relevant outcome, but should not be treated as the primary measure of TTO performance.

The breadth of this role requires TTOs to combine very different types of expertise. As illustrated in Figure 1.7, effective technology transfer can draw simultaneously on scientific and technical understanding, IP and legal expertise, market knowledge, communication and negotiation skills, access to finance, and entrepreneurship support.

The consultations conducted for this study also underline that these capabilities need to be connected rather than treated as separate functions. TTOs must be able to mobilise the right expertise and external networks as technologies evolve, from engagement with researchers to interaction with companies, investors and entrepreneurs. This breadth of capabilities helps explain why technology transfer is a specialised and resource-intensive activity rather than primarily an administrative function.

Figure 1.6

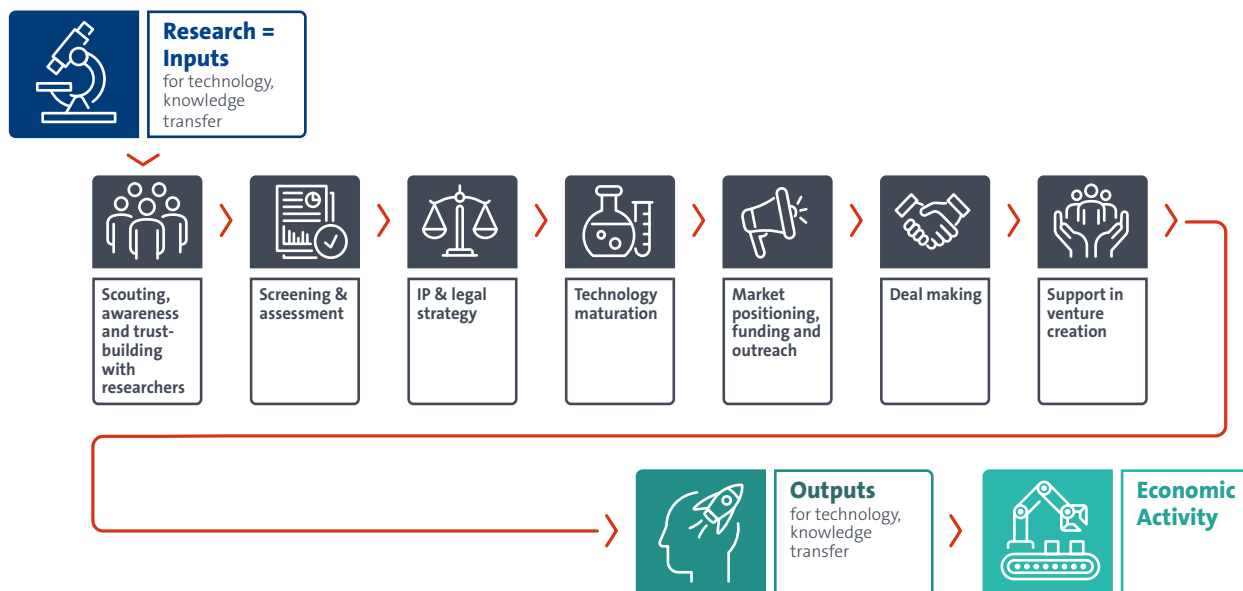
The role of knowledge and technology transfer offices



Source: EPO, simplified and adapted from Holi et al. (2008, p. 2), as cited in Finne et al. (2011, p. 10) and reproduced in ASTP (2025).

Figure 1.7

Illustration of skills and capabilities required throughout the technology transfer process



Source: EPO, based on testimonies from 22 TTOs interviewed to the study

TTOs can more broadly be understood as knowledge valorisation intermediaries. Knowledge valorisation covers the creation of economic and societal value from research, data and know-how and extends beyond patents and licensing (Council of the European Union, 2022). Institutions therefore use a range of terms, including “knowledge transfer office”, “knowledge exchange office”, “innovation office” and “knowledge valorisation unit”. This study uses technology transfer office as an umbrella term and focuses primarily on the transfer and commercialisation of technologies, reflecting the EPO’s institutional role and expertise. This does not imply that patents are the only relevant intellectual assets. Rather, they are one of the main instruments used to support commercialisation and economic and societal impact in science, technology, engineering and mathematics (STEM) fields, often alongside software licences, trade secrets, designs and trade marks. Knowledge transfer in the humanities and social sciences is also very relevant and has been a matter of development in recent years, especially in Europe, but falls outside the scope of this study.

For technologies, patent protection can clarify ownership, create transferable rights and provide the exclusivity required for licensing and further investment – but it is an enabling instrument rather than a measure of commercialisation impact. An EPO survey found that European universities and PROs had commercially exploited only 36% of the patented inventions covered, illustrating the importance of the capabilities, resources and networks required after filing (EPO, 2020).

1.4 The growing relevance of TTOs

TTOs and their mission have acquired greater urgency following the reports led by Mario Draghi and Enrico Letta. Draghi placed closing the innovation gap at the centre of Europe’s competitiveness challenge, while Letta called for a “fifth freedom” allowing research, innovation, knowledge and skills to circulate more effectively within the Single Market. The European Commission’s Competitiveness Compass has taken this agenda forward by making the innovation gap one of its central priorities (Letta, 2024; Draghi, 2024; European Commission, 2025).

Technology transfer has consequently moved from a specialised area of research administration towards the centre of the European competitiveness debate. Initiatives now under development include the

Commission's EU Blueprint for IP licensing and spin-off creation, its competence framework for knowledge valorisation intermediaries, and the Horizon Europe call "From lab to market: Strengthening the role of Technology Transfer Offices" in bringing knowledge to the market at "fair" conditions. Together, they reflect growing attention to the institutional capacity, skills, incentives and commercialisation practices required to bring publicly funded research into use (European Commission, 2026a; European Commission, 2026b; EISMEA, 2026).

The EPO is also strengthening practical support for TTOs through the PATLIB network, which brings together more than 300 patent information centres across Europe (see Artelsmair et al. 2009). PATLIB centres provide local expertise in patent information, IP strategy, valuation and commercialisation and are increasingly supporting technology transfer and knowledge exchange within the European Patent Network, through which the EPO co-operates with the national patent offices of the European Patent Organisation's 40 member states.

Existing evidence points to interconnected constraints involving TTO capacity, proof-of-concept and technology-maturation funding, researcher incentives, licensing and spin-off processes and access to companies, investors and specialist expertise. These constraints also affect how institutions use the patent system. Effective patenting requires filing decisions to be connected to technical validation, market demand, potential partners and an appropriate transfer route, rather than being assessed only through the number of applications submitted.

Although these challenges are widely recognised, the European evidence remains fragmented. Previous research has often examined particular countries, periods or dimensions of TTO performance. National surveys differ in their coverage, definitions and reporting periods, while similarly named indicators may measure different activities. The ASTP Knowledge and Technology Transfer Metrics Report confirms that many definitions are not yet sufficiently harmonised to support robust comparison across countries and over time (ASTP, 2025).

International comparison is also needed to distinguish convergence in patenting from convergence in the transfer systems behind it. The United States combines a relatively coherent federal framework with long-established TTO routines and dense regional innovation ecosystems, whereas Europe remains a multi-level system with diverse national ownership rules, institutional

practices and commercialisation infrastructures. Section 2 of this study therefore extends earlier work by the EPO Observatory on Patents and Technology on European universities and public research institutions by comparing university academic patenting in Europe with the United States and Canada. The objective is not to treat the US model as a uniform template, but to identify where patenting patterns have converged, where important differences remain and what those differences may imply for the management and longer-term use of academic inventions (Mowery and Sampat, 2005; Geuna and Rossi, 2011; Grimaldi et al., 2011).

This report seeks to fill an important part of that evidence gap by combining complementary data and expertise through the EPO Observatory on Patents and Technology. Fraunhofer ISI contributes the academic patent datasets and methodological expertise developed for the earlier EPO studies on universities, PROs and research hospitals, allowing that research agenda to be extended to an international comparison. ASTP contributes its knowledge of the European technology transfer profession and multi-year survey data on the organisation, resources and activities of TTOs. The EPO contributes its patent data, analytical capacity and experience with universities, PROs and the wider technology transfer community, including the most recent evidence on direct institutional patenting through 2025. The study builds directly on earlier Observatory work on patent commercialisation and the role of universities and public research in patenting and innovation (EPO, 2020; EPO, 2024; EPO, 2025).

Experts from national patent offices in 24 participating EPO member states have supported the study by contributing national evidence, examples of institutional and policy approaches, validation of patent data and comments on the analysis. Their participation helps ensure that the report reflects the diversity of national systems across the European Patent Organisation rather than only the most extensively documented ecosystems.

The European analysis is complemented by international comparison with China and the US. The US analysis was supported by the Association of University Technology Managers (AUTM) in North America. Consultation interviews with 22 TTOs provide further qualitative evidence on matters that cannot be fully understood through patent or survey data. They cover offices of different sizes, institutional types and geographical locations and address governance, resources, transfer

channels, technology-maturation funding, spin-off practices and international commercialisation. These interviews help explain how institutional circumstances, national rules and local ecosystems influence the choices made by TTOs in practice.

By bringing these sources together, the report provides a common evidence base for research institutions, TTO professionals and public authorities. It does not seek to prescribe a single European model for technology transfer. Rather, it examines how TTOs operate, where recurring constraints arise, and what conditions support more effective use of patents and other transfer channels. The evidence can inform discussion of institutional strategies, support instruments and possible future developments.

1.5 Structure of the study

This study continues with Section 2, which follows up on the EPO Observatory's research agenda on academic patenting by placing Europe in an international perspective, comparing it with the United States and Canada and examining direct and indirect ownership, technology fields, collaboration structures and patent maintenance.

Section 3 then turns from patents to the organisations that help manage and commercialise these inventions. It uses qualitative consultation interviews together with successive waves of the ASTP Annual Survey pooled at TTO level across more than 800 offices, to provide a broad empirical picture of the European TTO landscape.

Section 4 brings together the main challenges identified in the evidence and relevant European, national and institutional responses, while Section 5 then presents the study's conclusions and six takeaways.

2. Academic patenting in an international comparison

Building on the recent direct-applicant picture presented in the introduction, this section turns to the broader concept of academic patents. The analysis combines the EPO's Worldwide Statistical Patent Database PATSTAT with the Elsevier Scopus database to identify both direct university filings and indirect filings involving university-affiliated inventors at the EPO. Because the indirect component relies on inventor-publication matching and affiliation data that require time to become sufficiently complete, the international comparison ends in 2020. This section therefore continues the research agenda developed in the EPO Observatory's 2024 study on European universities and its 2025 study on public research organisations and research hospitals, while adding a comparison with the United States and Canada.

This development logically raises a natural question: how does Europe compare with other mature research systems? The United States provides an important reference because university technology transfer there has operated for several decades within a comparatively established legal and organisational framework. Since the Bayh-Dole Act of 1980, universities have generally been able to retain ownership of inventions resulting from federally funded research, accompanied by professional TTOs and established procedures for invention disclosure, patenting and licensing (Mowery and Sampat, 2005; Grimaldi et al., 2011). The scale of this infrastructure is also considerable. AUTM, the main North American association of university technology transfer professionals, reported more than USD 109 billion in research funding among institutions participating in its survey for fiscal year 2024, together with growing invention disclosures and startup activity (AUTM, 2025). In leading regions, this institutional capacity is reinforced by dense networks of investors, entrepreneurs, specialised services and technology companies that support commercialisation beyond the university itself (Shapira and Youtie, 2010; Frietsch et al., 2021). However, these favourable conditions are not uniform across the country, and universities outside major innovation clusters can face greater difficulties in accessing finance, entrepreneurial talent and markets.

Canada offers a different comparison. It combines a strong academic research base with a more decentralised approach to intellectual property ownership. Unlike the United States, there is no single national model comparable to Bayh-Dole: depending on the university, inventions may be owned by the researcher, the institution or through shared arrangements. Canada therefore provides a useful example of a system in which indirect academic patenting continues to play an important role. Despite its smaller scale, academic inventions are particularly prominent in Canadian patenting: in 2020, academic patents represented around 17% of Canadian patent applications at the EPO, although the share filed directly by universities remained below that of both the United States and Europe.

The comparison establishes the patent-side evidence for the sections that follow. It asks whether the growing institutionalisation of academic patenting in Europe is also visible when Europe is compared with the United States and Canada, and whether similar levels of direct university patenting are accompanied by similar patterns of ownership, technology specialisation and longer-term portfolio management. This matters because greater direct ownership also places greater responsibility on research institutions to select, protect, manage and commercialise academic inventions.

The purpose is therefore not to treat the United States as a model against which Europe should simply be ranked. Europe, the United States and Canada combine different ownership rules, organisational structures and innovation ecosystems, and these differences influence how academic inventions enter and remain in the patent system (Mowery and Sampat, 2005; Geuna and Rossi, 2011; Perkmann et al., 2013; Martinez and Sterzi, 2019). Comparing direct and indirect academic patents makes it possible to distinguish the underlying production of academic inventions from the institutional choice of who protects and manages them. The results therefore provide a starting point for the study's central institutional question: as European research institutions take greater responsibility for their inventions, has the capacity to manage and commercialise those inventions also grown in parallel?

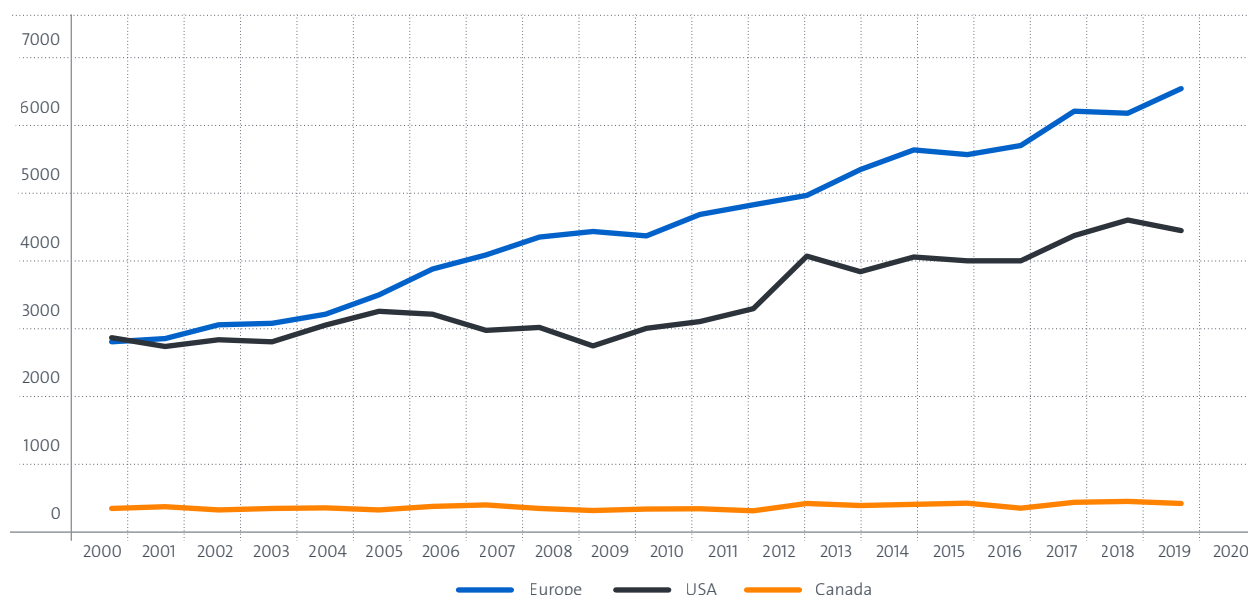
The international comparison is deliberately limited to universities and to the period up to 2020. Previous EPO studies showed that universities were the research institutions driving the strongest shift towards direct academic patenting in Europe, making them the most relevant group for examining whether increasing institutional ownership and TTO involvement are converging towards North American patterns (EPO, 2024; EPO, 2025). Extending the same methodology to PROs and research hospitals in the United States and Canada would raise significant comparability problems, since such organisations are structured, classified and linked to universities differently across the three systems and cannot be identified as consistently as universities. While the 2020 cut-off ensures a sufficiently complete and comparable patent and publication record for the matching methodology used to identify both direct and indirect academic patents; the analysis nevertheless draws on the latest available edition of EPO PATSTAT.

2.1 Trends in academic patenting

The number of academic patents at the EPO, expanded substantially between 2000 and 2020. Across Europe², the United States and Canada, the annual number of academic patents at the EPO almost doubled, from about 6 000 to more than 11 000. The strongest growth came from Europe: academic patents increased from approximately 2 800 to 6 500, while the United States started at a similar level but grew more slowly. Canada remained much smaller in absolute terms, but academic patents represented 17% of all Canadian filings at the EPO in 2020, compared with around 10% in the United States and slightly lower shares in Europe.

Figure 2.1

Academic patenting at the EPO from European, US and Canadian universities, 2000-2020



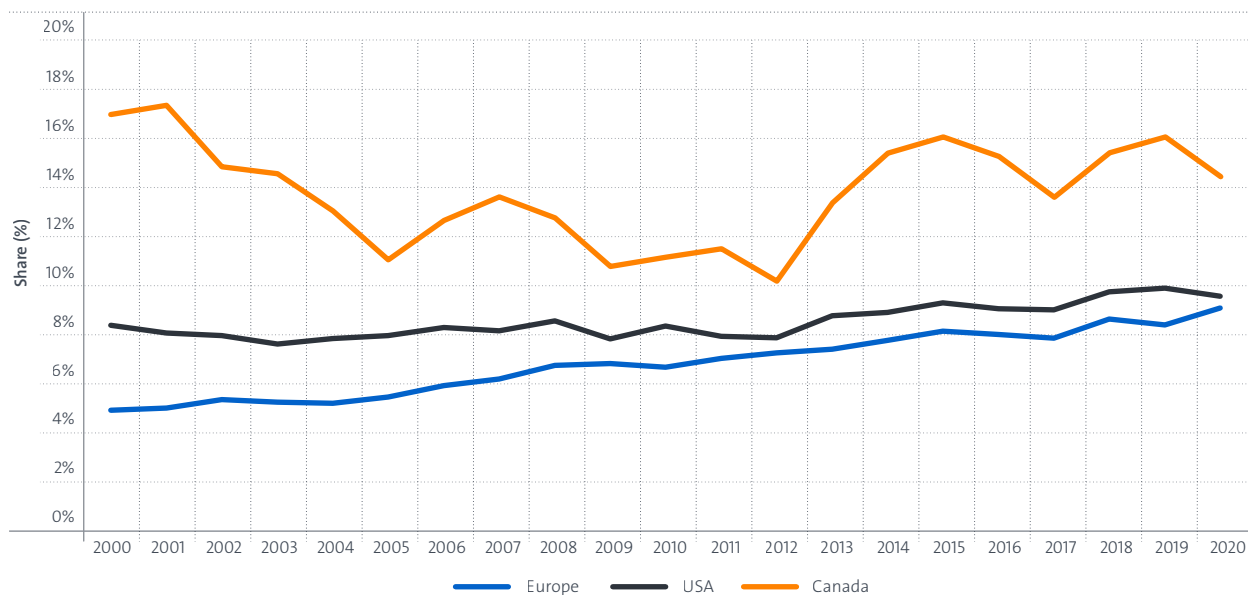
Note: Academic patents include both direct university filings and indirect filings at the EPO involving university-affiliated inventors.

Source: EPO – PATSTAT; Elsevier Scopus.

² In this study, “Europe” refers to the 40 countries member of the European Patent Organisation: Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Monaco, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye, and the United Kingdom.

Figure 2.2

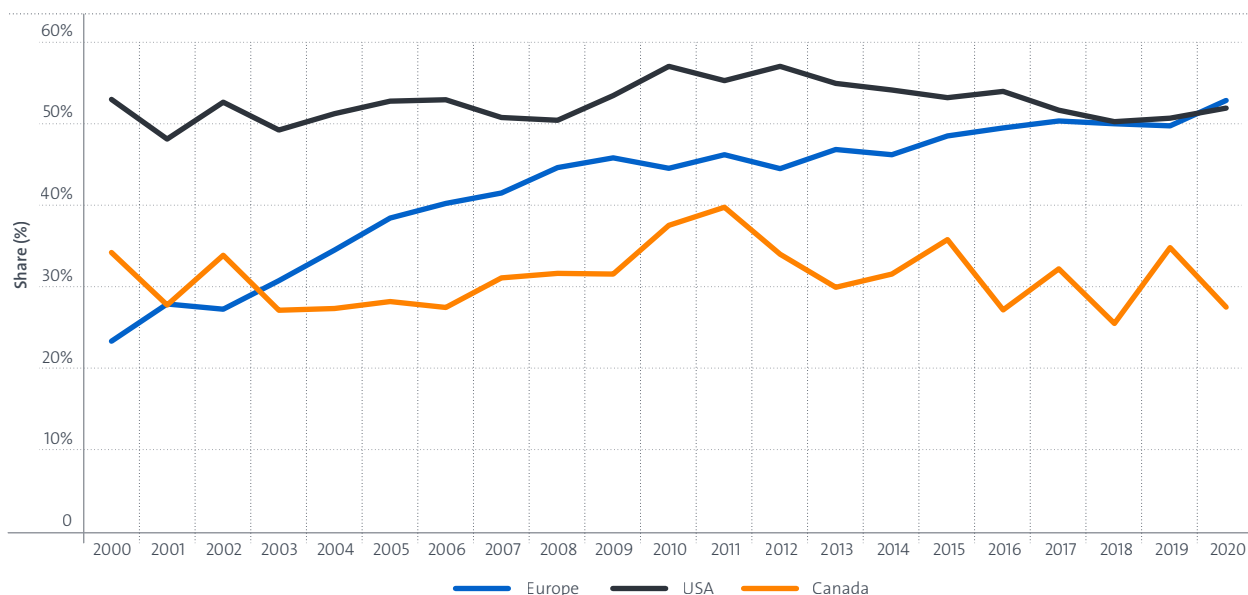
Share of academic patenting (direct and indirect) among EP applications from European, US and Canadian applicants, 2000-2020



Source: EPO – PATSTAT; Elsevier Scopus.

Figure 2.3

Direct university filings at the EPO as a share of all academic patent applications by applicant country of origin, 2000-2020



Source: EPO – PATSTAT; Elsevier Scopus.

The most striking change concerns who files these patents. In 2000, universities were named as applicants on 23% of academic patents from Europe, compared with 53% from the United States. By 2020, the European share had risen also to 53%, while the US share remained broadly stable at around 50% to 55%. Europe has therefore converged with the United States not only in the scale of academic patenting but also in the direct institutional ownership of academic inventions as measured by their patenting activity at the EPO. Canada follows a different pattern: university IP policies remain institution-specific and indirect filings continue to play a larger role.

This convergence is consistent with the expansion and professionalisation of European TTOs and with reforms that assigned universities greater responsibility for academic IP. It does not, however, demonstrate that the underlying transfer systems have become equivalent. Substantial indirect filing remains in every region, even the US, reflecting company-funded research, collaboration with firms and PROs, researcher entrepreneurship and other routes through which external organisations acquire or share rights to academic inventions.

2.2 National and technological diversity

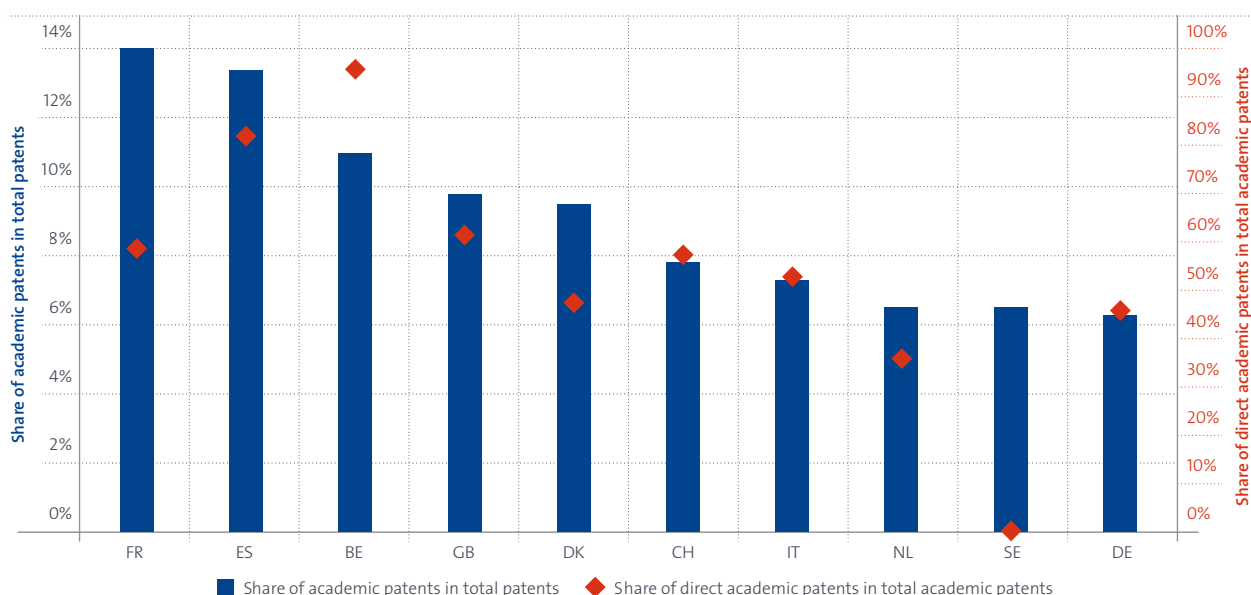
European convergence at aggregate level conceals major national differences. Among the ten European countries with the largest numbers of academic patents in 2020, France and Spain had the highest shares of EPO filings based on academic inventions, at around 14% and 13% respectively, compared with approximately 6% in Germany, Sweden and the Netherlands.

The share filed directly by universities ranged from 95% in Belgium and 81% in Spain to 35% in the Netherlands and zero in Sweden, where professor's privilege remains in place. France, the United Kingdom, Switzerland and Italy occupied intermediate positions. These patterns show that a similar academic contribution can coexist with very different ownership and transfer arrangements.

The European aggregate hides substantial national heterogeneity. At the aggregate level, European direct filing shares had converged towards the U.S. level by 2020. At the country level, however, this convergence is driven by a mix of very different national models. Belgium and Spain show direct filing shares far above the US and Canadian levels discussed above, suggesting highly university-centred patenting models in which

Figure 2.4

Academic patenting and direct filing shares in selected European countries, 2020 Academic patenting and direct filing shares at the EPO in selected European applicant countries, 2020



Note: The figure shows the ten European countries with the largest number of academic patent filings in 2020..

Source: EPO – PATSTAT; Elsevier Scopus.

academic inventions are predominantly channelled through university applicants. France and the United Kingdom also lie above or close to the US level of direct filings and thus contribute to the broader European shift towards institutional ownership and professionalised university technology transfer. Italy's direct filing share of 52% is particularly noteworthy because Italy reinstated the professor's privilege in 2017, which might reflect institutional routines and TTO capacities that had already developed before the legal change. The implications of this change back to the professor's privilege still needs to take effect in the statistics and might be seen more clearly in later years. Germany and Denmark, by contrast, remain below the aggregate US level despite having abolished the professor's privilege in the early 2000s. In both countries, indirect academic patents continue to play an important role, which might be explained by consistently strong university-industry collaboration and contract research channels as well as a strong integration of the university and non-university

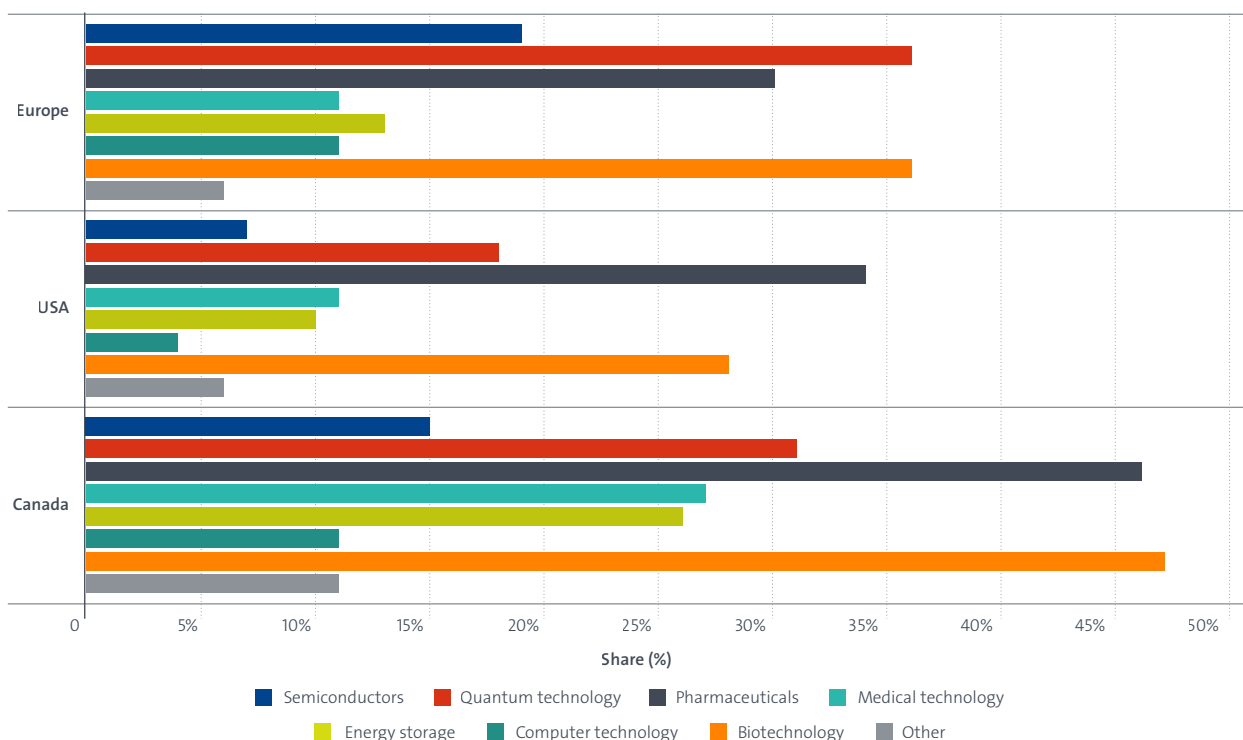
research systems as many academic patents are filed or co-filed not only by companies, but by non-university research organisations in these countries.

Sweden provides the clearest institutional contrast. Its 0% direct filing share is consistent with the continued existence of the professor's privilege, under which academic inventors rather than universities retain ownership rights. Compared with Canada, which also shows a comparatively high share of indirect filings, Sweden demonstrates an even more pronounced reliance on indirect academic patenting.

Beyond country-level trends, the differences in academic patenting by technology field can also be observed. For technology fields, a selection of strategic technologies was used, identifying IPC classifications and other technology patent classifications made by the EPO, on quantum technologies and batteries. Figure 2.5 presents the field-specific share of academic patents among in total patents.

Figure 2.5

Share of academic patenting at the EPO from universities by technology field and applicant origin, 2011-2020



Note: The technology fields biotechnology, pharmaceuticals, medical technology, computer technology and semiconductors follow the WIPO technology classification, while quantum technologies and energy storage follow EPO technology cartographies (see EPO 2025; EPO 2026).

Source: EPO – PATSTAT; Elsevier Scopus.

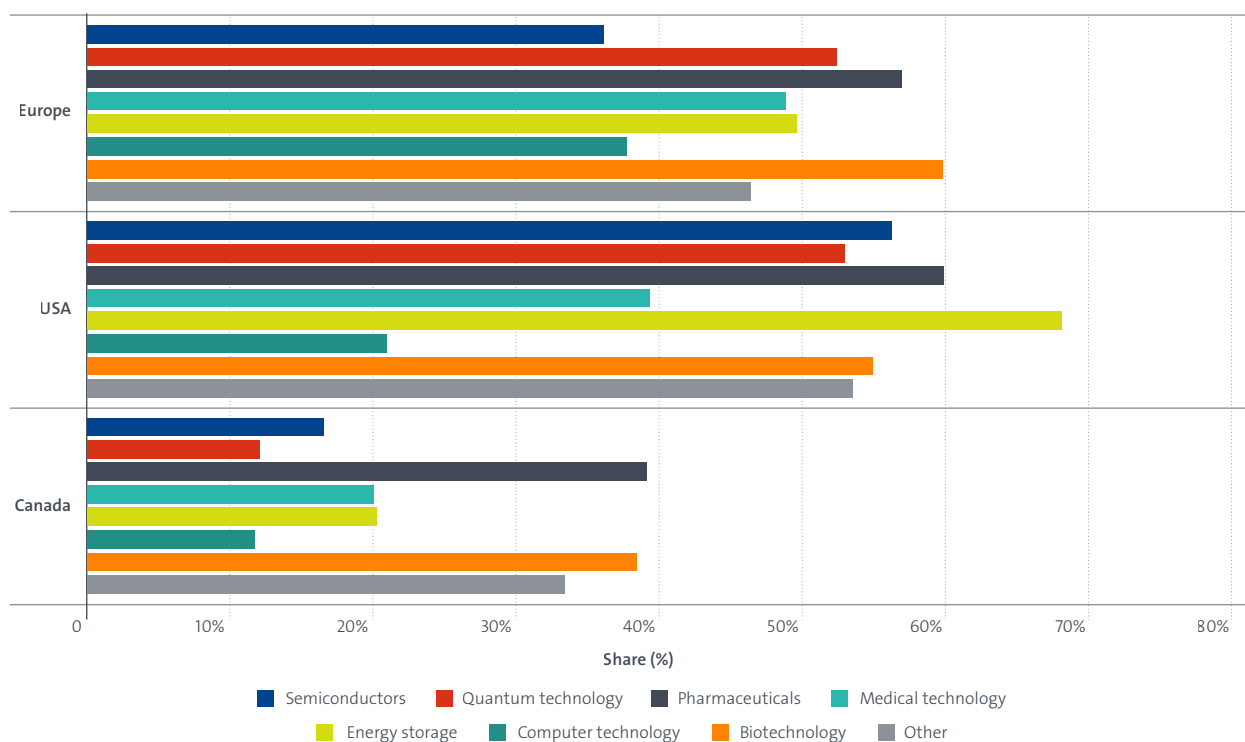
Biotechnology and pharmaceuticals stand out as the fields with the highest academic contribution from universities across all countries. Canada shows particularly high shares in these two areas, with 47% in biotechnology and 46% in pharmaceuticals, while the European values are also high at around 30%. The United States reaches 28% in biotechnology and 34% in pharmaceuticals. Quantum technologies is another field with a strong academic component, especially in Europe, where academic patents account for 36% of European filings, compared with 18% in the United States and 31% in Canada. However, we have to bear in mind that quantum computing is a rather small field in terms of absolute patent filings at the EPO, so the results here should not be overstated. Batteries and medical technology show intermediate academic shares, with Canada again well above the other regions at 26% and 27%, respectively, which is also a result of the overall high shares of academic patents in Canada. Computer technology and the residual category “Other” display the lowest academic patent shares

overall. In computer technology, the academic share is 4% in the United States, while Europe's reaches 11%. Semiconductors occupy an intermediate position, with academic shares of 19% in Europe, 15% in Canada and 7% in the United States.

In Figure 2.6 below, the perspective regarding the commercialisation model is added by calculating the share of direct academic filings among all academic patents from universities by technology field. Direct filing shares are also highest in biotechnology and pharmaceuticals. In these fields, European direct shares are close to the overall level and to the US level, while Canada is much lower at 39%. Batteries and quantum technologies also show relatively high direct filing shares overall. In batteries, the United States reaches values clearly above those of Europe. Medical technology and semiconductors show lower overall direct shares, while computer technology is the field with the largest share of indirect filings, i.e. this seems to be the field where university research is mostly externally contracted by

Figure 2.6

Share of direct academic patenting in total academic patents by technology field, 2011-2020



Note: The technology fields biotechnology, pharmaceuticals, medical technology, computer technology and semiconductors follow the WIPO technology classification, while quantum technologies and energy storage follow EPO technology cartographies (see EPO 2025; EPO 2026).

Source: EPO – PATSTAT; Elsevier Scopus.

companies, or, to a smaller extent, by PROs. A similar but less pronounced trend can also be found in medical technology and semiconductors.

The convergence of European academic patenting with the US model is not uniform across technologies. It is strongest in fields where universities traditionally play a central role in invention generation and where patenting is closely linked to research-based commercialisation (e.g. biotechnology and pharmaceuticals). In these fields, academic patents represent a very large share of total patenting, and direct university filing shares are relatively high in Europe and close to US levels. In addition, the figures show that the preferred commercialisation model, i.e. direct vs. indirect, is shaped by field-specific characteristics. Computer technology, semiconductors and parts of medical technology have much higher indirect filing shares, indicating that academic inventions in these fields are more often patented through firms or other non-university applicants, suggesting a more integrated or cooperative transfer activity system. In the traditionally “more academic” disciplines, a licensing-centred system seems to be the dominant approach of technology transfer.

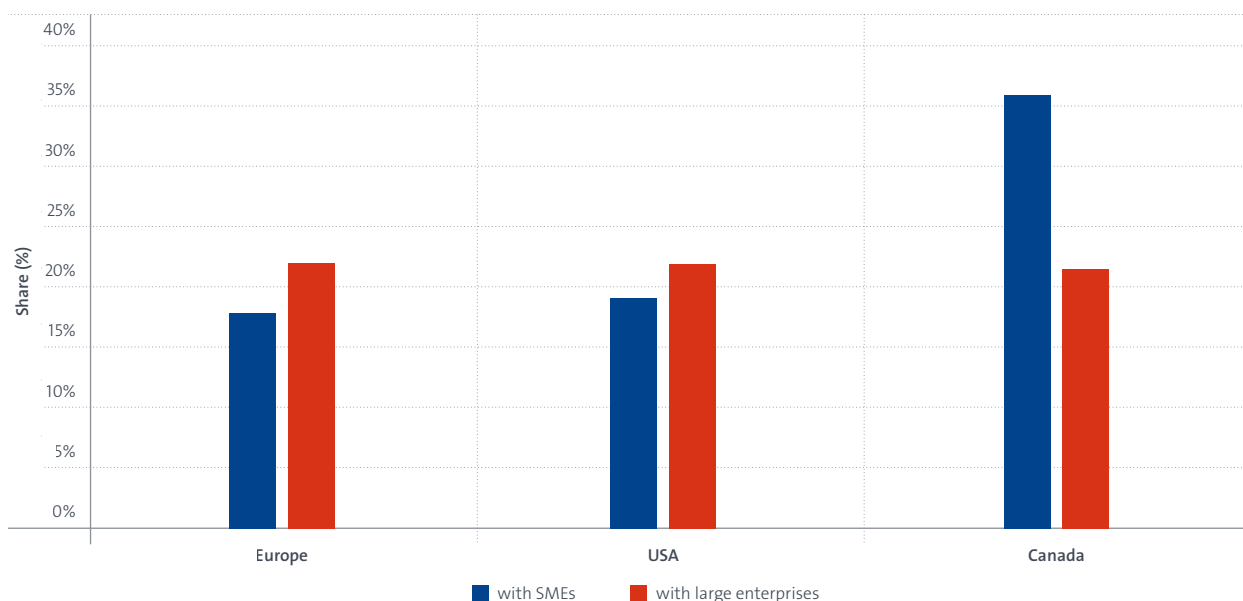
2.3 University-industry collaboration and commercialisation

This section shifts the focus from the volume and channels of academic patenting to ownership, collaboration structures and longer-term portfolio outcomes. As shown in Section 2.2 above, indirect filings remain an important part of academic patenting even where direct university filing has increased strongly. It is therefore relevant to ask who appears as the applicant when academic patents are not filed directly by universities.

Among indirect academic patents in the period 2011-2020, the types of applicants are surprisingly similar in Europe and the United States. In Europe SMEs are involved in 18% and large enterprises in 22% of indirect filings. The United States shows a very similar pattern with 20% and 22%, respectively. In the period 2001-2020, European academic patents showed higher company involvement, with an SME share of 23% and a large enterprise share of 28%. This stresses again the convergence with the US. For the period 2011-2020, Canada now differs more clearly: SMEs are involved in 39% of indirect academic patents, while the share involving large enterprises, at 22%, remains close to the

Figure 2.7

Share of academic patents at the EPO co-filed with SMEs and large enterprises, 2011-2020

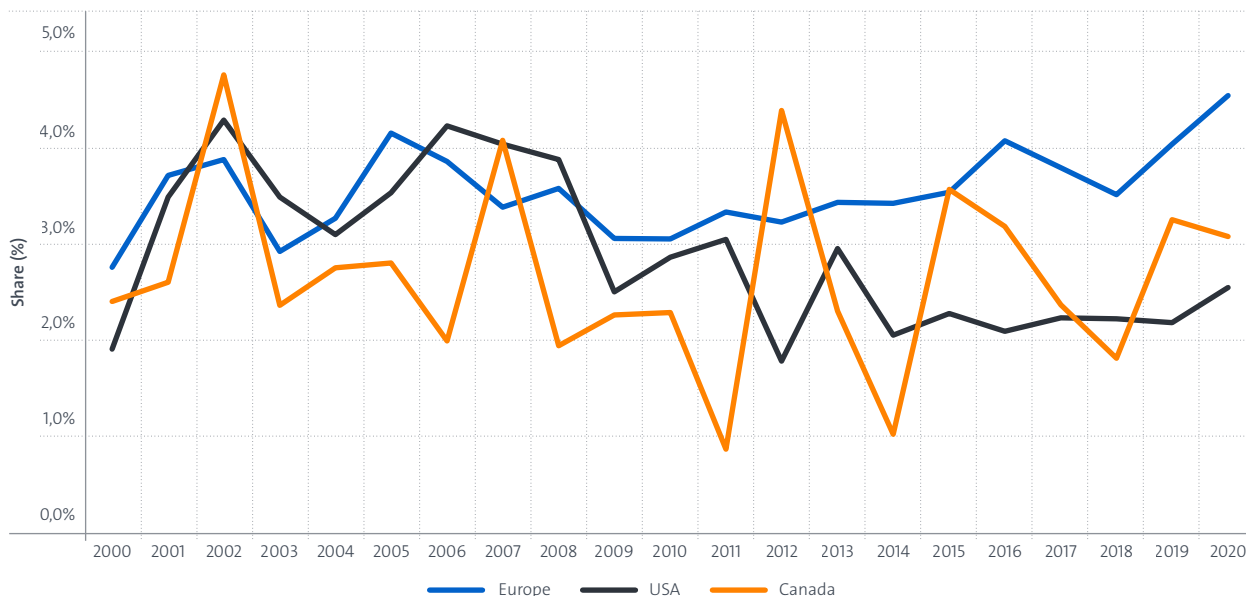


Note: Company applicant shares refer to indirect academic patents. Inventor affiliations are counted only when the company affiliation is reported in the patent filing year.

Source: EPO – PATSTAT; Elsevier Scopus.

Figure 2.8

Share of academic inventors with a company affiliation among all academic inventors



Note: Company applicant shares refer to indirect academic patents. Inventor affiliations are counted only when the company affiliation is reported in the patent filing year.

Source: EPO – PATSTAT; Elsevier Scopus.

other regions. This may partly reflect the importance of smaller companies and academic spin-offs in taking forward Canadian university inventions.

These results also show that indirect academic patenting is not simply a European phenomenon. Even in the United States, with its longer-established system of university ownership and technology transfer, companies remain important applicants for inventions involving university researchers. Direct university ownership and company-led exploitation therefore co-exist as different routes through which academic inventions reach the market.

In Figure 2.8 we now take a complementary perspective by examining whether academic inventors have an additional affiliation with a company besides their university affiliation, i.e. the indicator captures formal dual affiliation between university and industry. All in all, this is not a very common phenomenon. Across Europe, US and Canada combined, the share rose from 2.4% in 2000 to 3.5% in 2020, indicating a slightly increased integration of the industrial and academic systems. This trend was largely driven by European inventors. In Europe since around 2010, there has been a greater tendency for academic inventors to also have an affiliation with a

company. At the same time, the share of such affiliations declined for US inventors (4.6% in 2020 for Europe and 2.6% for the US).

The higher European share points to a greater formal overlap between university and industry roles, consistent with the continued importance of company-owned academic inventions in Europe. The lower US share should not, however, be interpreted as weaker university-industry collaboration. It may instead reflect more established institutional channels through which inventions can be disclosed, protected, licensed and transferred without researchers themselves needing a formal company affiliation. More mature TTO structures and standardised licensing routines can make the university, rather than the individual researcher, the main interface with industry. Europe's higher rate of dual affiliation may therefore reflect both close personal links between academia and industry and a more heterogeneous set of arrangements through which academic inventions are transferred.

From a TTO perspective, these findings add an important qualification to the convergence observed earlier in this section. European universities have moved much closer to the United States in the share of academic patents

they file directly, but greater institutional ownership does not in itself imply stronger commercialisation. TTOs must also connect institutionally owned technologies with companies, investors and entrepreneurs, while supporting collaborative routes in which the final patent owner may be a company or another organisation. The results therefore point to the importance of the quality and organisation of university-industry links, not simply to who appears as applicant on the patent.

The next question is whether these different arrangements are associated with differences in what happens to patents over the longer term. Patent data does not normally reveal whether an invention has been licensed, incorporated into a product or has generated commercial revenues. One way to obtain an indirect indication is to examine patent maintenance. Keeping a patent in force requires its owner to continue paying renewal fees. As information about an invention's technical and commercial prospects accumulates, owners have an incentive to let patents lapse when the expected value of continued protection no longer justifies these costs. Renewal and maintenance decisions have therefore long been used in economic research as an indicator of the private value attached to patent rights (Pakes, 1986; Schankerman and Pakes, 1986; Lanjouw et al., 1998).

Maintenance is not a direct measure of commercialisation: a patent may be kept in force for strategic, defensive or future-option reasons even if it generates no sales or licensing income. Nevertheless, long-term maintenance provides information that is otherwise difficult to observe in patent data. When an owner continues to incur renewal costs many years after filing, this indicates that the patent is considered to retain sufficient expected value to justify continued protection. Maintenance can therefore serve as a complementary – though imperfect – indicator of the longer-term commercial prospects of academic inventions.

This interpretation is broadly consistent with the EPO's 2020 survey of European universities and public research organisations (EPO, 2020). The survey found that 36% of inventions for which these institutions had filed an EP application were already commercially exploited, while a further 42% had planned commercial exploitation, and, 21% had no such plans. The 36% already exploited is close to the average 15-year maintenance rate for European direct academic patents in the present analysis (35%). Moreover, the combined proportion of inventions already exploited or with exploitation

planned (78%) is higher than the average 10-year maintenance rate for direct academic patents (59%). These figures are not directly comparable – the survey measures reported commercialisation status, whereas the maintenance analysis measures whether patents remain legally in force – but their broadly similar magnitude supports using long-term maintenance as one complementary signal of the sustained relevance and potential commercial value of academic patent portfolios.

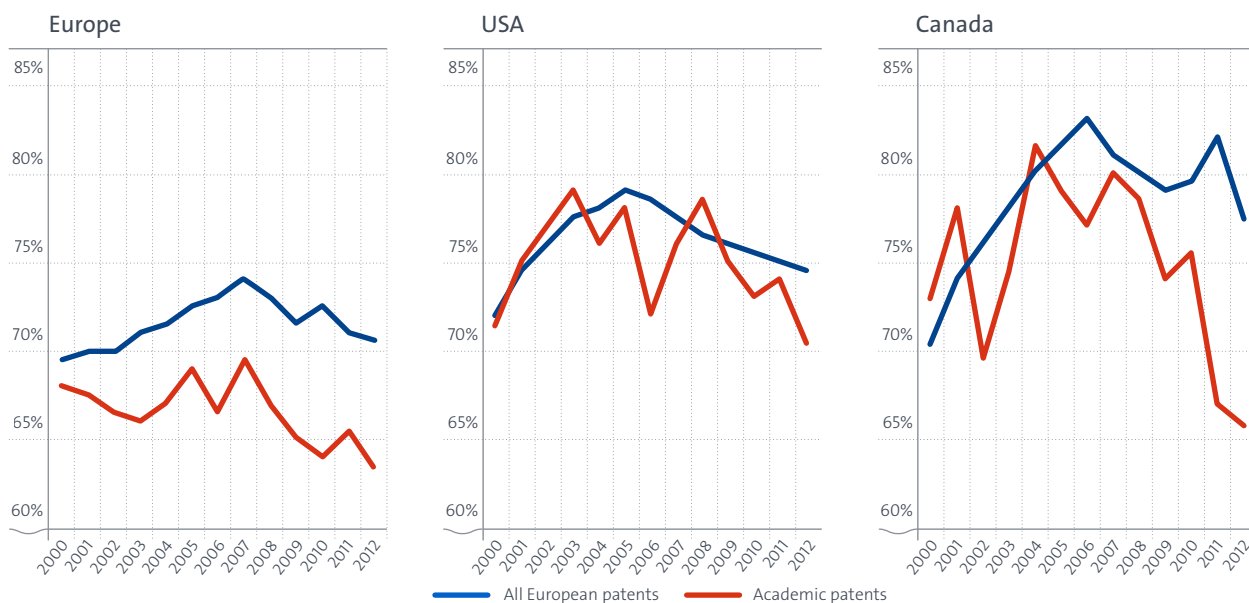
The analysis considers granted European patents with applicants from Europe, the United States and Canada. It compares the share of patents maintained for at least ten years for the 2000-2012 grant cohorts and for at least 15 years for the 2000-2007 cohorts. The comparison distinguishes between all patents, academic patents, indirect academic patents and direct academic patents.

The first finding is that academic patents are maintained less frequently than the average patent for European applicants. For the 2000-2012 cohorts, on average over the cohort years, 66.6% of European academic patents were maintained for at least ten years, compared with 71.8% of all European patents – a difference of 5.2 percentage points. This difference is substantially more pronounced in Europe than in the United States, where academic patents were maintained at a rate of 75.1%, compared with 76.4% for all US patents, a difference of only 1.3 points.

The longer-term comparison leads to the same conclusion: for the 2000-2007 cohorts, 41.9% of European academic patents were maintained for at least 15 years, compared with 45.4% of all European patents. In the United States, the respective rates were 51.2% and 51.6%. Hence, academic maintenance rate, calculated as the average over the cohort years, was almost identical to that of the overall US portfolio.

Figure 2.9

Ten-year maintenance rates for all and academic patents granted by the EPO, by applicant origin and priority year

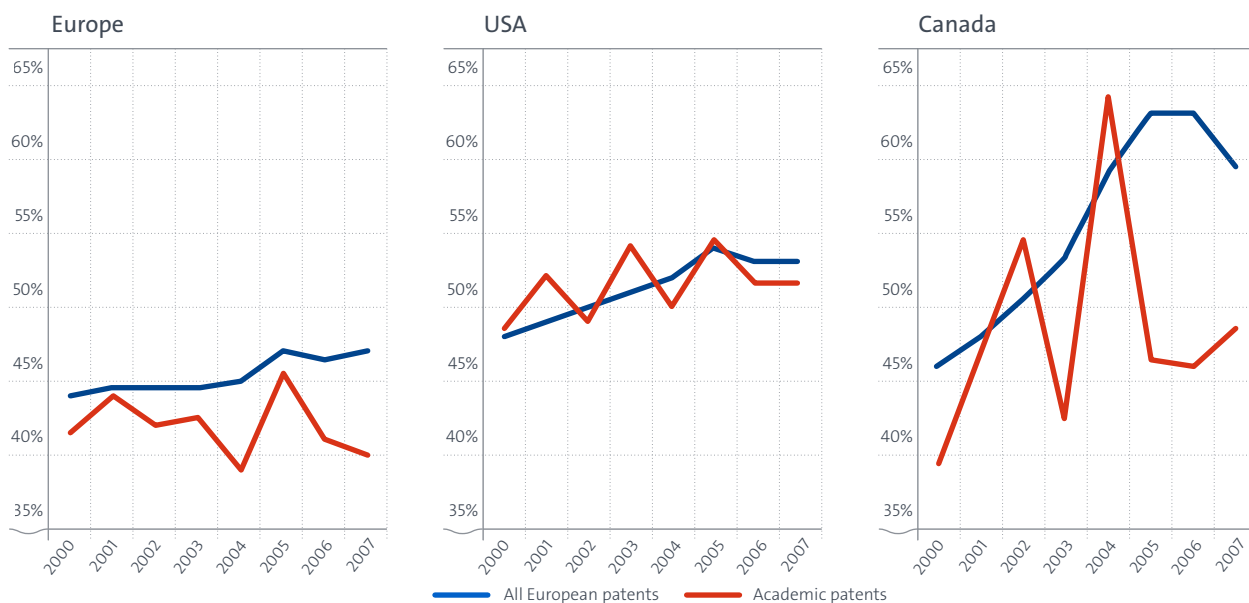


Note: Company applicant shares refer to indirect academic patents. Inventor affiliations are counted only when the company affiliation is reported in the patent filing year.

Source: EPO – PATSTAT; Elsevier Scopus.

Figure 2.10

15-year maintenance rates for all and academic patents granted by the EPO, by applicant origin and priority year



Note: Company applicant shares refer to indirect academic patents. Inventor affiliations are counted only when the company affiliation is reported in the patent filing year.

Source: EPO – PATSTAT; Elsevier Scopus.

The cohort patterns provide additional context. US academic maintenance rates remained above 70% in every observed 10-year cohort, ranging from 72% to 80%. European academic maintenance rates were lower in every cohort, ranging from 63% to 69%, and fell from 68% for the 2000 cohort to 63% for the 2012 cohort. This should be interpreted as a broad downward tendency rather than as a monotonic decline: cohort rates fluctuate, and changes may reflect technology mix, portfolio composition and differences in observable patent age as well as changes in expected commercial value.

Canada is generally positioned between Europe and the United States for academic maintenance, although its cohort series is more variable. This is consistent with a smaller and potentially more composition-sensitive portfolio, so Canada is best used as contextual evidence rather than as the central benchmark.

The difference between Europe and the United States is also greater for academic patents than for all patents. At ten years, US academic patents exceeded European academic patents on average by 8.5 percentage points, compared with a 4.6-point difference for all patents. At 15 years, the corresponding differences were 9.3 points for academic patents and 6.2 points for all patents. This indicates that academic patents occupy a relatively weaker position within the European patent portfolio than they do in the US portfolio.

The second key finding is that the Europe-US difference is especially pronounced for direct academic patents. This category is most relevant to university-led technology transfer because the university is itself an applicant and therefore likely to play a central role in decisions to retain, license, abandon or otherwise exploit the patent right.

For the 2000-2012 cohorts, 59.3% of European direct academic patents were maintained for at least ten years. This compares with 67.8% of European indirect academic patents and 71.8% of all European patents. The difference between direct and indirect academic patents was therefore 8.5 percentage points. In the United States, by contrast, 73.7% of direct academic patents and 75.2% of indirect academic patents were maintained for ten years – a gap of only 1.5 percentage points – while the all-patent rate was 76.4%.

At 15 years, the same contrast persists. The European direct academic maintenance rate was 34.6%, compared with 43.2% for indirect academic patents and 45.4% for all European patents. The direct-indirect difference was 8.6 percentage points. In the United States, 48.8% of direct academic patents and 51.8% of indirect academic patents remained in force, a difference of 3.0 percentage points – while the overall US rate was 51.6%.

Figure 2.11

Ten-year maintenance rates for direct and indirect academic patents granted by the EPO, by applicant origin (priority years 2000-2012)

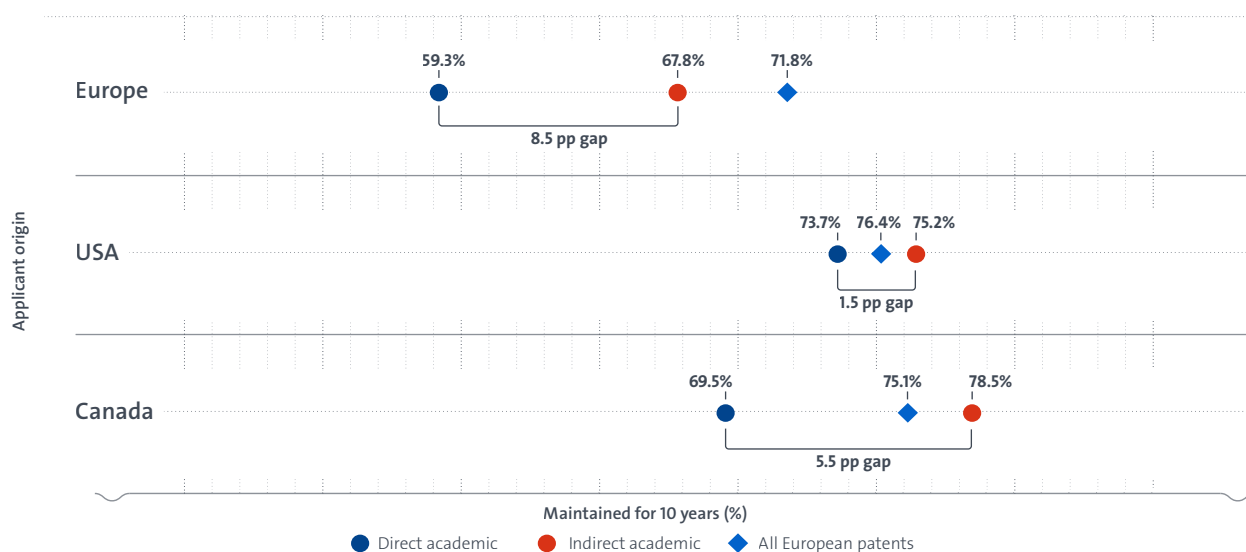
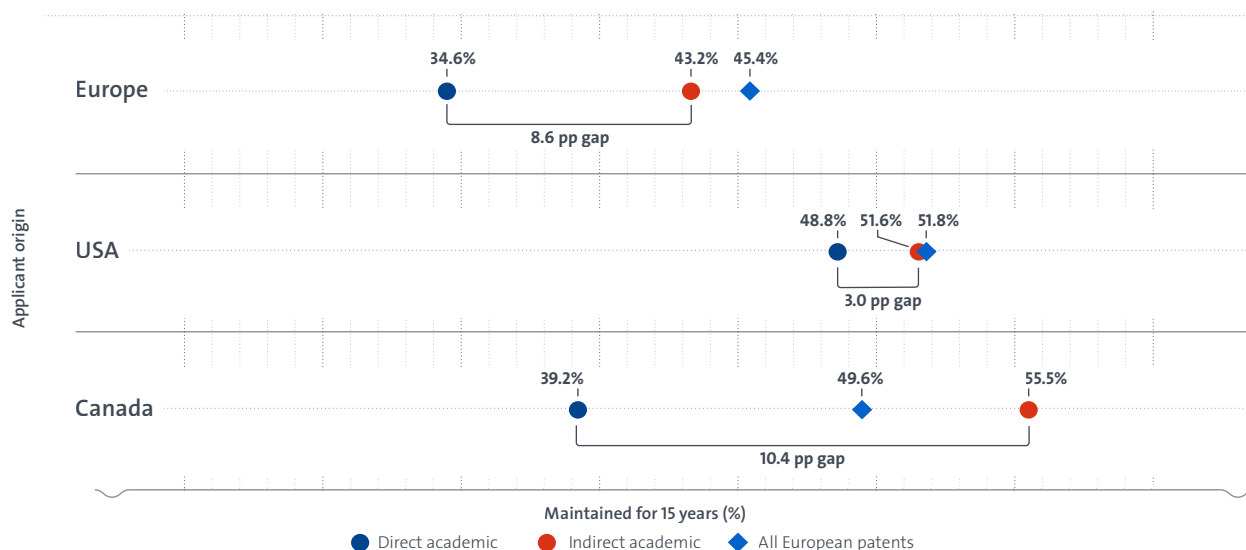


Figure 2.12

15-year maintenance rates for direct and indirect academic patents granted by the EPO, by applicant origin (priority years 2000-2007).



Source: EPO — PATSTAT, Elsevier scopus

US direct academic patents thus exceeded European direct academic patents by 14.4 percentage points at ten years and 14.2 points at 15 years. The difference is substantially larger than the all-patent Europe-US gap at either horizon. It is also larger than the corresponding Europe-US difference for indirect academic patents. The descriptive evidence is therefore consistent with a particularly weak long-term maintenance position for directly university-owned European patent portfolios.

The annual cohort data further show that this pattern is not driven by a single year. The gap is larger than the corresponding US-Europe difference for all patents in every reported cohort. This supports the conclusion that the direct-academic difference is broader than a general difference between the US and Europe patent populations.

To account for observable differences in patent composition, we also estimated logistic-regression models for 10- and 15-year maintenance. The models control for technology field and priority-year effects, and compare European applicants with a pooled US/Canadian reference group, separately for non-academic, indirect academic and direct academic patents.

The regression analysis confirms that the observed Europe gap, and particularly the direct-academic gap, cannot be attributed solely to differences in technology-field composition or priority-year cohort. It does not, however, establish a causal effect of university commercialisation practice, because other potentially relevant differences are not observed in the model, such as ownership structures, institutional resources, licensing status and invention quality.³

2.4 Interpretation of the results

Taken together, the evidence points to a difference in long-term portfolio outcomes. Granted academic patents are less frequently maintained than the average European patent, indicating the higher risk and stronger challenge of commercialising inventions stemming from frontier academic research, and, potentially, more limited resources available for patent maintenance and portfolio management. European direct academic patents are also less likely to remain in force than their US counterparts; this difference is larger than the general Europe-US maintenance gap, and remains statistically significant after controlling for technology field and cohort. This finding is consistent with greater challenges in selecting,

³ Forward citations cannot straightforwardly be used as a cross-region patent-quality control in this setting. US applicants and their representatives have a duty to disclose information material to patentability during prosecution, including relevant known prior art, whereas the EPO requires discussion of relevant background art but does not operate an equivalent broad disclosure duty. Citation counts may therefore embed differences in legal and administrative practice as well as differences in technological significance.

managing, financing and advancing university-owned European patents towards sustained commercial relevance.

Several mechanisms could contribute to this pattern. US universities may apply more selective commercial criteria before filing, manage portfolios more actively after grant, have bigger funds for IP protection, or operate in environments where academic technologies can more readily find licensees, investors, partners and companies willing to finance further development of academic inventions. More established and resource-endowed TTOs may also benefit from accumulated experience in evaluating invention disclosures, making patenting and licensing decisions, and developing relationships with potential commercial partners.

The patent data cannot determine which of these mechanisms is responsible, so higher or lower maintenance rates should not be interpreted as a

direct measure of TTO performance. Rather, the results suggest that differences exist in the environment and conditions under which academic inventions are selected for protection, managed after grant and taken forward through licensing, collaboration or venture creation.

These results make the institutional dimension of technology transfer particularly important. If European universities increasingly take direct ownership of academic inventions, they also assume more responsibility for invention assessment, patent strategy, portfolio management and the search for commercial partners. While the observed maintenance gap cannot establish whether differences in TTO capacity are the cause, it strengthens the case for examining the organisations that perform these functions. At the same time, the European patent framework itself is evolving in ways that may affect how research institutions manage cross-border protection. The Unitary Patent is one important example.

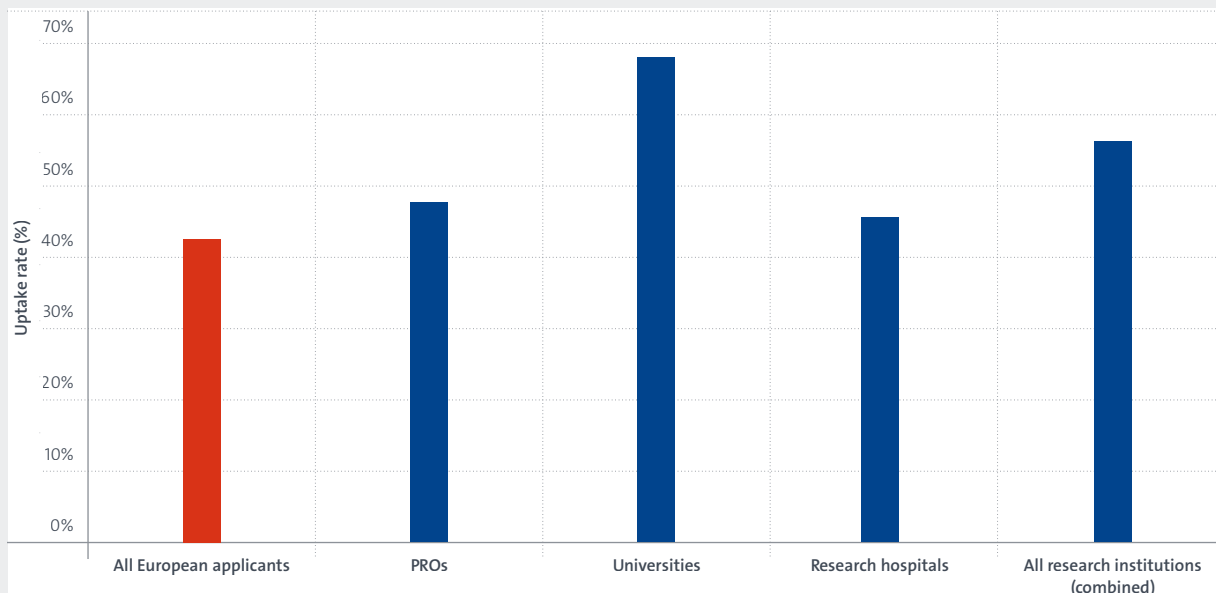
Box 2.1: The Unitary Patent – uptake by European research institutions

The European Patent with Unitary Effect (Unitary Patent) is a key development in European intellectual property law that became operational on 1 June 2023. The Unitary Patent is based on the existing European Patent Convention (EPC) system. The pre-grant examination process remains identical to traditional European patents, conducted by the European Patent Office (EPO). However, after grant, patent holders can request “unitary effect” within one month, converting their European patent into a single patent that provides uniform protection across currently 18 participating EU member states. The system eliminates expensive national validation procedures, translation requirements (after a transitional period) and multiple renewal fee systems. This represents significant savings compared to validating patents in multiple countries individually. Instead of managing patents separately in each country, applicants can deal with a single patent through the EPO as a “one-stop shop”. This reduces administrative burden substantially. In addition, the Unified Patent Court (UPC) provides centralised litigation for patents with unitary effect, eliminating costly multi-jurisdictional disputes and ensuring consistent legal interpretation.

The analysis of patent grants at the EPO covering January through June 2026 presented in Figure 2.13 reveals that the overall uptake rate among European applicants stands at 42.5%. However, the data also reveals differences in Unitary Patent adoption across applicant categories. Universities lead with the highest uptake rate at 67.9%, substantially exceeding both the research sector average (56.1%) and the overall European average (42.5%). PROs and research hospitals show an uptake rate of 47.7% and 45.6% respectively. In the January-June 2026 period, European research institutions show a higher engagement at 56.1% compared to 49.5% in January-June 2025, especially for PROs and universities. This sustained and growing uptake suggests that research institutions increasingly view the Unitary Patent as a strategic vehicle for commercialising their technologies across the wider European market, consistent with TTOs adopting a stance that favours a more integrated, cross-border approach to technology transfer within the European internal market, while also enabling more efficient use of limited IP budgets by reducing the costs associated with obtaining and maintaining patent protection across multiple European countries.

Figure 2.13

Unitary uptake rate indicators



Note: for up-to-date figures and indicators on Unitary Patent uptake, refer to the EPO's Unitary Patent Dashboard: <https://datadesk.epo.org/dashboards/unitary-patent-2026-02>

Source: EPO – PATSTAT; Elsevier Scopus.

With this patent-side evidence established, the next section turns to European TTOs themselves: how they are organised, what resources and capabilities they have, and how their scale relates to technology transfer activity.

3. The current status of European TTOs

The international comparison presented in Section 2 shows why technology transfer offices have become increasingly important to the European innovation system. As universities take direct ownership of a larger share of academic inventions, more responsibility for assessing, protecting, managing and commercialising those inventions sits within research institutions. TTOs are the specialised organisations that perform much of this work. Understanding their capacity is therefore essential to understanding what happens after an academic invention enters the institutional patenting and commercialisation process.

3.1 Understanding the population of European TTOs

To study these organisations systematically, this section uses the most comprehensive recurring source available on TTO activity: the ASTP Annual Survey. For the first time, successive survey waves are pooled and analysed at the level of individual offices across the financial years 2017 to 2023. The combined dataset contains anonymised information on 809 distinct TTOs, giving this study its broadest TTO-level evidence base and allowing the European landscape to be examined at a scale not available from a single annual survey wave. This is especially valuable in a field where national data sources, definitions and participation vary substantially.

The ASTP survey provides the quantitative basis for analysing staffing, the research institutions served, invention disclosures, patent portfolios, licensing activity and support for new ventures (see Box 3.1). It is complemented by consultation interviews with European TTOs (Box 3.2), which add qualitative context on governance, operating models, specialisation and the practical constraints behind apparently similar headline indicators.

This section proceeds in three steps. First, it maps the principal characteristics and activities of European TTOs. Second, it identifies recurring TTO profiles based on organisational capacity, research scale and invention-pipeline activity. Third, it examines how these profiles relate to technology transfer outputs and what the results suggest about scale, specialisation and effectiveness.

Box 3.1: The ASTP Annual Survey

ASTP is the pan-European association of over 3 000 knowledge transfer professionals from over 45 countries. Its mission is to strengthen the profession by supporting peer learning, professional development, practical tools and the exchange of good practices across Europe.

Measurement of knowledge transfer activities has long formed part of this work (see astp4kt.eu/kt-metrics). ASTP has collected data from European knowledge transfer offices since 2005, while the annual series currently available through its metrics platform extends back to financial year 2014. The survey is conducted annually and gathers information on the organisations served by knowledge transfer offices (KTO), their staffing and resources, research and industry agreements, intellectual property management, licensing, commercialisation income, and the creation of spin-offs and startups.

The data are assembled through two complementary routes. Individual KTOs submit information directly to ASTP through the survey questionnaire, while national knowledge transfer associations contribute compatible data collected through their own national surveys. This cooperation considerably broadens the geographic coverage of the exercise, although the number and composition of participating KTOs vary between years.

For this study, ASTP has shared survey anonymous results covering the financial years from 2017 to 2023. These successive editions are brought together and analysed in a consistent framework for the first time, providing a broader view of the resources, activities and outputs of European TTOs over this period. The results are used to describe the European TTO landscape, identify different organisational profiles and examine how TTO capacity

and scale relate to technology transfer activity and performance.

The ASTP survey covers more than 800 distinct TTOs and therefore captures a substantial share of Europe's technology transfer landscape, although it cannot be used to estimate the total number of TTOs operating in Europe. For comparison, recent work using the EPO's Deep Tech Finder has identified more than 1200 European universities and public research organisations associated with European patent applications at the EPO. The two figures are not directly comparable, since some institutions do not operate a dedicated TTO and some TTOs serve several institutions, but they provide an indication of the scale of the institutional landscape

covered by the ASTP survey. The results should therefore be read primarily as a picture of university technology transfer in Europe, rather than as a fully balanced representation of all institutional types.

Although the ASTP survey dataset includes information on 809 TTOs, the number of observations varies across indicators because not all TTOs report each item for every year. Unless stated otherwise, the analysis therefore creates one representative observation for each office by averaging its reported values across the fiscal years for which data are available. This prevents greater weight being given to TTOs that participated in more survey waves and provides a more stable picture of each office's typical scale and activity.

Table 3.1

Selected characteristics of European TTOs – ASTP survey evidence

Indicator	Reporting TTOs	Mean	Median	P25-P75
TTO establishment year	514	2003.1	2005	1997-2012
TTO staff, FTE	529	11.9	6.7	3.0-14.5
Research expenditure	488	EUR 86.0 million	EUR 18.1 million	EUR 3.2-75.4 million
Research effort, FTE	594	1,215.0	668.1	213.9-1,539.2
Invention disclosures	739	26.0	9.1	1.0-31.0
Priority patent applications	519	12.6	6.0	2.0-14.8
First patent grants	455	10.1	3.3	1.0-10.1
Active patent families	486	97.5	38.4	8.8-116.3
Licences, options and assignments	742	58.6	2.0	0.0-10.7
Operating spin-offs	594	12.0	2.5	0.0-13.6
New startups	633	9.7	0.9	0.0-7.0
New spin-offs	726	1.5	0.5	0.0-2.0

Note: Statistics are calculated from each TTO's average across its available survey years, followed by summary statistics across distinct reporting TTOs. The number of reporting TTOs therefore differs by indicator.

Source: EPO analysis based on ASTP survey data.

Box 3.2: Consultation interviews with European technology transfer offices

To complement the quantitative analysis, the study carried out a targeted consultation, conducting 40-minute interviews with 22 technology transfer organisations across Europe. The purpose was not to construct a statistically representative sample, but to examine how different TTO models operate in practice and to provide qualitative context for the patterns observed across the wider survey population.

Participants were selected purposively to capture variation in geography, institutional setting, organisational maturity and operational capacity. They were identified through the EPO PATLIB network, ASTP, and the wider European technology transfer community. The final sample included organisations from Western and Northern Europe, Southern Europe, and Central and Eastern Europe.

The consultation covered TTOs serving universities, PROs (including RTOs), and research hospitals. Universities represented the largest group, but the sample also included several larger research organisations and hospital-based structures in order to reflect the diversity of institutional contexts in which technology transfer is organised in Europe.

The sample was also designed to include TTOs with different levels of capacity. Small and mid-scale TTOs accounted for 77.3% of the interviewed organisations, while large-scale TTOs represented 22.7%. These capacity profiles are discussed further in Section 3.2.

Large organisations were included at a higher rate than in the ASTP survey population in order to provide greater insight into professionalisation, functional specialisation and possible economies of scale. Small and mid-scale offices, in turn, provided evidence on the strategies, constraints and transfer channels that remain realistic under more limited staffing and resources.

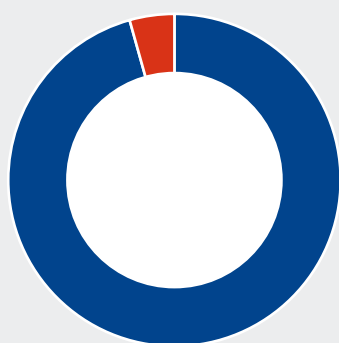
The consultations followed a common semi-structured interview guide (see Annex 1 for the full list of questions), while allowing participants to focus on the issues most relevant to their institutional context. Discussions covered governance and reporting lines, staffing and professional capabilities, the distribution of functions between internal teams and external providers, commercialisation channels, IP protection and licensing decisions, spin-off support, proof-of-concept and investment funding, relationships with industry and investors, and international commercialisation.

Particular attention was given to the relationship between TTO capacity and the commercialisation strategies that an organisation can realistically pursue. The consultation evidence is used throughout the study to complement the survey analysis and help interpret how organisational size, specialisation, institutional position and access to shared resources may affect technology transfer activities and outcomes.

Figure 3.1:

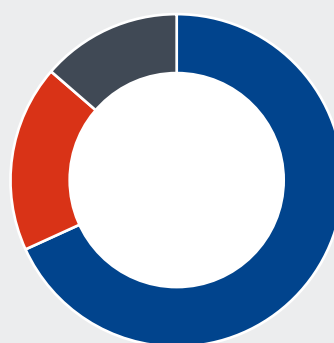
Composition of TTOs consulted by the EPO through interviews

TTO capacity profile



■ Small and mid-scale TTOs
 ■ Large-scale TTOs

Type of institution served



■ Universities
 ■ PROs, including RTOs
 ■ Research hospitals

Note: The consultation sample was selected purposively and is not intended to reproduce the composition of the wider population of European TTOs.

A heterogeneous landscape

One of the first points we can note about the survey is that a large share of European TTOs have existed for less than 20 years. Among the 514 offices reporting an establishment year, the median is 2005, and every fourth TTO was created in 2012 or after. This concentration is consistent with the wider institutionalisation of knowledge transfer functions as universities and PROs assumed greater responsibility for intellectual property, industry collaboration and research commercialisation.

It is relevant to note, however, that the establishment of a TTO does not always mark the beginning of transfer activity. Several consulted institutions had managed patents, contracts or industry relationships for many years before bringing these functions together in a central office. For example, one institution consulted created its present central TTO in 2023 even though its patent function had operated for more than four decades and business development remained partly decentralised. The date therefore denotes the unit establishment in its current organisational form, and not necessarily the age of the underlying technology transfer capability, which may have been available in a different form and performed as an ad-hoc task by researchers or other staff from the institution.

Figure 3.2

European TTOs vary widely in scale – ASTP survey evidence



Note: For the licenses, options and assignments (LOA), four extreme outliers were not considered for the calculations.

Source: EPO analysis based on ASTP survey data.

The median reporting TTO employs 6.7 full-time-equivalent (FTE) staff, while the middle half employ between 3.0 and 14.5 FTEs. The mean is higher, at 11.9 FTEs, because a relatively small number of large offices pull up the average. The typical European TTO is therefore a small specialist unit, even though it may be expected to cover invention assessment, IP strategy, patenting, licensing, business development, industry engagement, contract support and venture creation.

What is included in this number of TTO staff differs a lot between institutions. This was visible in the consultation interviews: some TTOs counted only the core patenting and licensing team in their statistics, while, others described a wider network that also included business developers, research-contract staff, entrepreneurship teams, incubators or legal specialists. One TTO reported a central team of around 12 people alongside approximately 67 business developers located elsewhere in the organisation. Another institution described about 25 people contributing to innovation functions but only around 14 or 15 FTEs if part-time appointments were taken into account. Headcount and FTE staffing are therefore not interchangeable, and apparently similar staff totals may cover very different functions. Most European TTOs were associated with a single research institution. However, 68 TTOs reported providing services to more than one research institution in at least one reporting year.

Staff allocation

The survey data provides information on how TTO staff time is distributed across five broad functional areas: Research Agreements, Commercialisation, Entrepreneurship Support, Business Development (including industry liaison), and Other Activities. According to the median values, we observe that reporting TTOs typically allocate roughly a quarter of staff time to Research Agreements (22.7%), including material transfer agreements, confidential disclosure agreements, and collaborative research agreements, and just over a quarter to Commercialisation (25.9%), while Entrepreneurship Support (10.0%) and Business Development (10.5%) each account for only about a tenth of staff time. The largest single median share, at 37.3%, falls into the catch-all Other Activities category, with a wide interquartile spread (16.0%-70.2%) suggesting considerable variation in how offices use this residual classification.

The dominance and wide dispersion of “Other Activities” suggests that a substantial portion of TTO staff time may be directed toward functions beyond the direct commercialisation of technology captured by other four named categories. Activities such as administration and reporting, invention scouting, awareness-raising among researchers, education and training on IP and technology transfer, engagement in institutional or national innovation policy, or general relationship-building with internal stakeholders could plausibly fall under this heading. Nevertheless, one should note that coverage of these variables is far from universal, ranging from 215 TTOs (14.7% of the 809 TTOs sampled) for Business Development to 374 TTOs (45.4%) for Other Activities, so these figures describe the subset of TTOs that reported functional shares and may not represent the full European TTO population.

Table 3.2

Share of TTO staff FTEs dedicated to each functional area (TTO-level averages, FY2018-FY2023)

Functional area	N TTOs (observations)	Mean	Median	P25-P75 range
Research Agreements	342	27.8%	22.7%	13.3%-37.5%
Commercialisation	345	30.0%	25.9%	12.6%-40.0%
Entrepreneurship Support	296	12.6%	10.0%	4.0%-18.6%
Business Development (including industry liaison)	215	14.7%	10.5%	5.0%-20.0%
Other Activities	374	45.4%	37.3%	16.0%-70.2%

Source: EPO analysis based on ASTP survey data.

Staffing can also vary from year to year. Several offices reported relying on positions financed through temporary projects, shared appointments or staff who combined technology transfer work with other duties. One university office reported five dedicated roles managing more than 160 commercialisation projects, and described its capacity as close to or beyond its practical limit. These examples help explain why annual survey figures should be read as snapshots of available capacity rather than fixed organisational structures.

TTOs operate on top of very different research systems. The median office serves an institution reporting EUR 18.1 million in annual research expenditure and 668 research FTEs. The corresponding means are EUR 88.3 million and 1 229 research FTEs, again showing that a smaller group of large research-intensive institutions sits alongside a much larger population of small and medium-sized organisations. The research base affects the volume and disciplinary mix of potential inventions, but it does not determine how much support is available to develop them.

The median office employs roughly one TTO staff member for every EUR 4.6 million in research expenditure, or one for every 108 researchers. Among the middle half of reporting offices, one TTO FTE serves between approximately 61 and 193 researchers. These ratios should be treated as indicative, given the differences in TTO mandates and in the allocation of central support functions. Some offices focus mainly on invention disclosure, IP protection and licensing, while others also cover research agreements, industry engagement, spin-offs or broader innovation-support functions. Legal, finance, accounting, human-resources and administrative support may be counted as TTO staff in some institutions but provided centrally or through shared university services in others.

The consultation interviews give tangible insight into this imbalance. One office reported around 12 central TTO staff for roughly 7 000 researchers and estimated that, within the university arm, a single transfer professional could effectively be supporting more

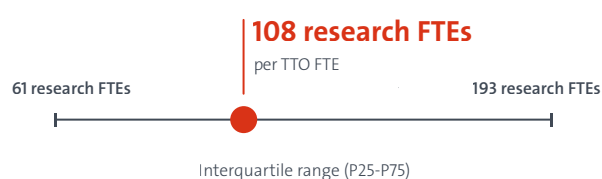
Figure 3.3

TTO staffing relative to the research base served – ASTP survey evidence

Research expenditure served by one TTO FTE



Research staff served by one TTO FTE



Note: Ratios are calculated from TTO-level averages for offices reporting both staffing and the relevant research-base measure. Extreme outliers make the median and interquartile range more informative than the mean.

Source: EPO analysis based on ASTP survey data.

than 1 000 researchers. Another TTO described five staff dedicated to on-site invention scouting across an institution with around 100 000 researchers. These examples are not population estimates, but they show how the same headline staff number can translate into very different practical workloads. As a result of this severe capacity shortage, the consulted offices reported many opportunities and projects could not be pursued. They also suggest that, in some offices, limited dedicated capacity may constrain the extent to which commercialisation opportunities and projects can be pursued.

From research results to the TTO pipeline

Invention disclosures are the main point at which potentially transferable research results enter the formal TTO pipeline. The median office receives 9.1 disclosures per year, compared with a mean of 26.0. The difference reflects both the scale and disciplinary profile of the institution and the way in which researchers are encouraged, required or supported to report potential inventions.

Organisational practice can have a significant impact on the number of invention disclosures. For example, one consulted TTO reported that annual disclosures rose from around 15-20 to 55-60 after the team shifted from waiting for researchers to approach the office to conducting more systematic scouting. At the other end of the scale, a large TTO reported 276 invention disclosures and 73 priority filings in one year. Another reported only eight filings, reflecting a selective strategy, limited central patent funding, and the use of collaborative projects, data, software, and know-how as alternative transfer routes.

Figure 3.4

Selected median indicators across the technology transfer lifecycle – ASTP survey evidence

Research base	Pipeline entry	IP protection	Patent results	Transactions
EUR 18.1 m 668 research FTEs	9.1 invention disclosures	6.0 priority applications	3.3 first grants	2.0 LOAs

Cumulative stocks and annual venture creation

Active patent families	New spin-offs	New start-ups	Operating spin-offs
38.4	0.5 per year	0.9 per year	2.5

Note: Indicators are ordered to illustrate the lifecycle but do not represent a same-year conversion funnel. Active patent families and operating spin-offs are stocks; the other indicators, such as licensing, options, and agreements (LOAs), are annual flows.

Source: EPO analysis based on ASTP survey data.

Differences in disclosure numbers may also reflect the threshold applied when registering an invention disclosure form. Some TTOs record any research result that may have commercial potential, while others register only those that have already met certain criteria for formal TTO assessment or patenting. A lower threshold is likely to generate more disclosures, including cases that are not primarily patent-related, and may therefore result in a lower ratio of priority filings to invention disclosures. In addition, a larger and more regular flow of disclosures can also give a TTO a broader pool from which to identify and prioritise inventions with the strongest prospects for protection and commercial development. Consequently, disclosure and filing totals should be understood as indicators of organisational strategy, institutional processes, and reporting practices as well as scientific output.

In the ASTP survey data, the median TTO files 6.0 priority patent applications and obtains 3.3 first patent grants per year. Three quarters of reporting offices obtain no more than 10.1 first grants annually. The median active patent portfolio contains 38.4 patent families, compared with a mean of 97.5 and an upper-quartile threshold of about 120. The largest observed portfolio approaches 2 000 families. Portfolio size is a stock accumulated over many years and should not be interpreted as a current-year output or, by itself, as evidence of commercial success.

They also confirm that patents and licences are only part of the transfer landscape. Several offices described collaborative and contract research as their largest channel. They emphasised that transfer often occurs through joint development, prototypes and follow-on projects. However, patenting and licensing of technology are important parts of such contractual relationships, depending as well on the field – with some fields, such as software, potentially also using alternative sorts of protection other than patents.

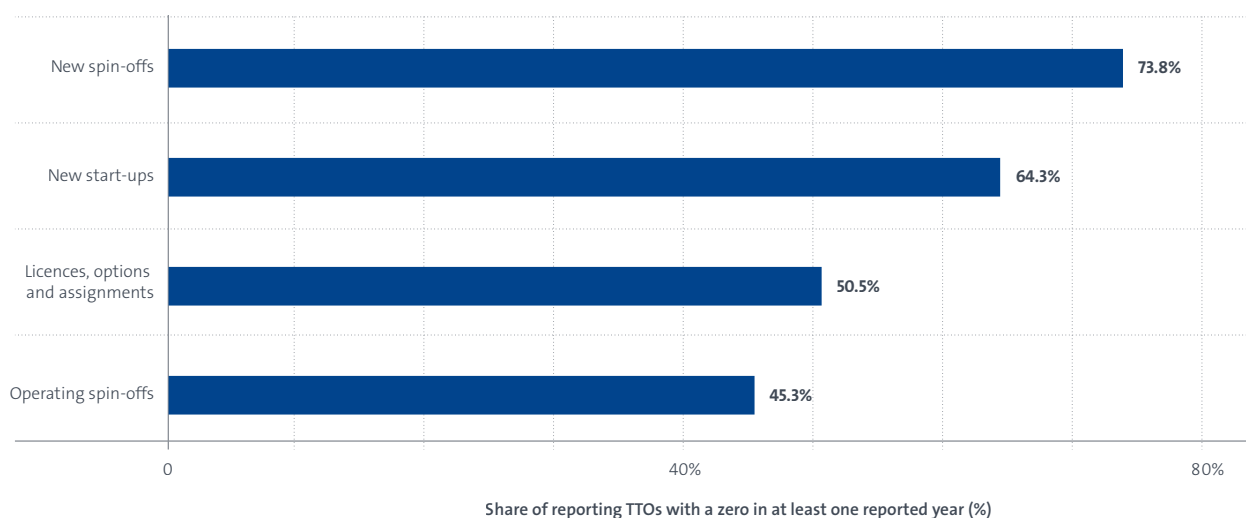
Commercialisation channels

Licences, options and assignments (LOA) are important contractual routes for transferring patents, software and know-how. The median reporting TTO concludes two such transactions per year, while the mean is 58.6. This exceptionally large gap indicates that activity is highly concentrated and that the mean is not representative of the typical office. It may also reflect differences in what is counted, including portfolios containing large numbers of software or standardised licences.

Zero values are common and are retained as substantive outcomes. A TTO is counted here as reporting a zero on a given indicator if it recorded a value of zero in at least one of its available survey years – not only if its multi-year average rounded to zero. Therefore, one TTO with strong,

Figure 3.5

Share of reporting TTOs with zero commercialisation outcomes – ASTP survey evidence



Note: A TTO is classified as reporting a zero on a given indicator if it recorded a value of zero in at least one of its available survey years – not if its multi-year average rounded to zero. This means a TTO with strong, consistent activity in most years, but happens to report nothing in a single year, is still counted.

Source: EPO analysis based on ASTP survey data.

consistent activity in most years is still counted if it happened to report nothing in a single year. On this basis, of 742 reporting TTOs, 375 (50.5%) report a zero in licences, options or assignments in at least one of their reported years. For venture creation, 536 of 726 (73.8%) report zero new spin-offs in at least one year, 407 of 633 (64.3%) report zero new startups in at least one year, and 269 of 594 (45.3%) report zero operating spin-offs in at least one year.

The median office has 2.5 operating spin-offs, creates 0.5 new spin-offs and 0.9 new startups per year. The survey distinguishes a spin-off established to develop or exploit IP generated by a public research organisation and linked to it through a formal contractual relationship from a startup created by staff or students without that direct IP link. Most offices therefore report modest annual venture-creation volumes, while a smaller group accounts for substantially higher activity.

The consultation interviews with selected TTOs show that even operating spin-offs can be tracked in different ways. Some institutions follow companies because they retain equity, while others do so because an IP licence remains active. Others periodically check whether companies created in earlier years still exist, whether they have raised funds and how many jobs they have created, as part of their impact assessment. Post-deal involvement also ranges from passive royalty administration to active investor introductions, mentoring and follow-on research partnerships and technology transfers. These differences affect both the workload behind the indicator and its comparability across offices.

Box 3.3: A window on European spin-offs through the Deep Tech Finder

Drawing on EPO patent data combined with business information from Dealroom, the EPO's Deep Tech Finder, developed by the EPO Observatory on Patents and Technology, offers a unique view of Europe's deep-tech ecosystem. The free tool allows users to explore patent-active startups and research institutions by technology field, country, industry, growth stage and funding, thereby helping investors, companies and policymakers to identify emerging technologies, potential partners and promising ventures.

Across the European countries, the Deep Tech Finder identifies 4 150 spin-offs with filings at the EPO.⁴

The large majority are at an early growth stage (65.8%), with considerably fewer having reached the breakout (17.5%) or late growth (4.3%) stages, while 12.4% have been successfully acquired.⁵ This distribution reflects the characteristic funnel of company development, in which only a fraction of young companies progress to more mature stages.

Sectoral activity is concentrated in Health Tech (2 028 spin-offs), followed by Energy (666), Computer Hardware (456), Information Tech (367) and Robotics (248). The prominence of Health Tech is consistent with the strong life-science orientation of direct institutional patenting, while the other leading sectors reflect energy-transition, digital and automation technologies.

Figure 3.6

Distribution of European spin-offs with EP patent applications across growth stages

All spin-offs



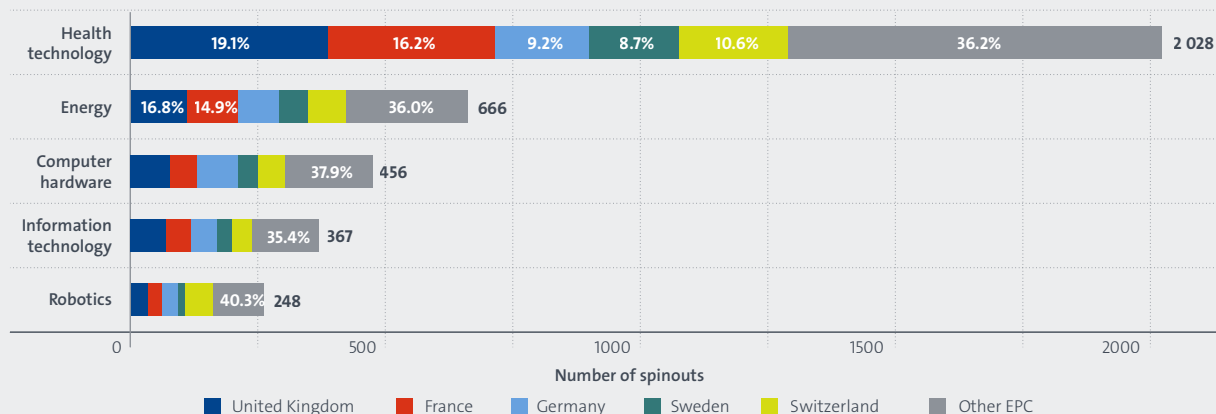
Source: EPO analysis

⁴ This includes direct filings at the EPO, applications for which an EPO search report has been issued, international (PCT) applications that have entered the European phase as well as PCT applications for which the EPO acted as the International Searching Authority

⁵ For definitions of Deep Tech Finder data see <https://www.epo.org/en/service-support/faq/data-insight-tools/deep-tech-finder>.

Figure 3.7:

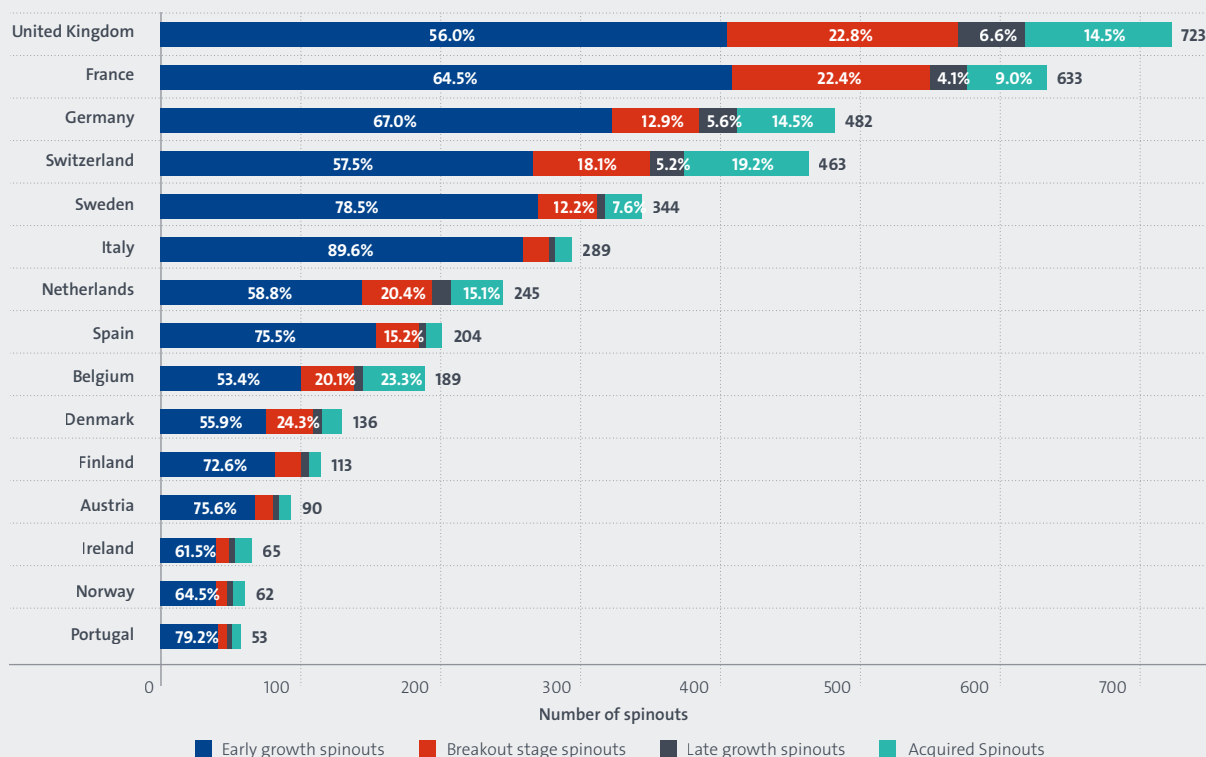
Top five industry sectors for European spin-offs by country



Source: EPO analysis

Figure 3.8:

European spin-offs by European country and growth stage (top 15)



Source: EPO analysis

The United Kingdom (723), France (633) and Germany (482) have the largest numbers of patent-active spin-offs. Switzerland, the Netherlands, Belgium and Denmark show comparatively high shares of breakout or acquired companies given their smaller totals, while Sweden, Italy, Spain and Finland have substantial

early-stage activity but fewer firms at later stages. The figures describe the companies captured by the Deep Tech Finder and should not be read as a complete ranking of national spin-off ecosystems

Combined impact of European TTOs

The indicators describe connected stages of technology transfer, but they should not be read as a one-year conversion funnel. Research expenditure and research FTEs describe the underlying research base. Disclosures, priority applications, first grants and new ventures are annual flows, while active patent families and operating spin-offs are stocks accumulated over several years. A disclosure made in one year may be patented, licensed or used to create a company only years later, while a licence signed today may concern research completed much earlier.

To indicate the scale of activity represented by the ASTP survey dataset the analysis first calculates each TTO's average across its available fiscal years and then sums those TTO-level averages to report the impact of European TTOs on the European technology transfer life cycle. The totals represent lower-bound estimates, as they only include technology transfer offices reporting the relevant indicator, and coverage differs across indicators.

Taken together, the reporting offices serve institutions accounting for approximately EUR 41.98 billion in annual research expenditure and around 721 728 research FTEs. They report about 19 236 invention disclosures, 6 537 priority applications and 4 608 first grants per year, while managing more than 47 386 active patent families. They also report almost 43 492 licences, options and assignments, around 1 080 new spin-offs and 6 140 new startups annually, and a stock of 7 122 operating spin-offs. These activities are supported by an estimated 6 296 TTO staff FTEs across the offices reporting staffing data.

Figure 3.9

Indicative scale represented by reporting TTOs – ASTP survey evidence

Research base	Pipeline	IP protection and portfolio	Transfer routes
EUR 41.98bn Research expenditure 488 TTOs	19 236 Invention disclosures 739 TTOs	6 537 Priority applications 519 TTOs	31 265* LOAs 742 TTOs
721 728 Research FTEs 594 TTOs	EUR 41.98bn Research expenditure 488 TTOs	4 608 First patent grants 455 TTOs	6 140 New start-ups 633 TTOs
6 296 TTO staff FTEs 529 TTOs	EUR 41.98bn Research expenditure 488 TTOs	47 386 Active patent families 486 TTOs	1 080 New spin-offs 726 TTOs
	EUR 41.98bn Research expenditure 488 TTOs		7 122 Operating spin-offs 594 TTOs

Note: Figures are sums of TTO-level average annual values and are indicative lower bounds. Coverage differs by indicator; stocks and flows are mixed. *To avoid undue influence from exceptional observations, the extreme values for two TTOs were excluded from the calculation of total LOAs.

Source: EPO analysis based on ASTP survey data.

Box 3.4: US TTOs – evidence from AUTM

The evidence above shows that European TTOs operate in very different institutional settings. They range from small offices serving relatively limited research bases to large organisations managing substantial invention pipelines and patent portfolios. The United States provides a useful international reference. University technology transfer has developed there over several decades within a comparatively established institutional framework. The ability of universities to retain rights over federally funded inventions, together with strong institutional incentives to manage and commercialise research results, contributed to the development of professional TTOs, established disclosure and licensing procedures and specialised technology transfer careers.

A central source of evidence on this system is the Association of University Technology Managers (AUTM), whose annual Licensing Activity Survey has collected information on US TTOs for more than three decades. AUTM also places considerable emphasis on benchmarking TTO activity, including through peer groups based on research expenditure, recognising that offices serving very different research bases should not be compared on headline outputs alone.

This box examines how technology transfer activity in the US varies with the scale of the research base of the institutions. It draws on institution-level data provided by AUTM for 110 US technology transfer offices (TTOs) observed over FY2017-FY2023. The data cover research expenditure, TTO staffing, invention disclosures, new patent applications and spin-off formation. To reduce the influence of annual fluctuations, each indicator is first averaged over the available years for each

institution. Institutions are then grouped according to their average annual research expenditure, and the tables report the median values within each group.

The AUTM data provide a useful benchmark for examining the relationship between institutional scale and technology transfer activity. However, they do not allow a direct comparison with the European data collected by ASTP. The ASTP dataset covers more than 800 European TTOs and captures a broad and heterogeneous population of offices, including many small and medium-sized TTOs. By contrast, the AUTM panel provides particularly strong coverage of highly research-intensive US institutions and represents the upper end of the US research system rather than the full distribution of US TTOs. The two datasets therefore differ markedly in their coverage and composition.

There are also differences in institutional structures and indicator definitions. In the AUTM data, total TTO staff comprise licensing staff and other TTO staff, while European TTOs may have broader mandates for knowledge-transfer and valorisation. AUTM reports new patent applications, whereas ASTP reports priority patent applications. For company creation, AUTM start-ups are treated here as comparable to ASTP spin-offs because both indicators refer to companies established to commercialise IP originating from the research institution. The results should therefore be interpreted as complementary evidence on the two systems, rather than as a basis for direct performance comparisons.

Table 3.3

US TTO activity by scale of the research base – AUTM survey evidence, FY2017-FY2023

Research expenditure group	n	Total TTO staff FTE	Invention disclosures	New patent applications	Spin-offs formed
USD 1bn or more	16	33.5	375.2	167.8	14.4
USD 500m-999m	25	22.0	229.0	104.6	8.0
USD 250m-499m	29	10.9	111.7	52.9	4.4
USD 100m-249m	25	8.6	67.7	36.4	2.4
Less than USD 100m	15	3.9	34.4	15.9	1.3

Note: Values are medians across institutions after first averaging each institution across FY2017-FY2023. Total TTO staff is calculated as licensing FTEs plus other TTO FTEs.

Source: EPO calculations based on institution-level AUTM Licensing Activity Survey data provided by AUTM.

Table 3.4:

US TTO activity ratios, FY2017-FY2023

Research expenditure group	Invention disclosures per staff FTE	New patent applications per invention disclosure	Spin-offs per invention disclosure
USD 1bn or more	12.12	0.53	0.037
USD 500m-999m	9.78	0.48	0.039
USD 250m-499m	11.25	0.58	0.041
USD 100m-249m	6.79	0.56	0.046
Less than USD 100m	7.89	0.62	0.038

Note: Values are medians across institutions after first averaging each institution across FY2017-FY2023. Total TTO staff is calculated as licensing FTEs plus other TTO FTEs.

Source: EPO calculations based on institution-level AUTM Licensing Activity Survey data provided by AUTM.

The results show a strong relationship between the size of the research base and the absolute scale of technology transfer activity. TTOs serving institutions with at least USD 1 billion in annual research expenditure have a median of 33.5 staff FTE, compared with 3.9 FTE among institutions with research expenditure below USD 100 million. They also manage much larger invention pipelines, with median annual values of 375.2 invention disclosures and 167.8 new patent applications, compared with 34.4 disclosures and 15.9 applications in the smallest expenditure group. Median spin-off formation similarly increases from 1.3 to 14.4 companies.

These differences should not be interpreted as evidence that larger TTOs necessarily perform better. Larger institutions generate substantially more research and, consequently, more potentially transferable inventions. Their TTOs therefore require more staff and process much larger volumes of disclosures, patent applications and commercialisation projects.

The ratio indicators reveal a more nuanced pattern. The number of new patent applications per invention disclosure varies between 0.48 and 0.62 across the five expenditure groups, while spin-offs per invention disclosure remain close to 0.037-0.046 and very similar to the median values of European TTOs (see table 3.4). Statistical tests do not identify significant differences across the expenditure groups for either new patent

applications per invention disclosure or spin-offs per invention disclosure. This suggests that within the AUTM panel, the conversion of disclosed inventions into patent applications and spin-offs does not vary systematically with the size of the institution's research base.

By contrast, the distribution of invention disclosures per staff FTE differs significantly across the expenditure groups. TTOs serving the largest research institutions generally process more disclosures per staff member than those serving institutions with smaller research bases, although the relationship is not strictly monotonic across every group. The median reaches 12.12 disclosures per staff FTE among institutions with at least USD 1 billion in research expenditure, compared with 6.79 and 7.89 in the two smallest expenditure groups.

This pattern is broadly consistent with the evidence for European TTOs. Larger TTOs appear able to process greater volumes of invention disclosures relative to their staffing levels, potentially reflecting capacity advantages, more specialised organisational structures and more established disclosure processes. At the same time, higher disclosure volumes per staff member do not translate into statistically different patenting or spin-off conversion rates.

Box 3.5: Technology transfer in China – a policy perspective

China provides a relevant international example of a more centrally coordinated approach to technology transfer. In recent years, policy attention has shifted from expanding the volume of intellectual property generated by universities and research institutions towards improving its actual utilisation and commercialisation.

Chinese policymakers have explicitly recognised that strong patenting activity has not automatically translated into equivalent levels of industrial use. Key challenges identified include large stocks of unutilised patents, insufficient market orientation and mismatches between public-research technologies and industry needs.

The main policy response has been the Special Action Plan for Patent Commercialisation and Utilisation (2023-2025), launched by the State Council and implemented by the China National Intellectual Property Administration (CNIPA), together with other central-government departments and local authorities. Rather than relying primarily on individual institutions to market patents independently, the initiative combines

government coordination, digital infrastructure, intermediary organisations and industrial networks around a common commercialisation objective.

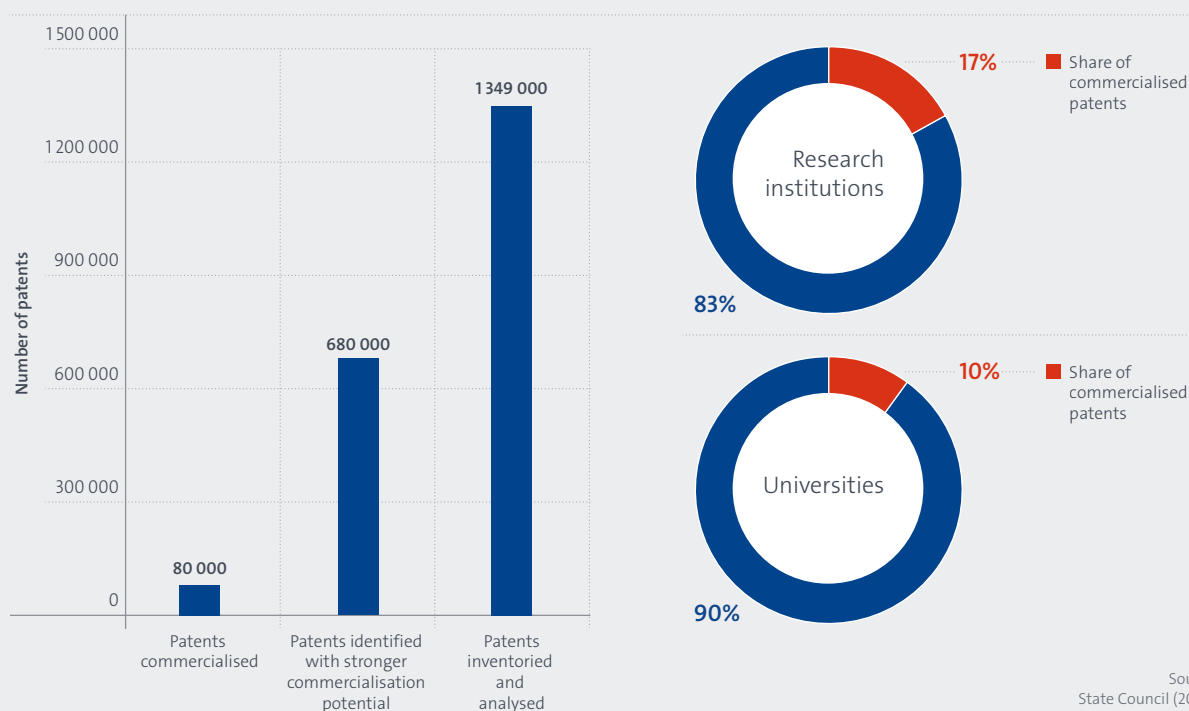
A data-driven inventory of university patents

A central feature of the initiative is the systematic use of patent data. Chinese authorities screened approximately 1.35 million patents held by more than 2 700 universities and research institutions, identifying around 680 000 invention patents with commercialisation potential and matching technologies with approximately 460 000 enterprises.

This stocktaking exercise is evolving into a more permanent system based on dynamic patent inventories, differentiated portfolio management and monitoring throughout the patent life cycle. Universities and research institutions are also being encouraged to assess industrialisation prospects earlier and to place greater emphasis on patent quality, implementation and commercial potential rather than patent numbers alone.

Figure 3.10:

Results from the Special Action Plan for Patent Commercialisation and Utilisation (2023-2025), as published by Chinese authorities



Source:
 State Council (2023);
 CNIPA et al. (2024); CNIPA (2025);
 CNIPA (2026a); State Council (2026)

Connecting technologies with industry

China combines digital platforms, offline matchmaking and increasingly data-driven tools to connect public-research patents with potential users. Digital platforms bring together patent information and company needs, while AI and big-data techniques are used to analyse technologies, identify potential applications and improve matching with relevant firms. These tools are complemented by professional brokerage, roadshows and other matchmaking activities.

Regional technology transfer centres, technology-trading platforms, proof-of-concept facilities and pilot-scale infrastructure support the further maturation of promising technologies. Professional technology managers provide services ranging from patent evaluation and valuation to incubation, negotiation, legal support and financing advice.

China has also introduced mechanisms to reduce the cost and risk of technology adoption. Open licensing can simplify access to patents under predefined conditions, while “use first, pay later” models allow companies to use technologies before making the full licensing payment. Commercialisation is also increasingly linked with IP-backed lending, insurance and investment, helping firms finance further development and market entry.

At the same time, policy is shifting towards the quality and strategic relevance of patents. CNIPA reported 2.29 million high-value invention patents at the end of 2025, with their growth rate 2.2 percentage points above that of invention patents overall; around 70% were concentrated in strategic emerging industries.

Towards a permanent commercialisation capability

China is now seeking to embed these measures in a more permanent technology transfer system. The 15th Five-Year Plan for IP Protection and Utilisation (2026-2030) calls for stronger links between university patents and enterprise demand, further reform of benefit-sharing mechanisms, wider use of open licensing and deferred-payment models, and continued development of IP finance. It also places greater emphasis on high-value patent portfolios in key technologies, alongside patent pools, standard-essential patent licensing and stronger integration of patented technologies into international standard-setting.

There is also international cooperation at various levels. Within the BRICS, cooperation is also extending technology transfer beyond national systems. Emerging initiatives seek to connect university technologies, TTOs, firms and incubators across member countries through shared information, matchmaking, professional training and cross-border incubation.

Source:
State Council (2023); CNIPA et al. (2024); CNIPA (2025); CNIPA (2026a); CNIPA (2026b); State Council (2026);

3.2 A typology of European TTOs

The descriptive evidence in Section 3.1 shows that European TTOs differ sharply in the size of their teams, the research systems they serve and the number of inventions entering their pipelines. The difference is not simply between better and worse offices and does not consider different approaches to technology commercialisation strategies. It reflects distinct institutional settings and very different volumes of work. A small office serving a regional university cannot be analysed in the same way as a national organisation managing hundreds of inventions across many institutes.

How the typology was constructed

To identify recurring profiles, the analysis groups TTOs according to three upstream characteristics: their staff capacity, the research effort of the institutions they serve and the number of invention disclosures they receive. Patent applications, licences and new ventures are deliberately excluded from the construction of the groups. They are examined only afterwards, making it possible to ask whether offices with different starting conditions also report different downstream activity.

Each TTO is represented once, using its average reported value across the fiscal years available between FY2017 and FY2023. This prevents offices that participated in more survey waves from carrying greater weight, and reduces the influence of temporary annual fluctuations. The three variables are standardised so that staffing,

expenditure⁶ and invention disclosures can be considered together despite being measured in different units. Missing observations for the three variables are imputed for the clustering exercise, allowing the typology to retain the wider population of surveyed offices. The technical choices and robustness checks are described in Annex 1.

A landscape dominated by small and mid-scale offices

The clearest statistical separation is a two-group solution. The first group contains small and mid-scale offices, while the second contains large-scale TTOs that support, research-intensive institutions. These labels describe organisational scale and throughput. They do not rank the quality of an office or imply that any institution should seek to move from one group to the other.

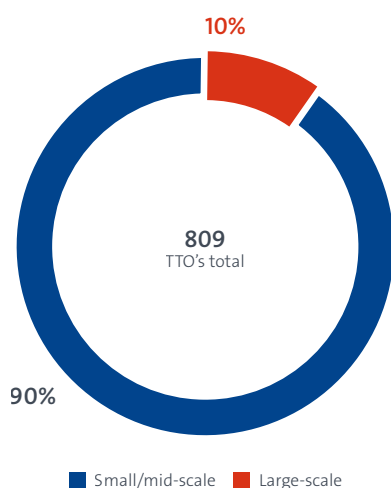
Small and mid-scale TTOs account for 732 of the 809 offices in the analysis, or 90.5%. The median office in this group has five staff, serves a research base reporting around EUR 14 million in annual expenditure and receives about seven invention disclosures per year. These offices form the core of the European TTO landscape.

The remaining 77 offices, or 9.5%, form a distinct large-scale group of TTOs. Their median profile is 30 TTO staff, EUR 442.7 million in research expenditure, around 3 900 research FTEs and about 101 invention disclosures per year. Hence, compared with the small and mid-scale group, the median large-scale office has six times the staff, approximately 22 times the research expenditure, six times the research workforce and almost 16 times the disclosure volume.⁷

The groups are not primarily differentiated by age. Their median years of establishment are 2005 (small/mid-scale) and 2003 (large-scale), and the difference in their age distributions is not statistically significant. The main difference lies in the scale of the research system, pipeline and specialist capacity they manage. The large-scale TTO group is also more concentrated geographically, reflecting the location of several major public research systems and highly research-intensive institutions in a smaller number of countries.

Figure 3.11

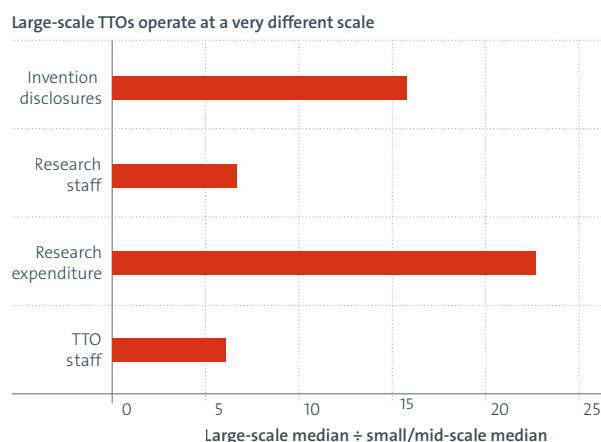
Two groups in the ASTP survey population



Source: EPO analysis based on ASTP survey data.

Figure 3.12:

Relative scale of the two TTO profiles



Note: Values show the median for the large-scale group divided by the median for the small and mid-scale group.

Source: EPO analysis based on ASTP survey data.

⁶ Statistical tests indicated that research expenditure performs better than research staff FTE in the cluster analysis. As the two variables are highly correlated, substituting one for the other has little effect on the results.

⁷ Research expenditure and research workforce are strongly correlated, but expenditure levels can vary substantially across countries because of differences in purchasing power and cost structures, as well as across research fields with different resource requirements. As a robustness check, the clustering analysis was therefore repeated using research FTEs instead of research expenditure. The resulting TTO profiles were materially unchanged, indicating that the clustering is not driven by the choice between these two measures of research scale.

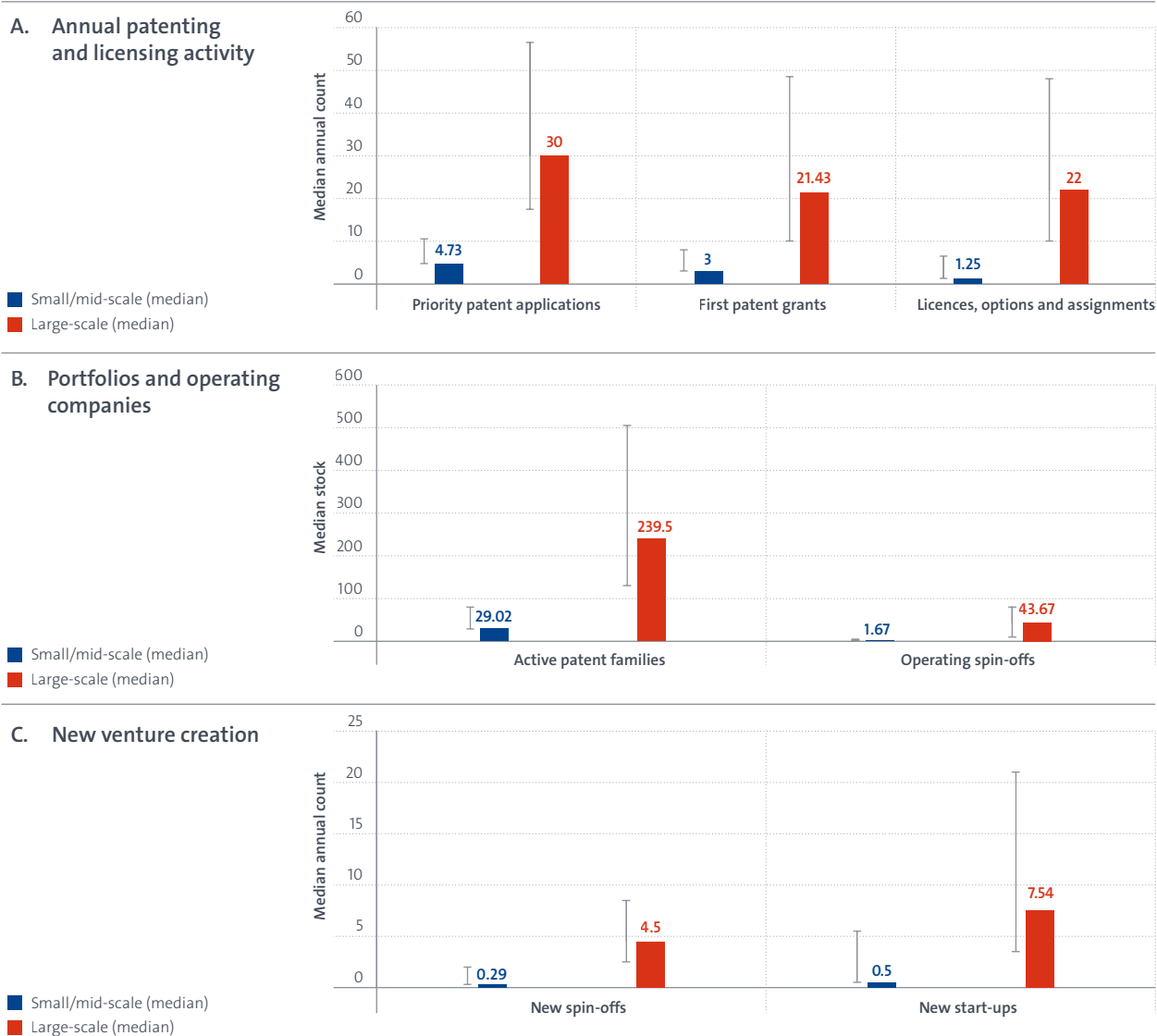
Scale is also visible in downstream activity

The two clusters were formed without using patenting, licensing or venture-creation indicators, which allows analysis to compare the differences in the output variables. The median large-scale TTO reports 29 priority patent applications per year, compared with five in the small and mid-scale group. It also reports a median of 229 active patent families, compared with 31, and almost 27 licences, options or assignments, compared with just over one.

The difference is similarly marked for entrepreneurship. The median large-scale office reports about 41 operating spin-offs, four new spin-offs and eight new startups. The corresponding medians for small and mid-scale offices are fewer than two operating spin-offs, 0.25 new spin-offs and 0.4 new startups. These differences provide an external check on the typology: offices grouped by their upstream capacity and pipeline also report very different volumes of downstream activity. This does not exclude that small/medium TTOs with entrepreneurship focus are amongst the outliers in this group.

Figure 3.13

Median downstream activity by TTO profile



Higher volumes do not by themselves establish that large offices are more effective in their commercialisation activities. They serve larger research systems, receive more disclosures and have more people available to process them. The distinction between scale and effectiveness is examined in Section 3.3.

The consultation sample displayed the same broad distinction. Sixteen of the 21 consulted organisations could be classified as small or mid-scale, and five as large-scale. Smaller offices often described teams with broad responsibilities, limited permanent specialist posts and substantial reliance on project-funded positions or shared staff. Their immediate priority was frequently to keep core patenting, contracting and commercialisation processes operating while responding to new opportunities as resources allowed.

This did not mean that smaller offices lacked expertise or could not produce strong projects. Several had developed substantial portfolios, new proof-of-concept schemes or promising spin-off pipelines with relatively few staff. The main difference was the range of functions that could be sustained simultaneously as well as resources and network available. Proactive scouting, systematic researcher outreach, specialist market analysis, investor engagement, post-deal portfolio management, and access to complementary tools and services were difficult to maintain when the same resources had to be tapped to handle invention disclosures, IP management, contract negotiations and TTO administration.

Large-scale organisations more often described stable and diverse specialist functions, better tools and a longer-term approach. They could allocate dedicated roles to scouting, sector expertise, patent management, licensing, venture building, investor relations or technology validation, and were less dependent on temporary projects to preserve core staffing. In some cases, this capacity was organised through hybrid systems: central experts provided common standards and specialised services, while institute-level or faculty-level staff remained close to researchers and industrial partners.

3.3 What determines effectiveness in TTOs?

Raw output volumes are an incomplete measure of TTO effectiveness. A large office embedded in a major research organisation has more inventions, researchers and potential partners to work with than a small office serving a regional institution. It may therefore produce more patents, licences and spin-offs even when the two offices handle individual cases with similar success. To separate these effects, the analysis considers three complementary perspectives: conversion per invention disclosure, output per TTO staff member and the statistical association between staffing and commercialisation activity after differences in research scale and national setting are taken into account.

These measures describe observable activity, not the full economic or societal impact of technology transfer. They do not capture the quality of individual licences, the survival and growth of ventures, improvements in public services, policy influence or the value of collaborative research. They should therefore be read as indicators of operational effectiveness within the limits of the survey data.

Case-level conversion is broadly similar across the two clusters, while productivity is not

Conversion rates compare an output with the number of invention disclosures entering the office. They ask, in simplified terms, what happens once a potentially transferable result reaches the formal pipeline. Across eight indicators, the two TTO profiles show remarkably similar median conversion rates.

Only two comparisons are statistically significant at 5% in the primary analysis. Small and mid-scale TTOs record a modestly higher ratio of priority patent applications to disclosures, while large-scale TTOs record a modestly higher ratio of operating spin-offs to disclosures. Patent grants, active patent families, new spin-offs, new startups, combined new ventures and LOAs show no statistically detectable difference between the groups.

Table 3.5

Conversion rates by TTO group

Output per invention disclosure	Small/mid scale TTO (median)	Large scale TTO (median)	Mann-Whitney p	Significant at 5%
Priority patent applications	0.471	0.403	0.040	Yes: small/mid TTOs higher
Patents granted	0.275	0.253	0.856	No
Active patent families	2.92	3.03	0.439	No
New spin-offs	0.041	0.048	0.255	No
New startups	0.071	0.089	0.479	No
New ventures (spin-offs + startups)	0.167	0.174	0.647	No
Operating spin-offs	0.328	0.479	0.049	Yes: large TTOs higher
LOAs	0.218	0.244	0.168	No

Note: Primary analysis on the imputed sample (N = 777), with pairwise deletion where an output is missing. LOAs are licences, options and assignments. The Mann-Whitney U test is used because the ratios are strongly skewed. Full methodology and robustness checks are reported in Annex 2.

The data provides little evidence of any systematic scale advantage in the probability that a disclosed invention progresses to most of the observed outputs. A disclosure entering a smaller office is not inherently less likely to become a patent, licence or venture solely because the office belongs to the smaller profile.

A different pattern emerges when outputs are divided by TTO staff FTEs. Large TTOs exhibit significantly higher observed productivity. All eight comparisons are statistically significant at 5% level, all in favour of the large-scale group. Large offices report more patent grants, active patent families, priority patents, licences and venture activity per staff member.

The difference is particularly pronounced at the beginning of the technology transfer pipeline. Large-scale TTOs have around six times as many staff as small/mid-scale offices, broadly in line with the difference in the number of researchers they serve, and therefore implying a broadly comparable TTO-staff-to-researcher ratio. Yet, they report around 15.8 times as many invention disclosures. This suggests that scale may be associated not only with the capacity to process a larger research base, but also with a greater ability to identify and bring potential inventions into the technology transfer pipeline. Larger offices can distribute scouting and researcher engagement across specialised staff and sustain more systematic contact with research teams.

This pattern should nevertheless be interpreted cautiously. The analysis is descriptive and does not establish that TTO size itself causes the higher level of invention disclosure: larger offices serve institutions with a higher funding intensity of the research base, reporting approximately 22 times as much research expenditure than their smaller counterparts. In addition, the institutions may also differ in their technological orientation, internal incentives or technology transfer culture. The results therefore point to an association between scale, organisational capacity and the breadth of activity rather than to a causal effect of TTO size.

Table 3.6

Output per TTO staff FTE

Output per TTO FTE	Small/mid- scale TTOs (median)	Large- scale TTOs (median)	Mann-Whitney p	Significant at 5%
Priority patent applications	0.679	0.902	0.034	Yes: large TTOs higher
Patents granted	0.449	0.784	0.019	Yes: large TTOs higher
Active patent families	4.93	5.91	0.026	Yes: large TTOs higher
New spin-offs	0.037	0.134	<0.001	Yes: large TTOs higher
New startups	0.015	0.208	<0.001	Yes: large TTOs higher
New ventures (spin-offs + startups)	0.161	0.365	<0.001	Yes: large TTOs higher
Operating spin-offs	0.244	1.336	<0.001	Yes: large TTOs higher
LOAs	0.202	0.720	<0.001	Yes: large TTOs higher

Note: Primary analysis on the imputed sample (N = 777). Full methodology and complete-case robustness checks are reported in Annex 2.

Larger TTOs are associated with higher output per staff FTE, but productivity gains cannot be explained by staffing levels alone

A cross-sectional regression provides further insights about the role the size and resource endowment of the TTO plays for the economic outcome variables, using the TTO staff FTE figure as an indicator. It allows analysis to investigate whether the source of the productivity advantage of larger TTOs can be attributed solely to larger invention pipelines and research bases. It examines 256 European TTOs for which staff FTEs, research expenditure, invention disclosures and country information were all directly reported, and asks whether TTO staff size is positively correlated with commercialisation indicators, after controlling for the impact of the other variables, including country environment.

The regression estimates show that, within the subset of TTOs, higher staff FTE is statistically associated with higher expected levels of all five commercialisation outputs examined – LOAs, new spin-offs, new startups, new ventures, and operating spin-offs – even after accounting for differences in disclosure volume, research expenditure, and country. The association is strongest for new startups (a doubling of staff is associated with roughly 53% higher

expected startup formation) and somewhat smaller for new spin-offs (≈36%), and more modest for LOAs and operating spin offs (≈21-23%). In other words, within this complete case cross section, offices that are more heavily staffed also tend to be those with higher levels of licensing and venture creation, with the association being most pronounced for the flow of new entrepreneurial ventures and somewhat less pronounced for accumulated stock measures such as operating spin-offs. The results show that TTOs with larger staff teams but similar research resources and similar numbers of invention disclosures tend to be offices that also report greater licensing and venture creation activity; however, they do not, on their own, demonstrate that changes in staff numbers cause changes in output for any given TTO. In this context, staff FTE is best interpreted as an indicator of TTOs that operate with more resources and capacity, rather than as a direct causal lever.

This is confirmed by a panel analysis using the annual ASTP data with TTO fixed effects and year fixed effects, which examines whether within-TTO changes in staff FTE over time are associated with within-TTO changes in LOAs, spin-offs, startups, new ventures, operating spin offs, patents granted, or active patent families: in those models, the staff FTE coefficient is small and not robustly significant across specifications, indicating that, given the limited

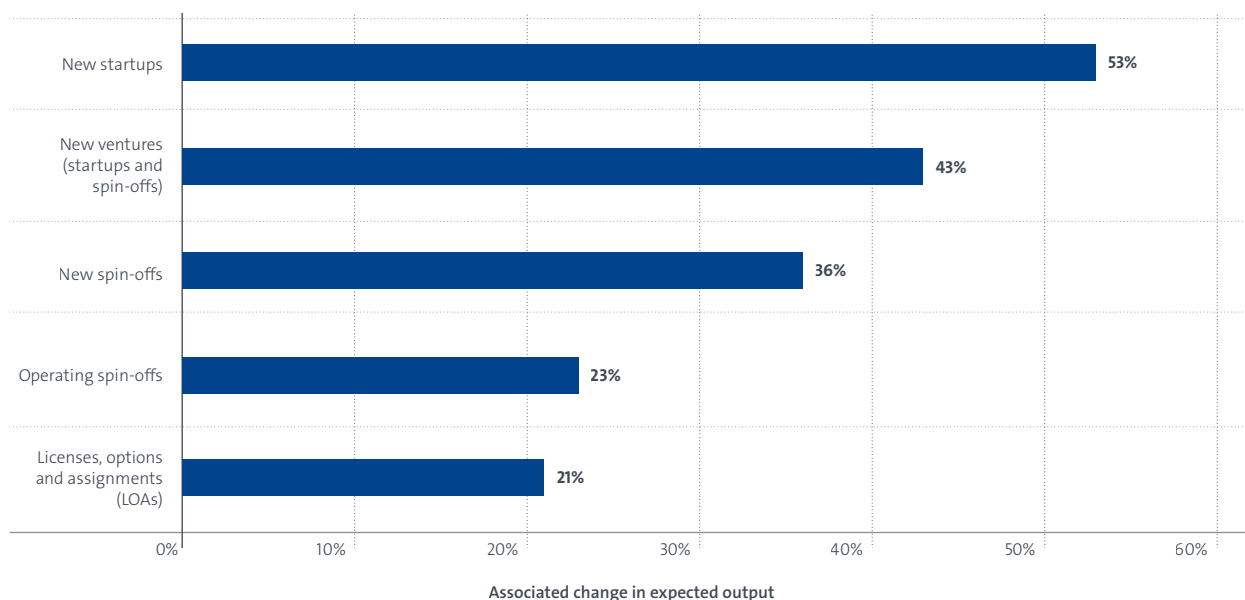
time span and modest within-TTO variation in staffing, the available data do not show a clear short run effect of staff increases on output at the level of individual offices.

In the same models, both invention disclosures and research expenditure show positive associations with commercialisation output, with invention disclosure volume generally emerging as the strongest single predictor. This pattern is consistent with the idea that TTOs embedded in larger or more active research environments, and those handling more invention disclosures, tend also to be those reporting higher levels of licensing and entrepreneurial activity. Interestingly, the establishment year shows no significant impact on the output variables, suggesting that the age of the TTO in itself may not have such a significant impact on the commercialisation success of an office.

The cross-sectional results should not be interpreted as implying that adding a given number of staff will automatically generate the corresponding increase in output for an individual TTO. Rather, institutions with larger TTOs tend to achieve higher commercialisation outputs even when they have similar research expenditures and invention disclosure volumes, suggesting that TTO capacity is associated with stronger technology transfer performance. Larger offices may differ in ways that extend beyond staff numbers, including greater organisational maturity, more specialised expertise, stronger industry and investor networks, established relationships with incubators and accelerators, dedicated internal funding mechanisms, more systematic invention scouting and stronger institutional support. Staff size may therefore partly reflect a broader set of capabilities that support technology transfer. Larger TTOs are also more likely to devote resources to awareness raising, researcher training and institutional outreach activities, which can contribute indirectly to commercialisation success.

Figure 3.14

Association between TTO staffing and commercialisation output



Note: Approximate percentage difference in expected output associated with a doubling of staff FTE in cross-sectional negative-binomial models controlling for research expenditure, invention disclosures and country. The estimates are associations, not causal effects.

Source: EPO analysis based on ASTP survey data

Table 3.7

Staff FTE association with commercialisation outputs

Output	Observations	Staff FTE IRR	p-value	Expected change if staff doubles
LOAs	248	1.21	0.007	approximately +21%
New spin-offs	243	1.36	<0.001	approximately +36%
New startups	217	1.53	<0.001	approximately +53%
New ventures	215	1.43	<0.001	approximately +43%
Operating spin-offs	204	1.23	0.011	approximately +23%

Note: Non-imputed complete-case sample with country fixed effects. IRR = incidence rate ratio. The model specification and alternative pipeline controls are reported in Annex 2.

Effectiveness depends on TTO capability, not scale alone

Taken together, the results point to a structural capacity interpretation. Large-scale TTOs produce much higher total volumes and higher output per staff member, but most conversion rates per disclosed invention are similar across the two profiles. The advantage of scale therefore appears to lie less in transforming each individual disclosure and more in the ability to handle a larger pipeline, spread fixed functions across more cases and sustain a broader set of specialist capabilities.

For policy and institutional benchmarking, this distinction matters. Metrics intended to assess case-level commercialisation should compare like with like and give weight to the size and composition of the invention pipeline. Raw output per staff member can be informative about throughput, but it may penalise offices whose mandates include extensive outreach, training or early-stage support that is not captured in the output variables. Likewise, merging or enlarging an office should not be assumed to improve the prospects of every individual invention.

The evidence nevertheless supports selective economies of scale. Patent prosecution, specialist legal advice, market intelligence, valuation, common licensing templates, proof-of-concept selection, founder training and investor showcasing can often be pooled across institutions. Shared services can give smaller offices access to expertise that they could not sustain in a permanent post. The regional model described in one consultation interview illustrates this division: the university retained local responsibility for its IP pipeline

and for remaining close researchers, while proof-of-concept funding, founder development, executive matching and investor engagement were organised jointly across multiple institutions.

The first requirement, however, is to keep this shared capacity in balance with proximity to researchers. Most consulted participants in the consultation stressed that effective transfer depends on trust and regular contact with scientists. Identifying promising results, understanding what researchers need and encouraging them to disclose inventions cannot be delivered only through a remote central service. Some of the largest organisations therefore combine central specialist capacity with people embedded in institutes, faculties, laboratories or hospitals. One hospital network created a dedicated scouting team specifically because a central office could not otherwise remain visible across dozens of sites. Shared services are therefore most useful when they strengthen specialist functions, while local presence remains responsible for researcher engagement.

Smaller offices offered a complementary perspective. Many had substantial practical experience in managing modest patent portfolios and developing promising projects with limited resources. Their recurring constraint was not necessarily the handling of an individual case, but the inability to sustain proactive functions over time and access to complementary resources. Project-funded positions could create a capability for several years and then remove it; a small team could recruit a patent or business-development specialist but not both; and urgent transactions could displace longer-term researcher engagement. Participants frequently linked larger and more stable

teams with greater specialisation, closer relationships with research groups and the capacity to build trust before a disclosure or negotiation became urgent.

Interpreting the results

The evidence points to a clear distinction between output and case-level effectiveness. Large-scale TTOs report much higher levels of patenting, licensing and venture creation, but this does not mean they are consistently better at converting each disclosed invention into an outcome. Their main advantage appears to be the ability to manage larger pipelines, spread fixed functions across more cases and sustain a broader range of specialist services. Smaller offices may handle individual technologies just as effectively, while producing lower total volumes because they serve smaller research bases and receive fewer opportunities. Where scale does matter at case level is through capabilities that smaller offices often lack on their own: specialist legal, market and valuation expertise; a wider pool from which to select projects based on cross-reviewed expert evaluation; and access to industry, investor and incubator networks. Those advantages can improve selection and deal quality, but they are not automatic and they still depend on remaining close to researchers.

The cross-sectional analysis shows a positive association between staffing and commercialisation activity, even after accounting for research expenditure, invention disclosures and country differences. Larger teams tend to report more licences, spin-offs and startups, and this result remains broadly similar when patent grants or active patent families are used as alternative measures of the pipeline.

This should not be interpreted as proof that adding staff alone will increase output. The panel analysis does not identify a robust short-term relationship between changes in staffing and changes in results within the same TTO, although the time series is limited. Staff FTE is therefore better understood as a proxy for wider organisational capacity: specialised roles, established processes, professional networks, funding instruments and experience in areas such as IP strategy, licensing, market assessment, venture building and post-deal management.

The practical implication is to build durable capability, not simply to increase headcount. This requires sufficient permanent staffing, appropriate expertise, effective recruitment and retention, reliable internal processes, and access to the funding and external networks needed to move technologies towards impact.

This matters for institutional and public support. Measures aimed at improving the quality or success of individual cases should not assume that consolidation will automatically raise conversion rates. Outcomes per disclosure are broadly similar across the two profiles. Scale can still improve case-level work through better selection, specialist expertise, and access to industry, investor and incubator networks. Those advantages are not automatic, however, and they still depend on remaining close to researchers. By contrast, measures aimed at increasing capacity and throughput may benefit more directly from pooled services, shared expertise and common infrastructure.

The consultation interviews reinforce this interpretation. Several smaller offices had developed credible patent portfolios, proof-of-concept programmes and spin-off pipelines despite limited staff. Their main constraint was the number of functions they could sustain at once. When a small team has to manage disclosures, patent decisions, negotiations, contracts, business development and administration, it is harder to maintain proactive work such as scouting, researcher outreach, market analysis and post-deal support. Reliance on project-funded or shared posts also makes it more difficult to retain expertise and provide a stable service over time.

Scale does not require full centralisation

Economies of scale do not mean that every function should be concentrated in one central office. The interview consultations with the TTOs repeatedly highlighted the importance of trust, visibility and regular contact with researchers. Transfer professionals are more likely to identify promising results when they understand the scientific environment, are known by research teams and can become involved before publication or project completion.

Effective systems therefore often combine central expertise with local proximity. Specialist legal, IP, licensing, advanced business development or venture

functions can be pooled, while scouts or technology transfer staff remain embedded in faculties, institutes, laboratories or hospitals. The recurring lesson is that some services benefit from scale, but scientific proximity and relationship-building require a visible local presence.

While conversion rates and output-per-staff measures provide useful additional perspectives, they also have limits. Technology transfer unfolds over several years, some indicators are annual flows while others are accumulated stocks, and the survey does not capture the quality or long-term impact of individual transactions. Output per staff member may also understate the contribution of offices that devote substantial effort to awareness raising, training, early scouting and relationship-building.

Performance assessment should therefore use a balanced set of indicators and compare TTOs with offices serving similar research bases, mandates and institutional settings. Overall, effective technology transfer depends less on one ideal organisational size than on the alignment between mandate, resources, operating model of the TTO and the involvement of the research institution in research valorisation. Smaller offices may need more stable staffing and access to shared specialist services; larger offices benefit from specialisation and scale but still require structures that preserve trust and proximity to researchers.

4. Challenges and current responses

European research institutions are taking greater responsibility for protecting and managing academic inventions, while technology transfer offices are expected to support an increasingly broad path from research results to market and societal use. The evidence in this study shows that this institutionalisation has progressed substantially, but that the conditions for commercialisation remain uneven. This section therefore separates diagnosis from response. It first identifies the recurring constraints described by TTOs and relates them to the quantitative evidence presented earlier, and then reviews European, national and institutional initiatives that are already addressing parts of that challenge landscape.

4.1 The current challenges for technology transfer

The in-depth interviews with 22 European technology transfer organisations provide a closer view of the frictions that sit behind the quantitative patterns described earlier

in this study (more information on the interviews in Annex 1). They do not point to a single bottleneck, rather, they show a sequence of linked constraints that can arise from the moment a research result is recognised right through to protection, maturation, transaction and market uptake. Six challenge areas recur across the interviews and help explain where promising technologies can lose momentum along that pathway.

This reading is consistent with the broader European policy approach to knowledge valorisation, which increasingly treats researcher incentives, professional capacity, intellectual-asset management, intermediary functions, networking and impact measurement as parts of the same system rather than as separate policy questions (Council of the European Union, 2022; European Commission, 2023; European Commission, 2024). The consultation counts indicate how widely each challenge appeared in the sample and how often it was described as a particularly important constraint.

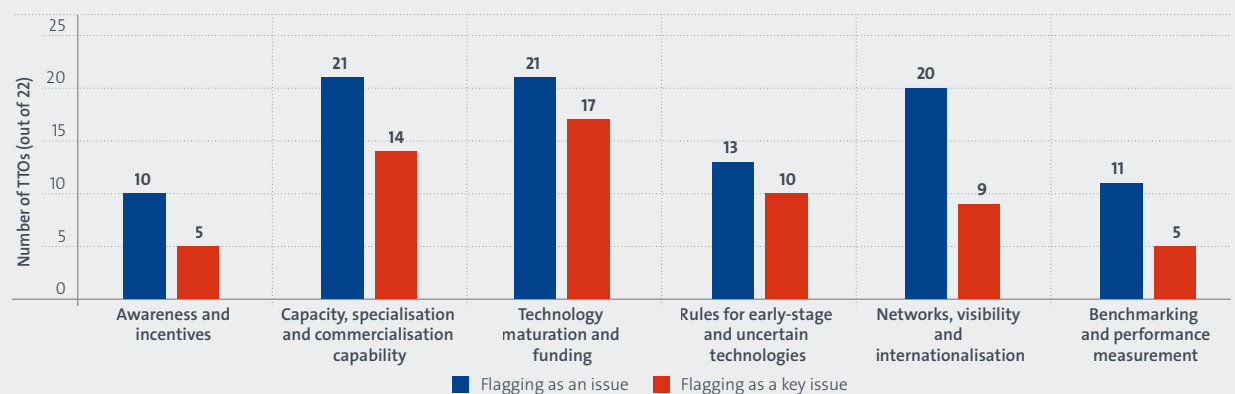
Box 4.1: Consultation evidence on recurring TTO challenges

To make the 22 anonymised consultation interviews more comparable, a large language model (LLM) was used to support a structured coding of the consultation material against 12 recurring issues. Each issue was coded on a three-point scale: 0 where it was not material or not raised, 1 where it was relevant, and 2 where it was repeatedly or strongly emphasised as a major constraint. Related issues were then grouped into the six broader challenge areas used below.

The counts are descriptive of this purposively selected consultation sample. They are intended to make the qualitative evidence more transparent and comparable, but they should not be read as statistically representative estimates for all European TTOs or as evidence that any one challenge causes a particular patenting or commercialisation outcome.

Figure 4.1:

Recurring challenge areas identified in the consultation interviews



Source: EPO analysis of 22 TTO consultation interviews.

4.1.1 Awareness and incentives to develop research that reaches the TTO

Effective technology transfer begins before a formal invention disclosure reaches the TTO: researchers must first recognise that a result may have commercial potential, understand when protection or industry engagement could be relevant, and see valorisation as a legitimate part of their work. The consulted TTOs identified a lack of awareness and incentives as a key barrier in this regard, particularly weak researcher recognition and institutional cultures that do not prioritise valorisation – issues that were raised by 11 of the 22 consulted TTOs, including 6 that treated these issues as a key constraint. Another topic, not coded as a separate quantitative variable but recurring throughout the interviews, was the limited capacity of the TTOs themselves to reach researcher teams early through scouting and regular engagement. This emphasis on incentives and engagement is also reflected in recent EU guidance on industry-academia co-creation (European Commission, 2024).

Several offices described moving away from a largely passive model – where researchers approach the TTO themselves – toward more systematic scouting, training, mentoring and contact with research groups. The ASTP evidence shows why this front end of the pipeline matters: the median TTO receives just 9.1 invention disclosures a year, with very large differences across offices. Yet one consultation described how disclosures increased from around 15-20 to 55-60 once more systematic scouting was introduced. Disclosure volumes therefore seem to reflect not only the scale and scientific profile of the research base, but also how effectively potential inventions are recognised and brought into the transfer process early enough for the institution to act.

4.1.2 Capacity, specialisation and commercialisation capability

Once a promising result reaches the TTO, the question is whether the office has the capacity to act on it. In practice, this extends beyond headcount to staffing continuity, specialist commercial and entrepreneurial expertise, reliable resources for IP protection and the institutional support needed to build experience over time. At least one capacity-related issue was raised by every consulted TTO. Staffing or operating capacity was raised by 21 of 22 TTOs, including 14 that treated it as a key issue, while access to commercial or CEO talent was raised by all 22 TTOs.

The survey evidence puts these concerns in perspective. The median European TTO employs 6.7 FTEs and roughly one TTO staff member for every 108 researchers – and around nine in ten offices fall into the small and mid-scale profile identified in the study. Larger offices can sustain a wider range of specialist functions and report higher output per staff FTE. Staff size also remains positively associated with licensing and venture outputs, even after accounting for research expenditure and invention disclosures, though these associations are not causal. The consultations help explain this pattern: several interviewees described the real difficulty not as handling any single invention well, but as maintaining patent, market, licensing, venture, investor and portfolio capabilities across many cases at once.

For some offices, the constraint arises even earlier. Several consultations described pressure on patent budgets, reliance on project-funded positions or the absence of a dedicated central budget from which protection costs could be paid. The recent EPO data presented in the introduction show that the long expansion of direct applications from European research institutions has recently plateaued. The interviews do not establish that budget pressure caused this development, but they illustrate the trade-offs some TTOs face: where patent protection is needed, uncertain or insufficient funding can prevent an invention from being protected before publication, narrowing the commercialisation options available later.

4.1.3 Technology maturation and funding

A protected invention may still be far from the point at which a company or investor is willing to take it forward. The consultations consistently identified a large gap between scientific feasibility and market readiness. The individual issues grouped under this challenge include issues with translational and proof-of-concept funding, low technology readiness levels (TRL)⁸ and long development timelines, lack of investor or growth capital, and difficulty retaining founders or entrepreneurial teams. All 22 TTOs interviewed raised translational or proof-of-concept funding issues and low-TRL or long-development timelines; proof-of-concept funding was a key issue for 17 and long development timelines for 14 of them. Investor or growth-capital constraints were raised by 20 TTOs, while founder commitment or continuity was raised by 13.

Promising research often enters the transfer process with substantial uncertainty still unresolved. Consulted offices referred to prototypes, engineering work, manufacturing validation, regulatory development, customer testing, scale-up and, in some cases, clarification of the final application itself as areas where uncertainty remained. This is especially relevant in view of the recent patent evidence presented in Figure 1.3: European research institutions account for substantial shares of patenting in biotechnology, pharmaceuticals, quantum technologies and other strategically important fields where development can remain technically demanding and capital intensive long after the initial scientific result.

The interviews drew a clear distinction between protecting an invention and making it transferable. The stronger approaches described by TTOs combined validation finance with technical support, external market feedback, milestones and explicit stop/go decisions.

4.1.4 Rules for early-stage and uncertain technologies

Commercialising early-stage research requires public institutions and private partners to work across rules that were not always designed with uncertain technologies, young companies or transactions involving several research organisations in mind. The consultations highlighted legal and regulatory fragmentation, IP co-ownership and negotiation, unclear decision mandates, public-sector constraints on equity, researcher or clinician dual roles, procurement requirements and internal approval processes as themes relating to this challenge. Legal or regulatory fragmentation was raised by 20 of the 22 consulted TTOs, including 10 that treated it as a key issue; IP co-ownership or negotiation difficulties were raised by 19, including 8 who saw it as a key issue.

These frictions become more pronounced when ownership is shared across institutions, as is common in collaborative and multi-partner research. Shared ownership can require several organisations to align IP strategies, approval processes and negotiating positions before a technology can move forward. European guidance similarly places emphasis on clear governance, decision-making procedures and intellectual-asset strategies in collaborative research (European Commission, 2023; European Commission, 2024).

The concern raised by TTOs was therefore not so much the absence of uniform financial terms as the cost of avoidable uncertainty. Unclear ownership, several approval layers, restrictions that investors cannot anticipate, or negotiations that begin without agreed parameters can delay a licence, collaboration or spin-off at precisely the stage when both the technology and the commercial team are already carrying substantial risk.

⁸ TRL stands for Technology Readiness Level, which is a standardized measurement system used to assess the maturity and development progress of a specific technology. It uses a scale from 1 to 9, where TRL 1 represents basic scientific research and TRL 9 indicates a fully proven technology that is already deployed.

4.1.5 Networks, visibility and internationalisation

Technology transfer ultimately depends on finding the company, investor, entrepreneur or other user able to take a technology forward. Several consultations identified market access as a distinct constraint, encompassing partner discovery and matching, investor and entrepreneurial networks, the limits of local industrial ecosystems, and the ability to reach relevant partners internationally. Twenty-one of the 22 consulted TTOs raised at least one market-access or ecosystem issue. Partner discovery or market matching was raised by 20 TTOs, stressing the technology push nature of academic IP, and international or local-ecosystem limitations by the same number; each was treated as a key issue by 9 of the TTOs.

Several offices, particularly in smaller markets or specialised fields, described internationalisation as part of the commercialisation strategy from the beginning rather than as a final step. The need for wider market access becomes more important as direct institutional patenting becomes more geographically distributed across Europe: the share accounted for by the three leading countries fell from 68.5% in 2006 to 56.0% in 2025 (Figure 1.2), so that a larger share of technologies now originates outside these core countries.

The interviews also made clear that visibility is not the same as effective matching. Databases and technology listings can make inventions easier to discover, but successful partner search still depends heavily on active brokerage, sector knowledge, trusted contacts and repeated interaction with companies and investors. This echoes European policy guidance, which identifies networking, relationship-building, digital platforms and brokerage as enabling conditions for stronger industry-academia collaboration (European Commission, 2024).

4.1.6 Benchmarking and performance measurement

A final challenge concerns how technology transfer performance is understood and compared. TTOs need indicators that help them manage their activities and demonstrate value to their institutions and funders, but the consultations repeatedly questioned whether the most readily available metrics capture the outcomes that matter. Twelve of the 22 consulted TTOs raised a mismatch between existing performance indicators and the results they considered important, with 6 treating this as a key issue. Interviewees frequently pointed beyond standard measures of patents, licences, spin-offs and income toward less tangible but still valuable outcomes such as software and data transfer, know-how, long-term industrial partnerships, public-health benefits and other forms of societal value.

The pooled ASTP data illustrate a related comparability problem. The survey covers 809 TTOs, but reporting varies substantially by indicator, while annual flows, accumulated stocks, institutional mandates and reporting practices cannot always be compared directly. The survey is therefore a major foundation for European benchmarking, but not a basis for a single performance ranking. More useful comparisons require sustained reporting, clearer definitions and peer groups that reflect institutional scale, mandate, technology mix and surrounding ecosystem, complemented where possible by longer-term outcomes and case evidence. This direction is consistent with the EU knowledge-valorisation framework, which encourages the use and sharing of metrics for learning and performance improvement rather than reliance solely on narrow financial measures (Council of the European Union, 2022).

4.2 Emerging areas of action across Europe

Many of the challenges identified above are already being addressed through European, national and institutional initiatives. These responses differ in design and scale, and do not point towards any one, single European model for technology transfer. They nevertheless reveal five recurring areas of action: making licensing and spin-off creation more predictable; embedding valorisation more firmly in institutional strategy and measurement; creating scale around specialist capabilities and technology maturation; improving the visibility of research technologies and access to markets; and strengthening the professional capabilities and networks available to technology transfer practitioners.

4.2.1 Making licensing and spin-off creation simpler and more predictable

A first area of action concerns the rules governing the transfer of early-stage research. The objective is not to impose identical commercial terms across technologies or institutions, but to reduce avoidable uncertainty around processes, decision-making and the starting points for negotiations. Clearer frameworks can shorten transaction times and make expectations more predictable for researchers, TTOs, founders, companies and investors.

This direction is increasingly visible across Europe. In the Netherlands, the National IP Deal Term Principles were developed into a national standard in 2025, building on principles introduced in 2023. They provide a common framework for agreements between research institutions and academic spin-offs on access to intellectual property, with the aim of increasing transparency, consistency and speed while preserving flexibility for individual transactions (Universities of the Netherlands and Techleap, 2025).

Denmark has adopted a similarly coordinated approach. Its University IP Commercialisation Framework provides two standard licensing models for patent-based university spin-offs, using a common legal structure and transparent financial terms across all Danish universities. The framework was developed jointly by the universities and organisations representing industry and investors; where neither model is suitable, a custom-tailored bespoke agreement remains possible (Danish Ministry of Industry, Business and Financial Affairs, 2025).

Ireland provides a longer-standing example of standardisation as practical infrastructure rather than prescription. Knowledge Transfer Ireland maintains national model agreements and practical guides covering licensing, collaborative research, joint ownership and spin-off formation. The documents are intended as starting points for negotiation and are not mandatory, reducing the need for institutions and companies to construct every transaction from scratch (Knowledge Transfer Ireland, 2019).

Germany is also developing stronger reference points for IP transactions. The national IP Deal Database, launched in 2025 by TU Berlin in co-operation with TransferAllianz and supported through the federal EXIST programme, collects anonymised information on IP-transfer agreements between research organisations and technology-based startups. Its purpose is to improve transparency on market practice and support more informed and efficient negotiations (TU Berlin, 2025). The recently introduced German Spin-off Framework (GSOF) follows a similar path: developed in collaboration with some of the most relevant institutions in the country such as the Fraunhofer Society, Max Planck Society and leading universities such as the Technical University of Munich (TUM), it provides a range of terms for licensing and equity agreements that can be used voluntarily in Germany by TTOs all across the country.

France has also moved in this direction. In 2026, the Ministry of Higher Education and Research (MESR) published From Lab to Startup: Good Practice Guidelines for Licence Negotiation, a non-binding reference framework designed to facilitate negotiations between public research organisations and startups by promoting greater transparency, consistency and predictability in licensing practices, while preserving flexibility for individual transactions.

At European level, the forthcoming EU Blueprint for IP licensing and spin-off creation under the Lab to Unicorn initiative is moving in the same direction. It is expected to provide practical guidance on licensing academic IP, royalty and revenue sharing, equity participation, researcher incentives and spin-off creation while allowing for differences between sectors and technologies (European Commission, 2026a).

4.2.2 Embedding valorisation in institutional strategy, incentives and measurement

A second area of action is to place knowledge valorisation more clearly within the research institution's strategy and management rather than treating it as a peripheral administrative function. This includes clear mandates, stable resources, recognition of valorisation in institutional and researcher objectives, and indicators that capture different routes through which research creates economic and societal value.

Flanders provides a concrete example of linking resources to valorisation activity. The allocation formula for the Industrial Research Funds combines traditional research indicators with measures of industrial contract income, EU Framework Programme income, patents and spin-off creation. Separate support for university interface activities can finance researcher awareness, scouting, market analysis, IP protection, licensing and spin-off support. The model therefore links observable valorisation activity with dedicated institutional capacity rather than treating the two separately (Flemish Government, 2024).

Austria is also seeking to strengthen the place of knowledge valorisation within institutional governance. Its National ERA Action Plan 2026-2028 calls for knowledge-transfer and entrepreneurship strategies to be reinforced through university performance and financing agreements, and pursues the goal of substantially increasing the number of economically successful academic spin-offs by 2030 (Austrian Federal Government, 2025).

Spain provides another example of this broader approach. The Ministry of Science, Innovation and Universities is working through dedicated strands on TTO efficiency and performance indicators, professionalisation and career pathways, and the role of TTOs as drivers of regional innovation ecosystems. The national Register of Knowledge Transfer Offices has also established a Plenary Forum intended to operate as a community around improvements in knowledge-transfer and valorisation practice (OEPM, 2026).

At European level, the measurement agenda is broadening beyond patents, licences and commercial income. A Commission expert study published in 2026 proposes 16 indicators and 41 metrics covering commercialisation as well as wider forms of value creation, including university-industry co-patenting, IP use, venture investment in spin-offs, standardisation, policy uptake and societal engagement. The framework also recognises persistent problems of definitions and data comparability and recommends combining quantitative indicators with qualitative evidence where appropriate (European Commission, 2026c).

These examples suggest that stronger measurement should not mean reducing TTO performance to a single score. Common definitions and more stable indicators can instead make it easier to compare similar institutions, understand resource requirements and integrate knowledge valorisation more systematically into institutional decision-making. However, there is more to be done to make these still voluntary measures truly effective across Europe.

4.2.3 Creating scale around specialist capabilities and technology maturation

The evidence in this study also points towards a selective use of scale. A TTO needs to remain close to its researchers, but not every institution needs to reproduce every specialist capability internally. Regulatory knowledge, valuation, specialist legal expertise, market intelligence, founder development, investor engagement and technology maturation finance can often serve several institutions or a wider portfolio.

Finland's Research to Business programme illustrates how a national instrument can concentrate resources on the transition from research to commercialisation. Business Finland provides public research organisations with funding to prepare research-based solutions for commercial use. In its 2026 scheme, it covers 80% of eligible project costs and requires at least 40% of project expenditure to be devoted to commercialisation preparation. Eligible activities include IP and freedom-to-operate analysis, customer and market validation, financing and investor searches, business-model assessment and entrepreneurship training (Business Finland, 2026).

The same logic underpins several initiatives that contributed to this study. France's SATT network pools maturation finance and specialised commercialisation capabilities across groups of research organisations. Research England's Shared TTO Pilot tested whether institutions with smaller portfolios could access stronger capabilities through shared teams, tools, expertise and networks, while Italy's national Proof-of-Concept programme addresses the maturation gap directly by financing the development of patented research towards higher technology readiness levels.

However, shared-service models also require clear and durable governance arrangements. When functions are shared across multiple offices, agreements are needed on the allocation of costs, responsibilities and future revenues from successful outcomes. These arrangements may need to be updated over time and can add complexity.

Box 4.3: France's the SATT network – an example of shared technology transfer capacity

France has developed a distinctive model for technology transfer through its network of Sociétés d'Accélération du Transfert de Technologies (SATTs), created under the national Programme des Investissements d'Avenir ("Investments for the Future Programme") from 2012 onwards. The objective was to address a structural weakness observed in many public research systems: while research excellence was distributed across universities and public research organisations, the critical expertise required to transform scientific discoveries into market-ready innovations was often fragmented and under-resourced.

The SATT model combines the proximity of local engagement with research institutions and the mutualisation of highly specialised technology transfer competencies. Each SATT serves several universities, engineering schools, hospitals and research organisations within a regional ecosystem. Instead of each institution developing its own full set of technology transfer capabilities, the SATTs provide shared access to multidisciplinary teams including intellectual property specialists, business developers, legal experts, licensing professionals and project managers dedicated to technology maturation. This approach enables institutions of different sizes to benefit from professional transfer services while achieving economies of scale and critical mass.

A distinctive feature of the SATT model is its ability to invest directly in the maturation of research results. Beyond traditional IP management and licensing activities, SATTs finance proof-of-concept development, prototype validation, regulatory studies and other de-risking activities that increase the technology readiness of inventions before transfer to industry or the creation of spin-offs. This capacity helps bridge the well-known

"valley of death" between academic research and commercial exploitation.

Fifteen years after their launch, the results demonstrate the effectiveness of this centralised yet territorially embedded approach. As of January 2026, the SATT network had analysed more than 21 000 innovation projects, filed over 4 650 priority patents, signed 2 357 licence agreements, and contributed to the creation of 987 deep-tech startups, which have collectively raised €4.4 billion and generated approximately 7 400 jobs.

Independent assessments have confirmed the economic impact of the model. An evaluation conducted for the French National Research Agency (ANR) found that spin-offs originating from SATT-supported technologies experience substantial growth effects following technology transfer, while stakeholders report high levels of satisfaction with SATT services. Investors particularly value the ability of SATTs to de-risk technologies and prepare ventures for subsequent financing rounds.

The French experience illustrates an important lesson for Europe: enhancing research valorisation does not necessarily require every university to develop a fully integrated TTO. An alternative approach consists of creating shared professional structures capable of concentrating scarce expertise, mobilising investment for technology maturation, and building stronger interfaces between public research and industry. In this respect, the SATT network offers a replicable example of how public policy can strengthen innovation capacity, increase the impact of publicly funded research and contribute to European technological sovereignty and competitiveness.

Source: Contribution from SATT.

Box 4.4: United Kingdom – testing shared TTO capacity

Research England's Shared Technology Transfer Office (TTO) Pilot tested whether universities could strengthen research commercialisation by sharing specialist expertise, resources and infrastructure. The pilot responded to a structural issue also visible in this study: institutions with smaller research portfolios may generate promising inventions but lack the volume or resources needed to sustain a full range of specialist commercialisation functions internally. The initiative therefore explored whether collaboration could widen access to expertise without requiring every university to build the same capabilities on its own.

Run through the Connecting Capability Fund between November 2024 and April 2025, Research England invested GBP 4.74 million in 13 projects across England. More than 81 organisations participated, including higher education providers, hospitals, local authorities, investors and professional-services partners. Projects tested different forms of shared capacity, including pooled commercialisation pipelines, common training, specialist advice, shared tools and templates, and stronger links to investors and other market actors.

One example was the Manchester-Salford Commercialisation Consortium, led by the University of Manchester, which brought together all universities in Greater Manchester around a city-region approach to commercialisation. The consortium sought to share expertise and resources, create a more sustainable professional community and co-ordinate IP-commercialisation outreach. The pilot also helped stimulate institutional investment: Manchester

Metropolitan University, for example, developed a ten-point commercialisation plan including new professional and academic posts and additional budget for commercialisation activity.

Across the pilot, 323 commercial opportunities were progressed, more than 850 participants received training or skills-development support, and six spin-offs progressed directly from the programme, with further projects continuing after the pilot. Participants also produced shared guides, toolkits and template documentation intended for wider use across the sector. These outcomes illustrate the potential of shared structures to create critical mass and widen access to capabilities that may otherwise be difficult for smaller offices to maintain.

The pilot also highlighted an important implementation lesson: while its compressed six-month timetable accelerated activity, some projects found that agreeing collaboration frameworks and initial commercial arrangements required more time. The independent evaluation therefore pointed to the value of continued outcome tracking, better visibility of knowledge assets and longer-term support where shared arrangements are expected to become durable. The experience suggests that pooling capacity can indeed complement local TTOs, but works best when relationships, responsibilities and funding are given enough time to mature.

Source: Research England contribution to the study and evaluation of the Shared TTO Pilot.

Box 4.5: Italy – Proof-of-Concept funding to bridge invention and market

Italy's Proof-of-Concept (PoC) Call provides an example of a national instrument designed specifically for the gap between patent protection and industrial uptake. Launched in 2019 by the Ministry of Enterprises and Made in Italy (MIMIT), the programme supports universities, public research bodies and IRCCS research hospitals in developing patented inventions towards application. Its objective is not simply to finance additional research, but to increase the technology readiness level (TRL) of protected inventions and make them more attractive for licensing, industrial collaboration or spin-off creation.

The instrument was conceived to address both a financial and a managerial gap. Early-stage patented technologies may require prototypes, validation, equipment, specialised technical work or market-oriented support before an external partner is prepared to invest. The programme therefore finances development activities while encouraging research institutions and TTOs to organise patent selection, project management and commercialisation more systematically. Eligible expenditure has included non-permanent research and technical staff, materials and equipment, software and specialised consultancy.

The scheme expanded significantly between its first and second editions. The 2019 call had a budget of around EUR 5.3 million and covered up to 70% of eligible project costs, with a maximum contribution of EUR 40 000 per PoC. Under the 2022 edition integrated into Italy's National Recovery and Resilience Plan, the budget increased to EUR 8.5 million, support rose to 90% of eligible costs and the maximum contribution increased to EUR 60 000 per PoC. Beneficiaries were given time to select patents internally and projects could run for up to 18 months, reflecting the need for a structured maturation period rather than one-off support.

Monitoring of 155 funded patents indicates substantial technological progression: the average TRL increased from 3.5 to 5.8. By April 2025, the programme had been associated with 31 academic spin-offs, 41 licensing or assignment agreements, 44 third-party research collaborations, 115 new products or services and 14 derivative patents. These outcomes illustrate the range of routes through which maturation funding can support valorisation rather than assuming that every project should end in the same type of transaction.

The programme also appears to have influenced organisational practice. Monitoring reported stronger awareness of valorisation inside participating institutions, additional marketing and negotiation skills for researchers and TTO staff, and the consolidation of internal patent-evaluation committees, in some cases involving external experts. At the same time, implementation highlighted continuing constraints: life-science projects may require larger budgets and longer timelines, TRL assessment is not always straightforward and institutions can still face difficulties financing patent protection and maintenance once PoC support ends.

The PoC framework has subsequently moved from a pilot measure towards a more structural policy instrument. Its inclusion in Italy's 2026-2028 strategic policy framework for knowledge valorisation and technology transfer reflects the growing role of technology maturation funding as part of the national commercialisation infrastructure. The Italian experience therefore illustrates how dedicated PoC finance can complement TTO capacity by giving protected inventions a defined pathway for technical and commercial development before market transfer.

Source: MIMIT/UIBM contribution to the study; Proof-of-Concept monitoring and 2025 impact evaluation.

Table 4.1:

Selected outputs of the Italian Proof-of-Concept programme, values updated to April 2025.

Output	Value
New academic spin-offs	31 spin-offs
New licensing and assignment agreements	41 agreements
New third-party research contracts	44 initiatives
New patents	14 new patents
New products or services	115 new products or services
New calls for proposals	21 new calls
Public engagement initiatives	6 initiatives

Source: MIMIT/UIBM contribution to the study

4.2.4 Making technologies more visible and connecting them with markets

Technology maturation only creates value if technologies can subsequently find the companies, investors, entrepreneurs and other users able to take them forward. Initiatives across Europe therefore increasingly seek to strengthen the market-facing side of technology transfer through common platforms, active brokerage and professional networks.

National professional networks can also develop common market infrastructure. In Italy, Netval manages Knowledge Share together with the Italian Patent and Trademark Office and Politecnico di Torino. The platform provides a common interface for patented technologies, spin-offs, research expertise and open-innovation opportunities from the Italian public research ecosystem. It now contains more than 4 000 entries and continues to add new technologies, illustrating how a TTO network can build shared visibility and matchmaking infrastructure (MIMIT, 2026). Spain similarly combines national registers with professional networks including RedTransfer and RedOTC and has established a forum connecting registered knowledge transfer offices (OEPM, 2026).

France offers a similar example through Tech-365, a shared marketplace operated by the SATT Network that aggregates technologies, startups and innovation opportunities from public research organisations, providing companies with a one-stop shop for technology sourcing and partnership development. In Flanders, the five Flemish universities cooperate through TTO Flanders, providing companies with a common entry point to university expertise, technologies available to business and collaboration with university spin-offs. The initiative does not replace the individual university TTOs, rather it adds a shared market-facing layer over locally organised transfer capabilities (VLAIO, n.d.).

At European level, the European TTO Circle brings together 35 major research and technology organisations and acts as a hub for exchange of practices, collaboration and the exploitation of member knowledge portfolios (European Commission JRC, 2026). The EPO Observatory's Deep Tech Finder adds a complementary patent-based layer by connecting patent information on European universities, research organisations and startups with business and investment information (EPO, 2026).

These initiatives address an important distinction identified in the consultations: making a technology visible is necessary, but visibility alone does not guarantee a commercial match. Effective transfer also depends on active brokerage, sector knowledge and trusted relationships with prospective users.

4.2.5 Building professional capability through learning, peer support and connected networks

The final area concerns the capabilities of the technology transfer profession itself. Modern TTOs need combinations of IP and contractual expertise, technical understanding, market assessment, business development, finance, entrepreneurship and negotiation skills. These competencies cannot be developed through formal training alone; they also depend on repeated exposure to cases, peer learning and access to specialist communities.

National and European networks already play an important role. Most countries have by now at least one national association of TTOs that, which combines professional exchange and training with wider networking functions (like TransferAllianz in Germany, Réseau SATT in France, Knowledge Exchange UK in the United Kingdom or Netval in Italy). The European-wide ASTP, hosts 35 of these national actors in their National Associations Advisory Committee (NAAC), which unites representatives regularly to share best practices and develop common advice and policy papers representing the technology transfer community. In Europe, the EPO hosts the PATLIB network which provides support, learning, patent tools and a forum to exchange on key topics. With centres distributed across the member states of the European Patent Organisation, the network already combines local accessibility with connections to national patent offices and the EPO. An example of its work with local ecosystem is illustrated in the box below:

Box 4.6: Slovenia – strengthening TTO capability through the PATLIB network



Workshop on intellectual property and licensing for Slovenian TTOs and PATLIB Centres, Ljubljana, 5 June 2026.

Source: Slovenian Intellectual Property Office contribution to the study.

Slovenia provides an example of how a national IP office, PATLIB and professional networks can jointly strengthen the practical capabilities available to TTOs. In June 2026, the Slovenian Intellectual Property Office organised a dedicated workshop on intellectual property and licensing for representatives of TTOs and PATLIB Centres, in cooperation with LES Austria and with support from the EPO. The initiative responded to the need for technology transfer professionals to combine legal understanding with commercial judgement when managing and licensing intellectual assets.

The workshop brought together 29 participants from ten TTOs and PATLIB Centres. Seven of the participating TTOs were also PATLIB Centres, reflecting the increasing overlap between the national PATLIB network and the technology transfer community. Four TTOs had joined the PATLIB network during the previous year. This development is relevant for smaller innovation systems because it allows patent-information capability, commercialisation skills and professional relationships to be reinforced through a common support network rather than developed separately by each institution.

The programme combined an introduction to patents, trade marks, designs and copyright with more commercially focused sessions on licensing models, valuation and approaches to licensing fees. A central element was a hands-on negotiation simulation in which participants worked as licensors and licensees, balancing commercial objectives, risks and contractual positions. The training was based on the internationally

recognised LES100 programme, and presented by practitioners with experience in licensing, technology transfer and patent litigation.

The example illustrates a wider role for PATLIB beyond providing access to patent information. By connecting TTOs with national IP offices, experienced practitioners and common training, the network can help build specialist capability that individual offices may use only intermittently and would struggle to maintain alone. It also creates repeated interaction among professionals working in the same national ecosystem, supporting peer learning and making it easier to share experience on real commercialisation cases.

Taken together, these examples show the value of joining capabilities rather than requiring individual offices to become self-sufficient in every area. Across the five areas, the common direction is towards a more connected support system in which clearer rules, institutional incentives, shared specialist capabilities, market-facing infrastructure and professional networks reinforce one another. Shared services are most useful when they expand what local TTOs can offer without replacing the relationships with researchers on which technology transfer depends.

For the EPO, this places particular emphasis on developing of PATLIB even further/ Building further technology transfer capabilities on this infrastructure could strengthen access to patent intelligence, IP strategy, training and specialist expertise and, over time, support stronger connections to commercialisation networks across Europe.

Box 4.7. PATLIB and the European Patent Network – towards a stronger shared support layer for technology transfer

The PATLIB network, supported by the EPO since 1990, was created to improve access to patent information through national offices and cooperating non-commercial libraries. PATLIB centres provide IP information and services to local industries, businesses, entrepreneurs, researchers and individual innovators.

Over the past years, the network has expanded numerically and geographically, with improved technology transfer skills, including the availability of training and promotion of professional certifications in technology transfer. The network today consists of more than 340 centres across 39 EPO-member and extension states, with approximately one third of those located within University TTOs, and has become a success story in terms of supporting innovation across Europe.

PATLIB centres are hosted at various types of organisations, mostly at universities (40%) but also national offices (16%), chambers of commerce (14%), city libraries (9%), institutes/associations (15%), and other entities (6%). The more advanced centres are also able to assist with the commercialisation of more mature technologies and provide guidance in applications for further funding.

The EPO supports the PATLIB centres via multiple routes, including providing training and access to EPO tools, networking opportunities and funding (Development & Support Package). As a direct example the EPO can assist with the training and onboarding of new staff members.

Raising awareness of technology transfer and the profession is an important topic for the PATLIB network. In addition to promoting the network this benefits the European innovation ecosystem.

Figure 4.2:

Distribution of PATLIBs across EPO-member and extension states

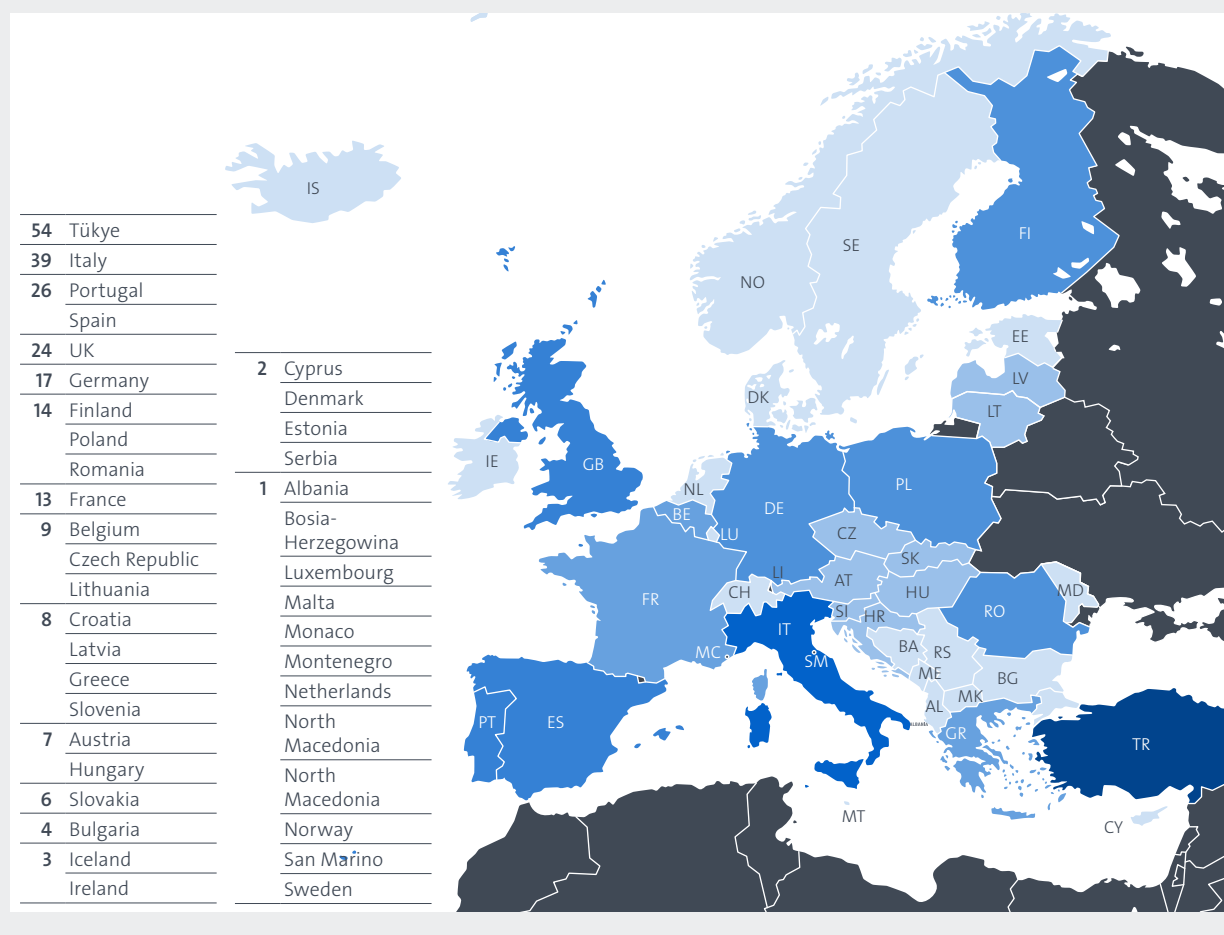


Figure 4.3

Overview of EPO support services and tools to the PATLIB network



What is a PATLIB centre?

PATLIB centres offer intellectual property (IP) services and information to:

- Local industries and businesses
- Entrepreneurs and researchers
- Individual innovators

They may be hosted in:

- National IP offices
- Universities (e.g. TTOs)
- Chambers of commerce
- Libraries and similar institutions



Requirements

To become part of the PATLIB network, a centre must:

- Have at least one staff member with proven IP expertise (e.g. qualifications or significant experience)
- Possess resources to inform on patent filing in the home country
- Be able to understand English-written documents related to the PATLIB network
- Obtain a green light from the national patent office or similar authority



EPO support

The EPO supports PATLIB centres through structured training, networking, and development opportunities:

Training & Learning Opportunities

- Introductory sessions for new centres' staff
- Curated e-courses tailored to PATLIB needs
- Tailored learning paths for onboarding and deepening knowledge
- "Patenting Innovation" course (ATTP-accredited: 11 CE points)
- Training in IP strategy and business support
- Full access to European Patent Academy's catalogue
- European Patent Academy E-learning Centre

Networking & Collaboration

- Annual PATLIB conference
- Online networking and "Shaping the Future" seminar series
- Monthly PATLIB newsletter
- Single access portal for PATLIB centres
- Opportunity to host seconded EPO young professionals
- Participation in KT2Africa initiative

Development & Service Package (DSP)

- The EPO provides financial and technical support, such as:
- Reimbursement of external training costs
 - Funding for certification (e.g. ATTP, CLP)
 - Support for local events hosted by PATLIB centres



EPO Tools

One free license per EPO tool, e.g.:

- GPI (Global Patent Index)
- PATSTAT (statistical analysis)
- OPS (Open Patent Services)
- Ansera based Search (Abs)

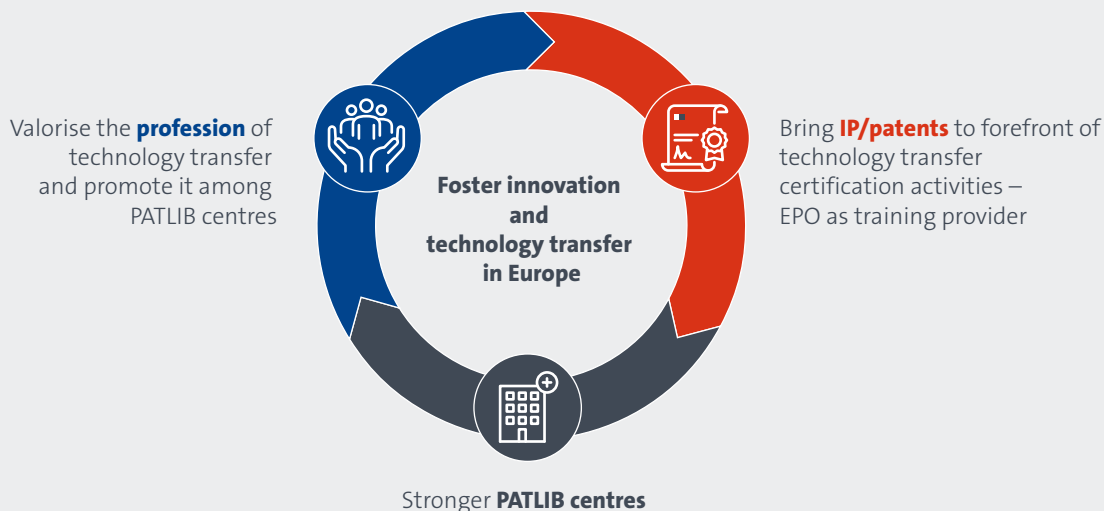
Ultimately the PATLIB network is optimally positioned to address the challenges laid out in this study, as its centres are able to:

- promote awareness and the benefits of IP commercialisation at a grassroots level
- provide support to university-based TTOs with the EPO-wide network of centres
- leverage the cross-border network to help raise awareness of new technologies

Moreover, the PATLIB network is not static, and the upcoming PATLIB Next Level initiative is designed to expand the network's technology transfer services and build the expertise needed to support innovators from the first technology search right through to commercialisation and investment.

Figure 4.4

Illustration of PATLIB Next Level



As a next step, main stakeholders will be consulted to give their views on the future role, structure and priorities of PATLIB. The consultation will seek strategic input from EPO member states, their PATLIB centres, and relevant innovation stakeholders to help shape the PATLIB roadmap. It will explore how the network can contribute more effectively to European and national objectives for innovation, competitiveness and economic growth, particularly by helping innovators use IP strategically, accelerating the commercialisation of research and strengthening connections between technologies, markets and finance.

The consultation will also examine how PATLIB centres can work more closely with TTOs, universities, public research organisations, innovation agencies, investors and other actors. Particular attention will be given to the capabilities that are difficult for individual organisations to maintain alone, including advanced patent and technology intelligence, IP strategy, licensing, valuation, partner identification and commercialisation and investment-readiness support. It will also consider how a common baseline of accessible local services could be combined with differentiated expertise, specialised national or cross-border hubs and effective referral mechanisms.

This approach responds directly to the evidence presented in this study. Many TTOs are relatively small and cannot realistically maintain every specialist capability internally. At the same time, proximity to researchers remains essential for identifying inventions early, building trust and understanding the institutional context in which technologies emerge. PATLIB can help connect these two dimensions. Its locally embedded centres can provide accessible support and relationships, while the wider European network can facilitate access to expertise, tools, training and connections that are not available within every institution or region.

By combining resources, strategic steering and local delivery, the PATLIB network will help reduce fragmentation and ensure that promising inventions can reach the expertise, partners and finance they need to reach the market. In this way, PATLIB Next Level will strengthen the network's role as a practical transmission mechanism between European innovation ambitions, national strategies and the needs of innovators in regional ecosystems.

**Box 4.8. Insights from EMA's Biotech Hub and TTO workshop:
Regulatory preparedness as an enabler of life-sciences technology transfer**

Connecting technology transfer and regulatory support

The European Medicines Agency (EMA) is responsible for the scientific evaluation, supervision and safety monitoring of medicines in the EU, working closely with national regulatory authorities. In life sciences, regulatory requirements can influence research, manufacturing and clinical development decisions long before a product reaches the market. Early regulatory preparedness can therefore help innovators avoid costly setbacks and make better-informed development and investment decisions.

TTOs, biotech hubs and innovation clusters can play an important role in this process. As early points of contact for academic researchers and start-ups, they can help identify potential regulatory needs and direct innovators towards existing support. This complements their traditional activities in IP management, licensing, financing and spin-off creation, without requiring them to act as regulatory advisers.

Insights from EMA's 2026 workshop

To strengthen connections with innovation intermediaries, EMA mapped 55 biotech hubs and 47 TTOs, engaging directly with 23 organisations through meetings, visits and workshops. On 16 September 2026, EMA brought together regulators, TTOs, biotech hubs and other intermediaries for its first dedicated workshop on this topic. Discussions highlighted that academic researchers and early-stage developers are often unaware of the regulatory support available or uncertain about when and how to access it.

Participants identified several opportunities to improve access to existing regulatory support:

- **Clearer guidance:** Simple route maps, checklists and stage-specific information to help innovators identify relevant regulatory pathways and support.
- **Better connections:** More effective referrals and coordination between national regulatory authorities, EMA and innovation intermediaries.
- **Greater awareness:** Training and information-sharing through existing TTO, biotech hub and cluster networks to reach researchers and start-ups earlier.

Implications for technology transfer

The workshop highlighted the value of connecting regulatory expertise with technology transfer activities from the earliest stages of innovation. TTOs and other intermediaries can help bridge the gap between academic research and regulatory systems by raising awareness, identifying relevant needs and directing innovators to the appropriate authorities.

Strengthening these connections can contribute to a more integrated innovation journey, in which IP protection, commercialisation strategies and regulatory preparedness reinforce each other. This can help translate promising life-sciences research into viable products, companies and practical applications, while recognising that regulatory preparedness does not guarantee approval or commercial success.

5. Conclusions: six takeaways for strengthening technology transfer in Europe

Europe is at an important moment for technology transfer. Its universities, public research organisations and research hospitals are increasingly important owners of technologies, including in strategic fields, at the same time as Europe seeks to strengthen its competitiveness and technological sovereignty. Generating excellent research is therefore only part of the challenge. Europe also needs the capacity to turn more of that research into technologies that companies, entrepreneurs and investors can develop and bring to market.

The evidence in this study shows that this capacity cannot be reduced to patenting alone. It depends on the organisations, people, resources and networks surrounding the invention from its identification in the laboratory right through to licensing, company creation or another route to market. The analysis combines EPO patent data, an international comparison of academic patenting, ASTP survey evidence from more than 800 European TTOs and consultations with technology transfer professionals across Europe.

Taken together, these sources point to six practical takeaways. They do not prescribe one European TTO model. Instead, they identify where the evidence suggests that institutions, funders and policymakers can strengthen the conditions for successful technology transfer.

Recognise TTOs as strategic actors in Europe's innovation system

The study shows why technology transfer capacity has become more strategically important. European research institutions directly manage a much larger patent portfolio than twenty years ago, and universities have moved towards levels of direct academic patent ownership similar to those in the United States. This means that more responsibility for deciding which inventions to protect, develop and commercialise now sits within research institutions themselves.

TTOs are one of the main instruments through which that responsibility is exercised. Their role therefore goes well beyond administering patents. They help determine whether publicly funded research can move from scientific results towards companies, investment and ultimately economic and societal use.

This matters particularly in the current European context. The United States has a mature technology transfer ecosystem built over several decades, while China is rapidly expanding university patenting and strengthening public support for commercialising research. Europe already has a strong research base and increasingly active institutional patent owners. Strengthening the organisations that connect this research with the market should therefore be considered part of Europe's wider competitiveness and technology strategy.

Reflect the diversity of European TTOs

The data show that there is no single European TTO against which all offices can meaningfully be measured. More than 90% of the 809 TTOs in the study's typology belong to the small and mid-scale group, while a much smaller number manage very large research systems and invention portfolios. Their institutional missions also differ: an RTO focused on applied research operates under very different conditions from a university, basic fundamental research institute or research hospital.

The consultations reinforce this point. TTOs with technology transfer strongly embedded in institutional strategy often described clearer mandates, more stable resources and greater opportunities to specialise. Others operate with small teams and must balance technology transfer against competing institutional priorities.

This diversity should shape both support and assessment. Common European data can enable more meaningful comparison, but benchmarking should compare institutions with relevant peers rather than create a single ranking or model of success. Policies should similarly take account of research profile, mission, scale and the surrounding innovation ecosystem.

Strengthen capacity across the entire transfer journey

The international patent evidence shows that taking ownership is only the beginning. European universities now directly own a similar share of academic inventions to US universities, but directly owned European academic patents are less often maintained over the longer term. This does not measure commercial success

directly, and different patent strategies may partly explain the gap. It nevertheless shows that ownership creates a long-term responsibility to select, finance and develop technologies.

The interviews with European professionals make the practical challenge clearer. TTOs identified constraints at many points in the journey: researcher engagement, invention scouting, reliable patent budgets, proof-of-concept funding, technical development, market assessment and access to companies and investors. Several reported having to make choices about which inventions could be patented or maintained because of limited IP budgets. These interviews cannot establish whether resource constraints caused the recent slowdown in direct patenting, yet they do illustrate how capacity can constrain the ability to protect potentially valuable technologies.

The survey evidence points in the same direction. Larger TTOs generate substantially more activity and higher output per staff member, and larger teams remain associated with more licensing and venture activity even after accounting for differences in research expenditure and invention pipelines. However, the result is not simply an argument for increasing headcount: capacity means not only stable staff headcounts and budgets, but also specialist expertise, accumulated experience, mature processes, market knowledge and commercial networks.

Combine local proximity with shared capabilities

Strengthening technology transfer capacity does not mean that every TTO needs to become a large organisation. Some of the most important parts of this work depend precisely on being close to researchers and understanding the institutional environment in which inventions emerge.

The consultations repeatedly highlighted the importance of trust, regular contact and early engagement. Identifying promising research early, understanding its potential and encouraging researchers to disclose it are activities that are difficult to separate from local research environments.

Proximity does not mean, however, that every capability has to be built locally. As technologies progress towards the market, TTOs may need expertise, information

or connections that are difficult for smaller offices to maintain internally. In such cases, sharing resources across institutions can broaden the support available without weakening the relationship between the TTO and its researchers, provided that appropriate governance and revenue-sharing arrangements can be put in place.

Figure 5.1 below illustrates this balance. The transfer journey requires different capabilities at different stages, but some can be pooled or accessed through collaboration rather than reproduced in every office. The objective is therefore not full centralisation, but a model in which strong local relationships are complemented by access to wider expertise and resources when these are needed.

Several of the approaches examined in this study already move in this direction. Shared TTO structures, specialist support services and professional networks allow institutions to access capabilities beyond their own teams while maintaining a local interface with researchers. The PATLIB network provides another example: its distributed structure combines local access to patent information and expertise with connections to a wider European network. Such models can be particularly valuable for smaller institutions, provided that the available support is visible, accessible and sufficiently adapted to their practical needs.

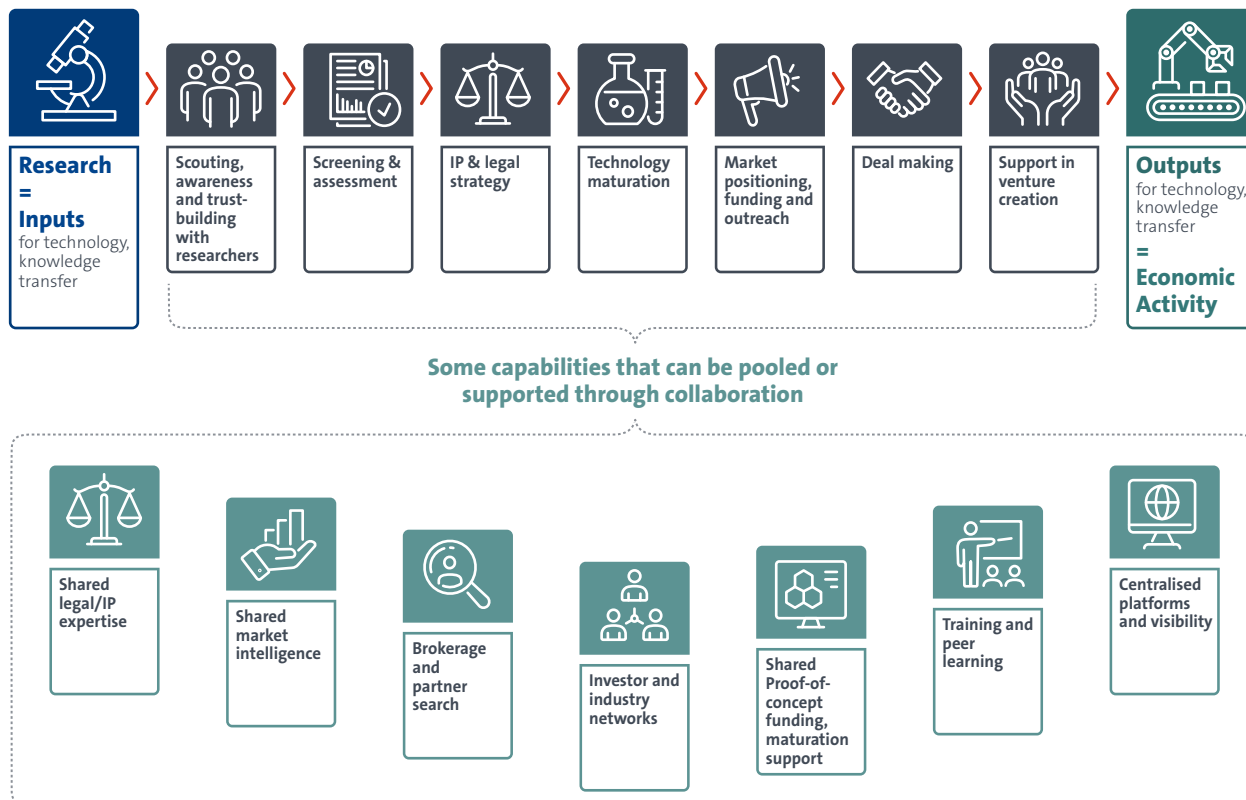
The broader lesson is that local engagement and shared capacity are not alternatives. Well-designed pooling can preserve proximity to researchers while giving each institution access to a much broader range of expertise and resources.

Build a more connected European market for technology

The same logic applies beyond expertise. As research-based inventions emerge from an increasingly broad range of institutions across Europe, TTOs also need access to markets and partners beyond their immediate environment. EPO data shows that direct patenting by universities, PROs and research hospitals is becoming more geographically distributed, including in strategically important fields. A particular technology may therefore emerge in one region while the company, investor or entrepreneur best placed to develop it is located somewhere else.

Figure 5.1

Illustration of capacity needs across the technology transfer journey and capabilities that can be shared



Source: EPO, based on testimonies from 22 TTOs interviewed for the study.

The consultations suggest that these connections are still difficult to make. TTOs often know their local ecosystem well, but have fewer ways of identifying suitable partners beyond it. Building a more European market for technology therefore requires mechanisms that make promising inventions visible across borders and reduce the effort involved in finding the organisations able to take them forward.

Europe has already made major progress in integrating patent protection, including through the Unitary Patent. A more integrated patent system, however, does not automatically create an integrated market for technology. It also requires better information about where technologies are emerging and where potential partners can be found.

Some of the solutions examined in this study seek to address this information gap. One example is the growing use of patent-based data tools to make technologies and innovation actors more visible. The

EPO Observatory's Deep Tech Finder links patent-active ventures with information on their technologies and research institution connections, while the Data Desk provides broader evidence on patenting activity across countries, technologies and institutions. These types of tools can complement existing professional networks by helping TTOs look beyond the partners they already know.

European initiatives on knowledge valorisation and research-industry collaboration are moving in the same direction. The challenge is increasingly not only to create additional networks, platforms and sources of information, but to ensure that they work together and can be used easily by the institutions they are intended to support. Greater attention to awareness, practical guidance and integration into everyday TTO work would help turn existing European resources into connections and collaborations.

Align incentives and focus on long-term impact

Finally, technology transfer depends on the people involved. Researchers must be willing to disclose inventions early and remain engaged while technologies are developed. The consultations show that this engagement is still rewarded very differently across institutions. Where academic assessment remains dominated by publications and research grants, the activities required for patenting, collaboration with industry and entrepreneurship may receive relatively little recognition. Revenue sharing and equity can help, but so can career recognition, proof-of-concept support, entrepreneurial leave and resources returned to research teams.

TTO professionals also need conditions that allow expertise to accumulate. The study shows that experience and specialisation are important parts of TTO capacity, yet temporary positions, small teams and limited career progression can make these capabilities difficult to retain. Training and professional accreditation therefore need to be accompanied by stable career structures, opportunities to specialise and stronger peer learning across institutions.

The same principle applies to performance measurement. Patent applications, licensing income and spin-off numbers are useful indicators, but they are strongly influenced by institutional scale, research field and mission, and capture only stages of the transfer process. The ultimate objective is not simply to produce more patents or companies, but to enable more promising research to reach users, attract investment and generate economic and societal impact.

Taken together, these six takeaways point to a connected agenda. Europe increasingly has the research, the technologies and the institutional responsibility for bringing them forward. The next step is to strengthen the system around them: recognise TTOs as strategic innovation infrastructure, reflect their different starting points, sustain capacity throughout the transfer journey, share specialist capabilities where scale helps, connect technologies with a genuinely European market and support the people who make technology transfer possible.

Annex

A.1 Questionnaire used for the semi-structured consultations

The consultation interviews examined how different technology transfer office models operate in practice, taking into account their capacity, mandate, institutional position, resources and access to funding instruments.

The central focus was TTO capacity: how staffing, professional skills, budget, reporting lines and access to commercialisation funding shape the transfer channels that an office can realistically pursue. The interviews therefore considered not only what contributes to successful technology transfer, but also which strategies are feasible under different institutional and resource conditions.

Each interview lasted approximately 20 to 30 minutes and followed a semi-structured format. The intention was not to ask every question mechanically, but to use a common framework that ensured comparability while allowing participants to focus on the issues most relevant to their organisation.

Interviews generally comprised:

- four or five opening questions on the TTO's profile and institutional setting;
- four questions on strategy, operating model and capacity; and
- two targeted follow-up questions selected according to the interviewee's experience and institutional context

TTO profile and institutional setting

1. What type of institution does the TTO serve, and what is its approximate scale?

This could include a university, public research organisation or research and technology organisation, research hospital, group of institutions, or regional or national structure. Where available, participants were invited to provide information on staffing, budget, invention disclosures, patent filings, licensing agreements, spin-offs and portfolio size.

2. Where is the TTO positioned within the institution, and to whom does it report?

Possible reporting lines included the rector or president, a vice-rector responsible for research or innovation, a research or legal department, an external foundation, a holding company, or a regional agency.

3. How is the TTO organised operationally, and which functions are internal, shared or outsourced?

Participants were asked to describe whether the office operated through a centralised, decentralised, shared-service, regional, national, outsourced or hybrid model. Relevant functions included patenting, licensing, contracts, business development, spin-off support, investor relations, market scouting and patent analytics.

4. What transfer channels does the TTO use most frequently, and why are these the most realistic or effective in its context?

Possible channels included collaborative and contract research, consultancy, licensing, spin-off and startup creation, open-source dissemination, know-how transfer and wider industry partnerships.

5. What related structures exist within or around the institution, and how does the TTO work with them?

Examples included incubators, accelerators, entrepreneurship centres, consulting services, science parks, investment vehicles and other ecosystem-support organisations.

Strategy, operating model and capacity

A selection of the following questions was used depending on the TTO's profile and the time available.

6. Given the TTO's resources and institutional position, what commercialisation routes work best, and why?

7. Can you describe a policy, routine, governance choice or funding instrument that made a transfer process faster, more predictable or more attractive?

8. Does the TTO have access to dedicated commercialisation funding, and how does this affect its strategy?

Examples included proof-of-concept funds, validation grants, seed or evergreen funds, internal investment committees, accelerator funding, regional or national programmes and investor partnerships.

9. Which functions need to remain within the TTO, and which can realistically be shared, outsourced or provided through regional or national structures?

10. How does the TTO's reporting line or institutional position affect its ability to obtain resources, influence strategy and make decisions?

11. For a TTO with limited resources, what operating strategy is most realistic?

Possible approaches included owning and controlling IP directly, prioritising collaborative research, pooling expertise with other institutions, outsourcing patent management or working with external commercialisation partners.

12. How does the TTO approach collaboration and commercialisation with international partners?

This could include international licensing, multinational companies, EU-funded projects, cross-border spin-offs, investor networks and international research partnerships.

Targeted follow-up questions

Two or more questions were selected according to the interviewee's responsibilities and institutional context.

13. How does the TTO decide between patenting, publishing, collaborative research, licensing, spin-off creation, open source, know-how protection or no formal protection?

14. Where do IP and licensing negotiations most often encounter difficulties?

Possible issues included ownership, valuation, royalties, equity, background IP, improvements, publication rights, sublicensing, liability, internal approvals and decision timelines.

15. For spin-offs, what makes a deal predictable and investable within the TTO's resources and institutional constraints?

16. What staff profiles and competencies are most important for this TTO model?

Examples included patent and IP expertise, legal expertise, business development, sector knowledge, investment experience, entrepreneurship support, negotiation skills and mixed scientific-commercial profiles.

17. What forms of external support would make the greatest difference to a TTO with this profile?

Possible forms of support included operational and proof-of-concept funding, training, mentoring, expert pools, shared services, model agreements, patent intelligence, investor access, EPO and PATLIB services, and ASTP peer learning.

18. Is there any international practice that European TTOs could realistically adapt for their own use, or any approach that Europe should avoid copying?

A.2 Cluster analysis methodology and detailed profiles

The cluster analysis uses a cross-sectional TTO-level dataset. For each office, each variable is calculated as the arithmetic average across the fiscal years in which a non-missing value was reported between FY2017 and FY2023. The clustering variables are TTO staff FTE, research expenditure and invention disclosures. Research FTE is not used jointly with expenditure because the two measures are strongly correlated.

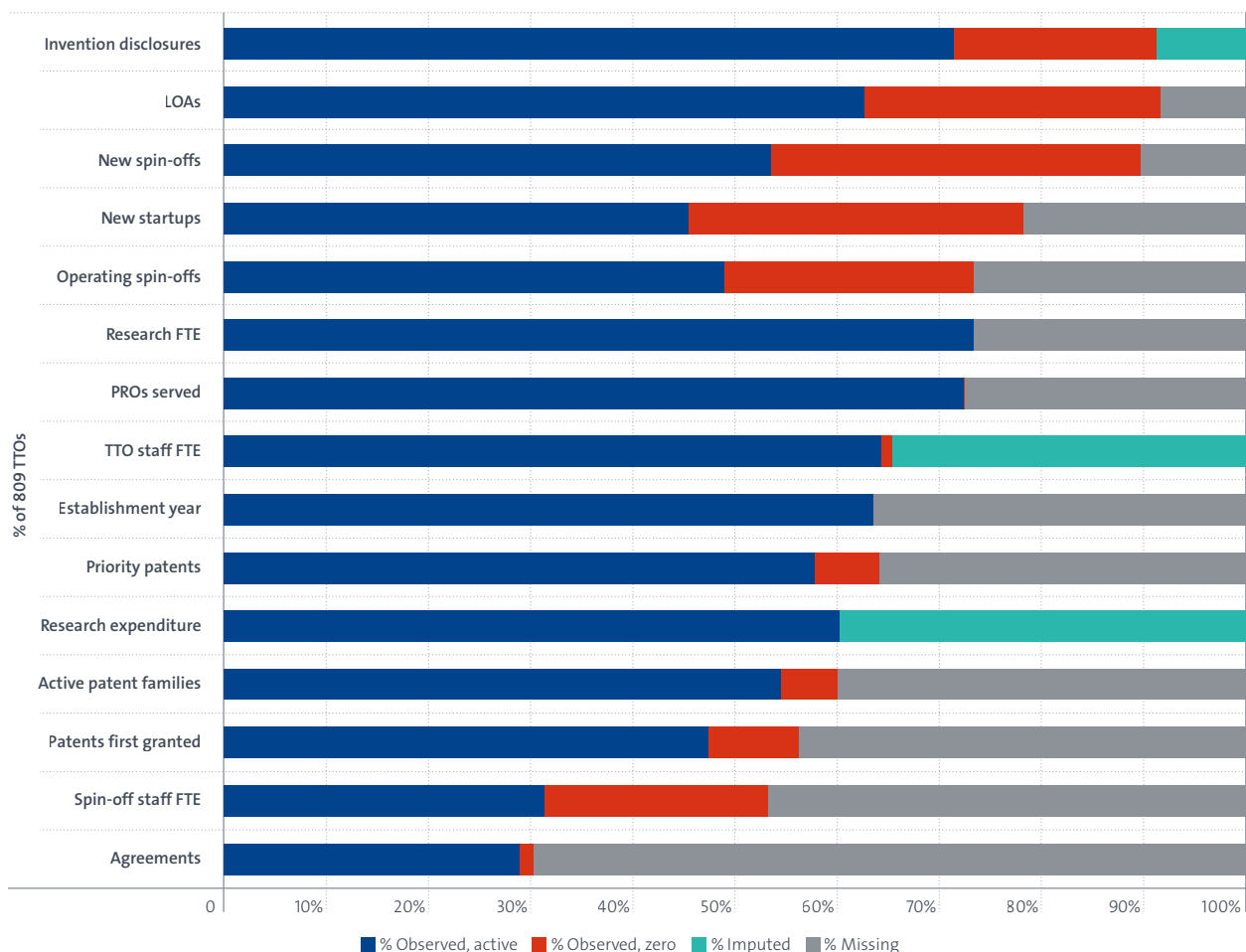
The analysis uses raw, unlogged values that are standardised before clustering. Missing values in one or more clustering variables are imputed to retain the broader survey population. K-means clustering is then applied to the completed dataset.

Data coverage varies substantially across indicators, from 91.3% for invention disclosures to 30.3% for the total number of agreements. Coverage for the three clustering variables is 65.4% for staff FTE, 60.3% for research expenditure and 91.3% for invention disclosures; the corresponding imputed shares are 34.6%, 39.7% and 8.7%, respectively. LOAs and agreements are excluded from the imputation model by design.

The highest silhouette score is obtained at $k = 2$, indicating that a two-group solution provides the clearest overall separation in the observed profiles.

Figure A2.1

Data coverage of key ASTP survey indicators



Source: EPO analysis based on the ASTP survey data

Table A2.1

Full cluster profiles

Profile	N	Share	Staff FTE med. (mean)	Research exp. med. (mean)	Research FTE med. (mean)	Disclosures med. (mean)	Est. year med. (mean)	Fiscal years med. (mean)
Small/mid-scale	732	89.8%	4.9 (7.2)	EUR 14.5m (49.5m)	640 (918)	7.2 (15.8)	2005 (2004.0)	4 (4.2)
Large-scale/ research-intensive	77	9.5%	30.6 (37.0)	EUR 362.3m (554.5m)	4171 (4778)	102.0 (116.2)	2001 (1999.8)	3 (3.9)

Country concentration in the anonymised source data: small/mid-scale group C-8: 31%, C-4&22: 26%, C-11: 8%, C-14: 7% and C-2: 7%; large-scale group C-14: 25%, C-8: 14%, C-11: 13%, C-4&22: 10% and C-10: 8%.

Table A2.2

Full downstream outcomes by cluster

Profile	Priority applications med. (mean)	Patent grants med. (mean)	Active families med. (mean)	LOAs med. (mean)	Operating spin- offs med. (mean)	New spin-offs med. (mean)	New startups med. (mean)
Small/mid-scale	4.73 (8.74)	3.00 (7.66)	29.02 (62.92)	1.25 (35.01)	1.67 (7.68)	0.29 (0.93)	0.50 (8.88)
Large-scale/ research-intensive	30.00 (39.55)	21.43 (33.75)	239.50 (352.72)	22.00 (274.95)	43.67 (64.62)	4.50 (6.40)	7.54 (18.17)

Note: Downstream outcomes were not used to form the clusters. LOAs are licences, options and assignments.

A.3 Effectiveness analysis – methods and robustness

Conversion and productivity ratios

A TTO contributes to a ratio only where both the relevant output and denominator are available. The primary analysis uses the imputed final values for staff FTE and disclosures on the full N = 809 sample, with pairwise deletion for missing outputs. A robustness check repeats the tests for the N = 485 TTOs whose staff FTE and disclosures were both originally observed. The Mann-Whitney U test is the primary test because the ratios are strongly skewed and non-normal; Welch's t-test is used as a secondary check. The significance threshold is 5%. The overall finding of limited scale differences in conversion rates and stronger differences in output per staff remains robust. The LOA conversion rate is no longer significant even in the primary (imputed) analysis (p = 0.168, versus p = 0.043 in the earlier dataset version); it remains non-significant in the observed-denominator-only robustness check (p = 0.214).

Cross-sectional regression

The regression analysis is restricted to TTOs that directly reported staff FTE, research expenditure and invention disclosures. It focuses on LOAs, new spin-offs, new startups, combined new ventures and operating spin-offs. Because these are non-negative, over-dispersed counts, negative-binomial models are estimated with log(1+x)-transformed predictors. Country fixed effects account for systematic differences in national funding systems, IP rules and support programmes. Countries represented by fewer than five TTOs in the complete-case sample are pooled into an "Other" category, giving 19 country groups.

The baseline specification for each output Y is:

$$E[Y] = \exp(\beta_0 + \beta_1 \log(1 + \text{Disclosures}) + \beta_2 \log(1 + \text{ResearchExpenditure}) + \beta_3 \log(1 + \text{StaffFTE}) + \sum_j \gamma_j \text{Country}_j)$$

Coefficients are reported as incidence rate ratios. The approximate percentage change associated with a doubling of staff is used in the main text because it is easier to interpret.

Invention disclosures and research expenditure are also positively associated with commercialisation output, with disclosure volume generally the strongest individual predictor. Replacing disclosures with patent grants or active patent families produces similar staff estimates. This supports the interpretation that each is capturing a related aspect of the underlying commercialisation pipeline, although their separate marginal contributions cannot be isolated in a single model without substantial collinearity.

Panel analysis

Additional models use the annual data (N = 3380 records across 809 TTOs, FY2017-2023) with TTO fixed effects and year fixed effects, estimated by Poisson pseudo-maximum-likelihood (PPML) with standard errors clustered by TTO. The Poisson fixed effects (FE) regression model rather than negative-binomial fixed effects is used here because Poisson FE remains consistent under the incidental-parameters problem created by including hundreds of TTO dummies, whereas negative-binomial FE does not. These models ask whether output changes within the same office when its own staff FTE changes,

Table A3.1:

Staff FTE association under alternative pipeline-stage controls

Output	Disclosures IRR (N)	Patents-granted IRR (N)	Active-families IRR (N)
LOAs	1.26 (267)	1.20 (249)	1.08 (264)
New spin-offs	1.60 (261)	2.07 (246)	1.85 (259)
New startups	1.96 (234)	1.77 (219)	2.23 (235)
New ventures	1.74 (232)	1.95 (219)	2.02 (234)
Operating spin-offs	1.43 (214)	1.57 (206)	1.54 (215)

Note: Non-imputed complete-case models with country fixed effects. The pipeline measures are used in separate models because disclosures, patent grants and active patent families are strongly correlated.

after accounting for common annual shocks and the office's time-invariant characteristics. Of the 809 TTOs, 340 report staff FTE in two or more years, and 296 of those show genuine within-office variation in staffing over time; models are restricted to TTOs with at least two usable observations.

Staff FTE is small and not statistically significant across any specification, whether for LOAs, new spin-offs, new startups, new ventures, operating spin-offs, patent grants, or active patent families (all $p > 0.18$; point estimates range from -11% to +9% associated with a doubling of staff, none distinguishable from zero). The short observation period and modest within-office staffing variation limit statistical power. The panel results therefore do not contradict the importance of capacity, but they do not support a simple short-run causal interpretation of increased headcount.

Table A3.2

Within-TTO staff FTE association (panel fixed effects)

Output	Observations	TTOs	IRR	Approx. % change	p-value
LOAs	1210	285	0.89	-10.8%	0.356
New spin-offs	1326	295	1.00	+0.2%	0.984
New startups	834	212	1.05	+4.9%	0.716
New ventures	797	200	1.09	+9.5%	0.411
Operating spin-offs	1001	216	0.96	-3.6%	0.535
Patent grants	1219	275	1.06	+5.8%	0.529
Active patent families	1294	299	0.92	-7.8%	0.184

Note: TTO and year fixed effects, PPML estimation, standard errors clustered by TTO. Restricted to TTOs with two or more annual observations of the outcome and staff FTE.

A.4 Identification of academic patents and international comparison methodology

The international comparison uses the EPO Worldwide Patent Statistical Database (PATSTAT) and focuses on patent applications filed at the EPO. Patents are assigned to the year of their earliest worldwide filing, or priority year, which is the point in the patent process closest to the date of invention. The main trend analysis covers priority years from 2000 to 2020. Results therefore describe academic inventions for which protection was sought at the EPO, and should not be interpreted as a census of all patents filed in the countries concerned.

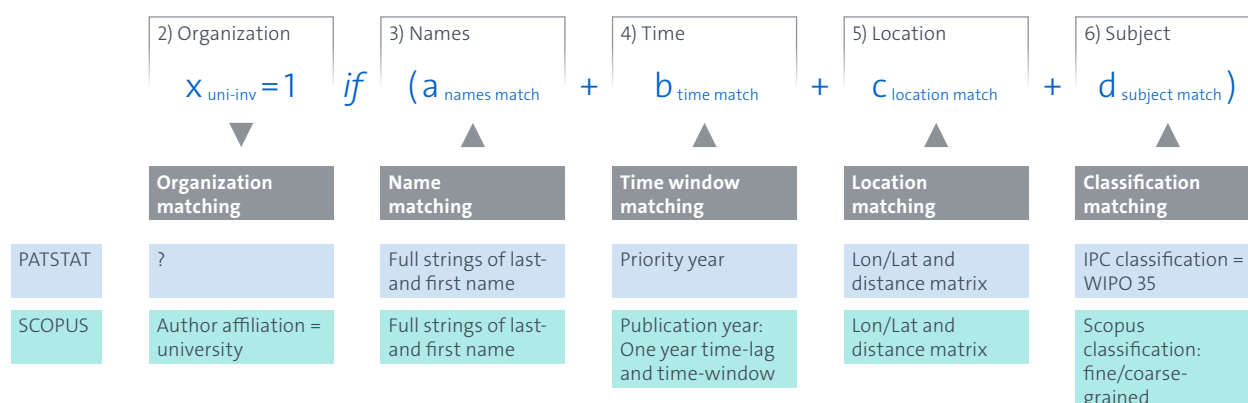
Academic patents comprise two categories. Direct academic patents are applications in which a university is named as an applicant. Indirect academic patents are filed by another applicant but involve at least one university-affiliated inventor. Direct and indirect filings together form the full academic-patent set. This broad definition is necessary because the institutional ownership of academic inventions differs across countries, and because company and PRO ownership is particularly important in Europe (Lissoni et al., 2008).

Direct filings are identified in PATSTAT through keyword searches, existing classifications and manual validation of university applicant names, accounting for language and spelling variants. Indirect filings are identified by matching inventor names in PATSTAT with authors of scientific publications in Elsevier Scopus, where institutional affiliations are available. A university researcher must therefore have at least one publication indexed in Scopus to be identified by the matching procedure (Dornbusch et al., 2013).

To reduce false matches between people with identical or similar names, the algorithm combines full-name matching with three additional criteria: a two-year time window between the patent and publication, geographic proximity between the inventor address and the university location (normally within 20 kilometres) and correspondence between broad science and technology fields. The technology match uses the WIPO technology classification and aggregated Scopus science fields. Validation using precision and recall measures produced an F-score of 0.92 when full names, location and subject criteria were combined (Baeza-Yates and Ribeiro-Neto, 2011; Dornbusch et al., 2013; Schmoch, 2008).

Figure A4.1

Identification of academic patents



Source: Adapted from Dornbusch et al. (2013)

The analysis distinguishes EPC member states (Europe), the United States and Canada. The country is assigned on the basis of the patent applicant for direct filings and the university affiliation identified through Scopus for indirect filings. Technology fields follow the international classification, supplemented by EPO definitions for quantum computing and energy storage.

Maintenance rates are calculated for granted patents and indicate whether protection is still maintained ten years after the priority filing. Once a European patent enters the national phase, a patent is treated as no longer maintained when it is not maintained in France, Germany or the United Kingdom. The analysis is limited to priority years 2000-2012 so that a full ten-year period can be observed. Fifteen-year rates were also examined, but did not produce structurally different results. Maintenance is used as a proxy for expected value and portfolio management, not as a direct measure of commercialisation success.

The method has several implications for interpretation: it captures only inventions for which protection was sought at the EPO; researchers without a Scopus-indexed publication cannot be identified as academic inventors; and differences in national and institutional ownership practices affect the balance between direct and indirect filings. The matching criteria reduce, but cannot entirely remove, the possibility of false or missed inventor-author links. These issues are particularly relevant when interpreting small countries, narrow fields or short-term changes.

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Use of artificial intelligence: AI-assisted tools were used in the preparation of visualisations, textual review, and the transcription and analysis of qualitative interviews, as further explained in Box 4.1.

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