



ASTP
A World of
Knowledge
Transfer

**National
Associations
Advisory
Committee**

ASTP White Paper endorsed by NAAC

Knowledge and Technology Transfer Metrics





Background

In high income countries all over the world higher education and research organisations have accepted knowledge and technology transfer (KTT) as part of a “third mission” in addition to their first and second missions of research and teaching. Many emerging economies around the world have taken this as an example and followed the same path.

Due to its importance for innovation and societal prosperity, KTT has long attracted the attention of policymakers around the world. In Europe, the European Commission recommended principles for the management of intellectual property (IP) in knowledge transfer activities and a Code of Practice for universities and other public research organisations¹ and, more recently, a Code of Practice on industry-academia co-creation for knowledge valorisation². The multidimensional approach required to accelerate the potential uptake of R&I results and data has also led the EC to define knowledge valorisation channels³. Knowledge valorisation describes the process of “creating social and economic value from knowledge by linking different areas and sectors and by transforming data, know-how and research results into sustainable products, services, solutions and knowledge-based policies that benefit society⁴”.

European communications and initiatives for strengthening KTT as well as academic work have repeatedly stressed the importance of developing valid metrics. Expert groups have worked on measurement frameworks and indicators⁵ and the Code of Practice on knowledge valorisation included a set of recommendations on metrics for assessing outcomes, value created and impact of industry-academia co-creation activities². Such contributions serve to overcome the risk of focusing on what is easily measurable and not what is important for providing a comprehensive picture of KTT⁶.

Nevertheless, the currently available measuring instruments for research and innovation systems in Europe⁷ and beyond⁸ do not yet satisfactorily reflect KTT.

Framework of a KTT metrics cube

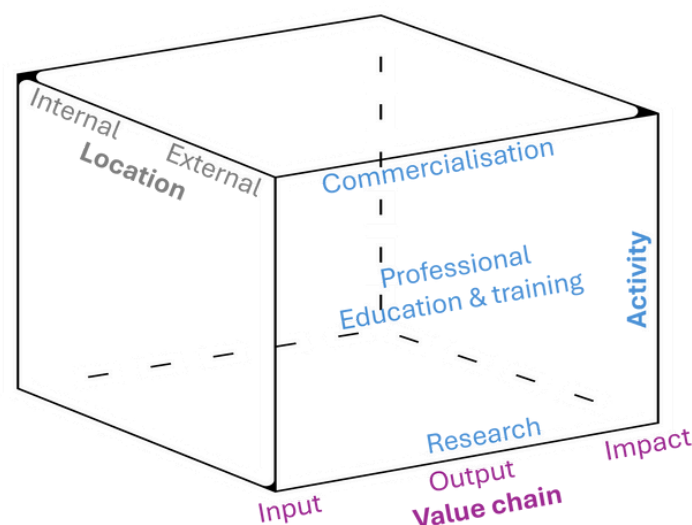
As others before us have argued^{4,5}, measuring KTT is complex.

- KTT consists of many different activities beyond the dedicated knowledge transfer and commercialisation channels of academic spin-offs, licensing and academic services. Public grants that fund collaborative research of academic and non-academic partners as well as research and development contracts issued by companies to research organisations are channels using the research capacities. Universities’ continuing professional development (CPD) and lifelong learning offers, start-ups established by students, or public lectures demonstrate the importance of the teaching function for knowledge and technology transfer.

- The value chain dimension distinguishes inputs from outputs and impacts of KTT. Whereas inputs cover the human, financial and other resources needed for generating transferable knowledge (e.g., research expenditure) and support services for facilitating the transfers (e.g., knowledge and technology transfer office KTO staff and budget), the output dimension reflects what others have labelled “activities” or “channels” namely the knowledge items generated for transfers (e.g., a patent, license, CPD offer etc.) and the connected monetary flows. Impact then relates to the economic, social, technological, political or other effects generated by the transferred knowledge, such as employment and sales in a spin-off company, better solutions to societal problems due to policy improvements, better treatment of diseases or the like. Impact measurement still has to overcome particular challenges, as impacts may emerge only after many years and not even be fully learnt of by the knowledge producing organisation without a dedicated investigation.
- Above all for inputs and impacts (less so for outputs) the third dimension of internal and external location in relation to the university/PRO and KTO is also highly relevant: for instance, internal financial resources of the KTO will be an important influence on its ability to support the protection of intellectual property (IP), but the technology-intensity of the surrounding region or country and its interest in licensing-in university/PRO inventions will be an important external influence on whether the commercialisation of IP via licensing is a productive mechanism to transfer technology.

Specific funding focused on the translation of innovative research results into spin-offs is also advocated. This would help research institutions implement and accelerate their spin-off activities. Possible funding could include grants to increase the commercial potential of research projects (i.e. Proof-of-Concept grants), as well as tools to enable institutions to provide seed investment and coaching to help researchers transition into entrepreneurial roles.

Figure 1: KTT Metrics Cube



Source: Barjak, F., 2025



Even though KTOs are the contact points for most questions regarding KTT and they commonly collect data on research and commercialisation projects, they cannot provide the full data matrix; university/PRO administrations will know about research expenditures or research personnel; how often or how intensively faculty use informal transfer mechanisms, how many students conduct project work for companies, or how many consultancy projects with companies faculty members have executed may even require internal surveys.

Data on the university's or public research organisation's external environment and demand for its knowledge will have to come from other sources. Hence, any KTT metrics system that aims to draw a comprehensive picture will have to go beyond the KTO and require additional efforts of compiling primary and secondary data from further sources. Today we are still at a starting point of such efforts where some countries advance more quickly than others.

The KTT Metrics Cube provided a useful framework in which to consider the distribution of metrics within the measurement space as a means of assessing and comparing the focal areas of different surveys conducted internationally.

Current metrics used across Europe (and beyond)

In our perception, the existing KTT data collections in Europe put a strong focus on output measures. Both input and impact measures are comparatively scarce.

The existing input measures are generally related to the internal inputs, i.e. the personnel and/or expenditures of the universities and PROs for R&D and the resources of the KTO.

External inputs to knowledge exchange, like business R&D expenditures, demand for academic graduates or for university/PRO inventions by the corporate sector, are generally not collected in KTT surveys, and must be taken from other sources (like national innovation surveys, R&D surveys, higher education surveys etc.) as they become available.

Though most indicators focus on KTT output, indicators for teaching and research-related outputs are still comparatively scarce or not disaggregated. Commercialisation indicators are the most common type of indicators.

Most surveys collect⁹:

- invention disclosures (78% of surveys)
- new patent applications (100% of surveys)
- new IP transactions (licences, options, assignments) (72% of surveys)
- the revenues resulting from IP transactions (67% of surveys)
- new spin-offs (83% of surveys)



Consulting agreements are also often counted (50% of surveys), and several countries also collect revenue data from consulting (44% of surveys). Applications for other IP rights (IPR) than patents or portfolios of other IPR are captured also in 50% of the surveys. Indicators on the frequency of collaborative research agreements and/or R&D contracts for non-academic organisations (67% of surveys) as well as the revenues resulting from such agreements (67% of surveys) are standard measures to represent the knowledge co-creation taking place via research. Metrics for KTT through students and the teaching mission are available only in few countries, which e.g. collect numbers on industrial PhD students, or lifelong learning education offers outside the standard Bachelor, Master and doctoral levels.

The current impact measures that exist are related to the external economic impact generated by IP and spin-off companies as a follow-on measure to the number of such new firms that have been created (and are still operating). Virtually no metrics have been designed for other societal impacts, be they technological, social, environmental, political or the like. Up to now they have been documented mainly in a qualitative manner or in pilot exercises¹⁰. Likewise, measures for the internal impact of knowledge exchange activities on higher education and research organisations, e.g. on the research budget, publications or staff/student recruitment, are commonly not available.

Definitions of the metrics used across Europe (and beyond)

The benefits of harmonised definitions and thus of data that can be compared across national borders have been recognised and proposals for definitions have been put forward. Such proposals always face an uphill struggle when divergent national definitions are required by donors, when long data series already exist on this basis or when aspects required by a definition are not (cannot be) recorded.

In a first step, it is important to grasp and present the differences in the definitions used in a structured way. Based on this, the consequences resulting from the heterogeneity can be determined in a second step and a prioritisation for harmonisation can be carried out.

The report on which this white paper is based attempted to do this¹¹. Similar definitions and metrics have been established for spin-offs/start-ups and for metrics related to the commercialisation of intellectual property and the inputs from KTOs in most countries. This also applies to a large extent to research contracts, especially with regards to the distinction between collaborative research and contract R&D. For practically all other metrics, harmonised definitions are currently lacking.



Recommendations to universities and public research organisations and KTT stakeholders

1. Work towards obtaining a comprehensive picture of the KTT activities of your organisation by covering all channels used (knowledge valorisation).
2. Institutionalise data collection related to KTT at all levels in your higher education and research organisation.
3. Report a set of core indicators that cover internal and external inputs, outputs and impacts of KTT (see the table on the core indicators suggested by ASTP)¹¹.
4. Engage in impact pilot studies and develop a solid understanding of the economic and non-economic (technological, social, political, health-related, etc.) impact of knowledge and technology transfer.
5. Apply the harmonised definitions proposed in the report on which this white paper is based¹¹ and work with your funders and owners to find ways to use these definitions for your other reporting requirements as well.
6. Bridge any transition period in the changeover of data collection by maintaining old and new (harmonised) definitions of the metrics in order to be able to extrapolate time series.

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We wish to express our sincere gratitude to Barjak, F., Lefebvre, F., Bailey, A., and Elliott, G. for their significant contributions to the development and writing of this paper.



References

- ¹ Commission Recommendation 2008/416/EC of 10 April 2008 on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations (OJ L 146, 5.6.2008, p. 19).
- ² Commission Recommendation 2024/774 of 1 March 2024 on a Code of Practice on industry-academia co-creation for knowledge valorisation (OJ L, 2024/774, 5.3.2024, ELI: <http://data.europa.eu/eli/reco/2024/774/oj>).
- ³ European Commission: Directorate-General for Research and Innovation (2020), Research innovation valorisation channels and tools – boosting the transformation of knowledge into new sustainable solutions, Publications Office, <https://data.europa.eu/doi/10.2777/480584>.
- ⁴ Council Recommendation (EU) 2022/2415 of 2 December 2022 on the guiding principles for knowledge valorisation (OJ L 317, 9.12.2022, p. 141, ELI: <http://data.europa.eu/eli/reco/2022/2415/oj>).
- ⁵ European Commission: Directorate-General for Research and Innovation (2009), Metrics for knowledge transfer from public research organisations in Europe – Report from the European Commission's Expert Group on Knowledge Transfer Metrics, Publications Office, <https://data.europa.eu/doi/10.2777/49910>; European Commission: Joint Research Centre, Campbell, A., Cavalade, C., Haunold, C., Karanikic, P. et al. (2020), Knowledge transfer metrics – Towards a European-wide set of harmonised indicators, Dinnetz, M.(editor), Publications Office of the European Union, <https://data.europa.eu/doi/10.2760/907762>.
- ⁶ Arundel, A., & Es-Sadki, N. (2021). Toward a Comprehensive Set of Metrics for Knowledge Transfer. In A. Arundel, S. Athreye, & S. Wunsch-Vincent (Eds.), *Harnessing Public Research for Innovation in the 21st Century* (1st ed., pp. 425–451). Cambridge University Press. <https://doi.org/10.1017/9781108904230.025>; Kreiling, L., & Scanlan, J. (2020). A European clustering study with Knowledge Transfer Office DNA. *International Journal of Intellectual Property Management*, 10(3), 292–319.
- ⁷ European Commission: Directorate-General for Research and Innovation, Al-Ajlani, H., Bubbico, A., Hollanders, H., Cvijanović, V., et al. (2024), ERA dashboard 2023, Publications Office of the European Union, <https://data.europa.eu/doi/10.2777/16305>; European Commission: Directorate-General for Research and Innovation (2024), European Innovation Scoreboard 2024, Publications Office of the European Union, <https://data.europa.eu/doi/10.2777/779689>.
- ⁸ World Intellectual Property Organization (WIPO) (2024), Global Innovation Index 2024: Unlocking the Promise of Social Entrepreneurship, Geneva: WIPO, <https://www.wipo.int/web-publications/global-innovation-index-2024/index.html>.
- ⁹ Drawing on the following 18 surveys and countries in Europe: ASTP, BE (LiEU), BG, CH, CZ, DE, DK, ES (Redotri/SICTI), FR (SATT), IE, IT, LU, SE, TR, & UK, outside Europe: AU, US (AUTM), ZA.
- ¹⁰ See Oxford University Innovation. Impact Report 2023. Oxford's Impact Odyssey. <https://impactreport2023.innovation.ox.ac.uk/> or the EC's Knowledge Valorisation Platform, https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform_en
- ¹¹ Barjak, F., Lefebvre, F., Bailey, A., Spinardi, L., and Elliott, G. (2025), 'NAAC Knowledge and Technology Transfer Metrics Report'