IP4OS

Unpacking the *possibilities* of Intellectual Properties for Open Science

SYNERGY FRAMEWORK FOR KNOWLEDGE VALORISATION

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1 INTRODUCTION

The European Research Area (ERA) Policy Agenda for 2025–2027 is an ambitious structural framework that places Open Science (OS) and Knowledge Valorisation at the centre of Europe's research and innovation policy. Together, these articulate two complementary expectations for the future of European research systems.

First, the ERA Policy Agenda calls for OS to become the "new normal", supported by a stronger EU legal and technical environment that enables *open sharing, seamless access, and reliable reuse of research data and other digital research objects* across the research lifecycle. This includes developing a high-value EOSC Federation, increasing the volume and productivity of FAIR data in Europe, identifying measures for an EU copyright and data framework fit for research, and assessing the impact of OS policies through robust intelligence tools.

Second, the ERA Policy Agenda highlights Europe's continuing difficulty in translating research and innovation results into societal and economic value. To address these gaps, the structural policy on knowledge valorisation calls for a *European scheme for responsible licensing and shared data governance, learning labs for value creation, guidance to accelerate the uptake of multidisciplinary Research and Innovation (R&I) results, and a comprehensive measurement framework* to capture the full spectrum of valorisation activities.

This dual ambition requires approaches that do not treat **OS practices** and **Intellectual Property (IP) rights management** as opposing forces, but as mutually reinforcing components of a modern research ecosystem valuing knowledge.

At the same time, researchers in Europe today often face a perceived dilemma. On the one hand, the EU, many national funding bodies and publicly funded research performing organisations (RPOs) strongly encourage the adoption of OS practices, reflecting a broad consensus in favour of openness and knowledge circulation to address societal and environmental challenges. On the other hand, these same funders, alongside public policy initiatives and RPOs collaborating with industry, also push for turning new ideas into products, services, and businesses, typically leveraging IP for economic value creation. This apparent contradiction between 'Open' and 'Closed' models (with less restrictive IP associated with broad societal impact and restrictive IP associated with commercialisation) is what this framework seeks to challenge, aiming to offer a resolution by exploring a broader concept of 'Knowledge Valorisation.'

Unsurprisingly, evidence shows that IP strategies and OS practices intersect in complex, sometimes conflicting ways, creating tensions for researchers and their stakeholders. However, with the right approach, it is possible (and in many cases highly effective) to pursue the valorisation of research knowledge, leveraging both concepts.

This framework converts the conflicting perspectives of the interaction between the exploitation of intellectual property rights (IPR) and OS into a **concerted IP–OS approach**[1]. This sets out to enable the pursuit of knowledge valorisation, operationalising the principle *"as open as possible, as closed as necessary"*, and documenting facilitators (approaches which support the synergy) and barriers (approaches which obstruct it). It acknowledges that intellectual property rights were designed to facilitate the dissemination of knowledge while preserving control, and that appropriate degrees of openness can be defined for each category of right. Such openness can, moreover, be embedded within the rights tmhemselves, enabling a more nuanced

1 To familiarise research stakeholders with this approach and to establish a culture change in how research work is being exploited with a focus on creating impact, Intellectual Properties for Open Science (IP4OS) introduces the Synergy Framework, an openly accessible handbook supplementing the EU Code of Practice on the Management of Intellectual Assets and comprising real-world cases, practices, and recommendations for a strategic and synergistic application of the principles of OS and IPRs exploitation for effective valorisation of research knowledge.

approach that supports knowledge valorisation and advances synergies.

In parallel, IP4OS contributes to Structural Policy 6, "Upscaling knowledge valorisation capacities and activities," of the ERA Policy Agenda 2025–2027. Through its concerted IP–OS approach, the project directly supports the political objectives of scaling research impact, strengthening knowledge transfer pathways, and fostering responsible exploitation of research outputs across Europe. Crucially, it serves to show that there is no need for conflict between these two goals, and that the EU's continued global leadership in the promotion of Open Science is fully compatible and consistent with its emphasis on competitiveness - and indeed may reinforce it.

The Synergy Framework is grounded in a three-strand evidence process that combines systematic knowledge mapping with stakeholder and practitioner validation. First, a **scoping review**[2] screened academic literature to trace where OS and IPR exploitation can appear to converge or conflict, and to collect good practices that demonstrate the possibility of synergy. Second, a **survey**[3] of researchers, technology-transfer offices, librarians, research managers, and policy actors across the research and innovation system collected their perceptions of IP–OS and identified conflict triggers and examples of synergy at work that they judged effective. Third, a series of **expert webinars**[4] invited legal scholars, researchers, IP practitioners, and OS ambassadors to present real-world cases, discuss emerging guidance, provide testimonials, and agree on consensus criteria for 'fit-for-purpose' tools. Insights from all strands are synthesised, ensuring that each recommendation in the framework rests on documented evidence, user need, and peer endorsement.

There are, of course, other factors that may affect decisions about what to share, or not, when and how to do so, including data protection, privacy, research security and more. These are extensively explored elsewhere. This framework focuses on the interplay between IP valorisation and the pursuit of OS practices (concerted IP–OS approach).

2 Sharma, G., Priess-Buchheit, J. C., Skoric, L., Iva, Č., Frantzeska, P. S., Stephen, W., Stoev, P., Hansen, A.-L., & Nilsonne, G. (2025). IP4OS Milestone 4 - Protocol: A Scoping Review of Open Science and Intellectual Property Rights: Tensions, Synergies, and Best Practices (Version 1). Zenodo. *https://doi.org/10.5281/zenodo.15094707*

Sharma, G., Hansen, A.-L., Wyber, S., Skoric, L., Papadopoulou, F., Miller, K., Alavi, M., Alessandra, B., Čizmin, I., Guzek, V., Stoev, P., Priess-Buchheit, J.C., & Nilsonne, G. (2026). Intellectual property rights and Open Science: A scoping review on tensions, synergies, and pathways to alignment (Version v1) (Preprint publication). Zenodo.) *https://doi.org/10.5281/zenodo.18508204*

3 Sharma, G., Fritz, C., Baccigotti, A., Stoev, P., Alavi, M., Škorić, L., ... & Nilsonne, G. (2025). Stakeholders' perceptions of the synergy between intellectual property and Open Science: A cross-sectional survey. Open Research Europe ,5, 229. *https://doi.org/10.12688/openreseurope.20782.1*

4 The Expert webinars can be accessed on the IP4OS YouTube channel *https://www.youtube.com/@IP4OS*

Table 1: Glossary of Key Terms[5]

TERM	DEFINITION
Knowledge Valorisation	"Knowledge valorisation is the process of creating social, [environmental] and economic value from knowledge by linking different areas and sectors and transforming [research outputs (results, data, software, code, etc.)] into sustainable products, services, solutions and knowledge-based policies that benefit society."[6]
Open Science	Open Science, as defined by UNESCO, is a set of principles and practices that aim to make scientific research from all fields accessible to everyone for the benefit of scientists and society as a whole. Open Science is about making sure not only that scientific knowledge is accessible but also that the production of that knowledge itself is inclusive, equitable and sustainable.
"As open as possible, as closed as necessary"	This principle is a key tenet of Open Science, advocating for sharing knowledge without unnecessary or inappropriate barriers.
"Open" in this framework	"Open" refers to approaches that use no or low degrees of restrictiveness. In the case of data, it is associated with FAIR principles, while in that of copyright, with licences such as CC-BY and CC-BY-SA. It is seen as facilitating further research and downstream innovation.
The FAIR-principles	(Findable, Accessible, Interoperable, and Re-usable) support research outputs to be machine-actionable and therefore foster sharing, redistribution, and reproduction.
FAIR-R²L	FAIR-expansion (as focusing on technical aspects and machine-actionability) to FAIR plus 'Responsibly Licensed' adding the requirement to datasets being responsibly licensed and legally ready for reuse (whether in research or machine learning workflows or in use by AI)[7].
Intellectual Asset (IA)	"[R]esults or products generated through R&I activities"[8] (such as data, software, publications, inventions, or know-how) that have scientific, societal, or economic value in their own right. Some of these intellectual assets may be protected through Intellectual Property Rights; where this occurs, the resulting rights constitute additional, legally enforceable assets that can support valorisation and exploitation.
Intellectual Property (IP) and Intellectual Property Rights (IPR)	"The result of intellectual activities that is eligible for legal protection and includes inventions, literary and artistic works, symbols, names, images, and designs."[9] IP4OS concentrates especially on the management of Intellectual Property Rights (IPR) in ways that are compatible with Open Science, such as decisions concerning copyright, open-source licensing, regulatory exclusivity, etc.
Rights Retention	The practice of ensuring authors keep their rights, only offering specific possibilities to publishers when signing publishing agreements.
Secondary Publication Rights	A legal framework allowing authors to make a version of their published articles openly accessible through institutional or non-profit repositories, typically after journal publication, an embargo period and under certain conditions.

5 See the glossary in Alavi, M., Koch, P., MacDonald, L., Miller, K., Nilsonne, G., Priess-Buchheit, J., Scherer, J., Škorić, L., Stoev, P., Vrkic, D., Wyber, S., Yovcheva, N., & Yucebalkan, C. (2025). Unpacking the possibilities of intellectual properties for Open Science. ARPHA Preprints. *https://doi.org/10.3897/arphapreprints.e181365*

6 European Commission. (n.d.). EU valorisation policy. European Commission. *https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy_en*

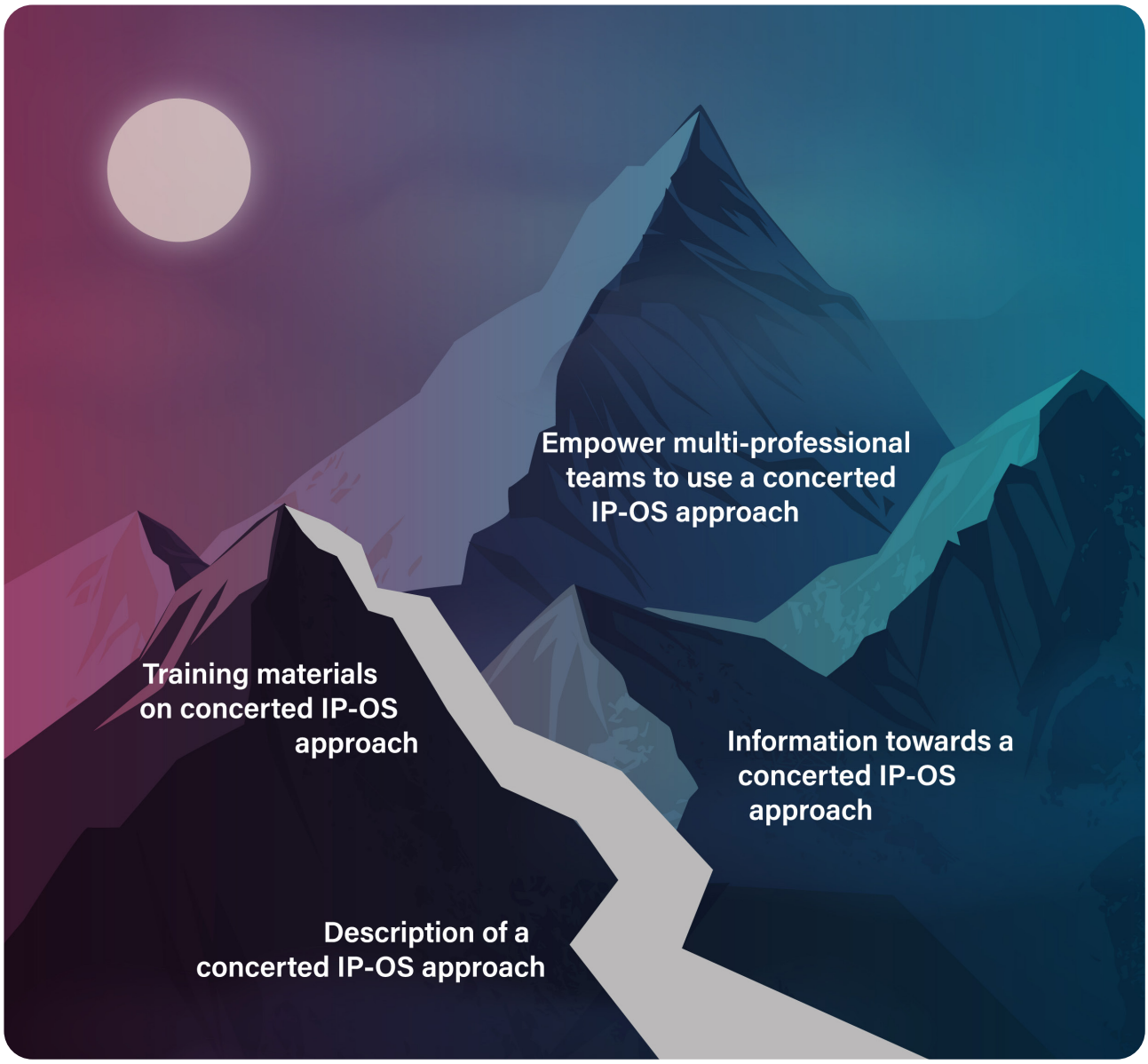
7 Miller, K., Hernando-Guzek, V., Alavi, M., Baccigotti, A., Čizmin, I., Fritz, C., Skoric, L., Wyber, S., & Priess-Buchheit, J. C. (2026). IP4OS Toolbox: FAIR-R²L Rubric. Zenodo. *https://doi.org/10.5281/zenodo.18231655*

8 COMMISSION RECOMMENDATION (EU) 2023/499 of 1 March 2023 on a Code of Practice on the management of intellectual assets for knowledge valorisation in the European Research Area. *https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023H0499&-from=EN*] [accessed: 11.02.2026]

9 European Commission, Directorate-General for Research and Innovation (2023, March 1). Commission Recommendation (EU) 2023/499 of 1 March 2023 on a Code of Practice on the management of intellectual assets for knowledge valorisation in the European Research Area, Publications Office of the European Union

1.1 Structure of the Synergy Framework for Knowledge Valorisation

The Synergy Framework for Knowledge Valorisation is structured as a progressive guide. It begins by identifying and elaborating on the core barriers to achieving IP–OS synergy (Section 2.1), which are essential for understanding the current challenges. These barriers are systematically categorised, including issues such as widespread uncertainty and lack of IP literacy among stakeholders, practical barriers to accessing, sharing, and reusing knowledge, misaligned incentives that often favour one system over the other, and critical policy gaps that hinder convergence. Following this diagnosis of the obstacles, the document pivots to constructive action by presenting **Recommendations for Knowledge Valorisation** (Section 2.2). This section offers targeted guidance, separating advice for individual researchers from broader strategic recommendations for policymakers and institutions, and covers key areas like establishing robust institutional support, harmonising IP and OS policies, and developing the necessary infrastructure. Finally, to ensure the effective implementation of these recommendations, the framework outlines essential measures for **Capacity building and training** (Section 2.3), designed to equip all stakeholders with the practical skills, knowledge, and collaborative mindset required to operationalise the concerted IP-OS approach successfully.



2 SYNERGY FRAMEWORK FOR KNOWLEDGE VALORISATION

2.1. Barriers to achieving IP-OS synergy

While achieving effective IP–OS synergy can appear complex at first glance, our findings show that many of the underlying challenges can be transformed into opportunities with the right support and understanding. This section highlights key areas where enhanced clarity, capacity, and alignment can further unlock the full potential of a concerted IP–OS approach.

2.1.1 Uncertainty and lack of IP literacy

- Educators and researchers **lack knowledge** about IP and open licences.[10,11]
- Researchers often express concerns about unclear data ownership and copyright when **sharing data**, making them hesitant to embrace open data practices[12,13] or, in contrast, excessive sharing[14].
  - Fear of losing control over data and collections as potential intellectual assets is a major deterrent to data sharing.
  - Concerns about data misuse, misinterpretation, or unfair advantage/commercial exploitation by others often lead to withholding data.

2.1.2 Barriers to access, sharing and reuse

- Traditional copyright transfer to publishers restricts open access; new norms such as Secondary Publication Rights (SPRs; possibly EU-wide) are needed. Funders and universities should adopt rights-retention mandates so researchers can apply open licences irrespective of publisher demands.
- Not all supposedly open licences are truly open; for example, "No Derivatives" or "Non-Commercial" clauses impede adoption and reuse, particularly for combined datasets or hardware designs, and open licences are often complex and lack clarity, causing interoperability concerns.[15,16,17,18]
- The proprietary nature of certain research tools, databases, and scientific materials (e.g., genomic data, preclinical safety data, clinical trial data) creates significant barriers to open access, hindering secondary use and follow-on research. Furthermore, excessive patenting and aggressive patent accumulation can result in "patent thickets" or the "tragedy of the anti-commons"[19,20]. Patents on core tools and IP-related restrictions on data

10 Thompson, S. D., & Muir, A. (2020). A case study investigation of academic library support for open educational resources in Scottish universities. Journal of Librarianship and Information Science, 52(3), 685-693.
11 Kursun, E., Cagiltay, K., & Can, G. (2014). An investigation of faculty perspectives on barriers, incentives, and benefits of the OER movement in Turkey. The International Review of Research in Open and Distributed Learning, 15(6).
12 Patel, D. (2016). Research data management: a conceptual framework. Library review, 65(4/5), 226-241.
13 Lupu, V., Cujba, R., & Sobetchi, V. (2023). The attitudes of agricultural researchers towards data sharing: Case study of the Republic of Moldova. In Proceedings of the Central and Eastern European eDem and eGov Days 2023 (pp. 84-93).
14 Jon, W. (2024, 3 July). Is your research a trade secret? South Korean data-sharing case is a wake-up call. Nature, 631, 9. https://doi.org/10.1038/d41586-024-02182-2
15 Kleinman, M. (2018). Open Educational Resources in the Health Sciences. In Medical and Scientific Publishing (pp. 267-277). Academic Press.
16 Hagedorn, G., Mietchen, D., Morris, R. A., Agosti, D., Penev, L., Berendsohn, W. G., & Hobern, D. (2011). Creative Commons licenses and the non-commercial condition: Implications for the re-use of biodiversity information. ZooKeys, (150), 127.
17 Viseur, R. (2012, September). From open source software to open source hardware. In IFIP International Conference on Open Source Systems (pp. 286-291). Berlin, Heidelberg: Springer Berlin Heidelberg.
18 Kamocki, P., Straňák, P., & Sedlák, M. (2016, May). The public license selector: making open licensing easier. In Proceedings of the Tenth International Conference on Language Resources and Evaluation (LREC'16) (pp. 2533-2538).
19 Brown, C. (2009). Ayresian technology, schumpeterian innovation, and the bayh-dole act. Journal of Economic Issues, 43(2), 477-486.
20 De Silva, P. U., & K. Vance, C. (2017). Free Flow of Scientific Information Versus Intellectual Property Rights. Scientific Scholarly Communication: The Changing Landscape, 57-71.

create access barriers (especially acute during public health emergencies). Additionally, high transaction costs are associated with sharing data and materials, particularly due to complex Material Transfer Agreements (MTAs).

- Current open access mandates often exclude other scholarly outputs next to articles, for example, books, chapters, and other research artefacts such as proceedings, research data (sets), and protocols, creating gaps in sharing and limiting the reuse of these materials due to varying or unresolved IP considerations.

- Data sharing, particularly for sensitive information such as human health data, must prioritise privacy and data protection concerns.

2.1.3 Incentive misalignment

- Traditional academic reward systems often prioritise individual paywalled publication and patenting and can discourage data sharing and collaboration.[21,22]

- Some funders, especially in industry–academia collaborations, may expect to be able to patent assets created, which can work against efforts to apply OS models and principles, and even to apply for funding streams that are contingent on adopting OS.[23,24]

2.1.4 Policy gaps and legal inconsistencies

- IP laws are fragmented across jurisdictions and lag behind technical change.[25]

- Few institutions offer clear policies on either OS practices or IP ownership for publicly funded research and open data.[26]

- Data ownership, privacy and security require robust governance and clear licences for shared datasets.

21 Fabrizio, K. R., & Di Minin, A. (2008). Commercializing the laboratory: Faculty patenting and the Open Science environment. Research policy, 37(5), 914-931.
22 Hart, K., An, S., Edwards, A. M., Mahadevan, R., Master, E. R., & Edwards, E. A. (2021). Could Open Science stimulate industry partnerships in chemical engineering university research?. The Canadian Journal of Chemical Engineering, 99(10), 2186-2194.
23 Evangelatos, N., Reumann, M., Lehrach, H., & Brand, A. (2016). Clinical trial data as public goods: Fair trade and the virtual knowledge bank as a solution to the free rider problem-A framework for the promotion of innovation by facilitation of clinical trial data sharing among biopharmaceutical companies in the era of omics and big data. Public Health Genomics, 19(4), 211-219.
24 Bombelles, T., & Coaker, H. (2015). Neglected tropical disease research: rethinking the drug discovery model. Future Medicinal Chemistry , 7 (6), 693-700.
25 Rodríguez-Doncel, V., Santos, C., Casanovas, P., & Gómez-Pérez, A. (2016). Legal aspects of linked data–The European framework. Computer law & security review, 32(6), 799-813.
26 See footnote 3

2.2 Recommendations for Knowledge Valorisation

Building on the insights gained from our 2025 research, this framework outlines recommendations to strengthen IP-OS synergy further. These actions support stakeholders in advancing IP utilisation and OS practices simultaneously and effectively.

2.2.1 Recommendations for researchers

- Treat openness as a guiding principle and share all research outputs as openly as possible and as closed as necessary: post preprints, share de-identified data, code, and protocols, while considering pathways for translation into practical applications (for example, via patents or other tools).
- Improve understanding of copyright, open licences (especially Creative Commons licences), and intellectual property options by seeking professional support early in the research process.
- Improve understanding of SPRs by seeking professional support early in the research process.
- Establish methods for identifying intellectual assets eligible for valorisation; assess valorisation potential and goals throughout the complete research lifecycle.
- Define data ownership, access rights, and reuse conditions with collaborators through appropriate data sharing or material transfer agreements. Discuss international collaborations early and seek advice on IP rights, licensing, and data sharing across jurisdictions.
- View patenting as complementary to publishing, and consider properly managing the timing of publications to avoid jeopardising patent filing (first patent, then publish).

2.2.2 Recommendations for policymakers and institutions

Building Institutional Capability for Knowledge Valorisation

- Provide strong institutional support through multi-professional teams[27] that offer integrated advice on copyright, licensing, and knowledge valorisation strategies combining OS and IP.
- Embed staff with disciplinary expertise and trained in IP, OS and transfer within research institutions to advise on IP matters and collaboration structures.
- Reform research assessment to create meaningful incentives for knowledge valorisation, recognising both open sharing of research outputs and responsible IP management as integral to scientific quality, integrity, and value creation.

27 An example of Multi-Professional Teams can be seen here: Priess-Buchheit, J. C., & Alavi, M. (2025). IP4OS Multi-Professional Teams. Zenodo. https://doi.org/10.5281/zenodo.15277028

Strategic Alignment of OS and IP Tools

- Develop a combined IP–OS policy backed by local expertise.
- Tailor IP strategy to research output maturity, ensuring it serves the societal and/or environmental progress and/or economic impact.
- Ensure that publicly funded research is shared as openly as possible, balancing economic, societal or environmental value and legal/ethical concerns, by promoting timely publication.

Creating Frameworks for FAIR research assets and Knowledge Valorisation

- Design and implement governance frameworks to ensure they can effectively support both protected and open knowledge valorisation in Europe.
- Invest in skilled staff, common standards, and infrastructure to advance as open as possible and as closed as necessary.
- Apply controlled-access models for sensitive data, using formal applications and data-sharing agreements until issues are resolved. This will ensure restrictions are applied consistently and proportionately, based on data sensitivity and user need.
- Harmonise the legal status of publicly funded research outputs to enable open use without infringement.
- Accelerate the implementation of a unified and transparent national policy for research outputs that aligns with EU law.
- Create data governance frameworks that balance FAIR principles with IPR protection, if necessary, using flexible regulation
- Advance the FAIR-expansion to FAIR plus 'Responsibly Licensed' (FAIR-RL), ensuring machine-actionability and clear and responsible licensing and legal readiness for reuse (whether in research or machine learning workflows or in use by AI).
- Enable ethical and legal sharing of research outputs across borders, particularly for sensitive datasets, by aligning with differing legal requirements.
- Tailor data governance strategies for international projects, shifting the focus from national to supranational laws.

Fostering Strategic Collaboration for Knowledge Valorisation

- Promote collaboration among the different stakeholders in the research ecosystem (policy-makers, researchers, publishers, knowledge transfer intermediaries, entrepreneurs, etc.) for an inclusive research system.
- Promote OS partnerships, including with industry, to reduce IP-related inefficiencies and improve knowledge diffusion, mirroring the success of open-source models.

2.3 Recommendations for Capacity Building and Training in Europe

Provide foundational and continuous training on IPRs, open licenses (including application and practical limits of clauses), copyright, privacy, ethics, consent, and trade secret considerations for all stakeholders, including: KTT Professionals, Infrastructure providing stakeholders in the EU R&I system (e.g. RFOs, RPOs, Publishers, Companies working on science communication & dissemination in EU projects), Entrepreneurship Officers, Research Librarians, Data Managers / Data Stewards, Research Managers, Policymakers (as promoters and supporters of scientific messages and tools), OS Ambassadors, Researchers, Research students, Academic and University lecturers, Innovation Managers in Industry & SMEs, RPO's professional, managerial, and/or academic staff, and Innovators from Spin-Offs and Start-Ups.

Offer courses for researchers and other stakeholders involved in international projects or sensitive or translatable work, focusing on research security, export control, and IP, and ensure the dissemination of this knowledge across institutions.

Develop data literacy curricula that connect FAIR principles with day-to-day research practice.

Run library-led workshops and provide resources on depositing, describing, and licensing intellectual assets in open repositories.

Deliver campaigns, events, workshops, and concise learning materials that clearly explain the value of smart IPR management, Open Educational Resources, OS, and Open Educational Practices and their intersection.

Equip and support multi-professional teams (comprising OS ambassadors, librarians, data professionals, research managers, and Knowledge Technology Transfer professionals) to advise on complex IP matters, industry collaboration, and reuse.

Offer briefings and one-to-one consultations that map out routes from research to commercial uptake or higher value societal/environmental/digital benefits while ensuring openness is retained as far as possible.

IP4OS

Unpacking the *possibilities* of Intellectual Properties for Open Science

IP4OS advocates for a concerted approach to integrating Intellectual Property (IP) and Open Science (OS). The project seeks a complementary and supportive link between agile and fitting IP management and OS practices to support transparency, accessibility, sharing and reuse of FAIR (Findable, Accessible, Interoperable, and Re-usable) research artefacts (data, results, codes, etc.).

The aim of IP4OS is to support researchers and Research Performing Organisations (RPO) with knowledge, skills, awareness, and advocacy to create the optimal value from their proprietary knowledge and translate it into social, economic, environmental, and digital benefits.

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