The European Research Infrastructure Consortium (ERIC) as the New Normal? Change and Continuity in Organising European Research Infrastructures since the Early 2000s

Nicolas V. RÜFFIN, Katharina C. CRAMER, Maren TIEMANN

1. Introduction

Regulation No 723/2009 on the Community Legal Framework for a European Research Infrastructure Consortium (ERIC), issued in 2009 by the European Commission, marked a watershed moment for the organisation of Research Infrastructures (RIs) in Europe.[1] ERIC represents a historically unprecedented framework that grants legal personality to RIs of pan-European interest that are to be governed by supranational Community law.

Europe has a long tradition of multilateral RIs, often referred to as Big Science. Since the post-war period, large-scale and usually single-sited Big Science projects were conceived and agreed on an intergovernmental ad-hoc basis among representatives of ministries of participating countries and scientific communities.[2] The establishment of the European Organisation for Nuclear Research (CERN) in 1954 can be described as Europe's earliest experience with large-scale, multilateral Big Science.[3] The European Southern Observatory (ESO) and the European Space Research Organisation (ESRO) followed in the 1960s, as did the European Synchrotron Radiation Facility (ESRF) in the 1980s and the European Free-Electron Laser (European XFEL) in the 2000s.[4] These projects have been organised on a multilateral level with varying legal frameworks, ranging from internation-

1. OJ L [*Official Journal of the European Union – Legislation*] 206, 08.08.2009, pp.1–8.
2. J. KRIGE, *The Politics of European Scientific Collaboration*, in: J. KRIGE, D. PESTRE (eds), *Companion to Science in the Twentieth Century*, Routledge, London, 2003, pp.897–918; O. HALLONSTEN, *Big Science Transformed: Science, Politics and Organization in Europe and the United States*, Palgrave Macmillan, Cham, 2016.
3. See also L. FORGIARINI, *Unstable Bonds: CERN's Relations with its Peripheral Member States, 1950s–1960s* in this special issue.
4. A. BLAAUW, *History of the European Southern Observatory (ESO)*, in: J. KRIGE, L. GUZZETTI (eds), *History of European Scientific and Technological Cooperation*, European Communities, Luxemburg, 1997, pp.109–119; A. HERMANN, L. BELLONI, U. MERSITS, D. PESTRE, J. KRIGE (eds), *History of CERN: Volume I – Launching the European Organisation for Nuclear Research*, North Holland, Amsterdam, 1987; A. HERMANN, L. WEISS, D. PESTRE, U. MERSITS, J. KRIGE (eds), *History of CERN*, vol.II: *Building and Running the Laboratory, 1954–1965*, North-Holland, Amsterdam, 1990; K. CRAMER, *A Political History of Big Science: The Other Europe*, Palgrave Macmillan, Cham, 2020; J. KRIGE, A. RUSSO, *A History of the European Space Agency 1958–1987*, vol.II: *The story of ESRO and ELDO, 1958–1973*, ESA Publications Division, Noordwijk, 2000.

al organisations (CERN, ESO) to company-like organisational structures (ESRF, European XFEL). In addition to these Big Science organisations, RIs also emerged as user facilities, for instance, in the field of photon science, neutrons or high magnetic fields, that were meant to serve the needs of multidisciplinary research groups.[5] Projects such as the Human Genome Project (HGP), which was not bound to centralised research centres but instead distributed globally, exemplified another transformation in the organisation of RIs in Europe at the end of the 20th century.[6]

Until the 2000s, the European Commission had no formal role in the organisation and institutionalisation of Big Science. Research policy on a supranational level was deeply fragmented, as governments historically safeguarded jurisdictions and responsibilities on a national level.[7] The increasing involvement of the European Commission in research policy and the governance of RIs across Europe began in the early 2000s with the Treaty on the Functioning of the European Union (TFEU, also referred to as the Lisbon Treaty), the creation of the European Strategy Forum on Research Infrastructures (ESFRI) and its roadmap as well as dedicated budgets for RIs within the Framework Programmes for Research (FP). These developments were clear indications of change in the European RI landscape as the European Commission began to flesh out its own policies in this field. These efforts culminated in the ERIC framework in 2009, representing a structural innovation in the European scientific landscape: It was the first time that a legal framework governed by Community law was made available to research consortia across Europe.[8] By April 2023, 26 pan-European RIs were granted ERIC status by the European Commission.

From being a novelty in 2009, the ERIC framework has since seemingly consolidated, becoming an anchor within a dynamic European RI landscape. However, research from the humanities and social sciences is still limited to a few publications.[9] Scholars still struggle to understand to what extent ERIC has changed the

5. O. HALLONSTEN, *Small Science on Big Machines: Politics and Practices of Synchrotron Radiation Laboratories*, Lund University, Lund 2009.
6. H.-J. RHEINBERGER, *Patterns of the International and the National, the Global and the Local in the History of Molecular Biology*, in: M. MERZ, P. SORMANI (eds), *The Local Configuration of New Research Fields. On Regional and National Diversity*, Springer, Cham, 2018, pp.193–204.
7. T. FLINK, *EU-Forschungspolitik – von der Industrieförderung zu einer pan-europäischen Wissenschaftspolitik?*, in: D. SIMON, A. KNIE, S. HORNBOSTEL, K. ZIMMERMANN (eds.), *Handbuch Wissenschaftspolitik,* Springer Fachmedien, Wiesbaden, 2016, pp.79–97; L. GUZZETTI, *A Brief History of European Union Research Policy*, European Communities, Luxemburg, 1995.
8. The Survey of Health, Ageing and Retirement in Europe (SHARE) ERIC was the first RI to be granted ERIC status in 2011. By December 2023, there were 28 RIs with ERIC status.
9. From legal perspectives: A. NORDBERG, *Big Science, Big Data, Big Innovation? ERIC Policies on IP, Data and Technology Transfer*, in: U. MAUNSBACH, A. HILLING (eds), *Big Science and the Law*, Ex Tuto Publishing, København, 2021, pp.65–106; A. ASTVALDSSON, *The European Research Infrastructure Consortium (ERIC) as Governed by EU Law and Swedish Law: A Study on a European Union Legal Form within the Swedish Legal System*, Lund University Press, Lund, 2022; J. REICHEL et al., *ERIC: A New Governance Tool for Biobanking*, in: *European Journal of Human Genetics*, 22(2014), pp.1055–1057; L. RYAN, *Balancing Rights in the European Re-*

landscape of science and research in Europe as well as the many faces of the European integration process. This article traces the historical evolution of the ERIC framework since the 2000s with emphasis on the decision-making process of emerging RIs. The findings presented here are contextualised within broader historical trajectories, shedding light on the underlying logics and negotiation patterns that shaped the establishment of European Big Science projects during the latter half of the 20th century. Put differently, in this article, we ask the following questions: To what extent is ERIC considered an alternative framework to other ways of organising and governing RIs in Europe, such as through international organisations, foundations or companies? What are the arguments favouring or disfavouring ERIC? How is the ERIC framework assessed and represented by those actors in charge of preparing the RIs for implementation? What challenges arise during the implementation process? These guiding questions are significant for assessing the extent to which the introduction of the ERIC framework since the late 2000s can be positioned regarding the Europeanisation *of* science vis-à-vis the Europeanisation *through* science in the early 21st century.

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search Area: the Case of ERICs (European Research Infrastructure Consortium), in: *European Intellectual Property Review*, 41(2019), pp.218–227; L. RYAN, *Research Infrastructures with European Research Infrastructure Consortium (ERIC) Status: Revisiting the Case of ERICs and Intellectual Property Rights in the European Research Area*, in: *European Intellectual Property Review*, 45(2023), pp.252–265; H. YU, J. BLAK WESTED, T. MINSSEN, *Innovation and Intellectual Property Policies in European Research Infrastructure Consortia*, part I: *The Case of the European Spallation Source ERIC*, in: *Journal of Intellectual Property Law & Practice*, 12(2017), pp.384–397; from policy and science and technology studies perspectives: O. HALLONSTEN, *Research Infrastructures in Europe: The Hype and the Field*, in: *European Review*, 28(2020), pp.617–635; I. MEIJER, J. MOLAS-GALLART, P. MATTSSON, *Networked Research Infrastructures and Their Governance: The Case of Biobanking*, in: *Science and Public Policy*, 39(2012), pp.491–499; M. MOSKOVKO, *Intensified Role of the European Union? European Research Infrastructure Consortium as a Legal Framework for Contemporary Multinational Research Collaboration*, in: K. CRAMER, O. HALLONSTEN (eds), *Big Science and Research Infrastructures in Europe*, Edward Elgar, Cheltenham, 2020, pp.128–156; M. MOSKOVKO, A. ASTVALDSSON, O. HALLONSTEN, *Who Is ERIC? The Politics and Jurisprudence of a Governance Tool for Collaborative European Research Infrastructures*, in: *Journal of Contemporary European Research*, 15(2019), pp.249–268; T. STAHLECKER, H. KROLL, *Policies to Build Research Infrastructures in Europe: Following Traditions or Building New Momentum?*, in: *Arbeitspapiere Unternehmen und Region*, 4(2013), Fraunhofer-Institut für System- und Innovationsforschung, Karlsruhe, 2013; I. ULNICANE, *Ever-Changing Big Science and Research Infrastructures: Evolving European Union Policy*, in: K. CRAMER, O. HALLONSTEN, op.cit., pp.76–100. The Biobanking and Biomolecular Resources Research Infrastructure (BBMRI) ERIC and the European Social Survey (ESS) ERIC have received in-depth analysis as individual case studies: V. ARGUDO-PORTAL, M. DOMÈNECH, *The Reconfiguration of Biobanks in Europe under the BBMRI-ERIC Framework: Towards Global Sharing Nodes?*, in: *Life Sciences, Society and Policy*, 16(2020), p.9; K. KROPP, *The Cases of the European Values Study and the European Social Survey – European Constellations of Social Science Knowledge Production*, in: *Serendipities. Journal for the Sociology and History of the Social Sciences*, 2(2017), pp.50–68; A. LARSSON et al., *Structuring a Research Infrastructure: A Study of the Rise and Fall of a Large-Scale Distributed Biobank Facility*, in: *Social Science Information*, 57(2018), pp.196–222; M.D. LINDSTRØM, K. KROPP, *Understanding the Infrastructure of European Research Infrastructures—The Case of the European Social Survey (ESS-ERIC)*, in: *Science and Public Policy*, 44(2017), pp.855–864.

The article is structured as follows: In Section 2, we briefly summarise the development of Big Science and RI policy in Europe during the second half of the 20th century and elaborate on the growing role of the European Commission at the dawn of the 21st century. The first part of Section 3 outlines the approach we used to compile and analyse the corpus of documents relevant to the genesis of ERICs. The remainder of Section 3 is subdivided into three parts: In Section 3.1, we present a periodisation of the diffusion of ERICs and discuss historical trends. In Section 3.2, this is followed by a description of the rationales and alternative options for legal structures that emerging RIs considered during their formation. In Section 3.3, we discuss the extent to which the new legal structure has been normalised and highlight some challenges faced by research consortia in its formation. Section 4 contextualises the findings in relation to the historically evolved organisation of large-scale research in Europe and draws conclusions on the extent to which ERIC as a legal structure represents a new type of Europeanisation *of* and *through* research.

2. History of Research Infrastructures in Europe

The historical evolution of RIs in Europe since the 1950s has been marked by examples of Big Science multilateral collaboration, such as the establishment of CERN, the European Organisation for Nuclear Research, near Geneva in 1954 and the parallel expansion of such large-scale endeavours on the national level.[10] The United Kingdom founded the Atomic Energy Research Establishment in Harwell near Oxford already in April 1946, while France established its first particle accelerator and nuclear research reactor in 1952 near Paris.[11] Germany started in 1956 with the founding of four research centres particularly focused on particle and nuclear physics.[12] The field differentiated further during the late 20th century. In addition to the Big Science organisations, similar RIs developed as smaller, often transnationally distributed infrastructures, such as the European Social Survey (ESS) in the domain of social sciences and humanities. The early 21st century saw the emergence of virtual efforts, including digital collections or computing grids.[13]

10. HERMANN et al. *History of CERN*, vol.I, op.cit.
11. U. MERSITS, *From Cosmic-Ray and Nuclear Physics to High-Energy Physics*, in: A. HERMANN, L. BELLONI, U. MERSITS, D. PESTRE, J. KRIGE (eds), op.cit.
12. M. SZÖLLÖSI-JANZE, H. TRISCHLER, *Einleitung: Entwicklungslinien der Großforschung in der Bundesrepublik Deutschland*, in: M. SZÖLLÖSI-JANZE, H. TRISCHLER, (eds), *Grossforschung in Deutschland*, Campus Verlag, Frankfurt a.M., 1990, pp.13–20.
13. H.-J. RHEINBERGER, *Patterns of the International and the National, the Global and the Local in the History of Molecular Biology*, in: M. MERZ, P. SORMANI (eds.), *The Local Configuration of New Research Fields. On Regional and National Diversity*, Springer, Cham, 2018, pp.193–204.

In the late 1990s and early 2000s, the European Commission lobbied for stronger integration and coordination of RIs in Europe.[14] The term RI was not yet defined more precisely at this time but referred indistinctly to transnational cooperation and existing and emerging large-scale research consortia that are of importance for Europe, its scientific landscape and the integration process.[15] This dynamic can be seen in line with a generally rising interest in research policy by the European Commission; a field that had long been in the primary national jurisdiction of the European Union's member states.[16] Ever since the Lisbon Strategy in 2000, the European Commission has stressed the importance of the European Union as a knowledge-driven economy that needs more integration to tackle the Grand Challenges of the 21st century and compete with other world powers like the United States. This argument resonates with the rhetoric of competing powers, which has already been integral to the European Commission's research policy narrative since the 1980s.[17] The overall goal of the European Commission during the 2000s was the establishment of a European Research Area (ERA), a kind of internal market for science and research within the European Union. By promoting scientific collaboration, individual researcher mobility, and the harmonisation of research policies, ERA aimed at fostering European integration. The role of the European Commission in translating the European Union into a world-leading knowledge economy can be labelled as coordinating, incentivising, and legislating. These characteristics have equally shaped its approach to RI policy since the early 2000s.[18]

Initiatives like ESFRI, which was established in 2002, were launched by the European Commission to streamline the planning and development of RIs. Here, the European Commission acted as an agenda-setting institution that assembled representatives of national science administrations, funding agencies, research councils, and existing Big Science organisations in a deliberative context to negotiate the future of a European approach to the coordination of RIs. In 2006, this

14. These initiatives built on the European Commission's increasing interest in the field of science and technology that started in the 1970s and expanded throughout the 1980s. See David Irion's contribution in this special issue.
15. EUROPEAN PARLIAMENT AND COUNCIL OF THE EUROPEAN UNION, *Decision No 1513/2002/EC of the European Parliament and of the Council of 27 June 2002 concerning the sixth framework programme of the European Community for research, technological development and demonstration activities, contributing to the creation of the European Research Area and to innovation (2002 to 2006)*, 2002.
16. D. IRION, op.cit.; L. GUZZETTI, *The 'European Research Area' Idea in the History of Community Policy-Making*, in: H. DELANGHE, L. SOETE, U. MULDUR, (eds.), *European Science and Technology Policy: Towards Integration or Fragmentation?* Edward Elgar, Cheltenham, 2009, pp.64–77.
17. T. FLINK, D. KALDEWEY, *The New Production of Legitimacy: STI Policy Discourses Beyond the Contract Metaphor*, in: *Research Policy*, 47(2018), pp.14–22.
18. M.-H. CHOU, *Constructing an Internal Market for Research Through Sectoral and Lateral Strategies: Layering, the European Commission and the Fifth Freedom*, in: *Journal of European Public Policy*, 19(2012), pp.1052–1070; K. CRAMER, N. RÜFFIN, *The EUropeanisation of Research Infrastructure Policy*, in: *Minerva*, 2024.

work culminated in the first ESFRI roadmap that compiled and published a list of relevant RIs for European scientific communities.[19] Since this first edition, the ESFRI roadmap has been updated in 2008, 2010, and – after a larger gap that was spent on developing the listed projects – in 2016, 2018, and 2021.[20] Although the European Commission emphasises that the ESFRI roadmap is not intended for political prioritisation, it is evident that projects featured on ESFRI's roadmap reflect a political commitment from the European Commission, signalling their strategic significance for European research policy.[21] Shortly after the first ESFRI roadmap was published in 2006, member states, the European Parliament, and the European Commission agreed for the first time on a dedicated budget for the preparatory phases of RIs in FP7 (2007–2013).[22] From then on, tailored financial support from the European FPs could be used to fund projects aimed at establishing or updating RIs that were listed on the ESFRI roadmap. Such dedicated budgets reoccurred in FP8 (Horizon 2020, 2014–2020) and FP9 (Horizon Europe, 2021–2027). These initiatives laid the groundwork for the European Commission's dual approach of coordination (ESFRI and ESFRI roadmap) and financial incentivisation (FPs) that can be said to have gradually strengthened the European Commission's role in this field throughout the last decade. At the same time, the definition of RIs employed by the European Commission remained largely the same, encompassing

> "major scientific equipment or sets of instruments; knowledge-based resources such as collections, archives or scientific data; e-infrastructures such as data and computing systems and communication networks; and any other infrastructure of a unique nature essential to achieving excellence in research and innovation. Such infrastructures may be 'single-sited', 'virtual' or 'distributed'".[23]

A significant turning point occurred in 2009 with the enactment of the ERIC framework. During the work on the first ESFRI roadmap, discussion arose on

19. ESFRI, *European Roadmap for Research Infrastructures: Roadmap 2006*, Publications Office of the European Union, Luxemburg, 2006.
20. ESFRI, *European Roadmap for Research Infrastructures: Roadmap 2008*, Publications Office of the European Union, Luxemburg, 2008; ESFRI, *Strategy Report on Research Infrastructures: Roadmap 2010*, Publications Office of the European Union, Luxemburg, 2011; ESFRI, *Strategy Report on Research Infrastructures: Roadmap 2016*, Publications Office of the European Union, Luxemburg, 2016; ESFRI, *Strategy Report on Research Infrastructures: Roadmap 2018*, Publications Office of the European Union, Luxemburg, 2018; ESFRI, *Strategy Report on Research Infrastructures: Roadmap 2021*, Publications Office of the European Union, Luxemburg, 2021.
21. O. HALLONSTEN, *Research Infrastructures…*, op.cit.
22. Originally, the European Commission proposed a budget of € 3,961,000 which was subsequently reduced to € 1,715,000 for RIs in FP7. See: EUROPEAN COMMISSION, *Proposal for a Decision of the European Parliament and of the Council concerning the Seventh Framework Programme of the European Community for Research, Technological Development and Demonstration Activities (2007 to 2013)*, COM(2005) 119 final, 2005; EUROPEAN COMMISSION, *Interim Evaluation of the Seventh Framework Programme. Report of the Expert Group. Final Report*, 01.11.2010.
23. Regulation (EU) No 1291/2013 of the European parliament and of the council of 11 December 2013 establishing Horizon 2020 – the Framework Programme for Research and Innovation (2014–2020) and repealing Decision No 1982/2006/EC.

suitable legal frameworks to pursue multinational RI projects across different fields and with heterogeneous actors involved.[24] The European Commission reacted by proposing a new legal framework for European Research Infrastructures (ERI), which subsequently became ERIC.[25] ERIC was promoted as a dedicated framework that aimed at streamlining the existing legal and organisational complexities of European RIs. The primary focus of ERIC was defined as "European multi-side and multi-country owned research infrastructures".[26] The first regulation was adopted by the European Council in June 2009.[27] It was amended in December 2013 to specify the relationship between member countries and other partners (e.g., non-member countries or associate countries) within the consortium.[28] Both regulations state that ERICs generally need to demonstrate an added value for ERA, clear organisational structures and statutes as well as the necessary number of valid members.[29] In turn, ERICs receive legal personality and the status of international organisations, including certain Value Added Tax (VAT) exemptions. RIs can apply for ERIC status, and the European Commission eventually awards ERIC status and decides on its implementation.[30] The years after ERIC was put in place saw a surge of emerging RIs that opted to become ERICs. As of April 2023, 26 ERICs were constituted in Europe. Other consortia contemplate applying for this legal status, with some already listed as ERIC candidates by ESFRI, seemingly creating a self-reinforcing development. However, it remains an open question why RIs decide to apply for ERIC status.

3. ERIC: Change and Continuity Since the Early 2000s

In this article, we are interested in how the ERIC framework has been discussed and negotiated as a suitable legal structure in emerging RIs in Europe since the early 2000s. We base our analysis on a corpus of 75 publicly available documents from European RIs that addressed the topic of legal structure, contained references to relevant documents or allowed us to pinpoint the chronology of decisions that led toward ERIC status. These documents were issued by 42 RIs that either have already adopted the ERIC framework or are striving towards its application, or have not yet decided on a final legal structure.[31] The time range encompasses the

24. K. KROPP, op.cit.; M. MOSKOVKO et al., op.cit.
25. M. MOSKOVKO, op.cit.
26. CORDIS, ERIC Forum Implementation Project. Online available: https://cordis.europa.eu/project/id/823798.
27. OJ L 206, 08.08.2009, pp.1–8.
28. OJ L 326, 06.12.2013, pp.1–2.
29. OJ L 206, 08.08.2009, pp.1–8; OJ L 326, 06.12.2013, pp.1–2.
30. A. ASTVALDSSON, op.cit.; M. MOSKOVKO, op.cit., M. MOSKOVKO et al., op.cit.
31. We initially focused on the different editions of the ESFRI roadmap to obtain an overview of the number of RIs that have adopted the ERIC framework or that strive towards it. Since 2006, the ESFRI roadmap has listed 74 RIs, of which 25 RIs have adopted ERIC status. The

publication of the first ESFRI roadmap in 2006 to the award of ERIC status to ACTRIS, the Aerosol, Clouds and Trace Gases Research Infrastructure (ACTRIS) ERIC, a distributed RI in environmental science, in April 2023.[32]

The corpus includes two types of documents that reveal relevant insights into the formation mechanisms of ERICs and are pivotal to tracing the chronology of decisions that led toward ERIC status. First, it encompasses deliverables that were published by European RIs while being funded through the European FPs. As mentioned, ERICs that have been listed on ESFRI's roadmap since 2006 were eligible for funding from the FPs within the dedicated budgets for RIs that aim to finance design studies as well as preparatory phases. The European Commission emphasises that the preparation of legal agreements, including aspects such as site selection, governance, and financing of new RIs, must be finalised and documented in the form of deliverables before the completion of a project that the European Union funds in the context of its FPs.[33] Hence, emerging RIs on ESFRI's roadmap that were funded through the European FPs were obliged to document their legal framework and governance agreements in deliverables. Second, it includes similar documents published by the respective RI during the period before the official awarding of the ERIC status by the European Commission (e.g., reports on preparatory phases or design studies) and the period immediately afterwards (e.g., annual reports and final project reports). As will become evident from the analysis, the chronological sequence of entry to the roadmap, preparation phase, and subsequent implementation represents an ideal-type imagination with almost all actual projects demonstrating smaller or bigger deviations from the process.

3.1 Periodisation and Historical Trends in the Diffusion of ERICs

The first group of entries on the ESFRI roadmap in 2006 encompassed 15 RIs. For these cases, it is important to remember that the new ERIC legal framework entered into force only in August 2009. For most of these projects, it is not

total number of RIs (74) that are listed on ESFRI's roadmap differs throughout the different editions. The reason for this variance is that roadmap projects do not reappear in a new edition if they have previously been merged, removed and/or completed. We excluded RIs that, while featured on one or more editions of the ESFRI roadmap, already operate within fixed legal and organisational frameworks. This group comprises of several intergovernmental organisations like CERN, ESRF, Institute Laue-Langevin (ILL) as well as nationally organised companies (like, for instance, German limited liability company (GmbH)). We further excluded two cases for which we did not find any evidence of publicly available information on governance structure or legal framework (Growing Up in Digital Europe: EuroCohort (GUIDE) and Research Infrastructure for Environmental Exposure Assessment in Europe (EIRENE RI)).

32. LOFAR ERIC and INFRAFRONTIER ERIC, which were granted ERIC status in December 2023, are not part of the scope of the study because they were established after data collection and analysis were finished.

33. EUROPEAN COMMISSION, *ERIC Practical Guidelines…*, op.cit., p.8.

possible to determine exactly when deliberations on different legal forms took place. Nevertheless, the final reports of the respective preparatory projects of these RIs in FP7 provide us with a terminus *ante quem* that indicates the latest possible date when a decision to opt for ERIC status was made. In this group, the decision to opt for ERIC status was taken by 13 out of 15 RIs within two years after the ERIC regulation entered into force in 2009. Eight RIs received the implementation decision of the European Commission within three years after the respective project consortia opted for ERIC status. With the noteworthy exception of the Extreme Light Infrastructure (ELI) ERIC, all considered entries from the 2006 roadmap had obtained ERIC status by 2017. ELI obtained ERIC status only in 2021.

The second group of entries, encompassing the ESFRI roadmap in 2008 and 2010, includes eight RIs. While all of the five new entries in the 2008 roadmap eventually became ERICs between 2017 and 2019, their decision to apply for ERIC status took longer than in the first group from 2006. Likewise, the periods between the executive decision to apply for ERIC status of the emerging RI and the actual implementation of the European Commission took longer than three years for four of them. This appearance of a significantly longer development time also extends to the three entries in the 2010 roadmap that were included in the analysis. Both for the period between admission to the ESFRI roadmap and the decision of the RI to opt for ERIC status, as well as for the period between this decision and the actual implementation of the ERIC framework by the European Commission, we found longer cycles compared to the original entries from the ESFRI 2006 roadmap. From such a comparative perspective, it becomes apparent that the speed of transformation towards the ERIC framework of the 2006 ESFRI roadmap entries – the first group mentioned – is quite remarkable.

For the six entries from the ESFRI 2016 roadmap, this picture changes again. For five of these projects, a decision for ERIC status can be seen within two years after their admission to the roadmap. Nevertheless, the second period in question – from executive decision within the project consortium to the actual implementation by the European Commission – lengthens again. ACTRIS ERIC has been the only entry from the 2016 roadmap that obtained ERIC status by April 2023 so far. The implementation decision of the European Commission for the other RIs is still pending.

In comparison, the RIs from the ESFRI roadmap editions in 2018 and 2021 show a mixed record. Four out of five investigated RIs from the 2018 roadmap became ERIC candidates by 2023. Only one RI (Religious Studies Infrastructure: Tools, Innovation, Experts, Connections and Centres in Europe, RESILIENCE) out of six entries from the 2021 roadmap has already opted for ERIC status.[34]

34. It would be surprising to see entries from these two roadmaps already transformed into an ERIC because decision and implementation processes, including a two-step application process, seem to take at least two to three years.

JIV ERIC (Joint Institute for Very Long Baseline Interferometry), an RI in radio astronomy, and CERIC ERIC (Central European Research Infrastructure Consortium), a distributed RI that provides access to multidisciplinary instruments in Central Europe, constitute two projects that never featured on the ESFRI roadmap but obtained ERIC status nonetheless in 2014. Documents indicate that the decision to apply for this legal status was made in June 2011 (CERIC) and in late 2012 (JIV), respectively. Thus, both RIs can be assigned to the pattern that also applies to the entries in the first roadmap from 2006, or in particular, the fast executive decision to opt for ERIC status.

3.2 Legal Comparison across Different Projects

For at least 23 out of 42 cases included in our article, there is direct evidence for legal analyses that were conducted before the executive decision to apply for ERIC status was taken by the key actors of the emerging RI. For another three cases, the analysed documents indicate that ERIC was the preferred legal structure for the respective emerging RI consortium from the beginning. For 11 additional cases, a terminus *ante quem* can be established that places the decision to opt for ERIC status in chronological order. Based on the available corpus of documents, it becomes apparent that ERIC was usually considered among several different legal forms and in most cases, ERIC was identified as the preferred organisational and legal structure. Differences arise in how this comparison was made for early RIs on ESFRI's 2006 roadmap and more recent projects that were featured on subsequent editions of ESFRI's roadmap. While the first projects on the 2006 roadmap assessed the various options of legal and governance structures based on the prospective characteristics of the ERIC legislation, more recent projects frequently built their assessment on experiences from already established ERICs. They did so by inviting experts from these established ERICs or sending out surveys to collect information on the advantages and obstacles of this specific legal framework.[35] Some RIs conducted the comparison internally, while others contracted specialised legal firms for this purpose. This approach is illustrated in a report by the European Solar Research Infrastructure for Concentrated Solar Power (EU-SOLARIS):

> "During the analysis, different stakeholders have participated and different sources have been considered in the decision-making process for the best choice. Some of the most relevant have been: experts from different entities participating in the EU-SOLARIS project, analysis of other similar entities and the solution adopted by other ESFRI

35. GETTING READY FOR EST (GREST), Summary D7.4 – Legal Entity, Governance Bodies and Operation Funding Scheme for EST, n.d. Online available: https://www.est-east.eu/images/media/pdf/GREST_D7.4_summary.pdf.

projects, and finally the advice and guidance of GARRIGUES, a prestigious company with recognised and deep expertise in legal topics".[36]

Regardless of the design of these assessments, the results differ only marginally: A prevailing preference for the ERIC framework can be identified across different domains and roadmaps from different years. The reasons for this preference stems from the perceived comparative advantages of the ERIC legal framework compared to other options. Recurring alternatives in the documents include the Belgian AISBL[37], national variations of companies with limited liability, intergovernmental agreements modelled on cases like CERN or the European Molecular Biology Laboratory EMBL, different – primarily commercial – association types like Societas Europaea (SE), and foundations.[38]

Documents from the first consortia that adopted the ERIC framework shed light on the reasons why this particular legal form promised advantages that other alternatives could not provide. For instance, within the Common Language Resources and Technology Infrastructure (CLARIN), an RI in the humanities, advantages of legal security and exemptions from taxation compared to disadvantages that primarily stem from the novelty of the ERIC framework were mentioned.[39] The search for a sustainable institutionalisation of RIs remains a significant argument in favour of ERIC status and is repeated in several analysed documents.[40] This almost always encompasses financial and legal aspects. Financially, the reasoning found in the documents expects member states to commit funding on a long-term basis.[41] In this argumentation, direct ministerial involvement is seen as creating a more substantial commitment to an RI than relying on intermediaries like, for instance,

36. EU SOLARIS, Final Report Summary – EU-SOLARIS, 2016. Online available: https://cordis.europa.eu/project/id/312833/reporting.
37. AISBL is an acronym for *Association internationale sans but lucratif*, a Belgian legal personality for a non-profit organisation with an international component and limited commercial operations but without tax exemptions.
38. The SE is a legal structure meant for companies that operate in several member states of the EU. The European Economic Interest Group (EEIG) is a similar entity, but with unlimited liability for the partners and designed for smaller companies. Some documents also discuss the European Grouping of Territorial Cooperation (EGTC) which provides a legal personality to facilitate public transnational collaboration among member countries of the EU. None of these different legal structures have been used to establish international research collaborations so far. See: OJ L 294, 10.11.2001, pp.1–21; OJ L 199, 31.7.1985, pp.1–9; OJ L 347, 20.12.2013, pp.303–319.
39. B. MAEGAARD, S. KRAUWER, H. FERSOE, L. HENRIKSEN, CLARIN - D8S-1.2 - Analysis and Proposal(s) for Governance, 2010, pp.20–21. Online available: https://office.clarin.eu/pp/D8S-1.2.pdf.
40. K. SCHÜRER, WP3 TEAM, D3.3 - Recommendations on Legal Structure, n.d., p.1. Online available: https://ppp.cessda.eu/doc/D3.3_Recommendations_on_legal_structure.pdf; DiSSCO, Analysis of the Legal Entity Models and Their Suitability for Achieving DiSSCo Objectives, 2021. Online available: https://know.dissco.eu/bitstream/item/473/1/DPP_WP7_MS7.2%20_DiSSCo%20Legal%20Entity%20proposal%20%28incl.%20Annex%29.pdf; Integrated Carbon Observation System (ICOS), Final Report Summary – ICOS, 2013. Online available: https://cordis.europa.eu/project/id/211574/reporting.
41. EUROPEAN SOCIAL SURVEY, *The European Social Survey Infrastructure Preparatory Phase. Final Report Summary*, 2010. Online available: https://cordis.europa.eu/project/id/212331.

research councils, and project-based funding. Legally, the overarching European framework promises facilitated processes, in particular for distributed consortia, as Community law is – at least in theory – well implemented and accepted in all countries.[42] Another major motive that surfaces in the sources is the expectation of gaining certain beneficial characteristics of international organisations, such as tax exemptions without contracting long and exhaustive negotiations on intergovernmental treaties.[43] A crucial element of this argument rests on the fact that ERIC status "gives a legal capacity, which is recognised in all EU member states" in contrast to alternatives that would need tailor-made arrangements with the legal requirements in different European countries.[44]

The authors of the different documents were aware of the trade-offs that an ERIC status entails. A primary concern that can be seen in their argumentation relates to the risk of reduced autonomy vis-à-vis national governments. This can be identified as the reason why some consortia are initially reluctant to opt for ERIC status and instead consider the Belgian AISBL legal form a reasonable alternative as it does not require the membership of country governments but can be run by research associations, research councils as well as a smaller group of engaged scientists.[45] For instance, the Scientific Large-Scale Infrastructure for Computing/Communication Experimental Studies (SLICES) argues in this regard that "[a]ll in all, the consortium's choice lies in whether autonomy is preferred over possible financial benefits or vice versa".[46] Nevertheless, the investigation shows that ERIC's promises prevail in most of the cases. This is true not only for newly emerging RIs but also for long-existing projects like, for instance, ESS ERIC or JIV ERIC that choose to transform into ERICs shortly after the new legal form was implemented.

42. P. KONTKENEN et al., *ACTRIS - Deliverable 2.1 Legal Entity Analysis*, 2017, p.3. Online available: https://www.actris.eu/sites/default/files/Documents/ACTRIS%20PPP/Deliverables/ACTRIS%20PPP_WP2_D2.1_Legal%20entity%20analysis.pdf; EUROPEAN PLATE OBSERVING SYSTEM (EPOS), *Final Report Summary – EPOS, 2015*. Online available: https://cordis.europa.eu/project/id/262229/reporting.
43. D. LUYTEN, A. BABES-FRUCHTER, R. SPECK et al., *Deliverable 2.2 Selection and Analysis of the Legal Frameworks for Distributed Research Infrastructures and the Preferred Model for European Holocaust Research Infrastructure*, 2020. Online available: https://www.ehri-project.eu/sites/default/files/downloads/Deliverables/EHRI%20-%20PP%20DL%202.2%20%20Selection%20of%20legal%20form%20and%20model%20for%20EHRI.pdf
44. P. KONTKENEN et al., *ACTRIS…*, op.cit.; EUROPEAN CARBON DIOXIDE CAPTURE AND STORAGE LABORATORY INFRASTRUCTURE (ECCSEL), *ECCSEL PP2 – Final Report Summary*, 2015. Online available: https://cordis.europa.eu/docs/results/312/312806/final1-eccsel-pp2-project-final-report-v5-full-index.pdf.
45. DiSSCO, Analysis …, op. cit.
46. S. ZIEGLER, A. QUESADA RODRIGUEZ, C. CRETTAZ, V. TSIOMPANIDOU, R. RADÓCZ, E. KASYANOVA-KÜHL, D1.3 Analysis of Legal Compliance and Regulation Issues in Europe, 2022. Online available: https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5f16abd43&appId=PPGMS.

3.3 ERIC as New Normal?

Reconciling with these circumstances, a pattern emerges which is consistent with recent findings presented by the European Commission that "the ERIC Regulation has become a legal instrument of choice for a large proportion of common European initiatives in the field of research infrastructures".[47] The analysis of several deliverables shows that the legal form of ERIC regularly outperforms other legal structures in comparison. The perceived advantages apparently outweigh the disadvantages not only for new RIs but also for collaborations that have already existed for some time outside of this European framework. This indicates that throughout the last decade, the ERIC legal framework developed into a bundle of desirable features that convince consortia and key actors to switch or adopt its specific legal status. This is particularly evident in the projects listed on the first ESFRI roadmap in 2006, to the extent that these RIs were aiming for ERIC status already shortly after the implementation of Regulation No 723/2009 in 2009. This finding is also consistent with our observation that the development of the 2009 ERIC regulation and the progress of the initial RI projects on the ESFRI roadmap, were closely linked.[48] For instance, the European contribution to the International Argo Programme (EURO-ARGO), an RI in the domain of oceanography, argues in one of its deliverables:

> "After extensive review of possible legal frameworks for the EURO-ARGO RI, it has been decided to adopt the European Research Infrastructure Consortium (ERIC) status. Since this is a new concept (which was elaborated by the commission during the course of the project) it has taken some time to obtain agreement by the project participants to join in the consortium".[49]

Through this evolving policy process, these key actors were involved early in the development of the regulation and were able to contribute information on the challenges and issues they faced as consortia. However, more recent RI projects from subsequent roadmaps predominantly conclude that ERIC is the most fitting organisational structure for them. In some cases, this decision is even made before the formal comparisons of different legal forms have been conducted or the project is included in the ESFRI roadmap. This has been, for instance, the case for the Generations and Gender Programme (GGP), a distributed RI in the social sciences.[50]

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47. EUROPEAN COMMISSION, *Report from the Commission to the Council and the European Parliament. Third Report on the Application of Council Regulation (EC) No 723/2009 of 25 June 2009 on the Community Legal Framework for a European Research Infrastructure Consortium (ERIC)*, COM/2023/488 final, 2023, p.2.
48. K. KROPP, op.cit.; K. CRAMER, N. RÜFFIN, op.cit.; B. MAEGAARD, S. KRAUWER, H. FERSOE, L. HENRIKSEN, op.cit.
49. EURO-ARGO, *Final Report Summary - EURO ARGO*, 2011. Online available: https://cordis.europa.eu/project/id/211597/reporting.
50. GGP, *The Generations & Gender Programme Evaluate, Plan - Deliverable 4.2 – Evaluation of Governance Options*, 2018, p.11. Online available: https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5c008a5a2&appId=PPGMS,

All of this indicates that the organisation of RIs at the Community law level is indeed undergoing normalisation. This is remarkable because new RI projects can learn from consortia and science administrators who have gained mixed experiences with the new legal form since 2009. Several sources indicate that a whole range of operational issues emerged after the first wave of ERICs was implemented. For instance, an evaluation of ECRIN (European Clinical Research Infrastructure Network) ERIC mentions problems for economic activities due to the VAT exemption because countries are not familiar with the implications of ERIC status.[51] The same report raises concerns about limited options of for-profit activities that might negatively impact the RI's operations. Other challenges arise from the multinational character of ERICs that had legal implications in participating countries, for instance, at the European Spallation Source ERIC, a neutron research facility.[52] Yet mixed experiences like these do not seem to have harmed the diffusion of the ERIC structure across Europe.

Second, however, it is striking that the actual transformation from temporary project structures to an ERIC is relatively slow in many of those cases that were not part of the first ESFRI roadmap in 2006. The time gaps between the start of the RI preparatory phase and the executive decision to apply for ERIC status, as well as the gap between the application process and the European Commission's decision to award ERIC status, seem remarkable, considering that, as shown, the scientific consortia overall hold positive views of this legal structure. To understand this hesitation, it is worth looking at the reports and publications issued by the different projects, particularly in the period between the executive decision to apply for ERIC status and the actual implementation of the framework following the European Commission's decision. These sources make it clear that many projects struggle to secure the necessary support from political and administrative stakeholders. A report of the KM3 Neutrino Telescope (KM3Net) sums up this challenge when it states that

> "[a]lthough there is a consensus that KM3NeT should become a legal entity and that the ERIC is a suitable implementation thereof, the main challenge is to convince the funding authorities (which should contribute the bulk of the human resources and finance the bulk of the operational costs) that the ERIC is timely".[53]

51. ECRIN, *ECRIN ERIC Evaluation Report 2019*, 2019. Online available: https://ecrin.org/reports-and-brochures.
52. EUROPEAN SPALLATION SOURCE, *Deliverable D3.5: ERIC Operations Programme*, 2018, p.5. Online available: https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5bd32ee3a&appId=PPGMS.
53. R. VAN DE MEER, *KM3NeT - D1.2 - Periodic Technical Report Part B*, 2019. Online available: https://www.km3net.org/wp-content/uploads/2020/02/D1.2-KM3NeT-intermidiate-report.pdf. It should be noted though that the challenge of coordinating ministerial bureaucracies was already present with projects from the 2006 roadmap. See DARIAH, *DARIAH-EU Annual Report 2012*, 2013, p.7. Online available: https://www.dariah.eu/wp-content/uploads/2017/02/DARIAH-EU_Annual_report_2012.pdf.

The balance between, on the one hand, political support and thus financial security and, on the other hand, greater autonomy for the partner organisations within the RI seems to be at the forefront of several projects.[54] This might slow down the Europeanisation process for some of the emerging RIs.

4. Conclusion

This article aimed to investigate the structural function of the ERIC framework among European RIs since its implementation in 2009 and its consequences for the European integration process and a wider Europeanisation through science.

Considering these analytical results, one cannot help but notice that the actual implementation process of ERICs across Europe is reminiscent of patterns well-known from the history of large-scale European collaborative research. As several studies on the genesis of Big Science projects from the 20th century highlight, there have been recurring challenges that characterise the negotiations for a legal framework of RI.[55] This particularly concerns the questions of facility sites, the distribution of funding responsibilities, and governance arrangements. For instance, ESO was originally planned as an organisation to be run by national research associations before the stakeholders realised that critical governmental involvement was needed to finance the astronomical infrastructures.[56] In other cases, the initial approach was to establish study groups or committees of experts to determine the most suitable choice. However, historical studies show that time and time again, the results of these scientifically informed reports were ignored or modified in the political arena.[57] The political logic of European Big Science was based on other criteria, in which scientific and systematic recommendations could be used as arguments in this political arena but did not necessarily tip the scales in favour of a specific decision.

It is reasonable to argue that ERIC, as a new structure of large-scale collaboration on the European level, still follows the historical logic established in the second half of the 20th century. Originally intended to "facilitate and speed up

54. For instance, this is discussed at the General Assembly of the DiSsco-project in 2021. See: DiSSCO, *Deliverable 9.3 - 1st DiSSCo Prepare All Hands Meeting*, 2021. Online available: https://know.dissco.eu/bitstream/item/140/1/DPP_WP9_D9.3_%20AHM1%20Report.pdf.
55. K. CRAMER, op.cit.; O. HALLONSTEN, *The Politics of European Collaboration in Big Science*, in: M. MAYER, M. CARPES, R. KNOBLICH (eds), *The Global Politics of Science and Technology*, Springer, Berlin, 2014, pp.31–46; W. P. MCCRAY, *Globalization with Hardware: ITER's Fusion of Technology, Policy, and Politics*, in: *History and Technology*, 26(2010), pp.283–312.
56. A. BLAAUW, op.cit.
57. K. CRAMER, op.cit.; J. KRIGE, op.cit.; J. KRIGE, A. RUSSO, op.cit.; A.-L. RÜLAND, N. RÜFFIN, K. CRAMER, P. NGABONZIZA, M. SAXENA, S. SKUPIEN, *Science Diplomacy from the Global South: The Case of Intergovernmental Science Organizations*, in: *Science and Public Policy*, scad024.

the establishment of new research infrastructures and provide some of the privileges and tax exemptions now granted to international organisations", political bargaining between national administrations and the RIs themselves on topics like, for instance, funding commitments prolong the process of establishing ERICs.[58] Each investment in an ERIC creates a long-term financial commitment for national administrations. As budgets remain under pressure, governments cannot support too many ERICs at once, which in turn leads to lengthy negotiations to reach favourable terms between potential stakeholders, including governmental representatives, funding agencies, and scientific communities.[59] This political level of negotiations is not directly affected by the institutionalisation of the new legal framework. On the contrary, it can be argued that science administrations in many European countries usually have a long tradition of negotiating deals on international research collaborations and infrastructures they can transfer to ERICs.

Moreover, it is important to note that the European Commission supports new ERIC candidates by funding projects through the FPs and by including them in the ESFRI roadmap. However, FP funding does not act as a primary source of funding for the maintenance of the RIs in the long term. This role remains with the member states of the ERIC and their national governments and funding agencies. Thus, while the ERIC framework transforms the way research consortia think about organising joint endeavours, the questions of funding, site selection and governance arrangements remain basically the same for the political actors now as it has been over the course of the long 20th century of Big Science.

In conclusion, we can see that the legal innovation of ERIC in the period since 2009 has indeed experienced a normalisation. Yet in terms of Europeanisation, the effects are twofold. On the one hand, it can be said that the development of Regulation No 723/2009 has created a new level of European RIs that differ from both national infrastructures and the large intergovernmental Big Science projects founded during the second half of the 20th century. In this view, ERIC constitutes a new step in the process of Europeanisation of science through infrastructures.[60] On the other hand, we can see that the new framework cannot escape the historical logic of political negotiations in this sector that emerged during the 20th century and continues to shape the actions of science administrations and bureaucracies across the continent. This considerably resembles the formula John Krige coined in 2003: "Collaboration, then, and European scientific collaboration in particular, is not undertaken at the expense of self-interest; it is rather, the pursuit of one's

58. ESFRI, *European Roadmap for Research Infrastructures: Roadmap 2008*, Publications Office of the European Union, Luxemburg, 2008, p.5.
59. ELI ERIC is an interesting case in point which illustrates that these challenges were already present with projects from the first roadmap in 2006. See F. ZUBAȘCU, *Laser wars drag on at eastern Europe's largest research infrastructure*, 2020. Online available: https://sciencebusiness.net/news/laser-wars-drag-eastern-europes-largest-research-infrastructure.
60. This process should certainly not be understood as exclusively unidirectional, but also as a process of "mutual Europeanisation", see D. IRION, op.cit.

interests by other means".[61] Nevertheless, it can also be argued here that due to the structural function and governance of the European Commission's ERIC framework, member states will have to deal with research issues even more systematically and possibly more frequently. In this respect, it is possible to speak of a parallel Europeanisation through science, even if this takes place according to the rules of the 20th century.

61. J. KRIGE, op.cit., p.900.