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## Who gets what, when, and how? An analysis of stakeholder interests and conflicts in and around Big Science

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### Citation

Rüland, A. N. (2024, July 4). *Who gets what, when, and how?: An analysis of stakeholder interests and conflicts in and around Big Science*. Retrieved from <https://hdl.handle.net/1887/3766305>

Version: Publisher's Version

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**Note:** To cite this publication please use the final published version (if applicable).

## References

- Åberg A (2021) The Ways and Means of ITER: Reciprocity and Compromise in Fusion Science Diplomacy. *History and Technology* 37(1): 1-19. <https://doi.org/10.1080/07341512.2021.1891851>.
- Ademolu E (2023) Birds of a Feather (Don't Always) Flock Together: Critical Reflexivity of "Outsiderness" as An "Insider" Doing Qualitative Research with One's "Own People". *Qualitative Research* 24(2): 344-366. <https://doi.org/10.1177/14687941221149596>.
- African Light Source (forthcoming) African Light Source Conceptual Design Report.
- African Light Source (2015) The African Light Source Manifesto. Grenoble: The African Light Source, 1-7.
- African Lightsource (2022a) *African Light Source CDR Process Management Page*. Available at: <https://twiki.cern.ch/twiki/bin/view/AfricanLightSource/WebHome> (accessed 8 August 2022).
- African Lightsource (2022b) *Organizational Chart*. Available at: <https://www.africanlightsource.org/organizational-chart/> (accessed 5 August 2022).
- Agrell W (2012) Framing Prospects and Risk in the Public Promotion of ESS Scandinavia. *Science and Public Policy* 39(4): 429-438. <https://doi.org/10.1093/scipol/scs045>.
- Aicardi C and Mahfoud T (2022) Formal and Informal Infrastructures of Collaboration in the Human Brain Project. *Science, Technology, & Human Values* 49(2): 403-430. <https://doi.org/10.1177/01622439221123835>.
- Alegado R (2019) Telescope Opponents Fight the Process, Not Science. *Nature* 572(7767): 7. <https://doi.org/10.1038/d41586-019-02304-1>.
- Anderson TS, Michael EK and Peirce JJ (2012) Innovative Approaches for Managing Public-Private Academic Partnerships in Big Science and Engineering. *Public Organization Review* 12: 1-22. <https://doi.org/10.1007/s11115-010-0142-3>.
- Anupama G, Chattopadhyay S, Deshpande S, et al. (2021) Big Science in India. *Nature Reviews Physics* 3(11): 728-731. <https://doi.org/10.1038/s42254-021-00384-5>.
- Arnoux R (2014) *ITER...And Then What*. Available at: <https://www.iter.org/mag/3/22> (accessed 2 January 2022).
- Arnoux R and Jacquinet J (2006) *ITER: Le Chemin des Étoiles?* Saint-Rémy-de-Provence: Edisud.
- Atalay S (2012) *Community-based Archaeology: Research with, by, and for Indigenous and Local Communities*. Berkeley: University of California Press.
- Atkinson D (2019) When Stars Collide: Competing Development Paradigms in the Central Karoo. *Journal of Southern African Studies* 45(4): 689-709. <https://doi.org/10.1080/03057070.2019.1645481>.

- Atkinson D, Kotze H and Wolpe R (2017) Socio-Economic Assessment of SKA Phase 1 in South Africa. n.i.: n.i.
- Autio E, Hameri A-P and Vuola O (2004) A Framework of Industrial Knowledge Spillovers in Big-Science Centers. *Research policy* 33(1): 107-126. [https://doi.org/10.1016/S0048-7333\(03\)00105-7](https://doi.org/10.1016/S0048-7333(03)00105-7).
- Bagla P (2020) ITER Project: India's Role in Creating a Miniature Sun on Earth. *Financial Express*, 25 August.
- Baneke D (2020) Let's Not Talk about Science: The Normalization of Big Science and the Moral Economy of Modern Astronomy. *Science, Technology, & Human Values* 45(1): 164-194. <https://doi.org/10.1177/0162243919846600>.
- Barandiaran J (2015) Reaching for the Stars? Astronomy and Growth in Chile. *Minerva* 53: 141-164. <https://doi.org/10.1007/s11024-015-9272-7>.
- Beach D and Brun Pedersen R (2013) *Process-Tracing Methods. Foundations and Guidelines*. Ann Arbor: University of Michigan Press. <https://doi.org/10.3998/mpub.6576809>.
- Beach D and Pedersen RB (2016) *Causal Case Study Methods: Foundations and Guidelines for Comparing, Matching, and Tracing*. Ann Arbor: University of Michigan Press. <https://doi.org/10.3998/mpub.6576809>.
- Beck HP and Charitos P (2021) *The Economics of Big Science: Essays by Leading Scientists and Policymakers*. Cham: Springer Nature.
- Berg-Schlosser D, De Meur G, Ragin CC, et al. (2009) Qualitative Comparative Analysis (QCA) as an Approach. In: Rihoux B and Ragin CC (eds) *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques* Los Angeles: SAGE, pp.1-18.
- Berman EP (2014) Field Theories and the Move Toward the Market in US Academic Science. In: Frickel S and Hess DJ (eds) *Fields of Knowledge: Science, Politics and Publics in the Neoliberal Age*. Bingley: Emerald Group Publishing Limited, pp.193-221. <https://doi.org/10.1108/S0198-871920140000027000>.
- Bodnarczuk M and Hoddeson L (2008) Megascience in Particle Physics: The Birth of an Experiment String at Fermilab. *Historical Studies in the Natural Sciences* 38(4): 508-534. <https://doi.org/10.1525/hsns.2008.38.4.508>.
- Bogner A, Littig B and Menz W (2009) *Interviewing Experts*. Basingstoke: Palgrave Macmillan. <https://doi.org/10.1057/9780230244276>.
- Boisot M (2013) Generating Knowledge in a Connected World: The Case of the ATLAS Experiment at CERN. In: Child J and Ihrig M (eds) *Knowledge, Organization, and Management: Building on the Work of Max Boisot*. Oxford: Oxford University Press, pp.142-154. <https://doi.org/10.1093/acprof:oso/9780199669165.001.0001>.
- Borch C (2012) Functional Eclecticism: On Luhmann's Style of Theorizing. *Revue internationale de philosophie* 259(1): 123-142. <https://doi.org/10.3917/rip.259.0123>.

- Börner K, Silva Nascimento F and Milojevic S (2021) Visualizing Big Science Projects. *Nature Reviews Physics* 3: 753-761. <https://doi.org/10.1038/s42254-021-00374-7>.
- Bourdieu P (1975) The Specificity of the Scientific Field and the Social Conditions of the Progress of Reason. *Social Science Information* 14(6): 19-47. <https://doi.org/10.1177/053901847501400602>.
- Broad WJ (1992) Quest for Fusion Power Is Going International. *The New York Times*, 28 July.
- Brookhuis H (2022) Transforming Big Science in Belgium: Management Consultants and the Reorganization of the Belgian Nuclear Research Centre (SCK CEN), 1980–1990. *Centaurus* 64(2): 483-508. 10.1484/J.CNT.5.131462.
- Brown RH and Malone EL (2004) Reason, Politics, and the Politics of Truth: How Science Is Both Autonomous and Dependent. *Sociological Theory* 22(1): 106-122. <https://doi.org/10.1111/j.1467-9558.2004.00206.x>.
- Brumfiel G and Butler D (2003) US Support for Spain Triggers Unease over Fusion Project. *Nature* 423(6937): 211-212. <https://doi.org/10.1038/423211a>.
- Buche A and Carstensen J (2009) Qualitative Comparative Analysis: Ein Überblick. In: Kriwy P and Gross C (eds) *Klein aber fein! Quantitative empirische Sozialforschung mit kleinen Fallzahlen*. Wiesbaden: VS Verlag für Sozialwissenschaften, pp.65-92. <https://doi.org/10.1007/978-3-531-91380-3>.
- Buck T (2004) Paris Urges EU to Build Fusion Centre Alone. *Financial Times*, 13 January.
- Cai Y (2016) *The Occupy Movement in Hong Kong: Sustaining Decentralized Protest*. London: Routledge.
- Capshew JH and Rader KA (1992) Big Science: Price to the Present. *Osiris* 7(1): 2-25. <https://doi.org/10.1086/368703>.
- Case E (2021) *Everything Ancient Was Once New: Indigenous Persistence from Hawai‘i to Kahiki*. Honolulu: University of Hawai‘i Press.
- Case E (2019) I ka Piko, To the Summit: Resistance from the Mountain to the Sea. *The Journal of Pacific History* 54(2): 166-181.
- Cass N and Walker G (2009) Emotion and Rationality: The Characterisation and Evaluation of Opposition to Renewable Energy Projects. *Emotion, Space and Society* 2(1): 62-69. <https://doi.org/10.1016/j.emospa.2009.05.006>.
- Castelnovo P, Florio M, Forte S, et al. (2018) The Economic Impact of Technological Procurement for Large-scale Research Infrastructures: Evidence from the Large Hadron Collider at CERN. *Research policy* 47(9): 1853-1867. <https://doi.org/10.1016/j.respol.2018.06.018>.
- Casumbal-Salazar I (2017) A Fictive Kinship: Making “Modernity,” “Ancient Hawaiians,” and the Telescopes on Mauna Kea. *Native American and Indigenous Studies* 4(2): 1-30.

- CERN (2022a) *Associate & Non-Member State Relations*. Available at: <https://international-relations.web.cern.ch/stakeholder-relations/Associate-Non-Member-State-Relations> (accessed 21 April 2022).
- CERN (2002) *Associate Status at CERN for Non-European States*. Geneva: CERN.
- CERN (2022b) *Fact and Figures about the LHC*. Available at: <https://home.cern/resources/faqs/facts-and-figures-about-lhc> (accessed 22 April 2022).
- CERN (2017) *India Becomes Associate Member State of CERN*. Available at: <https://home.cern/news/news/cern/india-becomes-associate-member-state-cern> (accessed 21 April 2022).
- CERN Council (1953) *Convention for the Establishment of a European Organization for Nuclear Research*. Paris: CERN.
- Chaïy S, Ciarlette D, Cross B, et al. (2009) Developing A Body of Knowledge for the Management of Large-scale International Science Projects. *PICMET'09-2009 Portland International Conference on Management of Engineering & Technology*. IEEE, 1481-1487.
- Chinchilla-Rodríguez Z, Sugimoto CR and Larivière V (2019) Follow the Leader: On the Relationship between Leadership and Scholarly Impact in International Collaborations. *PLoS ONE* 14(6): 1-18. <https://doi.org/10.1371/journal.pone.0218309>.
- Chinigò D (2020) Critical Reflections on Astronomy and Development. The Case of the Square Kilometre Array (SKA) Radio Telescope Project in South Africa. *Proceedings of the International Astronomical Union* 14(A30): 594-595.
- Chinigò D and Walker C (2020) Science, Astronomy, and Sacrifice Zones: Development Trade-offs, and the Square Kilometre Array (SKA) Radio Telescope Project in South Africa. *Social Dynamics* 46(3): 391-413. <https://doi.org/10.1080/02533952.2020.1850626>.
- Chohan V (2007) LHC Magnet Tests: The Indian Connection. *CERN Courier* 47(5): 19-24.
- Chrysostomou et al (2020) SKA1 Operations Plan. n.i.: SKA Organisation.
- Claessens M (2020) *ITER: The Giant Fusion Reactor*. Cham, Switzerland: Springer. <https://doi.org/10.1007/978-3-030-27581-5>.
- Cogen M (2012) Membership, Associate Membership and Pre-accession Arrangements of CERN, ESO, ESA, and EUMETSAT. *International Organizations Law Review* 9(1): 145-179. <https://doi.org/10.1163/15723747-00901008>.
- Collins HM (2003) LIGO Becomes Big Science. *Historical studies in the physical and biological sciences* 33(2): 261-297. <https://doi.org/10.1525/hsp.2003.33.2.261>.
- Connell S, Mtingwa S, Dobbins T, et al. (2018) The African Light Source Project. *The African Review of Physics* 13: 108-118.
- Connell SH, Mtingwa SK, Dobbins T, et al. (2019) Towards an African Light Source. *Biophysical Reviews* 11(4): 499-507. [10.1007/s12551-019-00578-3](https://doi.org/10.1007/s12551-019-00578-3).

- Cook-Deegan RM (1994) Origins of the Human Genome Project. *Risk: Health, Safety & Environment* 5: 97-119.
- Copeland D (2016) Science Diplomacy. In: Constantinou CM, Kerr P and Sharp P (eds) *The SAGE Handbook of Diplomacy*. Los Angeles: SAGE, pp.628-641.
- Cramer KC (2017) Lightning Europe: Establishing the European Synchrotron Radiation Facility (ESRF). *History and Technology* 33(4): 396-427. <https://doi.org/10.1080/07341512.2018.1489762>.
- Cramer KC (2020) *A Political History of Big Science*. Cham, Switzerland: Palgrave Macmillan. <https://doi.org/10.1007/978-3-030-50049-8>.
- Cramer KC, Hallonsten O, Bolliger IK, et al. (2020) Big Science and Research Infrastructures in Europe: History and Current Trends. *Big Science and Research Infrastructures in Europe*. Cheltenham: Edward Elgar Publishing, pp.1-26.
- Crease RP (1999) *Making Physics: A Biography of Brookhaven National Laboratory, 1946-1972*. Chicago: University of Chicago Press.
- Crease RP and Westfall C (2016) The New Big Science. *Physics Today* 69(5): 30.
- Cunningham C and Dougan C (2009) E-ELT Impact. The Impact of the European Extremely Large Telescope. Edinburgh: Royal Observatory Edinburgh.
- Curli B (2024) The Origins of Euratom's Research on Controlled Thermonuclear Fusion: Cold War Politics and European Integration, 1958-1968. *Contemporary European History* 33(1): 267-285. <https://doi.org/10.1017/S0960777322000133>.
- D'Ippolito B and Ruling C-C (2019) Research Collaboration in Large Scale Research Infrastructures: Collaboration Types and Policy Implications. *Research policy* 48(5): 1282-1296. <https://doi.org/10.1016/j.respol.2019.01.011>.
- Dados N and Connell R (2012) The Global South. *Contexts* 11(1): 12-13. 10.1177/1536504212436479.
- De Mendoza DH and Vara AM (2006) Political Storms, Financial Uncertainties, and Dreams of "Big Science:" The Construction of a Heavy Ion Accelerator in Argentina. *Historical studies in the physical and biological sciences* 36(2): 343-364. <https://doi.org/10.1525/hsps.2006.36.2.343>.
- De Mendoza DH and Vara AM (2007) Winding Roads to Big Science: Experimental Physics in Argentina and Brazil. *Science, Technology and Society* 12(1): 27-48. <https://doi.org/10.1177/097172180601200103>.
- Della Porta D (2020) Social Movements. In: Berg-Schlusser D, Badie B and Morlino L (eds) *The SAGE Handbook of Political Science*. London: SAGE Publications, pp.1-16.
- Department of Land and Natural Resources (2023) *Contested Case Questions*. Available at: [https://dlnr.hawaii.gov/mk/mauna-kea-faq/#:~:text=Question%3A%20What%20is%20a%20contested,91%2D1\(5\)](https://dlnr.hawaii.gov/mk/mauna-kea-faq/#:~:text=Question%3A%20What%20is%20a%20contested,91%2D1(5)). (accessed 15 September 2023).

- Destexhe A (2021) In Silico, Computer Simulations from Neurons up to the Whole Brain. *Eneuro* 8(2): ENEURO.0124-0121.2021. <https://doi.org/10.1523/ENEURO.0124-21.2021>.
- Deterding NM and Waters MC (2021) Flexible Coding of In-depth Interviews: A Twenty-First-Century Approach. *Sociological methods & research* 50(2): 708-739. <https://doi.org/10.1177/0049124118799377>.
- Devine-Wright P (2005) Beyond NIMBYism: Towards an Integrated Framework for Understanding Public Perceptions of Wind Energy. *Wind Energy: An International Journal for Progress and Applications in Wind Power Conversion Technology* 8(2): 125-139. <https://doi.org/10.1002/we.124>.
- Devine-Wright P (2009) Rethinking NIMBYism: The Role of Place Attachment and Place Identity in Explaining Place-Protective Action. *Journal of community & applied social psychology* 19(6): 426-441. <https://doi.org/10.1002/casp.1004>.
- Dougherty D (1992) Interpretive Barriers to Successful Product Innovation in Large Firms. *Organization Science* 3(2): 179-202. <https://doi.org/10.1287/orsc.3.2.179>.
- Doyle T (2005) *Environmental Movements in Minority and Majority Worlds: A Global Perspective*. London; New Brunswick, NJ: Rutgers University Press.
- Du Toit J (2021) Eavesdropping on the Sky: The Backstory of MeerKAT and SKA. *Daily Maverick*, 17 August.
- Echeverría King LF, González DA and Andrade-Sastoque E (2021) Science Diplomacy in Emerging Economies: A Phenomenological Analysis of the Colombian Case. *Frontiers in Research Metrics and Analytics* 6: 1-18. <https://doi.org/10.3389/frma.2021.636538>.
- Eggleton D (2018) *Examining the Relationship between Leadership and Megascience Projects*. PhD Thesis, University of Essex, Essex.
- Eisenhardt KM and Graebner ME (2007) Theory Building from Cases: Opportunities and Challenges. *Academy of Management Journal* 50(1): 25-32. <https://doi.org/10.5465/amj.2007.24160888>.
- Ekers R (2012) The History of the Square Kilometre Array (SKA)-Born Global. *arXiv:1212.3497*.
- Ellis J (2019) Supercollider Critics Should Learn from History. *Nature* 567: 311. <https://doi.org/10.1038/d41586-019-00927-y>.
- Elzinga A (2012) Features of the Current Science Policy Regime: Viewed in Historical Perspective. *Science and Public Policy* 39(4): 416-428. <https://doi.org/10.1093/scipol/scs046>.
- EUROfusion (2005) *India Becomes Full Partner in Fusion Project ITER*. Available at: <https://www.euro-fusion.org/news/detail/india-becomes-full-partner-in-fusion-project-iter/> (accessed 19 November 2021).

- European Commission (2011) Digital Agenda: FET Flagships, Six Cutting Edge Projects to Change the Face of Future and Emerging Technologies. Brussels: European Commission.
- European Commission (2017) EU Contribution to a Reformed ITER Project. Brussels: European Commission.
- European Space Agency (2014) *The ESRO Convention and 'Juste Retour'*. Available at: [https://www.esa.int/About\\_Us/ESA\\_history/The\\_ESRO\\_Convention\\_and\\_juste\\_retour](https://www.esa.int/About_Us/ESA_history/The_ESRO_Convention_and_juste_retour) (accessed 4 August 2022).
- European Strategy Group (2020) 2020 Update of the European Strategy for Particle Physics. Geneva: CERN.
- Ezekiel IP (2020) Engaging Science Diplomacy for Nanotechnology Development in Africa. In: *IOP Conference Series: Materials Science and Engineering*, pp.1-12. IOP Publishing.
- Fährnich B (2017) Science Diplomacy: Investigating the Perspective of Scholars on Politics-Science Collaboration in International Affairs. *Public Understanding of science* 26(6): 688-703. <https://doi.org/10.1177/0963662515616552>.
- Fan F-t (2012) The Global Turn in the History of Science. *East Asian Science, Technology and Society: An International Journal* 6(2): 249-258. <https://doi.org/10.1215/18752160-1626191>.
- Feder T (2019) Thirty Meter Telescope Faces Continued Opposition in Hawai'i. *Physics Today*.
- Fejerskov AM (2017) The New Technopolitics of Development and the Global South as a Laboratory of Technological Experimentation. *Science, Technology, & Human Values* 42(5): 947-968. <https://doi.org/10.1177/0162243917709934>.
- Feld A and Kreimer P (2019) Scientific Co-operation and Centre-Periphery Relations: Attitudes and Interests of European and Latin American Scientists. *Tapuya: Latin American Science, Technology and Society* 2(1): 149-175. <https://doi.org/10.1080/25729861.2019.1636620>.
- Fisher S, Abdi DI, Matovic V, et al. (2000) *Working with Conflict 2: Skills and Strategies for Action*. London; New York: Zed Books.
- Flaherty C (2019) *More Than a Fight for the Heavens*. Available at: <https://www.insidehighered.com/news/2019/07/25/u-hawaii-pursues-controversial-thirty-meter-telescope-mauna-kea-and-leading> (accessed 30 March 2023).
- Fligstein N and McAdam D (2012) *A Theory of Fields*. Oxford: Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199859948.001.0001>.
- Flink T and Schreiterer U (2010) Science Diplomacy at the Intersection of S&T Policies and Foreign Affairs: Toward a Typology of National Approaches. *Science and Public Policy* 37(9): 665-677. <https://doi.org/10.3152/030234210X12778118264530>.



- Florio M, Giffoni F, Giunta A, et al. (2018) Big Science, Learning, and Innovation: Evidence from CERN Procurement. *Industrial and Corporate Change* 27(5): 915-936. <https://doi.org/10.1093/icc/dty029>.
- Florio M and Sirtori E (2016) Social Benefits and Costs of Large Scale Research Infrastructures. *Technological Forecasting and Social Change* 112: 65-78. <https://doi.org/10.1016/j.techfore.2015.11.024>.
- Freeman J (1979) Resource Mobilization and Strategy: A Model for Analyzing Social Movement Organization Actions. In: Zald MN and McCarthy JD (eds) *The Dynamics of Social Movements. Resource Mobilization, Social Control, and Tactics*. Cambridge, MA: Winthrop, pp.167-189.
- Friedrichs J and Kratochwil F (2009) On Acting and Knowing: How Pragmatism Can Advance International Relations Research and Methodology. *International Organization* 63(4): 701-731. <https://doi.org/10.1017/S0020818309990142>.
- Galison P (1997) *Image and Logic: A Material Culture of Microphysics*. Chicago; London: University of Chicago Press.
- Galison P, Doboszewski J, Elder J, et al. (2023) The Next Generation Event Horizon Telescope Collaboration: History, Philosophy, and Culture. *Galaxies* 11(1): 32. <https://doi.org/10.3390/galaxies11010032>.
- Gastrow M and Oppelt T (2018) Big Science and Human Development - What Is the Connection? *South African Journal of Science* 114(11-12): 1-7. <https://doi.org/10.17159/sajs.2018/5182>.
- Gastrow M and Oppelt T (2019) The Square Kilometre Array and Local Development Mandates in the Karoo. *Journal of Southern African Studies* 45(4): 711-728. <https://doi.org/10.1080/03057070.2019.1642679>.
- Gerring J (2009) Case Selection for Case-Study Analysis: Qualitative and Quantitative Techniques. In: Box-Steffensmeier JM, Brady HE and Collier D (eds) *The Oxford Handbook of Political Methodology*. Oxford: Oxford University Press, pp.646-684. <https://doi.org/10.1093/oxfordhb/9780199286546.001.0001>.
- Gerring J (2007) *Case Study Research: Principles and Practices*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511803123>.
- Gerring J (2004) What Is a Case Study and What Is it Good for? *American Political Science Review* 98(2): 341-354. 10.1017/S0003055404001182.
- Gerring J and Cojocaru L (2016) Selecting Cases for Intensive Analysis: A Diversity of Goals and Methods. *Sociological methods & research* 45(3): 392-423. <https://doi.org/10.1177/0049124116631692>.
- Giddens A (1984) *The Constitution of Society: Outline of the Theory of Structuration*. Berkeley: University of California Press.

- Gläser J and Laudel G (2009) *Experteninterviews und qualitative Inhaltsanalyse*. Wiesbaden: Verlag für Sozialwissenschaften.
- Goodyear-Ka'ōpua N (2017) Protectors of the Future, Not Protestors of the Past: Indigenous Pacific Activism and Mauna a Wākea. *South Atlantic Quarterly* 116(1): 184-194. <https://doi.org/10.1215/00382876-3749603>.
- Hackett EJ, Conz D, Parker J, et al. (2004) Tokamaks and Turbulence: Research Ensembles, Policy and Technoscientific Work. *Research policy* 33(5): 747-767. <https://doi.org/10.1016/j.respol.2003.12.002>.
- Hall PA and Taylor RC (1996) Political Science and the Three New Institutionalisms. *Political studies* 44(5): 936-957. <https://doi.org/10.1111/j.1467-9248.1996.tb00343.x>.
- Hallonsten O (2016) *Big Science Transformed: Science, Politics and Organization in Europe and the United States*. Cham, Switzerland: Palgrave Macmillan. <https://doi.org/10.1007/978-3-319-32738-9>.
- Hallonsten O (2011) Growing Big Science in a Small Country: MAX-lab and the Swedish Research Policy System. *Historical Studies in the Natural Sciences* 41(2): 179-215. <https://doi.org/10.1525/hsns.2011.41.2.179>.
- Hallonsten O (2014) The Politics of European Collaboration in Big Science. In: Mayer M, Carpes M and Knoblich R (eds) *The Global Politics of Science and Technology*. Heidelberg; New York; Dordrecht; London: Springer, pp.31-46. [https://doi.org/10.1007/978-3-642-55010-2\\_3](https://doi.org/10.1007/978-3-642-55010-2_3).
- Hallonsten O (2020) Research Infrastructures in Europe: The Hype and the Field. *European Review* 28(4): 617-635. <https://doi.org/10.1017/S1062798720000095>.
- Hallonsten O and Heinze T (2012) Institutional Persistence through Gradual Organizational Adaptation: Analysis of National Laboratories in the USA and Germany. *Science and Public Policy* 39(4): 450-463. <https://doi.org/10.1093/scipol/scs047>.
- Harding S (2011) *The Postcolonial Science and Technology Studies Reader*. Durham; London: Duke University Press.
- Harvey F (2017) ITER Nuclear Fusion Project Reaches Key Halfway Milestone. *The Guardian*, 6 December.
- Hawaii Tribune Herald (2016) *Court Remands TMT Sublease*. Available at: <https://www.hawaiitribune-herald.com/2016/03/12/hawaii-news/court-remands-tmt-sublease/> (accessed 4 May 2023).
- Heinze T, Hallonsten O and Heinecke S (2015a) From Periphery to Center: Synchrotron Radiation at DESY, Part I: 1962–1977. *Historical Studies in the Natural Sciences* 45(3): 447-492. <https://doi.org/10.1525/hsns.2015.45.3.447>.
- Heinze T, Hallonsten O and Heinecke S (2015b) From Periphery to Center: Synchrotron Radiation at DESY, Part II: 1977–1993. *Historical Studies in the Natural Sciences* 45(4): 513-548. <https://doi.org/10.1525/hsns.2015.45.4.513>.

- Hemmer C and Katzenstein PJ (2002) Why Is There No NATO in Asia? Collective Identity, Regionalism, and the Origins of Multilateralism. *International Organization* 56(3): 575-607. <https://doi.org/10.1162/002081802760199890>.
- Hermann A, Belloni L, Mersits U, et al. (1987) *History of CERN, I: Volume I - Launching the European Organization for Nuclear Research*. Amsterdam; New York: North-Holland.
- Hevly B (1992) Reflections on Big Science and Big History. In: Galison P and Hevly B (eds) *Big Science: The Growth of Large-Scale Research*. Stanford: Stanford University Press, pp.355-363.
- Hilgartner S (1995) The Human Genome Project. In: Jasanoff S, Markle GE, Petersen JC, et al. (eds) *Handbook of science and technology studies*. Thousand Oaks: SAGE, pp.302-315. <https://doi.org/10.4135/9781412990127>.
- Hocker JL and Wilmot WW (1978) *Interpersonal Conflict*. Dubuque: W.C. Brown.
- Höne KE and Kurbalija J (2018) Accelerating Basic Science in an Intergovernmental Framework: Learning from CERN's Science Diplomacy. *Global Policy* 9: 67-72. <https://doi.org/10.1111/1758-5899.12589>.
- Horgan J (2013) *Do Big, New Brain Projects Make Sense When We Don't Even Know the "Neural Code"?* Available at: <https://blogs.scientificamerican.com/cross-check/do-big-new-brain-projects-make-sense-when-we-dont-even-know-the-neural-code/> (accessed 19 January 2022).
- Hornsby DJ and Parshotam A (2018) Science Diplomacy, Epistemic Communities, and Practice in Sub-Saharan Africa. *Global Policy* 9(S3): 29-34. <https://doi.org/10.1111/1758-5899.12565>.
- Hummel P (2015) Dicke Schädel, falsche Versprechen. *Die Süddeutsche Zeitung*, 1 May.
- Hurmerinta-Peltomäki L and Nummela N (2006) Mixed Methods in International Business Research: A Value-Added Perspective. *Management International Review* 46: 439-459. <https://doi.org/10.1007/s11575-006-0100-z>.
- IAEA (2007) Agreement on the Establishment of the ITER International Fusion Energy Organization for the Joint Implementation of the ITER Project. Paris: International Atomic Energy Agency.
- Indian Ministry of External Affairs (2022) *Grants & Loans*. Available at: <http://meadashboard.gov.in/indicators/92> (accessed 16 January 2023).
- Inouye M (2019) Like a Mighty Wave: A Maunakea Film. Available at: <https://www.youtube.com/watch?v=4J3ZCzHMMPQ>.
- INSCONS (2021) *About INSCONS*. Available at: <https://inscons.eu> (accessed 25 April 2023).
- ITER IO (2021) Annual Report 2020. St. Paul-lez-Durance: ITER IO Headquarters.

- Ito K and Rentetzi M (2021) The Co-production of Nuclear Science and Diplomacy: Towards a Transnational Understanding of Nuclear Things. *History and Technology* 37(1): 4-20. <https://doi.org/10.1080/07341512.2021.1905462>.
- Jacob M and Hallonsten O (2012) The Persistence of Big Science and Megascience in Research and Innovation Policy. *Science and Public Policy* 39(4): 411-415. <https://doi.org/10.1093/scipol/scs056>.
- Jang Y-S and Ko YJ (2019) How Latecomers Catch up to Leaders in High-energy Physics as Big Science: Transition from National System to International Collaboration. *Scientometrics* 119(1): 437-480. <https://doi.org/10.1007/s11192-019-03030-1>.
- Johnson G (2014) Seeking Stars, Finding Creationism. *The New York Times*, 20 October.
- Jong S (2018) Annex 1 to the Grant Agreement (Description of the Action) Part B.
- Joshi Y (2018) Between Principles and Pragmatism: India and the Nuclear Non-Proliferation Regime in the Post-PNE Era, 1974–1980. *The International History Review* 40(5): 1073-1093. <https://doi.org/10.1080/07075332.2017.1417322>.
- Kaena-Lee J and Espinosa-Jones A (2021) Standing Above the Clouds. Available at: <https://www.youtube.com/watch?v=s7mkzMtZDSE>.
- Kagawa-Viviani A (2019) *Maunakea: Redirecting the Lens onto the Culture of Mainstream Science*. Available at: <https://medium.com/@akkagawa/maunakea-redirecting-the-lens-onto-the-culture-of-mainstream-science-5d3a5a12376a> (accessed 18 September 2023).
- Kahanamoku S, Alegado RA, Kagawa-Viviani A, et al. (2020) A Native Hawaiian-led Summary of the Current Impact of Constructing the Thirty Meter Telescope on Maunakea. *arXiv preprint arXiv:2001.00970*.
- KAHEA (2016) *Maunaea Kea Timeline*. Available at: <http://kahea.org/issues/sacred-summits/timeline-of-events> (accessed 14 December 2022).
- Kaijser A (2016) Can Big Be Made Sustainable? Environmental Contestations over the ESS and MAX IV. In: Rekers J and Sandell K (eds) *New Big Science in Focus: Perspectives on ESS and MAX IV*. Lund: Lund Studies in Arts and Cultural Studies, pp.44-59.
- Kaiser R (2014) *Qualitative Experteninterviews. Konzeptionelle Grundlagen und praktische Durchführung*. Wiesbaden: Springer VS.
- Kamble K (2020) *Not on the Money - India's Fusion Energy Ambitions May Be Hampered by Understaffing at the World's Largest Fusion Reactor*. Available at: <https://swarajyamag.com/science/not-on-the-money-indias-fusion-energy-ambitions-may-be-hampered-by-understaffing-at-iter> (accessed 19 November 2021).
- Kantor S and Whalley A (2022) Moonshot: Public R&D and Growth. *Working Paper*.
- Katzenstein PJ and Sil R (2008) Eclectic Theorizing in the Study and Practice of International Relations. In: Reus-Smit C and Snidal D (eds) *The Oxford Handbook of International*

*Relations*. Oxford: Oxford University Press, pp.110-130.  
<https://doi.org/10.1093/oxfordhb/9780199219322.001.0001>.

- Kaufmann D, Kuenzler J and Sager F (2020) How (Not) to Design and Implement a Large-scale, Interdisciplinary Research Infrastructure. *Science and Public Policy* 47(6): 818-828. <https://doi.org/10.1093/scipol/scaa042>.
- Kauppinen I, Cantwell B and Slaughter S (2017) Social Mechanisms and Strategic Action Fields: The Example of the Emergence of the European Research Area. *International Sociology* 32(6): 796-813. <https://doi.org/10.1177/0268580917726630>.
- Kelly É (2014) *Brainstorm: Neuroscientists Protest against Europe's Human Brain Project*. Available at: <https://sciencebusiness.net/news/76630/Brainstorm%3A-neuroscientists-protest-against-Europe%E2%80%99s-Human-Brain-project-> (accessed 19 January 2022).
- Kevles DJ (1997) Big Science and Big Politics in the United States: Reflections on the Death of the SSC and the Life of the Human Genome Project. *Historical studies in the physical and biological sciences* 27(2): 269-297. <https://doi.org/10.2307/27757780>.
- Khan S and VanWynsberghe R (2008) Cultivating the Under-Mined: Cross-Case Analysis as Knowledge Mobilization. *Social Research* 9(1): n.i. <https://doi.org/10.17169/fqs-9.1.334>.
- Kiyuna K (2019) Ka Piko Kaulana o Ka 'Aina: Additional Context for Understanding the Cultural Significance of Mauna Kea. Wahington D.C.: Astro2020.
- Knapp A (2015) Understanding the Thirty Meter Telescope Controversy. *Forbes*, 12 June.
- Knorr Cetina K (1999) *Epistemic Cultures: How the Sciences Make Knowledge*. Cambridge, MA; London: Harvard University Press. <https://doi.org/10.4159/9780674039681>.
- Koch C and Jones A (2016) Big Science, Team Science, and Open Science for Neuroscience. *Neuron* 92(3): 612-616. 10.1016/j.neuron.2016.10.019.
- Koremenos B, Lipson C and Snidal D (2001) The Rational Design of International Institutions. *International Organization* 55(4): 761-799. 10.1162/002081801317193592.
- Krige J (1987) Case Studies of Some Important Decisions. In: Herman A, Belloni L, Mersits U, et al. (eds) *History of CERN I - Launching the European Organization for Nuclear Research*. Amsterdam; New York: North-Holland, pp.237-297.
- Krige J (2013) The Politics of European Scientific Collaboration. In: Krige J and Pestre D (eds) *Science in the Twentieth Century*. Milton Park: Routledge, pp.897-918. <https://doi.org/10.4324/9781315079097>.
- Kruesi L (2015) *E-mail Triggers Row Over Hawaii Telescope*. Available at: <https://physicsworld.com/a/e-mail-triggers-row-over-hawaii-telescope/#:~:text=Then%2C%20last%20month%2C%20an%20e,a%20horde%20of%20native%20Hawaiians>". (accessed 15 September 2023).

- Ku'iwalu (2020) Independent Evaluation of the Implementation of the Mauna Kea Comprehensive Management Plan. n.i.: n.i.
- Kuwada BK and Revilla Nu (2020) We are Maunakea: Aloha 'Aina Narratives of Protest, Protection, and Place. *Biography* 43(3): 515-683.
- Lambright WH (2002) Managing "Big Science": A Case Study of the Human Genome Project. Arlington: The PricewaterhouseCoopers Endowment for the Business of Government.
- Langford CH and Langford MW (2000) The Evolution of Rules for Access to Megascience Research Environments Viewed from Canadian Experience. *Research policy* 29(2): 169-179. [https://doi.org/10.1016/S0048-7333\(99\)00058-X](https://doi.org/10.1016/S0048-7333(99)00058-X).
- Lee K (2020) It's Not Just the WHO: How China is Moving on the Whole UN. *Politico*, 15 April 2020.
- Lenfle S and Söderlund J (2019) Large-scale Innovative Projects as Temporary Trading Zones: Toward an Interlanguage Theory. *Organization studies* 40(11): 1713-1739. <https://doi.org/10.1177/0170840618789201>.
- Leonard-Barton D and Swap WC (1999) *When Sparks Fly: Igniting Creativity in Groups*. Boston: Harvard Business School Press.
- Levy JS (2008) Case Studies: Types, Designs, and Logics of Inference. *Conflict Management and Peace Science* 25(1): 1-18. <https://doi.org/10.1080/07388940701860318>.
- Liboiron M (2021) *Pollution is Colonialism*. Durham; London: Duke University Press.
- Lieberman ES (2005) Nested Analysis as a Mixed-Method Strategy for Comparative Research. *American Political Science Review* 99(3): 435-452. <https://doi.org/10.1017/S0003055405051762>.
- Lu M and Qiu JL (2023) Transfer or Translation? Rethinking Traveling Technologies from the Global South. *Science, Technology, & Human Values* 48(2): 272-294. <https://doi.org/10.1177/01622439211072205>.
- Madelin R (2014) *No Single Roadmap for Understanding the Human Brain*. Available at: <https://ec.europa.eu/digital-single-market/en/blog/no-single-roadmap-understanding-human-brain> (accessed 22 February 2021).
- Madise D and Isike C (2020) Ubuntu Diplomacy: Broadening Soft Power in an African Context. *Journal of Public Affairs* 20(3): 1-10. <https://doi.org/10.1002/pa.2097>.
- Madsen LM and Adriansen HK (2021) Transnational Research Capacity Building: Whose Standards Count? *Critical African Studies* 13(1): 49-55. <https://doi.org/10.1080/21681392.2020.1724807>.
- Mahfoud T (2021) Visions of Unification and Integration: Building Brains and Communities in the European Human Brain Project. *New Media & Society* 23(2): 322-343. <https://doi.org/10.1177/1461444820929576>.

- Maile DUo (2019) Threats of Violence: Refusing the Thirty Meter Telescope and Dakota Access Pipeline. In: Estes N and Dhillon J (eds) *Standing with Standing Rock: Voices from the #NoDAPL Movement*. Minneapolis: University of Minnesota Press, pp.328-343.
- Marquardt W (2015) Human Brain Project Mediation Report. Düren: Forschungszentrum Jülich.
- Mattoo SK (2006) Fusion Technology Development in India. *Nuclear India* 39(11-12): 16-20.
- McAdam D, McCarthy JD and Zald MN (1996) *Comparative Perspectives on Social Movements: Political Opportunities, Mobilizing Structures, and Cultural Framings*. Cambridge, UK: Cambridge University Press.
- McAdam D and Scott WR (2005) Organizations and Movements. In: Davis GF, McAdam D, Richard W, et al. (eds) *Social movements and organization theory*. Cambridge: Cambridge University Press, pp.4-40. <https://doi.org/10.1017/CBO9780511791000>.
- McCray WP (2010) ‘Globalization with Hardware’: ITER’s Fusion of Technology, Policy, and Politics. *History and Technology* 26(4): 283-312. <https://doi.org/10.1080/07341512.2010.523171>.
- McCray WP (2000) Large Telescopes and the Moral Economy of Recent Astronomy. *Social Studies of Science* 30(5): 685-711. <https://doi.org/10.1177/030631200030005002>.
- Merz M and Cetina KK (1997) Deconstruction in a ‘Thinking’ Science: Theoretical Physicists at Work. *Social Studies of Science* 27(1): 73-111. <https://doi.org/10.1177/030631297027001004>.
- Merz M and Sorgner H (2022) Organizational Complexity in Big Science: Strategies and Practices. *Synthese* 200(3): 211. 10.1007/s11229-022-03649-3.
- Meyer DS (2004) Protest and Political Opportunities. *Annual Review of Sociology* 30: 125-145. <https://doi.org/10.1146/annurev.soc.30.012703.110545>.
- Modic D and Feldman MP (2017) Mapping the Human Brain: Comparing the US and EU Grand Challenges. *Science and Public Policy* 44(3): 440-449. <https://doi.org/10.1093/scipol/scw085>.
- Morris AD and Staggenborg S (2004) Leadership in Social Movements. In: Snow DA, Soule SA and Kriesi H (eds) *The Blackwell companion to social movements*. Malden, MA: Blackwell Publishing, pp.171-196. 10.1002/9780470999103.
- Motion J, Leitch S and Weaver CK (2015) Popularizing Dissent: A Civil Society Perspective. *Public Understanding of science* 24(4): 496-510. <https://doi.org/10.1177/0963662514556206>.
- Moyi Okwaro F and Geissler PW (2015) In/dependent Collaborations: Perceptions and Experiences of African Scientists in Transnational HIV Research. *Medical anthropology quarterly* 29(4): 492-511. 10.1111/maq.12206.

- Mtingwa SK and Winick H (2018) Synchrotron Light Sources in Developing Countries. *Modern Physics Letters A* 33(9): 1-19. 10.1142/S0217732318300033
- Nakamoto-White E (2019) *TMT Protesters Took to Social Media to Make Their Case - and Build Support Nationally*. Available at: <https://www.hawaiinewsnow.com/2019/08/01/tmt-protesters-took-social-media-make-their-case-build-support-nationally/> (accessed 29 March 2023).
- Nardini G, Rank-Christman T, Bublitz MG, et al. (2021) Together We Rise: How Social Movements Succeed. *Journal of Consumer Psychology* 31(1): 112-145. <https://doi.org/10.1002/jcpy.1201>.
- Neresini F and Lorenzet A (2016) Can Media Monitoring be a Proxy for Public Opinion about Technoscientific Controversies? The Case of the Italian Public Debate on Nuclear Power. *Public Understanding of science* 25(2): 171-185. <https://doi.org/10.1177/0963662514551506>.
- Neurofuture.eu (2014) *Open Message to the European Commission Concerning the Human Brain Project*. Available at: [https://imagens.publicocdn.com/imagens.aspx/860386?tp=UH&amp%3Bdb=IMAGE\\_NS&dl=1&fln=open-message-regarding-hbp--20140707.pdf](https://imagens.publicocdn.com/imagens.aspx/860386?tp=UH&amp%3Bdb=IMAGE_NS&dl=1&fln=open-message-regarding-hbp--20140707.pdf) (accessed 25 April 2022).
- Newton DE and Slesnick IL (1990) Difficult Decisions: The Superconducting Super Collider. *The Science Teacher* 57(1): 35-37.
- Newton MC, Connell SH, Mitchell EP, et al. (2023) Building a Brighter Future for Africa with the African Light Source. *Nature Review Physics* 5(2): 74-75. 10.1038/s42254-022-00534-3.
- Ngwenya S and Boshoff N (2023) Self-interestedness in Research Collaboration and its Association with Career Stage and Nature of Collaboration: A Survey of Zimbabwean Researchers. *Journal of Empirical Research on Human Research Ethics* 18(4): 189-207.
- Nicklin C, Stredwick R and Sewell T (2022) Synchrotron Techniques for African Research and Technology: A Step-Change in Structural Biology and Energy Materials. *Synchrotron Radiation News* 35(1): 14-19. <https://doi.org/10.1080/08940886.2022.2043684>.
- Nji E, Traore DA, Ndi M, et al. (2019) BioStruct-Africa: Empowering Africa-based Scientists through Structural Biology Knowledge Transfer and Mentoring—Recent Advances and Future Perspectives. *Journal of Synchrotron Radiation* 26(5): 1843-1850. 10.1107/S1600577519008981.
- Nye JS (1990) Soft Power. *Foreign Policy* 80: 153-171. <https://doi.org/10.2307/1148580>.
- O’Cathain A, Murphy E and Nicholl J (2010) Three Techniques for Integrating Data in Mixed Methods Studies. *British Medical Journal* 341. <https://doi.org/10.1136/bmj.c4587>.
- O’Meara J (2022) *A New Stewardship Paradigm for Maunakea*. Available at: <https://aas.org/posts/news/2022/08/new-stewardship-paradigm->



[maunakea#:~:text=Under%20Act%20255%2C%20astronomy%20is,composed%20of%20eleven%20voting%20members](#) (accessed 23 May 2023).

- OECD (2014) *The Impacts of Large Research Infrastructures on Economic Innovation and on Society*. Paris: OECD.
- Office of Technology Assessment (1995) *International Partnerships in Large Science Projects*. Washington D.C.: US Government Printing Office.
- Overbye D (2016) Under Hawai‘i’s Starriest Skies, a Fight Over Sacred Ground. *The New York Times*, 2 October.
- Panese F (2015) Cerveau et Imaginaire Sociotechnique: Genèse du Human Brain Project entre Science et Politique. In: Audétat M, Barazzetti G, Benaroyo L, et al. (eds) *Sciences et Technologies Émergentes: Pourquoi tant de Promesses?* Paris: Éditions Hermann, pp.165-193.
- Parikh S (2021) Why We Must Rebuild Trust in Science. *PEW Trend Magazine*, 9 February.
- Parizek M and Stephen MD (2021) The Long March through the Institutions: Emerging Powers and the Staffing of International Organizations. *Cooperation and Conflict* 56(2): 204-223. <https://doi.org/10.1177/0010836720966017>.
- Penca J (2018) The Rhetoric of ‘Science Diplomacy’: Innovation for the EU’s Scientific Cooperation? *EL-CSID Working Paper Issue* 2018(16): 1-15.
- Perrotta D and Alonso M (2020) Cross-National Research Partnerships in International Relations: A Study of Research Groups’ Practices of MERCOSUR—Re-Envisioning Scholarly Activities Beyond the Global North–Global South Divide. *Journal of Studies in International Education* 24(1): 79-96.
- Personal Communication from ITER IO ITER 2022 HR Statistics.
- Peterson BR and Miller A (2019) *The Economic and Fiscal Impacts of Fermilab on Illinois*. Chicago: Anderson Economic Group, LLC.
- Pickel S (2009) Die Triangulation als Methode in der Politikwissenschaft. In: Pickel S, Pickel G, Lauth H-J, et al. (eds) *Methoden der vergleichenden Politik-und Sozialwissenschaft*. Wiesbaden: VS Verlag für Sozialwissenschaften, pp.517-542. <https://doi.org/10.1007/978-3-531-91826-6>.
- Polejack A, Goveas J, Robinson S, et al. (2022) *Where is the Global South in the Science Diplomacy Narrative?* Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=4278557](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4278557).
- Pozza M (2015) Diplomacy for Science: The SKA Project. In: Davis LS and Patman RG (eds) *Science Diplomacy: New Day or False Dawn?* Singapore: World Scientific Publishing Co., pp.87-106. [https://doi.org/10.1142/9789814440073\\_0014](https://doi.org/10.1142/9789814440073_0014).
- Prashad V (2014) *The Poorer Nations: A Possible History of the Global South*. London; Brooklyn: Verso Books.

- Quick D (2012) *Square Kilometer Array Organisation Opts for Dual Site Solution*. Available at: <https://newatlas.com/ska-dual-site-solution/22702/> (accessed 18 December 2021).
- Rådberg KK and Löfsten H (2023) Developing a Knowledge Ecosystem for Large-scale Research Infrastructure. *The Journal of Technology Transfer* 48(1): 441-467. <https://doi.org/10.1007/s10961-022-09945-x>.
- Ragin CC, Shulman D, Weinberg A, et al. (2003) Complexity, Generality, and Qualitative Comparative Analysis. *Field Methods* 15(4): 323-340. <https://doi.org/10.1177/1525822X03257689>.
- Rajão R, Duque RB and De' R (2014) Introduction: Voices From Within And Outside the South—Defying STS Epistemologies, Boundaries, and Theories. *Science, Technology & Human Values* 39(6): 767-772. <https://doi.org/10.1177/0162243914542161>.
- Reagan R and Gorbachev M (1985) Joint Soviet-United States Statement on the Summit Meeting in Geneva. Simi Valley: Ronald Reagan Presidential Library and Museum.
- Rihoux B and Ragin CC (2009) *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques*. Los Angeles: SAGE.
- Riordan M (2001) A Tale of Two Cultures: Building the Superconducting Super Collider, 1988–1993. *Historical studies in the physical and biological sciences* 32(1): 125-144. <https://doi.org/10.1525/hsp.2001.32.1.125>.
- Riordan M, Hoddeson L and Kolb AW (2015) *Tunnel Visions: The Rise and Fall of the Superconducting Super Collider*. Chicago; London: University of Chicago Press.
- Ritch JB (2006) It Makes Sense to End India's Nuclear Isolation. *The New York Times*, 5 April.
- Robinson M (2020) Big Science Collaborations; Lessons for Global Governance and Leadership. *Global Policy* 12(1): 66-80. <https://doi.org/10.1111/1758-5899.12861>.
- Robinson M (2019) *Science Mega-Project Communities; Mechanisms of Effective Global Collaboration?*, Durham University, Durham.
- Robinson S, Adamson M, Barrett G, et al. (2023) The Globalization of Science Diplomacy in the Early 1970s: A Historical Exploration. *Science and Public Policy* 50(4): 749-758. <https://doi.org/10.1093/scipol/scad026>.
- Rohlinger DA and Gentile H (2017) Sociological Understandings of Social Movements: A North American Perspective. In: Roggeband C and Klandermans B (eds) *Handbook of social movements across disciplines*. Cham: Springer International Publishing AG, pp.9-32. <https://doi.org/10.1007/978-0-387-70960-4>.
- Rüffin N (2020) Methods and Strategies in the Study of Big Science and Research Infrastructures: A Review. *Big Science and Research Infrastructures in Europe*. Cheltenham: Edward Elgar Publishing, pp.27-56.
- Rüffin N and Rüländ A-L (2022) Between Global Collaboration and National Competition: Unraveling the Many Faces of Arctic Science Diplomacy. *Polar Record* 58(e20): 1-12. <https://doi.org/10.1017/S0032247422000158>.

- Ruffini P-B (2020) Collaboration and Competition: The Twofold Logic of Science Diplomacy. *The Hague Journal of Diplomacy* 15(3): 371-382. <https://doi.org/10.1163/1871191X-BJA10028>.
- Rüland A-L (2023) The Effectiveness of Science Diplomacy between Adversarial States: Insights from US-Cuban and US-Iranian Science Collaborations. *The Hague Journal of Diplomacy* 18: 1-25. <https://doi.org/10.1163/1871191x-bja10147>.
- Rungius C and Flink T (2020) Romancing Science for Global Solutions: On Narratives and Interpretative Schemas of Science Diplomacy. *Humanities and Social Sciences Communications* 7(1): 1-10. 10.1057/s41599-020-00585-w.
- Rupera P (2015) India to Set up Its Own Mini N-Fusion Reactor. *The Times of India*, 1 April.
- Sahni VC (2004) Indian Contribution to the Large Hadron Collider under Construction at CERN, Geneva. *Current Science* 87(4): 441-446.
- Sai DK (2004) American Occupation of the Hawaiian State: A Century Unchecked. *Hawaiian Journal of Law and Politics* 1: 46-81.
- Salazar JA (2014) *Multicultural Settler Colonialism and Indigenous Struggle in Hawai'i: The Politics of Astronomy on Mauna a Wākea*. University of Hawai'i at Manoa, Honolulu.
- Sanders GH (2013) The Thirty Meter Telescope (TMT): An International Observatory. *Journal of Astrophysics and Astronomy* 34: 81-86. 10.1007/s12036-013-9169-5.
- Scarrà D and Piccaluga A (2020) The Impact of Technology Transfer and Knowledge Spillover from Big Science: A Literature Review. *Technovation* 116: 102165. <https://doi.org/10.1016/j.technovation.2020.102165>.
- Scheuring I (2015) *Local Celebrities Take to Social Media in Mauna Kea Protests*. Available at: <https://web.archive.org/web/20150408145902/http://www.hawaiiensnow.com/story/28730585/more-arrests-reported-sunday-during-mauna-kea-protests> (accessed 14 December 2022).
- Schnabel U and Rauner M (2013) Flaggship Initiative: Ein Hauch Apollo. *Die Zeit*, 31 January.
- Schopper H (2009) *LEP - The Lord of the Collider Rings at CERN 1980 - 2000: The Making, Operation and Legacy of the World's Largest Scientific Instrument*. Berlin: Springer.
- Seidel RW (1986) A Home for Big Science: The Atomic Energy Commission's Laboratory System. *Historical studies in the physical and biological sciences* 16(1): 135-175. <https://doi.org/10.2307/27757560>.
- Shore B and Cross BJ (2005) Exploring the Role of National Culture in the Management of Large-scale International Science Projects. *International Journal of Project Management* 23(1): 55-64. <https://doi.org/10.1016/j.ijproman.2004.05.009>.
- Shore B and Cross BJ (2003) Management of Large-scale International Science Projects: Politics and National Culture. *Engineering Management Journal* 15(2): 25-34. <https://doi.org/10.1080/10429247.2003.11415202>.

- Shrum W, Chompalov I and Genuth J (2001) Trust, Conflict and Performance in Scientific Collaborations. *Social Studies of Science* 31(5): 681-730. <https://doi.org/10.1177/030631201031005002>.
- Siddhartha V (2017) The Roles and Dimensions of Science and Technology in India's Foreign Policy. *Defence Science Journal* 67(4): 481-482. 10.14429/dsj.67.11543.
- Sil R (2020) Analytic Eclecticism—Continuing the Conversation. *International Journal* 75(3): 433-443. <https://doi.org/10.1177/0020702020962814>.
- Sil R (2000) The Foundations of Eclecticism: The Epistemological Status of Agency, Culture, and Structure in Social Theory. *Journal of Theoretical Politics* 12(3): 353-387.
- Sil R and Katzenstein PJ (2010) Analytic Eclecticism in the Study of World Politics: Reconfiguring Problems and Mechanisms across Research Traditions. *Perspectives on Politics* 8(2): 411-431. 10.1017/S1537592710001179.
- SKAO (2019) Convention Establishing the Square Kilometre Array Observatory. Rome: n.i.
- SKAO (2022) *The SKA Project*. Available at: <https://www.skatelescope.org/the-ska-project/> (accessed 15 August 2022).
- Small ML (2009) 'How Many Cases Do I Need?' On Science and the Logic of Case Selection in Field-Based Research. *Ethnography* 10(1): 5-38. <https://doi.org/10.1177/1466138108099586>.
- Smith CL (2007) How the LHC Came to Be. *Nature* 448: 281-284. <https://doi.org/10.1038/nature06076>.
- Snow DA and Trom D (2002) The Case Study and the Study of Social Movements. In: Klandermans B and Staggenborg S (eds) *Methods of social movement research*. Minneapolis: University of Minnesota, pp.146-172.
- Sooryamoorthy R (2010) Science and Scientific Collaboration in South Africa: Apartheid and After. *Scientometrics* 84(2): 373-390. <https://doi.org/10.1007/s11192-009-0106-y>.
- Sovacool BK (2009) Exploring and Contextualizing Public Opposition to Renewable Electricity in the United States. *Sustainability* 1(3): 702-721. <https://doi.org/10.3390/su1030702>.
- Stadelmann-Steffen I and Dermont C (2021) Acceptance through Inclusion? Political and Economic Participation and the Acceptance of Local Renewable Energy Projects in Switzerland. *Energy research & social science* 71: 101818. <https://doi.org/10.1016/j.erss.2020.101818>.
- State of Hawai'i (2022) House Bill Number 2024. In: House of Representatives (ed). Honolulu.
- Stenborg E and Klintman M (2012) Organized Local Resistance: Investigating a Local Environmental Movement's Activities against the ESS. In: Hallonsten O (ed) *In Pursuit of a Promise*. Lund: Arkiv, pp.173-192.

- Stichweh R (2013) Differenzierung von Wissenschaft und Politik. In: Stichweh R (ed) *Wissenschaft, Universität, Professionen. Soziologische Analysen*. Bielefeld: transcript Verlag, pp.135-153.
- Su P and Mayer M (2018) Science Diplomacy and Trust Building: ‘Science China’ in the Arctic. *Global Policy* 9: 23-28. <https://doi.org/10.1111/1758-5899.12576>.
- Swanner L (2017) Instruments of Science or Conquest? Neocolonialism and Modern American Astronomy. *Historical Studies in the Natural Sciences* 47(3): 293-319. <https://doi.org/10.1525/hsns.2017.47.3.293>.
- Swanner LA (2013) *Mountains of Controversy: Narrative and the Making of Contested Landscapes in Postwar American Astronomy*. Cambridge, MA: Harvard University.
- Tachera D (2021) *Reframing Funding Strategies to Build Reciprocity*. Available at: <https://eos.org/opinions/reframing-funding-strategies-to-build-reciprocity#:~:text=Extractive%20and%20exploitive%20practices%20erode,and%20respect%20and%20repair%20relationships>. (accessed 18 September 2023).
- Tarrow S (1993) Cycles of Collective Action: Between Moments of Madness and the Repertoire of Contention. *Social science history* 17(2): 281-307. <https://doi.org/10.2307/1171283>.
- Taylor V (2007) Tactical Repertoires of Contention. In: Ritzer G (ed) *The Blackwell Encyclopedia of Sociology*. Malden, MA: Blackwell Publishing, pp.1-4.
- Taylor V and Van Dyke N (2004) “Get Up, Stand Up”: Tactical Repertoires of Social Movements. In: Snow DA, Soule SA and Kriesi H (eds) *The Blackwell companion to social movements*. Malden, MA: Blackwell Publishing, pp.262-293. 10.1002/9780470999103.
- Teo MM and Loosemore M (2011) Community-based Protest against Construction Projects: A Case Study of Movement Continuity. *Construction management and economics* 29(2): 131-144. <https://doi.org/10.1080/01446193.2010.535545>.
- The Royal Society and AAAS (2010) *New Frontiers in Science Diplomacy. Navigating the Changing Balance of Power*. London: The Royal Society.
- Thomann E (2020) Qualitative Comparative Analysis for Comparative Policy Analysis. In: Peters GB and Fontaine G (eds) *Handbook of research methods and applications in comparative policy analysis*. Cheltenham: Edward Elgar Publishing Limited, pp.254-276.
- Tilly C (1978) *From Mobilization to Revolution*. Reading, MA: Addison-Wesley.
- Tilly C (2004) Social Boundary Mechanisms. *Philosophy of the Social Sciences* 34(2): 211-236. <https://doi.org/10.1177/0048393103262551>.
- TMT International Observatory (2022) *About*. Available at: <https://www.tmt.org/page/about#what-is-tmt> (accessed 4 May 2023).
- Traweek S (2009) *Beamtimes and Lifetimes*. Harvard: Harvard University Press.

- Trust Africa (2015) Declaration and Action Plan from the 1st African Higher Education Summit. Dakar: Trust Africa.
- Tuertscher P, Garud R and Kumaraswamy A (2014) Justification and Interlaced Knowledge at ATLAS, CERN. *Organization Science* 25(6): 1579-1608. <https://doi.org/10.1287/orsc.2013.0894>.
- Tuhiwai Smith L (2021) *Decolonizing Methodologies: Research and Indigenous Peoples*. London: Zed Books.
- Ulnicane I (2020) Ever-changing Big Science and Research Infrastructures: Evolving European Union Policy. In: Cramer KC and Hallonsten O (eds) *Big Science and Research Infrastructures in Europe*. Cheltenham: Edward Elgar Publishing, pp.76-100.
- Ulnicane I (2015) Why Do International Research Collaborations Last? Virtuous Circle of Feedback Loops, Continuity and Renewal. *Science and Public Policy* 42(4): 433-447. <https://doi.org/10.1093/scipol/scu060>.
- US Department of Energy (2004) Remarks by Secretary of Energy Spencer Abraham. In: Department of Energy (ed). Washington: Department of Energy.
- Uyeda C (2021) Mountains, Telescopes, and Broken Promises: The Dignity Taking of Hawaii's Ceded Lands. *Asian American Law Journal* 28: 65. <https://doi.org/10.15779/Z38CC0TV0T>.
- Van der Horst D (2007) NIMBY or Not? Exploring the Relevance of Location and the Politics of Voiced Opinions in Renewable Energy Siting Controversies. *Energy Policy* 35(5): 2705-2714. <https://doi.org/10.1016/j.enpol.2006.12.012>.
- Van Dyke JM (2007) *Who Owns the Crown Lands of Hawai'i?* Honolulu: University of Hawai'i Press.
- Vasconcellos E (1990) Managing Conflicts between Line and Staff in Interdisciplinary R&D Projects. In: Birnbaum PH, Rossini FA and Baldwin DR (eds) *International Research Management: Studies in Interdisciplinary Methods from Business, Government, and Academia*. Oxford: Oxford University Press, pp.133-138. <https://doi.org/10.1093/acprof:oso/9780195062526.003.0014>.
- Velho L and Pessoa Jr O (1998) The Decision-making Process in the Construction of the Synchrotron Light National Laboratory in Brazil. *Social Studies of Science* 28(2): 195-219. <https://doi.org/10.1177/030631298028002001>.
- Vincenzi M (2022) Why Do Big Science Projects Exist? The Role of Social Preferences. *Science and Public Policy* 49(6): 853-864. <https://doi.org/10.1093/scipol/scac033>.
- Vorkinn M and Riese H (2001) Environmental Concern in a Local Context: The Significance of Place Attachment. *Environment and behavior* 33(2): 249-263. <https://doi.org/10.1177/00139160121972972>.

- Vuola O and Hameri A-P (2006) Mutually Benefiting Joint Innovation Process between Industry and Big-science. *Technovation* 26(1): 3-12. <https://doi.org/10.1016/j.technovation.2005.03.003>.
- Wakunuma K, Castro Fd, Jiya T, et al. (2021) Reconceptualising Responsible Research and Innovation from a Global South Perspective. *Journal of Responsible Innovation* 8(2): 267-291. <https://doi.org/10.1080/23299460.2021.1944736>.
- Walker C (2019) Cosmopolitan Karoo: Land, Space and Place in the Shadow of the Square Kilometre Array. *Journal of Southern African Studies* 45(4): 641-662. <https://doi.org/10.1080/03057070.2019.1645493>.
- Walker C and Chinigò D (2018) Disassembling the Square Kilometre Array: Astronomy and Development in South Africa. *Third World Quarterly* 39(10): 1979-1997. <https://doi.org/10.1080/01436597.2018.1447374>.
- Wang Z (1995) The Politics of Big Science in the Cold War: PSAC and the Funding of SLAC. *Historical studies in the physical and biological sciences* 25(2): 329-356. <https://doi.org/10.2307/27757748>.
- Wareham J, Priego LP, Romasanta AK, et al. (2022) Systematizing Serendipity for Big Science Infrastructures: The ATTRACT Project. *Technovation* 116: 102374. <https://doi.org/10.1016/j.technovation.2021.102374>.
- Watts J (2003) End of an Era as Japan Enters Iraq. *The Guardian*, 26 July.
- Webb EJ, Campbell DT, Schwartz RD, et al. (1999) *Unobtrusive Measures*. Thousand Oaks; London; New Delhi: SAGE Publications.
- Westfall C (2012) Institutional Persistence and the Material Transformation of the US National Labs: The Curious Story of the Advent of the Advanced Photon Source. *Science and Public Policy* 39(4): 439-449. <https://doi.org/10.1093/scipol/scs054>.
- Williams A and Mauduit J-C (2020) The Access and Return on Investment Dilemma in Big Science Research Infrastructures: A Case Study in Astronomy. In: Cramer KC and Hallonsten O (eds) *Big Science and Research Infrastructures in Europe*. Cheltenham: Edward Elgar Publishing, pp.198-217.
- Witze A (2018) *Embattled Thirty Meter Telescope Scores Big Win in Hawaii's Highest Court*. Available at: <https://www.nature.com/articles/d41586-018-04444-2#:~:text=31%20October%202018-.Embattled%20Thirty%20Meter%20Telescope%20scores%20big%20win%20in%20Hawaii%27s%20highest,after%20years%2Dlong%20legal%20battle.&text=Hawaii%27s%20supreme%20court%20has%20ruled,atop%20the%20mountain%20Mauna%200Kea> (accessed 23 May 2023).
- Yin RK (2003) *Case Study Research: Design and Methods*. Thousand Oaks; London, New Delhi: SAGE Publications.

Zapp M (2018) The Scientization of the World Polity: International Organizations and the Production of Scientific Knowledge, 1950–2015. *International Sociology* 33(1): 3-26. <https://doi.org/10.1177/0268580917742003>.



## Appendix

Table 1: Overview of conflict causes at the meso level in Big Science

Author(s)	Case Studies	Identified Source(s) of Conflict
Shrum et al. (2001)	Projects in particle physics, geophysics, oceanography, space science, ground-based astronomy, material science & medical physics	Resources
		Communication
		Credit
		Control of project
Vasconcellos (1990)	Brazilian R&D centers	Organizational objectives and priorities Work and task division
Knorr-Cetina (1999)	Particle physics & molecular biology laboratory	Authorship quarrels
		Resources
		Access to scientific resources Work and task division
Traweek (2009)	Stanford Linear Accelerator Center (SLAC) Ko-Energie butsurigaku Kenkyusho (KEK)	Access to scientific instruments
		Funding
		Cultural differences User groups
D'Ippolito & Rüling (2019)	Institut Laue-Langevin (ILL)	Work and task division
Mahfoud (2021)	Human Brain Project (HBP)	Project objective
		Epistemology
		Funds
		Organization of scientific work
Hilgartner (2011)	Human Genome Project (HGP)	Resource allocation
		Distribution of scientific rewards
		Ethics
		Project objective
		Epistemology
Lambright (2002)	Human Genome Project (HGP)	Access to scientific resources
		Project management
Cook-Deegan (1994)	Human Genome Project (HGP)	Resources
		Science policy
Claessens (2020)	International Thermonuclear Experimental Reactor (ITER)	Resources
		Project management
McCray (2000)	Gemini Telescope	Science policy
		Funding
Riordan et al. (2015)	Superconducting Super Collider (SSC)	Access to scientific instruments
		Resources

*Table 2: Overview of conflict causes at the macro level in Big Science*

<b>Author(s)</b>	<b>Case Studies</b>	<b>Identified Source(s) of Conflict</b>
Hallonsten (2014)	European Organization for Nuclear Research (CERN) II	Siting
	European Southern Observatory (ESO)	Financial contributions
	Institut Laue-Langevin (ILL)	Scientific access
	European Synchrotron Radiation Facility (ESRF)	
	European X-ray Free Electron Laser (XFEL)	Procurement
	European Spallation Source (ESS)	
Krige (2003)	European Organization for Nuclear Research (CERN) II	Siting
McCray (2010)	International Thermonuclear Experimental Reactor (ITER)	Siting
Claessens (2020)	International Thermonuclear Experimental Reactor (ITER)	Funding
		Siting
		Schedule
Aberg (2021)	International Thermonuclear Experimental Reactor (ITER)	Siting
		Organization
		Funding
Williams & Mauduit (2020)	Astronomy	Scientific access
Arnoux & Jacquinet (2006)	International Thermonuclear Experimental Reactor (ITER)	Funding

Table 3: Overview of analyzed documents for chapter four

Author Name	Year	Title	Document Type
European Commission	2011	Digital Agenda: Commission Selects Six Future and Emerging Technologies Projects to Compete for Research Funding	Press release
Waldrop	2012	Brain in a Box	Magazine article
Hummel	2015	Dicke Schädel, falsche Versprechen	Newspaper article
Horgan	2013	Do Big New Brain Projects Make Sense When We Don't Even Know the "Neural Code"?	Opinion piece
Sample	2014	Scientists Threaten to Boycott 1.2bn euro Human Brain Project	Newspaper article
Schnabel & Rauner	2013	Ein Hauch Apollo	Newspaper article
Destexhe	2021	In Silico, Computer Simulations from Neurons up to the Whole Brain	Academic article
Neurofuture.de	2014	Open Message to the European Commission Concerning the Human Brain Project	Press release
Marquardt	2015	Human Brain Project Mediation Report	Report
Kelly	2014	Brainstorm: Neuroscientists Protest against Europe's Human Brain Project	Magazine article
Broad	1992	Quest for Fusion Power Is Going International	Newspaper article
Claessens	2020	ITER: The Giant Fusion Reactor	Book
McCray	2010	Globalization with Hardware. ITER's Fusion of Technology, Policy, and Politics	Academic article
Reagan & Gorbachev	1985	Joint Soviet-United States Statement on the Summit Meeting in Geneva	Government document
European Commission	2017	EU Contribution to a Reformed ITER Project	Government document
Madelin	2014	No Single Roadmap for Understanding the Human Brain	Government document
US Department of Energy	2004	Remarks by Secretary of Energy Spencer Abraham	Government document
Buck	2004	Paris Urges EU to Build Fusion Centre Alone	Magazine article
Brumfiel & Butler	2003	US Support for Spain Triggers Unease over Fusion Project	Magazine article
Arnoux & Jacquinet	2006	ITER: Le Chemin des Étoiles?	Book
Watts	2003	End of an Era as Japan Enters Iraq	Newspaper article
Lambricht	2002	Managing Big Science: A Case Study of the Human Genome Project	Academic article
Mahfoud	2021	Visions of Unification and Integration: Building Brains and Communities in the Human Brain Project	Academic article

Aberg	2021	The Ways and Means of ITER	Academic article
Cook-Deegan	1994	Origins of the Human Genome Project	Academic article
D'Ippolito & Rüling	2019	Research Collaboration in Large Scale Research Infrastructures	Academic article
Hallonsten	2014	The Politics of European Collaboration in Big Science	Book chapter
Hilgartner	2011	The Human Genome Project	Book chapter
Knorr Cetina	1999	Epistemic Cultures	Book
Krige	2013	The Politics of European Scientific Collaboration	Book chapter
McCray	2000	Large Telescopes and the Moral Economy of Recent Astronomy	Academic article
Shrum et al.	2001	Trust, Conflict and Performance in Scientific Collaboration	Academic article
Traweek	2009	Beamtimes and Lifetimes	Book
Vasconcellos	1990	Managing Conflicts between Line and Staff in Interdisciplinary R&D Projects	Book chapter
Williams & Maudit	2020	The Access and Return on Investment Dilemma in Big Science Research Infrastructures	Book chapter