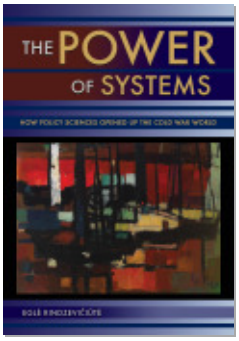
Notes



Published by

Rindzevičiūtė, Eglė.
The Power of Systems: How Policy Sciences Opened Up the Cold War World.
1 ed. Cornell University Press, 2016.
Project MUSE. https://dx.doi.org/10.1353/book.49328.

Notes

INTRODUCTION

1. Russian mathematician and research director of the Computer Center at the Soviet Academy of Sciences, Nikita Moiseev wrote in his memoir that he began to be embarrassed about his military jacket and was only able to buy his first civil suit in 1951, adding that at the moment of writing, in the mid-1990s, he once again could not afford to buy a suit. Nikita Moiseev, *Kak daleko do zavtreshnego dnia: svobodnye razmyshleniia, 1917–1993* (Moscow: ASPEKT, 1994).

2. Archive of the Russian Academy of Sciences (henceforth ARAN), documents of the discussion at the Council of the Soviet Academy of Sciences, 1972.

3. Robert R. Kline, *The Cybernetics Moment: Or Why We Call Our Age the Information Age* (Baltimore, MD: Johns Hopkins University Press, 2015); Hunter Heyck, *Age of System: Understanding the Development of Modern Social Science* (Baltimore, MD: Johns Hopkins University Press, 2015); Paul Edwards, *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming* (Cambridge, MA: MIT Press, 2010). See also Stephen Collier and Andrew Lakoff, "Vital Systems Security: Reflexive Biopolitics and the Government of Emergency," *Theory, Culture and Society* 32, no. 2 (2015): 19–51.

4. Slava Gerovitch, *From Newspeak to Cyberspeak: A History of Soviet Cybernetics* (Cambridge, MA: MIT Press, 2002).

5. See, for instance, a novel by Carl A. Posey, *Red Danube* (London: St Martin's, 1986).

6. Giuliana Gemelli, ed., *The Ford Foundation and Management Education in Western and Eastern Europe (1950s–1970s)* (Brussels: European Interuniversity Press, 1998); Giuliana Gemelli, ed., *American Foundations and Large-Scale Research: Construction and Transfer of Knowledge* (Bologna: Clueb, 2001); Johan Heilbron, Nicolas Guilhot, and Laurent Jeanpierre, "Toward a Transnational History of the Social Sciences," *Journal of the History of the Behavioral Sciences* 44, no. 2 (2008): 146–160; Roger E. Backhouse and Philippe Fontaine, eds., *A Historiography of the Modern Social Sciences* (Cambridge: Cambridge University Press, 2014); Mark Solovey, ed., *Shaky Foundations: The Politics-Patronage-Social Science Nexus in Cold War America* (New Brunswick, NJ: Rutgers University Press, 2013); Jenny Andersson, "The Great Future Debate and the Struggle for the World," *American Historical Review* 117 (2012): 1411–1430.

7. Mark Sandle, "Russian Think Tanks, 1956–1996," in *Think Tanks Across Nations: A Comparative Approach,* ed. Diane Stone, Andrew Dedham, and Mark Garnett (Manchester, UK: Manchester University Press, 1998), 202–222. See also Marion Fourcade, *Economists and Societies: Discipline and Profession in the United States, Britain and France, 1890s–1990s* (Princeton, NJ: Princeton University Press, 2009).

8. Fernando Elichirigoity, *Planet Management: Limits to Growth, Computer Simulation, and the Emergence of Global Spaces* (Evanston, IL: Northwestern University Press, 1999); Leena Riska-Campbell, *Bridging East and West: The Establishment of the International Institute for Applied Systems Analysis (IIASA) in the United States Foreign Policy of Bridge Building, 1964–1972* (Helsinki: The Finnish Society of Science and Letters, 2011).

9. Stacy D. VanDeveer, "Ordering Environments: Regions in European International Environmental Cooperation," in *Earthly Politics: Local and Global in Environmental Governance*, ed. Sheila Jasanoff and Marybeth Martello (Cambridge, MA: MIT Press, 2004),

309–334; Duncan Liefferink, *Environment and the Nation State: The Netherlands, the European Union and Acid Rain* (Manchester, UK: Manchester University Press, 1996). See also Rolf Lidskog and Göran Sundkvist, eds., *Governing the Air: The Dynamics of Science, Policy, and Citizen Interaction* (Cambridge, MA: MIT Press, 2011).

10. It is quite possible that the relative obscurity of this organization, at least in Cold War and Soviet histories, is due rather to the fact that its target audience constituted of a particular set of elite research and political organizations, an orientation which, according to Stone and Garnett, was indeed typical of the majority of Western think tanks. Diane Stone and Mark Garnett, "Introduction: Think Tanks, Policy Advice and Governance," in *Think Tanks Across Nations: A Comparative Approach,* ed. Diane Stone, Andrew Denham, and Mark Garnett (Manchester, UK: Manchester University Press. 1998), 13–14.

11. Barbara Czarniawska-Joerges and Guje Sevón, eds., *Translating Organizational Change* (Berlin: de Gruyter, 1996).

12. While I am not the first to suggest this, I am not aware of any other study of the activities pursued at IIASA. Some scholars, like Elichirigoity, Schwartz, and Riska-Campbell point out the relevance of IIASA to the emergence of a new type of global thinking beyond the Cold War in US foreign policy from the 1960s, but I am not aware of other thorough studies on this. Fernando Elichirigoity, *Planet Management, Limits to Growth, Computer Simulation, and the Emergence of Global Spaces* (Evanston, IL: Northwestern University Press, 1999); Francis J. Gavin and Mark Atwood Lawrence, eds., *Beyond the Cold War: Lyndon Johnson and the New Global Challenges of the 1960s* (Oxford: Oxford University Press, 2014).

13. In this respect, my study is a kind of history of the present transnational policy entrepreneurship. See, for instance, Andrew Moravcsik, "A New Statecraft? Supranational Entrepreneurs and International Cooperation," *International Organization* 53, no. 2 (1999): 267–306.

14. See also Oscar Sanchez-Sibony, who underscores the importance of international trade for the Soviet government, suggesting that East-West relations were based less on head-on confrontation than on mutual accommodation and cooperation. Oscar Sanchez-Sibony, *Red Globalization: The Political Economy of the Soviet Cold War from Stalin to Khrushchev* (Cambridge: Cambridge University Press, 2014), 4–7.

15. These are two bodies of literature that only occasionally overlap. Some have attempted to draw the disparate fields into one, system-cybernetic paradigm; the roots of this intellectual project of field-building go back to the 1970s. I refer here only to the publications in English, although there is extensive literature on the paradigm of system-cybernetic sciences in French and Swedish. For an example, see Darrell P. Arnold, ed., *Traditions of Systems Theory: Major Figures and Contemporary Developments* (New York: Routledge, 2014). The other type of scholarship reflects on the elements of what I call system-cybernetic governmentality and, drawing on the history of science and technology, critically examines it. Early examples include Daniel Bell's writings on the postindustrial society, Yoneji Masuda's work on information society, and David Noble's writing on the social consequences of automation. Later and highly influential examples include Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999); Manuel Castells and Emma Kiselyova, *The Collapse of Soviet Communism: A View from the Information Society* (Berkeley: University of California Press, 1995). A third body of literature involves those social and political theories that (either explicitly or implicitly) incorporated elements of a system-cybernetic approach to advance social science. Examples are very many, the most prominent being the works of Karl Deutsch, Gregory Bateson, Amitai Etzioni, Nikolas Luhmann, and François Lyotard. See Céline Lafontaine, *L'empire cybernétique: des machines à penser à la pensée machine* (Paris: Seuil, 2004). More recently, studies have begun to appear scrutinizing the impact

and legacy of system cybernetic sciences in governance and culture from a historical perspective. See Eglė Rindzevičiūtė, *Constructing Soviet Cultural Policy: Cybernetics and Governance after World War II* (Linköping, Sweden: Linköping University Press, 2008); David Crowley and Jane Pavitt, eds., *Cold War Modern* (London: V&A, 2010); Eden Medina, *Cybernetic Revolutionaries Technology and Politics in Allende's Chile* (Cambridge, MA: MIT Press, 2011); Orit Halpern, *Beautiful Data: A History of Vision and Reason since 1945* (Durham, NC: Duke University Press, 2014).

16. Obviously, systems thinking in governance has much older roots, considering which is beyond the scope of this book. I have limited my analysis to the Cold War period, largely because precisely at this time the newly invented computer technology and cybernetics informed new notions of governance and control. However, there is an interesting argument to be made regarding efforts to develop East-West scientific cooperation, efforts which could well be seen as an attempt to re-create the international world scientific community of the nineteenth century regardless of the ideological divisions imposed on the Cold War world. Further research is necessary to fully understand to what extent the Cold War was a driver and obstacle of scientific cooperation.

17. The key works that touch on the East-West transfer of systems analysis are Paul Erickson et al., *How Reason Almost Lost Its Mind: The Strange Career of Cold War Rationality* (Chicago: University of Chicago Press, 2013); David Holloway, *Stalin and the Bomb: The Soviet Union and Atomic Energy, 1939–1956* (New Haven, CT: Yale University Press, 1996); Walter C. Clemens, *Can Russia Change? The USSR Confronts Global Interdependence* (Boston: Unwin Hyman, 1990); David Holloway, "The Political Uses of Scientific Models: The Cybernetic Model of Government in Soviet Social Science," in *The Use of Models in the Social Sciences*, ed. L. Collins (Boulder, CO: Westview Press, 1976); Mark R. Beissinger, *Scientific Management, Socialist Discipline, and Soviet Power* (Cambridge, MA: Harvard University Press, 1988); Loren Graham, *Science, Philosophy, and Human Behaviour in the Soviet Union* (New York: Columbia University Press, 1987); Ilmari Susiluoto, *The Origins and Development of Systems Thinking in the Soviet Union: Political and Philosophical Controversies from Bogdanov and Bukharin to Present-Day Re-Evaluation* (Helsinki: Suomalainen tiedeakatemia, 1982); F. J. Fleron, ed. *Technology and Communist Culture: The Socio-Cultural Impact of Technology under Socialism* (New York: Praeger, 1977).

18. Albeit previously criticized for its lack of a critical position in the 1990s and throughout the first decade of the twenty-first century, the governmentality perspective appears to be well-established as a mainstream approach across the disciplines of sociology, political science, and cultural studies. Recently the critical thrust of the governmentality perspective became evident in the studies of neoliberal governance. William Davies, *The Limits of Neoliberalism: Authority, Sovereignty and the Logic of Competition* (London: Sage, 2014); Nicholas Gane, "The Governmentalities of Neoliberalism: Panopticism, Post-Panopticism and Beyond," *The Sociological Review* 60, no. 4 (2012): 611–634; Nicholas Gane, "Sociology and Neoliberalism: A Missing History," *Sociology* 48, no. 6 (2014): 1092–1106.

19. Mitchell Dean, *Governmentality: Power and Rule in Modern Society* (London: Sage, 1999), 1.

20. Foucault's own definition states "First, by 'governmentality' I understand the ensemble formed by institutions, procedures, analyses, and reflections, calculations, and tactics that allow the exercise of this very specific, albeit very complex power that has the population as its target, political economy as its major form of knowledge and apparatuses of security as its essential technical instrument. Second, by 'governmentality' I understand the tendency, the line of force, that for a long time, and throughout the West, has constantly led towards the pre-eminence over all other types of power—sovereignty, discipline, and so on—of the type of power that we can call 'government' and which has led

to the development of specific of a series of specific governmental apparatus (*appareils*) on the one hand, [and on the other] to the development of a series of knowledges (*savoirs*). Finally, by 'governmentality' I think we should understand the process, or rather the result of the process by which the state of justice of the Middle Ages became the administrative state in the fifteenth and sixteenth centuries and was gradually 'governmentalised'." Michel Foucault, *Security, Territory, Population: Lectures at the Collège de France, 1977–1978*, trans. Graham Burchell, ed. Michael Senallart (Basingstoke, UK: Palgrave Macmillan, 2009), 108–109.

21. Foucault, *Security, Territory, Population*, 122, 92, 99.

22. For the history of a rational agent, see Nicola Giocoli, *Modelling Rational Agents: From Interwar Economics to Early Modern Game Theory* (Cheltenham, UK: Edward Elgar, 2003). For a definition of governmental rationality in the Foucauldian sense, see Dean, *Governmentality*, 10–11. For a concise exposition of the research agenda of governmentality studies see Nikolas Rose and Peter Miller, "Political Power beyond the State: Problematics of Government," *The British Journal of Sociology*, 43, no. 2 (1992): 173–205.

23. Ian Hacking, "How Should We Do the History of Statistics?" in *Foucault's Effect: Studies in Governmentality*, ed. Graham Burchell, Colin Gordon, and Peter Miller (Chicago: University of Chicago Press, 1991), 181–196.

24. For the focus of governmentality studies on the "art of governance" see Dean, *Governmentality*, 18. The longstanding internal debate on systems analysis as an art of governance is vast, but see Aaron Wildavsky, *Speaking Truth to Power: The Art and Craft of Policy Analysis* (Boston: Little, Brown, 1979); and Giandomenico Majone, *Evidence, Argument and Persuasion in the Policy Process* (New Haven, CT: Yale University Press, 1989).

25. Alan McKinlay and Philip Taylor, *Foucault, Governmentality, and Organization* (New York: Routledge, 2014), 2–3. I thank Colin Gordon for the commentary on whether Foucault borrowed the term from Barthes.

26. Céline Lafontaine suggests that Michel Foucault's theory of dispersed and distributed power apparatuses draws on "the relational logic of cybernetics." Although she does not offer substantiating proof of Foucault's readings on cybernetics, there is indeed a good deal of overlap between system-cybernetic ontology and Foucault's idea of power and episteme. Also, Lafontaine makes a strong argument by indicating the contemporaneous criticism of structuralists as "cybermen" and "technocrats," as in Henri Lefebvre's *Position: Against Technocrats* (1967). Lafontaine, *L'empire cybernétique*, 110. See also Céline Lafontaine, "The Cybernetic Matrix of French Theory," *Theory, Culture & Society* 24, no. 5 (2007): 27–46.

27. See, for instance, David Holloway, "Innovation in Science—The Case of Cybernetics in the Soviet Union," *Science Studies* 4, no. 4 (1974): 299–337; but also Erik Hofmann and Robin F. Laird, *Technocratic Socialism: The Soviet Union in the Advanced Industrial Era* (Durham, NC: Duke University Press, 1985).

28. Gerovitch, *From Newspeak to Cyberspeak*.

29. Karl Polanyi, *The Great Transformation: The Political and Economic Origins of Our Time* (New York: Farrar & Rhinehart, 1944). The term "social technology" was also used by Olaf Helmer, who proposed changing human behavior by amending the material settings rather than changing people's views. This understanding of social technology was welcome in the Soviet Union, as in, for instance, Edvard Arab-Ogly, *V labirinte prorochestv* (Moscow: Molodaia gvardiia, 1973), 105.

30. Rindzevičiūtė, *Constructing Soviet Cultural Policy*.

31. This perspective is advanced in the studies on large technical infrastructures. See Thomas P. Hughes, *Networks of Power: Electrification of Western Society, 1880–1930* (Baltimore, MD: Johns Hopkins University Press, 1983); Andrew Barry, *Material Politics: Disputes along the Pipeline* (Oxford: Wiley-Blackwell, 2013); and Penny Harvey and Hannah

Knox, *Roads: An Anthropology of Infrastructure and Expertise* (Ithaca, NY: Cornell University Press, 2015).

32. The classic studies are Otto Mayr, *The Origins of Feedback Control* (Cambridge, MA: MIT Press, 1970); Stuart Bennett, *A History of Control Engineering 1800–1930* (Stevenage, UK: Peregrinus, 1979); David A. Mindell, *Between Human and Machine: Feedback, Control, and Computing before Cybernetics* (Baltimore, MD: Johns Hopkins University Press, 2002); John Agar, *The Government Machine: A Revolutionary History of the Computer* (Cambridge, MA: MIT Press, 2003); Gerovitch, *From Newspeak to Cyberspeak*.

33. Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (Oxford: Oxford University Press, 2005).

34. In much scholarship "technocracy" is often used as synonymous with technical totalitarianism and belief in a determinist world and, thus simplified, used to contrast different forms of either reflexive governance or complex organizational reality. I suggest that in such cases "technocracy" is used as a critical and not a descriptive concept. However, I would argue that there is more complexity to technocracy, which in some cases is able to embrace complexity and reflexivity, as revealed in the history of Soviet systems approach. For a similar argument see Michael Power, *Organized Uncertainty: Designing a World of Risk Management* (Oxford: Oxford University Press, 2007).

35. S. M. Amadae, *Rationalizing Capitalist Democracy: The Cold War Origins of Rational Choice Liberalism* (Chicago: University of Chicago Press, 2003); Paul Erickson et al., *How Reason almost Lost its Mind*; Philip Mirowski, *Machine Dreams: Economics Becomes a Cyborg Science* (Chicago: University of Chicago Press, 2010); Jennifer Light, *From Warfare to Welfare: Defense Intellectuals and Urban Problems in Cold War America* (Baltimore, MD: Johns Hopkins University Press, 2004).

36. The importance of East-West relations is acknowledged in recent studies on transnational governmentalities, such as neoliberal economics. Johanna Bockman, *Markets in the Name of Socialism: The Left-Wing Origins of Neoliberalism* (Stanford, CA: Stanford University Press, 2011). However, my case of the development of systems analysis questions Bockman's and Bernstein's thesis that the onset of neoliberalism put East-West coproduction of governance to an end, making way for a "monologue" of neoliberal governance. This is because the impact of system-cybernetic governmentality should be traced in wider sectors of governance and not only in the struggles over the institutionalization of markets or a planned economy. Johanna Bockman and Michael Bernstein, "Scientific Community in a Divided World: Economists, Planning, and Research Priority during the Cold War," *Comparative Studies in Society and History* 50, no. 3 (2008): 581–613.

37. Joy Rohde, *Armed with Expertise: The Militarization of American Social Research during the Cold War* (Ithaca, NY: Cornell University Press, 2013); Erickson et al., *How Reason Almost Lost Its Mind*.

38. Marie-Laure Djelic and Kerstin Sahlin-Andersson, eds., *Transnational Governance: Institutional Dynamics of Regulation* (Cambridge: Cambridge University Press, 2006).

39. Scholars, like Timothy Mitchell, turned to colonial history in the search of the origins of expertise-based governance. Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002). For a first study of Soviet governmentality of selfhood see Oleg Kharkhordin, *The Collective and the Individual in Russia: A Study of Practices* (Berkeley: University of California Press, 1999). Foucault himself commented on Soviet biopolitics; for more on this, see Sergei Prozorov, "Foucault and Soviet Biopolitics," *History of the Human Sciences* (2014): 1–20.

40. Dean, *Governmentality*, 145; Mitchell Dean, "Liberal Government and Authoritarianism," *Economy and Society* 31, no. 1 (2002): 37–61.

41. The notion of coproduction was popularized in the social sciences by Bruno Latour, *We Have Never Been Modern* (Cambridge, MA: Harvard University Press, 1991).

From at least the 1950s the many principles of coproduction have been explicitly discussed in practice-oriented disciplines, such as management, social engineering, security research, and particularly, as I show in this book, systems approach.

42. Sheila Jasanoff, "The Idiom of Co-production," in *States of Knowledge: The Co-production of Science and Social Order*, ed. Sheila Jasanoff (New York: Routledge, 2004), 2–3.

43. Jasanoff, "The Idiom," 3, 4.

44. Latour, *We Have Never Been Modern*. I first proposed to study the history of Soviet cybernetics as an intertwining process of hybridization and purification of cybernetics with/from the political in Eglė Rindzevičiūtė, "Purification and Hybridisation of Soviet Cybernetics: The Politics of Scientific Governance in an Authoritarian Regime," *Archiv für sozialgeschichte* 50 (2010): 289–309.

45. Thomas F. Gieryn, *Cultural Boundaries of Science: Credibility on the Line* (Chicago: University of Chicago Press, 1999), 23.

46. Nikolas Rose, *Powers of Freedom: Reframing Political Thought* (Cambridge: Cambridge University Press, 1999).

47. Loren Graham, "Introduction: The Impact of Science and Technology on Soviet Politics and Society," in *Science and the Soviet Social Order*, ed. Loren Graham (Cambridge, MA: Harvard University Press, 1990), 15.

48. Graham, "The Impact of Science," 10–12.

49. Eglė Rindzevičiūtė, "A Struggle for the Soviet Future: The Birth of Scientific Forecasting in the Soviet Union," *Slavic Review*, 75, no. 1 (2016): 52–76.

50. For more about Soviet technocracy, see Kendall E. Bailes, "The Politics of Technology: Stalin and Technocratic Thinking among Soviet Engineers," *The American Historical Review* 79, no. 2 (1974): 445–469; D. K. Rowney, *Transition to Technocracy: The Structural Origins of the Soviet Administrative State* (Ithaca, NY: Cornell University Press, 1989). New work on the modernization of Russia and the Soviet Union has appeared, mainly as part of the revision of Cold War studies. See Markku Kangaspuro and Jeremy Smith, eds., *Modernisation in Russia since 1900* (Helsinki: Finnish Literature Society, 2006); Sari Autio-Sarasmo and Katalin Miklóssy, eds., *Reassessing Cold War Europe* (New York: Routledge, 2011).

51. For more on technocracy, see Frank Fischer, *Technocracy and the Politics of Expertise* (Newbury Park, CA: Sage, 1990); Gabrielle Hecht, "Planning a Technological Nation: Systems Thinking and the Politics of National Identity in Postwar France," in *Systems, Experts, and Computers: The Systems Approach in Management and Engineering, World War II and After*, ed. Agatha C. Hughes and Thomas P. Hughes (Cambridge, MA: MIT Press, 2000), 133–160.

52. Fischer, *Technocracy and the Politics of Expertise*, 17.

53. Research shows that not all technically educated bureaucrats are prone to what is described as "technocratic" decision making. In all, debates on how to identify a technocrat go back at least fifty years. See Robert D. Putnam, "Elite Transformation in Advanced Industrial Societies: An Empirical Assessment of the Theory of Technocracy," *Comparative Political Studies* 10, no. 3 (1977): 383–412.

54. Loren Graham, *Science in Russia and the Soviet Union: A Short History* (Cambridge: Cambridge University Press, 1993), 161.

55. For studies of Soviet scientific management in the context, see Loren Graham, *The Ghost of an Executed Engineer: Technology and the Fall of the Soviet Union* (Cambridge, MA: Harvard University Press, 1996); Stephen Hanson, *Time and Revolution: Marxism and the Design of Soviet Institutions* (Chapel Hill: University of North Carolina Press, 1997).

56. Beissinger, *Scientific Management, Socialist Discipline and Soviet Power*; Kendall Bailes, "Alexei Gastev and the Soviet Controversy over Taylorism, 1918–24," *Soviet Studies* 29, no. 3 (1977): 373–394.

57. Nikita Moiseev, *Sotsializm i informatika* (Moscow: izdatel'stvo politicheskoi literatury, 1988), 67.

58. Stephen Fortescue, *Science Policy in the Soviet Union* (New York: Routledge, 1990); Pekka Sutela, *Socialism, Planning and Optimality: A Study in Soviet Economic Thought* (Helsinki: Finnish Society of Science and Letters, 1984).

59. Graham, *Science in Russia and the Soviet Union*, 160–165.

60. The seminal works are Theodore Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton, NJ: Princeton University Press, 1995); Mary Poovey, *A History of the Modern Fact: Problems of Knowledge in the Sciences of Wealth and Society* (Chicago: University of Chicago Press, 1998); Ian Hacking, *The Taming of Chance* (Cambridge: Cambridge University Press, 1990).

61. Vivien A. Schmidt, *Democracy in Europe: The EU and National Polities* (Oxford: Oxford University Press, 2006). For an overview of the link between the foundational debates on technocracy and more recent discussions, see Christina Ribbhagen, *Technocracy within Representative Democracy: Technocratic Reasoning and Justification among Bureaucrats and Politicians* (Gothenburg: University of Gothenburg Press, 2013); Claudio M. Radaelli, *Technocracy in the European Union* (New York: Longman, 1999).

62. For informality in centralized planning, see Paul R. Gregory, *The Political Economy of Stalinism: Evidence from the Soviet Secret Archives* (Cambridge: Cambridge University Press, 2003). Here I am drawing on the important work on the ambivalent role of informal practices in the Russian economy and society by Alena V. Ledeneva, *How Russia Really Works: The Informal Practices that Shaped the Post-Soviet Politics and Business* (Ithaca, NY: Cornell University Press, 2006). For the importance of informality in the organization of scientific expertise in the EU agencies, see Andrew Barry, *Political Machines: Governing a Technological Society* (London: Athlone, 2001), 93–101.

63. See the argument in Steven Brint, *In an Age of Experts: The Changing Role of Professionals in Politics and Public Life* (Princeton, NJ: Princeton University Press, 1994).

64. James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT: Yale University Press, 1998), 4.

65. Scott, *Seeing Like a State*, 96.

66. Ibid., 5.

67. Scott, *Seeing Like a State*, 98–99; Richard Stites, *Revolutionary Dreams: Utopian Vision and Experimental Life in the Russian Revolution* (New York: Oxford University Press, 1989).

68. Loren Graham, *Moscow Stories* (Bloomington: Indiana University Press, 2006).

69. Richard F. Vidmer, "Soviet Studies of Organization and Management: A 'Jungle' of Competing Views," *Slavic Review* 40, no. 3 (1981): 404–422.

70. Chapter 5 is a revised version of my article, "Toward a Joint Future Beyond the Iron Curtain: East-West Politics of Global Modelling," in *A Struggle for the Long-Term in Transnational Science and Politics: Forging the Future*, eds. Jenny Andersson and Eglė Rindzevičiūtė (New York: Routledge, 2015).

71. Graham, "The Impact of Science," 13.

1. GRAY EMINENCES OF THE SCIENTIFIC-TECHNICAL REVOLUTION

1. Such a simplistic division between political and technocratic power is described and criticized by Frank Fischer in *Technocracy and the Politics of Expertise*, 110–111.

2. Ronald Grigor Suny, *The Soviet Experiment: Russia, the USSR and the Successor States* (New York: Oxford University Press, 1998).

3. Fischer, *Technocracy and the Politics of Expertise*, 19.

4. For a concise overview of the Soviet military-industrial complex, see Audra J. Wolfe, *Competing with the Soviets: Science, Technology and the State in Cold War America* (Baltimore, MD: Johns Hopkins University Press, 2013), and for a comprehensive review of Soviet environmental programs and disasters, see Paul Josephson et al., *An Environmental History of Russia* (Cambridge: Cambridge University Press, 2013).

5. Fischer, *Technocracy and the Politics of Expertise*.

6. See Josephson et al., *An Environmental History of Russia*; Laurent Coumel and Marc Elie, "A Belated and Tragic Ecological Revolution: Nature, Disasters, and Green Activists in the Soviet Union and the Post-Soviet States, 1960s–2010s," *Soviet and Post-Soviet Review* 40, no. 2 (2013): 157–165.

7. Bruno Latour, *We Have Never Been Modern*. Translated by Catherine Porter (Cambridge, MA: Harvard University Press, 1993).

8. Louise Amoore, *The Politics of Possibility: Risk and Security Beyond Probability* (Durham and London: Duke University Press, 2013), 34–39.

9. Stephen Fortescue, *Science Policy in the Soviet Union* (New York: Routledge, 1990), 27.

10. The role of Gvishiani as an internationalizer of Soviet governance is discussed in Clemens, *Can Russia Change?* and in Matthew Evangelista, *Unarmed Forces: The Transnational Movement to End the Cold War* (Ithaca, NY: Cornell University Press, 1999).

11. Kosygin supported the ousting of Khrushchev and, indeed, it was he who granted permission to erect a monument to Khrushchev after his death. William Taubman, *Khrushchev: The Man and His Era* (New York: W. W. Norton, 2004), 647.

12. For example, Khrushchev's son-in-law, Aleksei Adzhubei, became chief editor of *Izvestii,* and the son-in-law of Brezhnev, Iurii Churbanov, served as a deputy minister of Interior Affairs.

13. The Russian State Archive of the Economy (henceforth RGAE), f.99, op.1, d.890, l.33.

14. This argument has been defended in a vast body of work: Michael E. Latham, *Modernization as Ideology: American Social Science and "Nation Building" in the Kennedy Era* (Chapel Hill: University of North Carolina Press, 2000); David Engerman et al., eds., *Staging Growth: Modernization, Development and the Global Cold War* (Amherst: University of Massachusetts Press, 2003); Nils Gilman, *Mandarins of the Future: Modernization Theory in Cold War America* (Baltimore, MD: Johns Hopkins University Press, 2004); Michael E. Latham, *The Right Kind of Revolution: Modernization, Development, and U.S. Foreign Policy from the Cold War to the Present* (Ithaca, NY: Cornell University Press, 2010).

15. See also Latham, *The Right Kind of Revolution*, 7; and Nils Gilman, "Modernization Theory, the Highest Stage of American Intellectual History," in *Staging Growth: Modernization, Development and the Global Cold War*, ed. David Engerman et al. (Amherst: University of Massachusetts Press, 2003), 50.

16. Gilman, "Modernization Theory, the Highest Stage," 54–55.

17. For Bernal's role in the development of postwar policy sciences in Britain, see William Thomas, *Rational Action: The Sciences of Policy in Britain and America, 1940–1960* (Cambridge, MA: MIT Press, 2015) and Andrew Jamison, "Technology's Theorists: Conceptions of Innovation in Relation to Science and Technology Policy," *Technology and Culture* 30, no. 3 (1989): 505–533. For a biography of Bernal, see Andrew Brown, *J. D. Bernal: The Sage of Science* (Oxford: Oxford University Press, 2007).

18. J. D. Bernal, *The Social Function of Science* (London: Routledge, 1939), 379, 383.

19. Ibid., 409.

20. For the US version of technological modernization as both solution and problem, see Latham, *The Right Kind of Revolution*.

21. Mikuláš Teich, "The Scientific-Technical Revolution: An Historical Event in the Twentieth Century?" in *Revolution in History,* ed. Roy Porter and Mikuláš Teich (Cambridge: Cambridge University Press, 1986), 317–319.

22. J. P. Snow, *The Two Cultures and the Scientific Revolution* (New York: Cambridge University Press, 1959).

23. Leonard Silk, *The Research Revolution* (New York: McGraw-Hill, 1960).

24. Donald N. Michael, *Cybernation: The Silent Contest* (Santa Barbara, CA: Center for the Study of Democratic Institutions, 1962); Marshall McLuhan, "Cybernation and Culture," in *The Social Impact of Cybernetics*, ed. Charles R. Dechert (Notre Dame, IN: University of Notre Dame Press, 1966), 95–108. See also Daniel Bell, *The End of Ideology: The Exhaustion of Political Ideas in the 1950s,* 2nd ed. (Cambridge, MA: Harvard University Press, 2000); Daniel Bell, *The Coming of Post-Industrial Society: A Venture in Social Forecasting* (New York: Basic Books, 1976); Malcolm Waters, *Daniel Bell* (New York: Routledge, 1996), 106.

25. Silk, *The Research Revolution*, 106.

26. Gilman, "Modernization Theory, the Highest Stage," 54–55.

27. Discussed in Thomas, *Rational Action*.

28. According to Dmitrii Efremenko, the term "scientific-technical revolution" emerged in Soviet discourse in 1954. Dmitrii Efremenko, *Ekologo-politicheskie diskursy: vozniknovenie i evoliutsiia* (Moscow: INION, 2006).

29. Anatolii Zvorykin, *Sozdanie material'no-tekhnicheskoi bazy kommunizma v SSSR* (Moscow: Sotsekgiz, 1959). Importantly, Zvorykin includes electronic and automatic technologies in the material-technical basis of communism, outlining the East-West development in the following way: material-technical basis first originates in capitalism, and is then taken over to make the material-technical basis for socialism and, eventually, communism. Zvorykin discusses the importance of automatic machinery, which developed from rigid control mechanisms to reflexive, digital servomechanisms, based on informational control, where, ultimately, complex systems of machines emerge. Note that from the 1950s through the early 1960s, Zvorykin focuses exclusively on technoscientific progress and only later expands his interests to include social change. Anatolii Zvorykin, "Material'no-tekhnicheskaia baza kommunizma," *Voprosy filosofii* 4 (1960): 26–40. Others, however, mention the social consequences of STR as early as 1960: see V. S. Naidenov, "Sotsial'no-ekonomicheskie posledstvie tekhnicheskogo progressa pri sotsializme," *Voprosy filosofii* 8 (1960): 14–24.

30. Bernal was translated into Russian: His *Science in History* (1954) was published in Moscow in 1956. For more on the importance of Bernal in the Soviet thinking on STR, see V. G. Marakhov and Iu. S. Meleshchenko, "Sovremennaia nauchno-tekhnicheskaia revoliutsiia i ee sotsialnye posledstviia v usloviiakh sotsializma," *Voprosy filosofii* 3 (1966): 130.

31. Anatolii A. Zvorykin, "Nauka i proizvodstvo," *Kommunist* 4 (1962): 37.

32. V. S. Semenov, "Na V vsemirnom sotsiologicheskom kongrese," *Voprosy filosofii* 11 (1962): 19–35.

33. L. V. Smirnov, "Matematicheskoe modelirovanie razvitiia," *Voprosy filosofii* 1 (1965): 67–73.

34. M. B. Mitin and V. S. Semenov, "Dvizhenie chelovechestva k komunizmu i burzhuaznaia kontseptsiia 'edinogo industrial'nogo obshchestva,'" *Voprosy filosofii* 5 (1965): 35–45.

35. Aleksandr Kuzin, Ivan Negodaev, and V. I. Belolipetskii, eds. *Sovremennaia nauchno-tekhnicheskaia revoliutsiia: Istoricheskoe issledovanie* (Moscow: Nauka, 1967).

36. For early versions of Soviet techno-optimism coupled with STR, see Genadii M. Dobrov and Anton Iu. Golian-Nikol'skii, *Vek velikih nadezhd: sud'by nauchno-tehnicheskogo progressa XX stoletiia* (Kiyv: Naukova dumka, 1964).

37. The key East European authorities of STR were, in GDR, Kurt Tessman; in Czechoslovakia, Radovan Richta, who published *Člověk a technika v revoluci našich dnů* (Prague: Čs. společ, 1963); and in Romania, Valter Roman, who authored *Revoluția industrială în dezvoltarea societății* (Bucharest: Editura Ştiinţifică, 1965).

38. For more on Richta, see Vítězslav Sommer, "Forecasting the Post-Socialist Future: Prognostika in Late Socialist Czechoslovakia, 1970–1989," in *The Struggle for the Long Term in Transnational Science and Politics: Forging the Future,* ed. Jenny Andersson and Eglė Rindzevičiūtė, 144–168 (New York: Routledge, 2015).

39. These were the volumes *Člověk-věda-technika* [*Man, Science and Technology*] (1974) and *Vědecko-technická revoluce a socialismus* [*Scientific-Technical Revolution and Socialism*] (1971). Richta's *Civilizace na rozcestí* [*Civilization at the Crossroads*] (1966) was not translated into Russian until 1977 and was published in Prague under the title *The Freedom of Which We Talk* (Svoboda, o kotoroi idet rech'!).

40. Anatolii P. Kudriashov, *Sovremennaia nauchno-tekhnicheskaia revoliutsiia i ee osobennosti* (Moscow: Mysl, 1965).

41. Dzhermen Gvishiani, "Problemy upravleniia sotsialisticheskoi promyshlennost'iu," *Voprosy filosofii* 11 (1966): 4.

42. Arab-Ogly, *V labirinte prorochestv*, 65.

43. As early as in 1986 Mikuláš Teich had suggested that STR was a state socialist development theory. Teich, "The Scientific-Technical Revolution," 323.

44. Barbara Czarniawska, *Narrating the Organization: Dramas of Institutional Identity* (Chicago: University of Chicago Press, 1997).

45. For instance, see the argument of Michael Burawoy, "The End of Sovietology and the Renaissance of Modernization Theory," *Contemporary Sociology* 21, no. 6 (1992): 774–785.

46. For a concise overview of the background to Kosygin's reforms, which aimed to change the incentives of firms, shaped in response to faulty centralized planning, see Mark Harrison, "Economic Growth and Slowdown," in *Brezhnev Reconsidered*, ed. Edwin Bacon and Mark Sandle (Basingstoke, UK: Palgrave Macmillan, 2002), 55–58.

47. The key source is the biography of Aleksei Kosygin produced by his grandson. Aleksei Gvishiani, *Fenomen Kosygina: zapiski vnuka* (Moscow, Fond kul'tury Ekaterina, 2004), 20–32.

48. Gvishiani, *Fenomen Kosygina*, 20–32.

49. Ibid., 41–59.

50. In his memoir, Dzhermen Gvishiani briefly describes the Leningrad purge, writing that they only had an intuition that "something terrible" was going on because Kosygin was especially quiet at home and said final good-byes before going to work. It is difficult to even begin to imagine what was really happening. Historians such as Khlevniuk and Gorlizki oppose the groups of Kosygin and Beria, for whom Mikhail Gvishiani's group worked. Oleg Khlevniuk and Yoram Gorlizki, *Cold Peace: Stalin and the Soviet Ruling Circle, 1945–1953* (Oxford: Oxford University Press, 2004), 73–75; Dzhermen Gvishiani, *Mosty v budushchee* (Moscow: Editorial URSS, 2004), 24.

51. Gvishiani, *Fenomen Kosygina*, 98.

52. Kosygin reportedly personally checked on the progress of the development of Siberian oil and gas field projects. Dmitry Travin and Otar Marganiya, "Resource Curse: Rethinking the Soviet Experience," in *Resource Curse and Post-Soviet Eurasia: Oil, Gas and Modernization*, ed. Vladimir Gel'man and Otar Marganiya (New York: Lexington Books, 2010), 31–32.

53. Nataliya Kibita, *Soviet Economic Management under Khrushchev: The Sovnarkhoz Reform* (New York: Routledge, 2013), 92–93.

54. Gvishiani, *Fenomen Kosygina*, 90.

55. Ibid., 105.

56. Vladislav M. Zubok, *A Failed Empire: The Soviet Union in the Cold War from Stalin to Gorbachev* (Chapel Hill: University of North Carolina Press, 2007), 194–195, 200–202. Zubok describes Kosygin as a "red director" who not only was not keen on international relations, but was also not receptive to nuclear thinking, as expressed in his outrage over McNamara's suggestion at the Glassboro meeting.

57. Zubok, *A Failed Empire,* 194.

58. Jonathan Haslam, *Russia's Cold War: From the October Revolution to the Fall of the Wall* (New Haven, CT: Yale University Press, 2012), 214.

59. Odd Arne Westad, *The Global Cold War: Third World Interventions and the Making of Our Times* (Cambridge: Cambridge University Press, 2007), 315–316.

60. David Rockefeller, *Memoirs* (London: Random House, 2004).

61. Gvishiani surfaces in writings about the CIA and technological espionage, as a source of the information about the failing development of Soviet ICBMs in 1961. See Haslam, *Russia's Cold War*, 196.

62. Exceptions to this include the work of Matthew Evangelista and Walter Clemens, who both point to the importance of Gvishiani. However, although the significance of Aleksei Kosygin is recognized by some leading historians, such as Moshe Lewin, Kosygin's role in the introduction of scientific expertise into Soviet governance remains to be explored. Moshe Lewin, *The Soviet Century* (London: Verso, 2005).

63. Gvishiani, *Mosty*, 70–71. Following this meeting, Gvishiani established a lasting contact with Knox. Another prominent businessman whom Gvishiani lists as a good friend is Armand Hammer of Occidental Petroleum.

64. Olga Kryshtanovskaya and Stephen White, "From Soviet Nomenklatura to Russian Elite," *Europe-Asia Studies*, 48, no. 5 (1996): 711–733.

65. Robert Conquest, *The Great Terror: A Reassessment* (Oxford: Oxford University Press, 1990), 438.

66. Vladislav Zubok and Constantine Pleshakov, *Inside the Kremlin's Cold War: From Stalin to Khrushchev* (Cambridge, MA: Harvard University Press, 1996).

67. For more on Mikhail Gvishiani, see Michael Parrish, *The Lesser Terror: Soviet State Security, 1939–1953* (Westport, CT: Praeger, 1996).

68. Riska-Campbell, *Bridging East and West,* 60. In any case, the Leningrad affair took place after the marriage between Dzhermen Gvishiani and Liudmila Kosygina.

69. Gregory, *The Political Economy of Stalinism*, 17.

70. Interview 1, conducted September 30, 2009. Here and elsewhere, my interviews are completely anonymized.

71. Riska-Campbell, *Bridging East and West,* 53.

72. Willem Oltmans, "A Life of Science: Six Conversations with Dr. Philip Handler" (draft manuscript, most probably from 1981, p. 93), IIASA Archives, Laxenburg, Austria.

73. Gvishiani accompanied Wiesner on his trip to explore the presumed Soviet superiority in cybernetic technologies. Wiesner wrote that he could not identify any traces of such superiority, though Gvishiani wrote that he tried to show Wiesner "the most interesting" things. Spurgeon M. Keeny Jr., "The Search for Soviet Cybernetics," in *Jerry Wiesner: Scientist, Statesman, Humanist: Memories and Memoirs*, ed. Judy Rosenblith (Cambridge, MA: MIT Press, 2003), 86–87; Gvishiani, *Mosty*, 86.

74. Yale Richmond, *Practising Public Diplomacy: A Cold War Odyssey* (Oxford: Berghahn Books, 2008), 139.

75. Howard Raiffa, *The Art and Science of Negotiation: How to Resolve Conflicts and Get the Best of Bargaining* (Cambridge, MA: Belknap Press, 1985), 4–5.

76. Riska-Campbell, *Bridging East and West,* 55; Solly Zuckerman, *Men, Monkeys and Missiles* (New York: W. W. Norton, 1989).

77. Gvishiani, *Mosty*, 18.

78. Ibid., 20–21.

79. See the discussion of Nazi engineers in Dolores L. Augustine, *Red Prometheus: Engineering and Dictatorship in East Germany, 1945–1990* (Cambridge, MA: MIT Press, 2007), 28–29.

80. Nikolai Zen'kovich, *Samye sekretnye rodstvenniki: entsiklopedia biografii* (Moscow: Olma Medis Group, 2005).

81. Iurii Popkov, Vadim Sadovskii, Aleksandr Seitov, "Mosty v budushchee: 'ezda v neznaemoe,'" in Gvishiani, *Mosty*, 6, 21.

82. Gvishiani, *Mosty*, 21.

83. Zubok and Pleshakov, *Inside the Kremlin's Cold War*, 176.

84. At the end of her career Liudmila Gvishiani directed the Library of Foreign Literature in Moscow. Gvishiani, *Fenomen Kosygina*, 107.

85. Gvishiani, *Fenomen Kosygina*, 93; Iankovich and Zen'kovich, *Samye sekretnye*, 195.

86. I thank Marija Drėmaitė for her comment on the Soviet residential architecture.

87. For more on this area, see Graham, *Moscow Stories*, 243.

88. Gvishiani, *Fenomen Kosygina*; Gvishiani, *Mosty*; Ekaterina Zhiritskaia, "O kodekse zhizni na Nikolinoi Gore," *Nezavisimaia gazeta*, February 15, 2008.

89. Moshe Lewin, "Rebuilding the Soviet nomenklatura 1945–1948," *Cahiers du monde Russe* 44 nos. 2–3 (2003): 219–252.

90. Gvishiani, *Fenomen Kosygina*, 94–95.

91. Gvishiani, *Mosty*, 26–29, 31.

92. Fortescue, *Science Policy*, 22.

93. Even top scientists from the VNIISI, an institute under the personal patronage of Gvishiani, complained of being unable to have an impact on the Central Committee. Interview 28, April 15, 2013; Interview 29, April 15, 2013.

94. Another important channel for bringing US management into the Soviet Union was Valerii Tereshchenko, who returned to Ukraine and gave a talk on US management theories; his book was published in 1965. Popkov, Sadovskii, Seitov, "Mosty v budushchee," 11.

95. Gvishiani, *Mosty*, 51.

96. Ibid., 103.

97. This was the opinion of Yegor Gaidar, who worked at VNIISI and emphasized that, due to Gvishiani's formal role and informal connections, VNIISI could enjoy some autonomy from the ideological restrictions. Yegor Gaidar, *Days of Defeat and Victory* (Seattle: University of Washington Press, 1999), 20.

98. This was suggested both by my informants and by some historians. See, for example, Robert Wellington Campbell, *A Bibliographical Dictionary of Russian and Soviet Economists* (New York: Routledge, 2012), 131–132.

99. Popkov, Sadovskii, Seitov, "Mosty v budushchee," 11–13.

100. Gvishiani, *Mosty*, 109.

101. Zubok, *A Failed Empire*, 102–103.

102. Gvishiani, *Mosty*, 34. In 1955 the Soviet government allowed Soviet citizens to travel abroad; 700,000 of them did so in 1957. Zubok, *A Failed Empire*, 172.

103. Riska-Campbell, *Bridging East and West,* 54.

104. Gvishiani, *Mosty*, 43.

105. Gvishiani, *Fenomen Kosygina*, 94–95. For more on the signing of the Soviet-FIAT deal see Riska-Campbell, *Bridging East and West,* 86–89.

106. Gvishiani, *Mosty*, 61.

107. Clemens, *Can Russia Change?*, 162.

108. Interview 13, October 18, 2010.

109. Viacheslav V. Sychev, "Vospominaniia o V. A. Kirilline," in *Akademik Vladimir Alekseevich Kirillin: Biografiia, vospominaniia, dokumenty*, ed. by Kirillin, A. V. et al. (Moscow, MEI, 2008).

110. Kirillin, Vladimir, et al., eds. *Akademik Vladimir Alekseevich Kirillin: Biografiia, vospominaniia, dokumenty* (Moscow, MEI, 2008), 32–36.

111. For more on Kosygin's reforms and management science, see Beissinger, *Scientific Management,* 172–178.

112. For more on the predecessors of the GKNT, see Eugène Zaleski, *Planning Reforms in the Soviet Union, 1962–1966* (Chapel Hill: University of North Carolina Press, 2012). One of the first such organizations was the Commission for the Studies of Natural Productive Forces, established at the Academy of Sciences by Vladimir Vernadskii in 1915. I thank Oleg Genisaretskii for this reference.

113. For an overview, see Fortescue, *Science Policy*, 22–54.

114. This amounts on average to 250 rubles per employee, which was considered to be a good monthly salary in the Soviet Union. If a cleaner received 60 rubles, Gvishiani's salary amounted to 585 rubles, not so much more than the salary of the head of department (450 rubles). "Shtatnoe raspisanie," GKNT, 1976, the Russian State Archives of the Economy (henceforth RGAE), f.9480, op.12, d.328, l.1–19.

115. When Kosygin died in 1980, Kirillin immediately resigned from his post at the GKNT.

116. RGAE, f.9480, op.9, l.6–7.

117. The project OGAS was criticized from early on by both insiders and Western commentators. For an example, see Ben Peters, *How Not to Network a Nation* (Cambridge, MA: MIT Press, 2016).

118. Issues discussed at the collegium of the GKNT, October 9, 1971, prot. 56, RGAE, f.9480, op.9, d.1291, l.30.

119. RGAE, f.9480, op.9, d.1291, l.10.

120. RGAE, f.9480, op.9, l.6–7.

121. "Ob itogah vypolneniia plana po osnovnym nauchno-issledovatelskim problemam i vnedreniiu dostizhenii nauki i tehniki v narodnoe khoziaistvo za 1971 god," RGAE, f.9480, op.9, d.1434, 1–8.

122. For a discussion of what constituted high-technology in East-West relations, see Gary K. Bertsch, ed., *Controlling East-West Trade and Technology Transfer: Power, Politics and Policies* (Durham, NC: Duke University Press, 1988).

123. Donald F. Hornig, Lyndon B. Johnson's science advisor, to K. N. Rudnev, April 15, 1965, RGAE, f.9480, op.9, d.439, l.16; Vladimir Kirillin to Donald F. Hornig, RGAE, f.9480, op.9, d.439, l.18–19.

124. Meeting with the US science attaché Glenn Schweitzer at the GKNT, May 17, 1966, RGAE, f.9480, op.9, d.439, l.38.

125. A. Mironov, "Spravka," March 17, 1966, RGAE, f.9480, op.9, d.439, l.25–6.

126. For instance, Marchuk wrote to Gvishiani that Hewlett Packard was not only interested in selling smaller computer systems to the Soviet Union, but also in organizing campaigns to soften the embargo. Gurii Marchuk to Dzhermen Gvishiani, confidential, May 16, 1971, RGAE, f.9480, op.9, d.1964, l.1–3; "Spravka," April 12, 1973, RGAE, f.9480, op.9, d.1964, l.51.

127. Foy D. Kohler to Rudnev, April 29, 1965, RGAE, f.9480, op.9, d.439, l.20; "Spravka," November 13, 1965, RGAE, f.9480, op.9, d.439, l.24.

128. "Protocol," November 4, 1972, Russian State Archives of the Russian Academy of Sciences (henceforth ARAN), f.579, op.13, d.200, l.36.

129. RGAE, f.9480, op.9, d.439, l.55; RGAE, f. 9480, op.9, d.932, l.116.

130. RGAE, f-9480, op.9, d.1238, l.2–3.

131. Travin and Marganiya, "Resource Curse," 32–33.

132. Beginning in 1968, decision sciences and control systems were included among the key priorities for long-term research at the Academy of Sciences. ARAN, f.2, op.6m, d.435, l.180.

133. Stephen Fortescue, ed., *Russian Politics from Lenin to Putin* (Basingstoke, UK: Palgrave, 2010).

2. BRIDGING EAST AND WEST

1. The envisioned center had many working titles; thus I refer to it as the East-West Institute before it was formally established in October 1972, and as IIASA, after that date. The name IIASA began to figure in the documents in 1969, such as in Howard Raiffa's memoir of the meeting in Moscow on July 10–11, 1969.

2. Karl E. Weick, *The Social Psychology of Organizing* (New York: McGraw-Hill, 1979), 89–118.

3. Schwartz makes this point strongly and correctly, yet because of his methodological angle he underestimates the impact that IIASA would have beyond diplomacy. Thomas A. Schwartz, "Moving Beyond the Cold War: The Johnson Administration, Bridge-Building and Détente," in *Beyond the Cold War: Lyndon Johnson and the New Global Challenges of the 1960s*, ed. Francis Gavin and Mark Atwood Lawrence (Oxford: Oxford University Press, 2014), 76–96.

4. See a detailed discussion of this announcement in Riska-Campbell, 29–31.

5. See Schwartz's chapter for an excellent reconstruction of the US foreign policy context, within which the idea of the East-West institute was formulated. Schwartz, 80–81.

6. Raiffa refers to an "unpublished unfinished manuscript to Mark Thompson," which suggests that the collaboration effort was seen as an attempt by the undersecretary, George Ball, and the Council of Presidential Advisors to ease the Cold War. McGeorge Bundy invited Henry Rowen, the president of RAND Corporation, and commissioned a draft proposal from two RAND administrators, Roger Levien and Sid Winters. Howard Raiffa, "Analytical Roots of a Decision Scientist: A Memoir" (unpublished manuscript, IIASA Archives, Laxenburg, Austria, June 28, 2005), 85.

7. Andersson, "The Great Future Debate."

8. Some actors, such as Solly Zuckerman, Louis Armand, and Pierre Piganiol, involved in the MIT for Europe project, would resurface in the organization of the East-West Institute. John Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe* (Cambridge, MA: MIT Press, 2006), 210–211.

9. John Krige and Helke Rausch, eds., *American Foundations and the Coproduction of World Order in the Twentieth Century* (Götingen: Vanderhoeck & Ruprecht, 2012).

10. Gemelli, "Building Bridges," 174. Note that it was Walt Rostow who convinced Johnson to establish the UN Economic Commission for Europe.

11. Dzhermen Gvishiani, *Mosty*, 133; Interview 1, September 30, 2009.

12. I am referring to the GKNT files kept at RGAE.

13. RGAE, f.579, op.13, d.199, l.170.

14. Raiffa wrote about meeting secretly with Gvishiani without staff during 1967. Bundy also told Raiffa that the first meeting was scheduled in late June 1968. Raiffa, "Analytical Roots," 85–86.

15. In 1979 OMENTO gained the status of an agency (*upravlenie*), hence its new acronym, UMENTO. RGAE, f.9480, op.12, d.58, l.74.

16. For instance, in his report on the negotiations on the East-West Institute, Raiffa listed the following Soviet representatives, whom he met during one of his last trips to Europe: Aleksandr Letov from the Soviet Academy of Sciences, an assistant for foreign affairs Andrei Bykov, Ananichev's deputy Genrik Shvedov, Viktor Krylov of the GKNT, then Boris Mil'ner of the Academy's Institute for the US and Canada Studies. Documentation of Howard Raiffa's trip appears on page 1 of "Persons met in Europe in 1972" (IIASA Archives, Laxenburg, Austria). Other meetings, such as the one in Paris, 1971, included Ananichev of the GKNT. A list of the delegates to the Paris, October 11–12, 1972 meeting appears in the IIASA Archives, Laxenburg, Austria.

17. Ronald E. Doel and Kristine C. Harper, "Prometheus Unleashed: Science as a Diplomatic Weapon in the Lyndon B. Johnson Administration," *Osiris* 21, no. 2 (2006): 66–85.

18. A report about Soviet participation at the Economic Commission of the UN, "Otchet," Geneva, October 2–7, 1967, RGAE, f.99, op.1, d.890, l.32–63.

19. Jenny Andersson, "RAND Goes to France: Genèse de la prospective française" (paper presented at *Writing the History of the 'Neoliberal Turn,'* Sciences Po in Paris, October 17, 2014).

20. Wassily Leontief, "Proposal for the establishment by the United Nations of an international scientific agency for technical economics," August 11, 1964, ARAN, f.1959, op.1, d.92, l.13–14.

21. Ibid.

22. Riska-Campbell, *Bridging East and West,* 73–4. Gvishiani forwarded Leontief's proposal to Fedorenko at the Central Institute for Mathematical Economics (TsEMI). Fedorenko expressed an interest, but no further steps were taken. ARAN, f.1959, op.1, d.92, l.11–12.

23. For more on the Club of Rome, see Elodie Vieille-Blanchard, "Les limites à la croissance dans un monde global: modélisations, prospectives, réfutations" (PhD diss., École des Hautes Études en Sciences Sociales, Paris, 2011).

24. Aurelio Peccei, *The Human Quality* (New York: Pergamon, 1977), 51; cf. Elichirigoity, *Planet Management,* 84.

25. Raiffa, "Analytical Roots," 98.

26. Herbert A. Simon, *Models of My Life* (New York: Basic Books, 1991), 301.

27. Gvishiani, *Mosty*, 161–164. Raiffa noted in 1973 that Gvishiani joined Zuckerman to criticize *The Limits to Growth* when it was published. Both Gvishiani's and American views softened, however, and Raiffa had a free hand to develop global modeling at the IIASA. See "Rapporteurs notes—advisory meeting re U.S. participation in IIASA," March 9, 1973, 12, IIASA Archives, Laxenburg, Austria.

28. "Memo of Conversation on the International Institute of Systems Analysis" December 17, 1970, IIASA Archives, Laxenburg, Austria. Peccei was, however, kept in the loop until the signing of the IIASA charter; for example, Raiffa visited Peccei on his European trip in June 1972.

29. Gvishiani, *Mosty*, 89–90.

30. Thomas Medvetz, *Think Tanks in America* (Chicago: University of Chicago Press, 2012); Christina Garsten and Adrienne Sörbom, *Think Tanks as Policy Brokers in Partially Organized Fields: The Case of World Economic Forum* (Stockholm: Scores rapportserier, 2014).

31. Akira Irye, *Global Community: The Role of International Organizations in the Making of the Contemporary World* (Berkeley: University of California Press, 2004).

32. Roger Levien, "RAND, IIASA, and the Conduct of Systems Analysis," in *Systems, Experts and Computers*: *The Systems Approach in Management and Engineering, World*

War II and After, ed. Agatha Hughes and Thomas Hughes (Cambridge, MA: MIT Press, 2000), 448; Raiffa, "Analytical Roots," 85–86.

33. For instance, a highly positioned US negotiator told me that the euphemism "advanced industrial society" was used to please and comfort the Soviet Union. (Interview 1.) I suggest that there may have also been another use: to prevent Third World countries from entering the East-West Institute, in part because their financial contribution was doubted, in part because they were amenable to Soviet manipulation. The hint to this is the Russian insistence that the phrase "modern societies" be removed from IIASA's preamble, which the Americans refused to do. The GDR representative did not like this term either. See Raiffa's reports, "Meeting in Moscow with GKNT representatives (June 6, 1972)," 5; "Meeting in East Berlin" (June 7, 1972), 11–12 (IIASA Archives, Laxenburg, Austria). India, for instance, wished to join IIASA until they "saw the price tag" in 1973. "Rapporteurs notes of an advisory meeting," March 9, 1973, 3, IIASA Archives, Laxenburg, Austria.

34. Ronald E. Powaski, *The Cold War: The United States and the Soviet Union, 1917–1991* (New York: Oxford University Press, 1998), 165.

35. This suggests that Gvishiani either forgot about or chose not to mention his earlier talk with Leontief in his memoir.

36. Gvishiani, *Mosty*, 124–125.

37. McGeorge Bundy to Henry Kissinger, memo, April 4, 1969, 1–2, IIASA Archives, Laxenburg, Austria.

38. "Moscow travel plans for Bundy group," n.d., probably July 1969, IIASA Archives, Laxenburg, Austria. The document does not list Carl Kaysen, who was part of the group. This group also included Joseph Bower and Howard Swearer.

39. Not all experts involved were indifferent to Czechoslovakia. For instance, Schelling was reported to have grown quite skeptical about further collaboration with "the Russians." Joseph Bower to McGeorge Bundy, May 14, 1969, IIASA Archives, Laxenburg, Austria.

40. McGeorge Bundy, memorandum of conversation with Dzhermen Gvishiani, April 3, 1969, Ford Foundation, IIASA Archives, Laxenburg, Austria.

41. "Planning for the Institute of the Systems Methodology," aide-memoire, Vienna meeting, December 8, 1969, IIASA Archives, Laxenburg, Austria. The name of the center or institute for "the study of common problems of industrialized societies" would resurface in the American documents in 1970, but by the end of the year the name IIASA made a return. "Proposed center for the study of common problems of industrialized societies," draft prepared for the NAS, November 1970, IIASA Archives, Laxenburg, Austria; "Notes on the December 3 London Meeting to Discuss the Proposed Center for the Study of the Problems of Advanced Societies," December 3, 1970, IIASA Archives, Laxenburg, Austria, 1.

42. Willem Oltmans, *A Life of Science* (unpublished manuscript, IIASA Archives, Laxenburg, Austria, n.d.), 100.

43. Philip Handler to Edward David, president's science advisor, May 18, 1972, IIASA Archives, Laxenburg, Austria.

44. ARAN, f.579, op.13, d.200, l.135.

45. Letter from unknown to Raiffa, "For heaven's sake let us get the Institute set up in such a way that it can be relied upon to achieve its purpose, as opposed to being an indiscernible ornament in a major package deal with the Russians," May 18, 1972, Cabinet Office, London, IIASA Archives, Laxenburg, Austria.

46. Gvishiani, *Mosty*, 47.

47. Ibid., 201–202.

48. "Excerpt from Dr Handler's trip report of May 1970," July 1970, 2–3, IIASA Archives, Laxenburg, Austria.

49. "Zapis' besedy," November 29, 1972, RGAE, f.9480, op.9, d.1716 (1), l.109.

50. In turn, mathematical methods and computers in planning and management were classified under "Economic Sciences." "Proekt," 1972, ARAN, f.2, op.1, d.2, l.14, 19–20.

51. US-Soviet agreement on scientific exchange, signed by Mstislav Keldysh and Philip Handler, November 4, 1972, New York, ARAN, f.579, op.13, d.200, l.137.

52. See the introduction in Gavin and Lawrence, *Beyond the Cold War*, 17–43 and Schwartz, "Moving Beyond the Cold War," 78, 80–81.

53. See, for example, the argument in Heyck, *Age of System*, 81–125; Jenny Andersson and Eglė Rindzevičiūtė, "Introduction," in *The Struggle for the Long-Term in Transnational Science and Politics: Forging the Future*, ed. Jenny Andersson and Eglė Rindzevičiūtė, 1–15 (New York: Routledge, 2015).

54. John Lewis Gaddis, *Strategies of Containment: A Critical Appraisal of American National Security Policy during the Cold War* (Oxford: Oxford University Press, 2005), 275–279.

55. "Background information provided by Professor Bower," attachment C1, for the Woods Hole, Massachusetts meeting, (August 13–14, 1970), 3–8, IIASA Archives, Laxenburg, Austria.

56. For instance, Levien and Winter drew inspiration from some of the organizational principles of the International Geophysical Year and the International Year of the Quiet Sun. Roger Levien and S. G. Winter Jr., "Draft Proposal for an International Research Center and International Studies Program for Systematic Analysis of the Common Problems of Advanced Societies," The RAND Corporation, April 1967, 17, IIASA Archives, Laxenburg, Austria.

57. Audra J. Wolfe, *Competing with the Soviets: Science, Technology, and the State in Cold War America* (Baltimore, MD: Johns Hopkins University Press, 2013).

58. Gvishiani, *Mosty*, 146–147, 149.

59. "Rapporteurs Notes—Advisory Meeting. Re: U.S. Participation in IIASA," March 9, 1973, 9, IIASA Archives, Laxenburg, Austria.

60. Oltmans, *A Life of Science*, 75–80. Under his presidency, Philip Handler reorganized NAS and NCR into many subcommittees and made sure that it was NAS members who made decisions at NCR.

61. Simon, *Models of My Life*, 291.

62. "Notes from the NAS Advisory Committee Meeting on Center for Study of the Common Problems of Industrialized Societies," October 23, 1970, 5, IIASA Archives, Laxenburg, Austria.

63. Levien and Winter, "Draft Proposal," 1–8, 15–16.

64. Simon, *Models of My Life*, 291–292.

65. "Notes from the NAS Advisory Committee Meeting," 5.

66. "Eight months summary," 1969, IIASA Archives, Laxenburg, Austria.

67. Levien and Winter, "Draft Proposal," 20–21, IIASA Archives, Laxenburg, Austria.

68. "Notes from the NAS Advisory Committee Meeting," 5.

69. Guidelines addressed to or from Joseph Bower, "The Director," November 13, 1970, IIASA Archives, Laxenburg, Austria.

70. Joseph L. Bower to Mr. McGeorge Bundy, April 11, 1969, IIASA Archives, Laxenburg, Austria.

71. Ibid.

72. Jacques Dreze was the director of the Center for Operations Research and Econometrics at Université Catholique in Louvain, Belgium. This center, established in 1965, was an important channel for transferring American game theory to Europe; for instance, Koopmans visited it. See Mirowski, *Machine Dreams*, 490.

73. Bower to Bundy, 2.

74. McGeorge Bundy, to Dr. Henry Kissinger, memorandum, April 4, 1969, 2, IIASA Archives, Laxenburg, Austria. In his memoir Simon wrote that after the case of Sakharov he did not meet to any Russian scientists, against which he was discouraged as a member of NAS, and he never visited Moscow before 1987 (Simon, *Models of My Life*, 356). Nevertheless, Arrow still suggested Simon as a candidate for IIASA's director in 1971. Kenneth Arrow to Philip Handler, April 12, 1971, IIASA Archives, Laxenburg, Austria.

75. "Notes from the NAS Advisory Committee Meeting," 5.

76. Bundy to Kissinger, 1.

77. "Meeting and luncheon," May 12, 1969, IIASA Archives, Laxenburg, Austria.

78. Russell L. Ackoff to McGeorge Bundy, May 28. 1969, 1, IIASA Archives, Laxenburg, Austria.

79. Robert Dorfman to Joseph L. Bower, May 13, 1969, 1, IIASA Archives, Laxenburg, Austria.

80. For more on Kremlinologists, see David C. Engerman, *Know Your Enemy: The Rise and Fall of America's Soviet Experts* (Oxford: Oxford University Press, 2009); and for more on conservative neoliberals, see Philip Mirowski and Dieter Plehwe, eds., *The Road from Mont Pèlerin: The Making of the Neoliberal Thought Collective* (Cambridge, MA: Harvard University Press, 2009).

81. Oltmans, *A Life of Science*, 81. In this interview, Handler adds that NAS had built in "carefully enforced institutional procedures to see to it that the standards are always rigorously maintained."

82. Robert Dorfman to Joseph L. Bower, May 13, 1969, 1, IIASA Archives, Laxenburg, Austria. The economist Dorfman envisioned this center as "a long two-storey building in a pleasant park easily accessible to the northern suburbs of London" and "a squarish building with lounge, library, refectory, and rooms for transient visitors" and a conference center nearby.

83. Gvishiani noted that the Soviet government limited international cooperation to "scientific and technical" spheres. Any cooperation that dealt with issues of humanities was "treated very skeptically." Gvishiani, *Mosty*, 150.

84. Raiffa's notes from his trip to Moscow, June 6, 1972, 6, IIASA Archives, Laxenburg, Austria. These notes suggest that both Shvedov and Mil'ner had a mandate to negotiate the research agenda and some organizational matters pertaining to the charter.

85. Howard Raiffa, "Recent trip to the member institutions of IIASA," Cambridge, Massachusetts, June 22, 1972, 4, IIASA Archives, Laxenburg, Austria.

86. "Rapporteurs notes—advisory meeting," March 9, 1973, 11, IIASA Archives, Laxenburg, Austria.

87. "Predlozheniie Akademii nauk SSSR po rasshireniiu nauchnogo sotrudnichestva s SShA," ARAN, f.579, op.13, d.196, l.82, 114.

88. McGeorge Bundy to Wassily Leontief, September 25, 1969, IIASA Archives, Laxenburg, Austria.

89. "Institute for Applied Systems Analysis: Site Considerations (Privileges and Immunities)," memorandum, March 16, 1972, IIASA Archives, Laxenburg, Austria; Howard Raiffa to Friedrich Schneider, June 14, 1972, IIASA Archives, Laxenburg.

90. See papers in relation to Raiffa's trip to Europe and Moscow in June 1972, particularly his notes from Moscow, dated June 5, 1972, IIASA Archives, Laxenburg, Austria.

91. Howard Raiffa, "Recent trip to the member institutions of IIASA," Cambridge, Massachusetts, June 22, 1972, 2, IIASA Archives, Laxenburg, Austria.

92. *Charter of the International Institute of Applied Systems Analysis* (IIASA Archives, Laxenburg, Austria, 1972).

93. "Notes on the December 3 London Meeting to Discuss the Proposed Center for the Study of the Problems of Advanced Societies," December 3, 1970, 3, IIASA Archives, Laxenburg, Austria.

94. Louis Levin, Assistant Director for Institutional Programs at NAS, to Philip Handler, October 6, 1971, IIASA Archives, Laxenburg, Austria.

95. Interview 1, September 30, 2009.

96. Jenny Andersson and Eglė Rindzevičiūtė, "The Political Life of Prediction: The Future as a Space of Scientific World Governance in the Cold War Era." *Les Cahiers européens de Sciences Po*, 4 (2012): 1–25.

97. Eden Medina, *Cybernetic Revolutionaries: Technology and Politics in Allende's Chile* (Cambridge, MA: MIT Press, 2011).

3. SHAPING A TRANSNATIONAL SYSTEMS COMMUNITY (1)

1. McGeorge Bundy and Jermen Gvishiani, "Foreword," in *Organization for Forecasting and Planning: Experience in the Soviet Union and the United States*, ed. W. R. Dill and G. Kh. Popov (New York: Wiley, 1979), vi–ix.

2. James Beniger, *The Control Revolution: Technological and Economic Origins of the Informational Society* (Cambridge, MA: Harvard University Press, 1989); JoAnne Yates, *Control through Communication: The Rise of System in American Management* (Baltimore, MD: Johns Hopkins University Press, 1993).

3. Peter Galison, "The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision," *Critical Inquiry* 21, no. 1 (1994): 228–266.

4. See Ida R. Hoos, *Systems Analysis in Public Policy: A Critique* (Berkeley: University of California Press, 1972).

5. As early as in 1967 Yezhekel Dror argued for a shift from systems analysis to a more diversified policy analysis that would be more sensitive to political struggles and issues of agenda setting. Yezhekel Dror, "Policy Analysts: A New Professional Role in Government Service," *Public Administration Review* 27, no. 3 (1967): 197–203. For a good overview of the changing institutional role of policy analysts, see Beryl A. Radin, *Beyond Machiavelli: Policy Analysis Comes of Age* (Washington, DC: Georgetown University Press, 2000).

6. Scott, *Seeing Like a State*; Josephson et al., *An Environmental History of Russia*.

7. Heyck, *Age of System*, 3–5.

8. A similar revision of the history of cybernetics, a field which split into highly different approaches to control, where some followed Wiener to underscore uncertainty and futility to apply cybernetic control to complex social systems, whereas others believed in such applications, was proposed by Robert Kline in *The Cybernetics Moment*.

9. Here I am in agreement with a similar suggestion to acknowledge a higher heterogeneity of Cold War culture, in Paul Erickson, "Mathematical Models, Rational Choice, and the Search for Cold War Culture," *Isis* 101, no. 2 (2010): 386–392.

10. Hoos, 15–17, 86.

11. Ibid., 15.

12. Aihwa Ong and Stephen Collier, *Global Assemblages: Technology, Politics, and Ethics as Anthropological Problems* (Oxford: Wiley-Blackwell, 2004); Nigel Thrift, Adam Tickell, Steve Woolgar, and William Roop, eds., *Globalization in Practice* (Oxford: Oxford University Press, 2014).

13. Kunda's ethnography of a high-tech company offers many valuable insights into the organizational logic that guided the development of the IIASA. Gideon Kunda, *Engineering Culture: Control and Commitment in a High-Tech Corporation,* rev. ed. (Philadelphia: Temple University Press, 2006).

14. Michael Thompson, "Among the Energy Tribes: The Anthropology of the Current Policy Debate," Working Paper WP-82-059 (Laxenburg, Austria: International Institute for Applied Systems Analysis, 1982).

15. See David Mindell, *Between Human and Machine: Feedback, Control, and Computing Before Cybernetics* (Baltimore: John Hopkins University Press, 2002); Heyck, *Age of System*; Thomas, *Rational Action*.

16. Agatha C. Hughes and Thomas P. Hughes, eds. "Introduction," in *Systems, Experts and Computers: The Systems Approach in Management and Engineering, World War II and After* (Cambridge, MA: MIT Press, 2000), 1–26.

17. According to Majone, in the 1970s systems analysis applied to public issues was reframed as policy analysis. Giandomenico Majone, *Evidence, Argument and Persuasion in the Policy Process* (New Haven, CT: Yale University Press, 1989), 14.

18. James J. Kay, "An Introduction to Systems Thinking," in *The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability*, ed. David Waltner-Toews, James J. Kay, and Nina-Marie E. Lister (New York: Columbia University Press, 2008), 3–14; Igor' V. Blauberg, Vadim N. Sadovskii, and Erik G. Yudin, *Systems Theory: Philosophical and Methodological Problems* (Moscow: Progress, 1977); Kenneth Boulding, "General Systems Theory: A Skeleton of Science," *Management Science* 2, no. 3 (1956): 197–208. Cf., Silvio Funtowicz and Jerome Ravetz, "Science for the Post-Normal Age," *Futures* 25, no. 7 (1993): 739–755.

19. Susiluoto, *Origins and Development of Systems Thinking*; Georgii Gloveli, "The Sociology of Aleksandr Bogdanov," in *Aleksandr Bogdanov Revisited,* ed. Vesa Oittinen (Helsinki: Aleksanteri Institute, 2009), 47–80; for an attempt at contextualizing Bogdanov's thought and at assessing its relevance to the contemporary theory of self-organization, see John Biggart, Peter Dudley, and Francis King, eds., *Alexander Bogdanov and the Origins of Systems Thinking in Russia* (Aldershot, UK: Ashgate, 1998).

20. See Philip Mirowski's argument in *Machine Dreams*, 177–184; Thomas, *Rational Action*, 199–209. These approaches pervaded or rather posed research problems to many disciplines and led to the formulation of the policy sciences. The first academic journal, *Policy Sciences,* was founded in 1970 and featured articles by Harold D. Lasswell and E. S. Quade, who would later write his *Handbook of Systems Analysis* when at IIASA.

21. Mirowski, *Machine Dreams*, 177–189, 314–319.

22. Here I draw on the Swedish systems thinker Lars Ingelstam, a mathematician, appointed as head of a unit for planning theory at the Royal Institute of Technology in Stockholm, who was deeply involved in setting up future studies and promoting systems approach in Sweden. Lars Ingelstam, *System: Att Tänka över samhälle och teknik* (Stockholm: Energimyndigheten, 2002), 12.

23. Collier and Lakoff, "Vital Systems Security," 26.

24. Here I draw heavily on Ingelstam's outline of systems thinking.

25. Lewis Mumford, *Technics and Civilization* (Chicago: University of Chicago Press, 2010), 52.

26. Lewis Mumford, "Authoritarian and Democratic Technics," *Technology and Culture* 5, no. 1 (1964), 2–5.

27. Jürgen Habermas, *The Theory of Communicative Action,* vol. 2, *Lifeworld and System: A Critique of Functionalist Reason,* trans. Thomas McCarthy (Boston: Beacon Press, 1987). See also Ingelstam, *System*.

28. Dror, "Policy Analysts," 199–200.

29. Andrew Pickering, *The Cybernetic Brain: Sketches of Another Future* (Chicago: University of Chicago Press, 2010).

30. Michael Ruse, *The Gaia Hypothesis: Science on a Pagan Planet* (Chicago: University of Chicago Press, 2013).

31. Celine Lafontaine, *L'empire cybernétique*; Gregory Bateson, *Steps to an Ecology of Mind* (Northvale, NJ: Jason Aronson, 1987).

32. Key works on infrastructure systems include Thomas P. Hughes, *Networks of Power: Electrification in Western Society, 1880–1930* (Baltimore: Johns Hopkins University Press, 1983); Susan Leigh Star, "The Ethnography of Infrastructure," *American Behavioral Scientist* 43, no. 3 (1999): 377–391; Paul Edwards, "Infrastructure and Modernity: Force, Time, and Social Organization in the History of Sociotechnical Systems," in *Modernity and Technology*, ed. Thomas Misa, Philip Brey, and Andrew Feenberg (Cambridge, MA: MIT Press, 2004), 185–225; Paul Edwards, S. J. Jackson, G. C. Bowker, and C. P. Knobel, *Understanding Infrastructure: Dynamics, Tensions, and Design* (Ann Arbor: Deep Blue, 2007).

33. A similar argument is pursued by Hunter Heyck; however, Heyck is inclined to treat the systems approach as a coherent field, at least in social sciences, and proposes that the systems approach can be understood as an expression of high modern science. Heyck, *Age of System*.

34. Ingelstam, *System*, 49–50.

35. E. S. Quade, "Introduction," in *Systems Analysis and Policy Planning: Applications in Defence*, ed. E. S. Quade and W. I. Boucher (New York: American Elsevier, 1968), 2; Giandomenico Majone, "Systems Analysis: A Genetic Approach," in *Handbook of Systems Analysis: Overview of Uses, Procedures, Applications and Practice*, ed. Hugh J. Miser and Edward S. Quade, Chapter 2 (Chichester, UK: John Wiley, 1985); Mirowski, *Machine Dreams*; Arne Kaijser and Joar Tiberg, "From Operations Research to Futures Studies: The Establishment, Diffusion, and Transformation of the Systems Approach in Sweden, 1945–1980," in *Systems, Experts and Computers: The Systems Approach in Management and Engineering, World War II and After,* edited by Agatha C. Hughes and Thomas P. Hughes (Cambridge, MA: MIT Press, 2000), 385–412. For a good overview of US and British OR, see John Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe* (Cambridge, MA: MIT Press, 2006), 162–251; and the more recent study by Thomas, *Rational Action*.

36. For Arrow, planning equaled rational choice under uncertainty in the conditions of a Walrasian economy. Mirowski, *Machine Dreams*, 298.

37. Schelling would go on to work at IIASA only after the end of the Cold War, in 1994–1999. Amy Dahan, "Axiomatiser, modéliser, calculer: les mathématiques, instrument universel et polymorphe d'action," in *Les sciences pour la guerre*: *1940–1960*, ed. Amy Dahan and Dominique Pestre (Paris: Éditions de l'École des Haute Études en Sciences Sociales, 2004), 49–82.

38. Mirowski, *Machine Dreams*, 256–257, 290.

39. "Rapporteurs notes," NAS, Washington, D.C., March 9, 1973, IIASA Archives, Laxenburg, Austria. Malone, for instance, was directly involved in negotiations with Gvishiani. RGAE, f. 9480, op.9, d.1716, l.211–212.

40. Mirowski, *Machine Dreams*, 289.

41. Ingelstam, *System*, 72. Ackoff's volume *On Purposeful Systems* (1972), coauthored with Fred Emery, was quickly translated into Russian in 1974. See also his programmatic article: Russell Ackoff, "The Systems Revolution," *Long Range Planning* 7, 6 (1974): 2–20.

42. Kenneth E. Boulding, "General Systems Theory—the Skeleton of Science," *Management Science* 2, no. 3 (1956): 197–208.

43. For more see Gemelli, *The Ford Foundation and Management Education*; Krige, *American Hegemony*.

44. Gemelli, "Building Bridges," 177–179. For more on Blackett, see Thomas, *Rational Action*, chapters 5, 7, and 17; and Erik P. Rau, "Technological Systems, Expertise, and

Policy Making: The British Origins of Operational Research," in *Technologies of Power: Essays in Honor of Thomas Parke Hughes and Agatha Chipley Hughes*, ed. Michael Thad Allen and Gabrielle Hecht (Cambridge, MA: MIT Press, 2001), 215–252.

45. Bernal, together with Zuckerman, contributed a study of blast damage during World War II and was directly involved in the debate on the expanding the role of the British government in funding science and technology after the war. Rau, "Technological Systems, Expertise, and Policy Making," 62; William Thomas, *Rational Action*, 53, 155–159.

46. Franck Cochoy, *Une histoire du marketing: Discipliner l'économie de marché* (Paris: La Découverte, 1999).

47. Gabrielle Hecht, "Planning a Technological Nation: Systems Thinking and the Politics of National Identity in Postwar France," in *Experts, Systems and Computers*, 133–160.

48. Dominique Pestre, "Le nouvel univers des sciences et des techniques: une proposition générale," in *Les sciences pour la guerre*: *1940–1960*, ed. Amy Dahan and Dominique Pestre (Paris: Éditions de l'École des Haute Études en Sciences Sociales, 2004), 22.

49. Riska-Campbell, *Bridging East and West,* 295.

50. Mirowski, *Machine Dreams*, 490.

51. Rindzevičiūtė, "A Struggle for the Soviet Future."

52. For instance, Nikolai Vorob'ev, a prominent Leningrad-based Soviet game theorist, published his first work on game theory and control processes in 1955, and established the first research unit in the Soviet Union dedicated to game theory and OR in 1961. See his biographical profile on the website *Istoriia Matematiki*, http://www.math.ru/history/people/vorobev_nn (Russian), accessed March 18, 2016.

53. Gerovitch, *From Newspeak to Cyberspeak,* 179; Sergei Sobolev, Anatolii Kitov, Aleksei Liapunov, "Osnovnye cherty kibernetiki," *Voprosy filosofii* 4 (1955): 136–148.

54. Gerovitch, *From Newspeak to Cyberspeak*, 267.

55. In 1970 the Russian translation of von Neumann and Morgenstern's *Game Theory and Economic Behavior* was published by Nauka.

56. In November 1964, W. Ross Ashby visited the editorial offices of the influential journal *Issues of Philosophy*, where he spoke with members of the Moscow Methodological Circle and philosophers Erik Iudin, Oleg Genisaretskii, and Igor' Blauberg.

57. Gerovitch, *From Newspeak to Cyberspeak*, 272.

58. Krige, *American Hegemony*, 233.

59. E. B. Ianovskaia, "Pervaia Vsesoiuznaia konferentsiia po teorii igr," *Uspekhi matematicheskikh nauk* 24 (4, no. 148) (1969): 216–220.

60. "Norbert Viner v redaktsii nashego zhurnala," *Voprosy filosofii* 9 (1960): 164–168.

61. I have outlined the history of the Moscow Methodological Circle elsewhere: see Eglė Rindzevičiūtė, "The Future as an Intellectual Technology in the Soviet Union: From Centralised Planning to Reflexive Management," *Cahiers du monde Russe* 56, no. 1 (2015): 111–134.

62. Aksel I. Berg, "O nekotorykh problemakh kibernetiki," *Voprosy filosofii* 4 (1960), 58.

63. Vladislav A. Lektorskii and Vadim N. Sadovskii, "O printsipakh issledovaniia system (V sviazi s 'obshchei teoriei sistem' L. Bertalanfi)," *Voprosy filosofii* 8 (1960): 67–78.

64. Lektorskii and Sadovskii, "O printsipakh issledovaniia system," 74.

65. Georgii Shchedrovitskii, "Problemy metodologii sistemnogo issledovaniia (1964)," in G. P. Shchedrovitskii, *Izbrannye Trudy*, 155–196 *(Moscow:* Izd-vo Shkoly kul'turnoi politiki, 1995).

66. Igor' Blauberg, Vadim Sadovskii, and Erik Iudin, *Sistemnyi podhod: predposylki, problemy, trudnosti* (Moscow: Znanie, 1969).

67. Rindzevičiūtė, *Constructing Soviet Cultural Policy*.

68. Rindzevičiūtė, "The Future as an Intellectual Technology."

69. Per Angelstam et al., "Biodiversity and Sustainable Forestry in European Forests: How East and West Can Learn from Each Other," *Wildlife Society Bulletin* 25, no. 1 (1997): 38–48.

70. Radin, *Beyond Machiavelli*, 16–17.

71. B. G. Iudin, "Iz istorii sistemnykh issledovanii: mezhdu metodologiei i ideologiei," *Vestnik TGPU* 1, no. 75 (2008): 28–33.

72. V. N. Volkova and A. A. Denisov, *Osnovy teorii sistem i sistemnogo analiza* (St Petersburg: SPbGTU, 2001). Optner's volume was translated by the effort of TsEMI.

73. Their key works, published in Russian over that period, include Sadovskii and Iudin, *Research on General Systems Theory* (1969). Iudin and Blauberg published their monograph *The Development and Essence of Systems Approach* in 1973, and Sadovskii published his *The Foundations of General Systems Theory: Logico-methodological Analysis* in 1974.

74. Iudin, "Iz istorii," 29.

75. Ibid., 32.

76. Gvishiani made sure that his protégés would not unnecessarily suffer from ideological attacks, as, for instance, the sociologist Nikolai Lapin.

77. Notes from Gvishiani's meeting with Raiffa in Moscow, "Zapis' besedy" (November 27, 1972), RGAE, f. 9480, op.9, d.1716 (1), l.107–110.

78. Volkova and Denisov, *Osnovy teorii sistem*.

79. In general IIASA signed bilateral cooperation agreements with many Soviet research institutes, predominantly the ones in the system of the Academy of Sciences. For an overview of the Institute of Automation and Control, where the most advanced mathematical calculations for control purposes were developed, see A. B Kurzhanskii, "50 Years of Coexistence in Control: The Contributions of the Russian Community," *European Journal of Control* 13, no. 1 (2007): 49–60.

80. GKNT, "Prikaz," December 15, 1976, RGAE, f.9480, op.12, d.58, l.73.

81. "Poiasnitelnaia zapiska," RGAE, f.9480, op.12, d.343, l.13.

82. Nikolai Lapin, *Teoriia i praktika innovatiki* (Moscow: Logos, 2013), 18–19.

83. "Postanovlenie," ARAN, f.2, op.6m, d.435, l.108–10; RGAE, f.9480, op.12, d.58, l.73.

84. RGAE, f.9480, op.12, d.343, l.4; RGAE, f.9480, op.12, d.1865, l.4.

85. In the late 1970s the prevailing view at VNIISI was that it was pointless to develop a general systems theory; instead a loosely defined systems analysis was proposed. Interview 24, December 11, 2012.

86. RGAE, f.9480, op.12, d.343, l.9.

87. Stuart A. Umpleby and Vadim N. Sadovsky, *A Science of Goal Formulation: American and Soviet Discussions of Cybernetics and Systems Theory* (New York: Hemisphere, 1991).

88. Roger Levien to Dzhermen Gvishiani, October 21, 1977, 6, IIASA Archives, Laxenburg, Austria.

89. Raiffa, memo, September 20, 1973, 3, IIASA Archives, Laxenburg, Austria.

90. IIASA internal seminars, 1973–1974, 6, IIASA Archives, Laxenburg, Austria. The stay of Stafford Beer overlapped with those of Abel' Aganbegian, L. Evenko, and V. Tokhadze of the Soviet Academy of Science. "Project Review: Design and Management of Large Organizations," n.d., but likely 1976, IIASA, 11–12, IIASA Archives, Laxenburg, Austria.

91. Roger Levien, "IIASA after Five Years: Retrospect and Prospect," Laxenburg, November 1977, 2, IIASA Archives, Laxenburg, Austria.

92. Interview 13, October 18, 2010.

93. Levien, "IIASA after Five Years," 8.

94. Roger Levien, "Survey/Handbook Project," November 1974, 1–12, IIASA Archives, Laxenburg, Austria. This survey led to a series of publications, with Gvishiani as the chairman of the publishing board.

95. Annual Task Report, 1978, 1, IIASA Archives, Laxenburg, Austria.

96. Quade, "Introduction," 2.

97. Minutes from the twenty-fourth meeting of the IIASA Council, June 19–20, 1985, 16, IIASA Archives, Laxenburg, Austria.

4. SHAPING A TRANSNATIONAL SYSTEMS COMMUNITY (2)

1. Paul Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America.* (Cambridge, MA: MIT Press, 1996), 317.

2. As described by Nathan Ensmenger, *The Computer Boys Take Over: Computers, Programmers, and the Politics of Technical Expertise* (Cambridge, MA: MIT Press, 2010); Mirowski, *Machine Dreams*; Fred M. Kaplan, *The Wizards of Armageddon,* (Stanford, CA: Stanford University Press, 1991); Sharon Ghamari-Tabrizi, *The Worlds of Herman Kahn: The Intuitive Science of Thermonuclear War* (Cambridge, MA: Harvard University Press, 2005).

3. For instance, a Russian scientist named Mikhail Lopukhin stayed at RAND for almost one year and as a result of this stay published *PATTERN Method for Planning and Forecasting Science* (1971). Volkova and Denisov *Osnovy teorii sistem*.

4. Nils Gilman, "The Cold War as an Intellectual Force Field," *Modern Intellectual History*, First View Article (2015), 17.

5. Howard Raiffa, "Can IIASA survive?" confidential, first draft, November 19, 1981, 24, IIASA Archives, Laxenburg, Austria.

6. Mats Alvesson and Per-Olof Berg, *Corporate Culture and Organizational Symbolism: An Overview* (Berlin: de Gruyter, 1992), 16.

7. Catherine Casey, " 'Come, Join Our Family': Discipline and Integration in Corporate Organizational Culture," *Human Relations* 52, no. 1 (1999): 155–178.

8. Raiffa, "Analytical Roots," 117. Another initiative pursued by Raiffa was to get Israel and Egypt to join IIASA. Interview 13, October 18, 2010.

9. Interview 3, November 2010.

10. Raiffa, "Analytical Roots," 106.

11. Raiffa's address to the IIASA staff, "Farewell," 1975, 11, IIASA Archives, Laxenburg, Austria.

12. My informant recalled that his contract for a three-year fellowship at IIASA was drawn with the GKNT. Interview 37, October 22, 2014.

13. Raiffa, "Can IIASA Survive?" confidential, first draft, November 19, 1981, 14, IIASA Archives, Laxenburg, Austria.

14. Raiffa, "Analytical Roots," 118.

15. Interview 19, October 11, 2010.

16. Raiffa, "Analytical Roots," 112.

17. Ibid., 116.

18. This is clear from the comments by Soviets and Raiffa in the archival documents stored in RGAE and IIASA. See also chapter 2.

19. Interview 6, October 22, 2010.

20. Interview 10, October 20, 2010.

21. Unsigned letter to McGeorge Bundy, April 12, 1977, 1–3, IIASA Archives, Laxenburg, Austria.

22. Martha Wohlwendt, "IIASA Employee Number 1," http://blog.iiasa.ac.at/2014/02/18/alumni-iiasa-employee-number-1/.

23. Interview 18, October 12, 2010. On the other hand, according to Slava Gerovitch only a few circles of Soviet mathematicians fostered internal, informal democratic interaction, whereas the mathematics institutes both administratively and architecturally sought to establish control over any activities of their students and staff.

24. Interview 3, November 2010.

25. Holloway, *Stalin and the Bomb*.

26. Conversation with IIASA library staff, October 2010.

27. Interview 10, October 20, 2010; Interview 37, October 22, 2014.

28. Interview 13, October 18, 2010; Raiffa, "Can IIASA Survive?" 15.

29. Interview 3, November 2010.

30. Interview 37, October 22, 2014.

31. Interview 37, October 22, 2014.

32. Interview 25, March 21, 2013.

33. "Stenograma," December 14, 1972, ARAN, f.579, op.13, d.199, l.212–213.

34. Kirillin, A. V. et al., eds. *Akademik Vladimir Alekseevich Kirillin*, 118.

35. Moiseev, *Kak daleko*.

36. The Tallinn workshop within the framework of the UN Conference on Science and Technology for Development was organized by Gvishiani. Further workshops in the series followed, in Singapore, Kuala Lumpur, and Mexico. Jermen Gvishiani, ed., *Science, Technology, and Global Problems: Trends and Perspectives in Development of Science and Technology and Their Impact on Contemporary Global Problems* (Oxford: Pergamon, 1979).

37. Interview 36, May 12, 2014.

38. Interview 3, November 2010.

39. Radin, *Beyond Machiavelli,* 21.

40. Ibid., 14–16.

41. Engerman et al., *Staging Growth*.

42. Patrick O. Cohrs, "Towards a New Deal for the World? Lyndon Johnson's Aspirations to Renew the Twentieth Century's Pax Americana," in *Beyond the Cold War: Lyndon Johnson and the New Global Challenges of the 1960s,* ed. by Francis J. Gavin and Mark Atwood Lawrence (Oxford: Oxford University Press, 2014), 58.

43. Carl Schmitt, *The Concept of the Political* (Chicago: University of Chicago Press, 1996).

44. Letter from B. E. Freeman, "Proposal to establish a US/USSR working group to model the economic and military interactions of the two countries," February 1975, 1–3, IIASA Archives, Laxenburg, Austria.

45. James H. Bigelow to T. A. Brown, March 11, 1975, IIASA Archives, Laxenburg, Austria.

46. Augustine adds that the German notion of technology was attached to irrational creativity, coupled with ideas of national greatness, and in this way removed from economic rationality. Augustine, *Red Prometheus*, 22–24.

47. For an example of politically motivated socialist engineers, see the study on Palchinskii by Graham, *The Ghost*.

48. Daniel Bell, *The End of Ideology*, 419.

49. Ibid., 419. See also John F. Kennedy, "Commencement Address at Yale University," June 11, 1962, *The American Presidency Project.* http://www.presidency.ucsb.edu/ws/?pid=29661.

50. Hermann et al., *History of CERN,* 789.

51. The IIASA archives contain documents in which Raiffa requested CERN to send him a report on their organizational structure and salary system. Similar information was

received from a representative of UNIDO, which also shared (positive) experience about Austrian support for their Vienna operations. Handwritten notes, Mark Thompson's meeting with John Birkhead (UNIDO), June 29, 1972, Vienna. These notes included a meticulous list of the long shelves and other kinds of furniture seen in the UNIDO offices.

52. Hermann et al., *History of CERN,* 345.

53. Howard Raiffa, director's farewell address, November 24, 1975, Laxenburg, Austria, 6, IIASA Archives, Laxenburg, Austria.

54. Raiffa, "IIASA's Long Range Options," November 1974, IIASA Archives, Laxenburg, Austria.

55. Raiffa, "IIASA's Long Range Options," November 1974, 15.

56. Raiffa, "IIASA's Long Range Options," November 1974, 17. Dantzig and Koopmans were in charge of the methodology project, where they developed the multiattribute utility theory, to be used to make decisions with many different objectives, such as pest control, siting a nuclear reprocessing facility, and setting standards. Tjalling Koopmans, "Methodology Project," November 1974, IIASA Archives, Laxenburg, Austria.

57. Interview 19, October 11, 2010.

58. Interview 21, May 29, 2012.

59. For more on the Soviet Aesopian discourse see Irina Sandomirskaja, "Aesopian Language: The Politics and Poetics of Naming the Unnameable," in *The Vernaculars of Communism: Language, Ideology and Power in the Soviet Union and Eastern Europe,* ed. Petre Petrov and Lara Ryazanova-Clarke (New York: Routledge, 2015), 63–88.

60. "Rapporteur notes," March 9, 1973, NAS, Washington, DC, IIASA Archives, Laxenburg, Austria.

61. Interview 3, November 2009.

62. Interview 13, October 18, 2010.

63. Interview 6, October 22, 2010.

64. Roger Levien to Dzhermen Gvishiani, June 6, 1979, 4, IIASA Archives, Laxenburg, Austria.

65. Brian Arthur, "On Competing Technologies and Historical Small Events: The Dynamics of Choice under Increasing Returns," (working paper 83-090, 1983), IIASA Archives, Laxenburg, Austria; W. Brian Arthur, *Increasing Returns and Path Dependency in the Economy* (Ann Arbor: University of Michigan Press, 1994).

66. W. Brian Arthur, "Competing Technologies and Economic Prediction," *Options* 2 (1984): 1–3; Paul A. David, "Clio and the Economics of QWERTY," *American Economic Review Proceedings* 75, no. 2 (1985): 332–337.

67. Brian Arthur to C. S. Holling, February 11, 1982, 1, IIASA Archives, Laxenburg, Austria.

68. "From QWERTY to Microsoft," *Options* (Winter 2007): 20–21.

69. The idea of cyclical development of the economy emerged in the late 1800s, when several economists, such as Clement Juglar and William Stanley Jevons, proposed statistical evidence of cycles. See Mary Morgan, *The History of Econometric Ideas* (Cambridge: Cambridge University Press, 1990).

70. N. D. Kondratieff, "The Long Waves in Economic Life [1926]," *Review (Ferdinand Braudel Center)* 2, no. 4 (1979): 519–562.

71. Dennis Meadows, "Tools for Understanding the Limits to Growth: Comparing a Simulation and a Game," *Simulation and Gaming* 32, no. 4 (2001): 526–527.

72. The Balaton Bulletin, January 1984, IIASA Archives, Laxenburg, Austria.

73. Dennis Meadows, "A Brief and Incomplete History of Operational Gaming in Systems Dynamics," *System Dynamics Review* 33, nos. 2–3 (2007): 199–203. Available at systemsdynamics.org.

74. "Mezhdunarodnyj 16-yi seminar IFAK/ISAGA po delovym igram i imitatsionnomu modelirovaniiu," *Avtomatika i telemekhanika* 10 (1986): 173–175.

75. John Sterman and Dennis Meadows, "STRATAGEM-2: A Microcomputer Simulation Game of the Kondratiev Cycle," *Simulation & Gaming* 16, no. 2 (June 1985): 174–202.

76. John Sterman and Dennis Meadows, "STRATAGEM-2: A Microcomputer Based Operational Game on the Kondratiev Cycle," (working paper, WP-84-60, IIASA, Laxenburg, Austria, August 1984), 12.

77. Sterman and Meadows, "STRATAGEM-2," 13.

78. Raiffa, memo, IIASA, September 20, 1973, 5, IIASA Archives, Laxenburg, Austria.

79. J. Curry, "IIASA Computer Services," report, November 1974, 4, IIASA Archives, Laxenburg, Austria; Gary Bertsch, ed., *Controlling East-West Trade and Technology Transfer: Power, Politics and Policies* (Durham, NC: Duke University Press, 1988), 210.

80. István Sebestyén, ed., *Experimental and Operational East-West Computer Connections: The Telecommunication Hardware and Software, Data Communication Services, and Relevant Administrative Procedures* (Laxenburg, Austria: International Institute for Applied Systems Analysis, 1983), vii.

81. For more on Soviet computer networks see Eglė Rindzevičiūtė, "Internal Transfer of Cybernetics and Informality in the Soviet Union: The Case of Lithuania," in *Reassessing Cold War Europe*, ed. Sari Autio-Sarasmo and Katalin Miklossy (New York: Routledge, 2011), 119–137; Slava Gerovitch, "InterNyet: Why the Soviet Union Did Not Build a Nationwide Computer Network," *History and Technology* 24, no. 4 (2008): 335–350; Peters, *How Not to Network a Nation*.

82. Alexandr Butrimenko, "Computer Sciences Project," report, November 1974, 8, IIASA Archives, Laxenburg, Austria.

83. Alexandr Butrimenko and I. Sebestyén, "Data Communication in the USSR: The Telecommunication Infrastructure and Relevant Administrative Procedures," in *Experimental and Operational East-West Computer Connections: The Telecommunication Hardware and Software, Data Communication Services and Relevant Administrative Procedures*, ed. István Sebestyén (Laxenburg, Austria: IIASA, 1983), 291–292.

84. Interview 5, October 22, 2010.

85. Global modeling of long-term oil demand was actively developed in Soviet research institutes beginning in the 1970s, for instance, by IIASA-based Aleksandr Papin of Novosibirsk.

86. Interview 16, October 14, 2010.

87. The Director's report on IIASA's activities, November 1976–July 1977, 12, IIASA Archives, Laxenburg, Austria.

88. *Oral Testimony to the Subcommittee for HUD and Independent Agencies, Committee on Appropriations,* 100th Cong. (29 April 1987) (statement of vice president of the Institute of Defense Analysis Chester Cooper), 1–2, IIASA Archives, Laxenburg, Austria. In his testimony Cooper described the measures that he took to consult the CIA and DOD as to the safety of his cooperation with IIASA. Both agencies confirmed that the work at IIASA posited no danger for the United States; a DOD technical expert described IIASA computer equipment as outdated.

89. Transcript of Sir Hermann Bondi's Statement to the IIASA Council, June 3, 1982, 1–4, IIASA Archives, Laxenburg, Austria. For a brief account of the Royal Society's involvement, see Peter Collins, *The Royal Society and the Promotion of Science Since 1960* (Cambridge: Cambridge University Press, 2015), 178–181.

90. Howard Raiffa, "Can IIASA Survive?" 1–4, IIASA Archives, Laxenburg, Austria. The decision was first relayed by Thomas Malone to Gvishiani via phone, at the instruction of the president of NAS, Frank Press.

91. "Can IIASA Survive?" 17–18.

92. "Can IIASA Survive?" 33.

93. Draft minutes, 19th meeting of the IIASA Council, November 11–12, 1982, 1, IIASA Archives, Laxenburg, Austria.

94. "IIASA-UK," notes from the 23rd meeting of the IIASA Council, November 21–22, 1984, IIASA Archives, Laxenburg, Austria; Robert Maxwell to Tom Lee, November 15, 1984, IIASA Archives, Laxenburg, Austria. But in November 1984 China decided to apply for a membership at IIASA; see Wu Dalan to Dzhermen Gvishiani, November 17, 1984, IIASA Archives, Laxenburg, Austria.

95. Notes from the 24th meeting of the IIASA Council, June 19–20, 1985, 8–9, IIASA Archives, Laxenburg, Austria.

96. See the correspondence between Hugh Miser and Howard Raiffa from 1988 to 1990, particularly the memo from Hugh Miser to Pry, Salewicz, and Raiffa, July 10, 1990; and letter from Howard Raiffa to Hugh Miser, March 3, 1989, and from Hugh Miser to Robert H. Pry, as well as Howard Raiffa, "A response to Raiffa's challenge to create regional IIASAs," November 8, 1988, IIASA Archives, Laxenburg, Austria.

97. Other Russian scientists involved include Danilov-Danilian, D. N. Bobryshev, and D. Levchuk of VNIISI. Documentation of East-West Symposium on Corporate Planning Practices, Fontainebleau, France February 8–11, 1978, 1–4, IIASA Archives, Laxenburg, Austria; Paul Josephson, *Red Atom: Russia's Nuclear Power Program from Stalin to Today* (New York: W. H. Freeman, 1999), 94–95.

98. Thomas Lee, "Long-Term Strategy for IIASA," June 19–20, 1985, 8, IIASA Archives, Laxenburg, Austria.

99. Draft of "Training programme on international economics, scientific and technological relations for East-West executives," IIASA Council meeting, June 19, 1985, 10, IIASA Archives, Laxenburg, Austria.

100. Stuart A. Umpleby and Vadim N. Sadovsky, *A Science of Goal Formulation: American and Soviet Discussions of Cybernetics and Systems Theory* (New York: Hemisphere, 1991).

101. Kunda, *Engineering Culture*.

102. Interview 19, October 11, 2010; Interview 11, October 19, 2010.

103. This is also the argument suggested by Jardini, who pointed out that the Great Society program of welfare sought to remove what was conceived as "political issues" from the planning process; David R. Jardini, "Out of the Blue Yonder: The Transfer of Systems Thinking from the Pentagon to the Great Society, 1961–1965," in *Systems, Experts, and Computers: The Systems Approach in Management and Engineering, World War II and After,* ed. Agatha C. Hughes and Thomas P. Hughes (Cambridge, MA: MIT Press, 2000), 385–412.

104. Importantly, this is an internal, practitioner's view; for instance, see the book by IIASA scholar, Andrzej P. Wierzbicki, *Technen: Elements of Recent History of Information Technologies with Epistemological Conclusions* (Berlin: Springer, 2014), 36.

105. See William C. Clark and C. S. Holling, "Sustainable Development and Biosphere: Human Activities and Global Change," July 1984, IIASA Archives, Laxenburg, Austria. In this draft of a paper for the First ICSU "Multidisciplinary Symposium on Global Change," Ottawa, Canada, September 22–25, 1984, Clark refers to Charles Lindblom and David K. Cohen, *Usable Knowledge: Social Science and Social Problem Solving* (New Haven, CT: Yale University Press, 1979). See also Donella Meadows, John Richardson, and Gerhart Bruckmann, eds., *Groping in the Dark: The First Decade of Global Modelling* (New York: Wiley, 1982).

106. Keyfitz thus replaced Andrei Rogers as the head of the population program. The twentieth IIASA Council meeting, June 1, 1983, 8, IIASA Archives, Laxenburg, Austria.

107. Mirowski, *Machine Dreams*, 307.
108. Ibid., 304.
109. Amadae, *Rationalizing Capitalist Democracy*, particularly Chapter 2.

5. THE EAST-WEST POLITICS OF GLOBAL MODELING

1. UNESCO was a central platform for the articulation of these views. See Perrin Selcer, "Patterns of Science: Developing Knowledge for a World Community at UNESCO" (PhD diss., University of Pennsylvania, 2011); and Sibylle Duhautois, "The Future of World Problems" (PhD diss., Sciences Po, Paris, in progress).

2. See, for example, Dzhermen Gvishiani, "Methodological Problems of Global Development Modelling," in *Science, Technology and the Future: Soviet Scientists' Analysis of the Problems of and Prospects for the Development of Science and Technology and their Role in Society*, ed. E. P. Velikhov, J. M. Mikhaiilovich Gvishiani, and S. R. Mikulinskii (Oxford: Pergamon, 1980), 21–35.

3. For instance, see Elichirigoity, *Planet Management*; Giuliana Gemelli, "Building Bridges in Science and Societies During the Cold War: The Origins of the International Institute for Applied Systems Analysis (IIASA)," in *American Foundations and Large Scale Research: Construction and Transfer of Knowledge*, ed. Giuliana Gemelli (Bologna: Clueb, 2001), 159–198. The lack of empirical research was pointed out in Michael Barnett and Martha Finnemore, *Rules for the World: International Organizations in Global Politics* (Ithaca, NY: Cornell University Press, 2004). The subject is touched upon but not fully explored in the transnational histories of science, especially with regard to the Club of Rome activities and the development of earth sciences. See Néstor Herran, Soraya Boudia, and Simone Turchetti, *Transnational History and the History of Science* (Cambridge: Cambridge University Press, 2012); and Bentley B. Allan, "Producing the Climate: States, Scientists and the Constitution of Global Governance Objects," *International Organization*, forthcoming.

4. One possible reason may be, building on Tatarchenko, the excessive focus on hardware in the histories of computing. In contrast, global modeling is principally about software. Ksenia Tatarchenko, "'A House with a Window to the West': The Akademgorodok Computer Center (1958–1993)" (PhD diss., Princeton University, 2013). For historiography, see Martin Campbell-Kelly, William Aspray, Nathan Ensmenger, and Jeffrey R. Yost, *Computer: A History of the Information Machine,* 2nd ed. (Boulder, CO: Westview, 2004); Paul Ceruzzi, *A History of Modern Computing,* 2nd ed. (Cambridge, MA: MIT Press, 2003); and Agar, *The Government Machine.*

5. See Jon Agar, "'Future Forecast—Changeable and Probably Getting Worse': The UK Government's Early Response to Anthropogenic Climate Change," *Twentieth Century British History* 26, no. 4 (2015): 602–628; Bentley Allan, "Producing the Climate: States, Scientists, and the Constitution of Global Governance Objects," *International Organization* (forthcoming); Ola Uhrqvist, *Seeing and Knowing the Earth as a System: An Effective History of Global Environmental Change Research as Political and Scientific Practice* (PhD diss., Linköping University, Sweden, 2014); and ongoing work by Kevin Baker at Northwestern University.

6. United Nations, 1084th Plenary Meeting, December 19, 1961. See the full text of this resolution at http://www.un.org/documents/ga/res/16/ares16.htm.

7. Peter Galison and Bruce W. Hevly, eds., *Big Science: The Growth of Large-Scale Research* (Stanford, CA: Stanford University Press, 1992).

8. Brian Wynne, *Models, Muddles and Megapolicies: The IIASA Energy Study as an Example of Science for Public Policy*, IIASA Reports WP-83-127 (Laxenburg, Austria: International Institute for Applied Systems Analysis, 1983).

9. Ludwik Fleck, *Genesis and Development of a Scientific Fact*, trans. Frederick Bradley and Thaddeus J. Trenn (Chicago: University of Chicago Press, 1979).

10. See also the argument by Bruce Allyn, "Fact, Value, and Science," in *Science and the Soviet Social Order*, ed. Loren Graham (Cambridge, MA: Harvard University Press, 1990), 238.

11. I base this statement on the use of the term "global" in the Gosplan documents, kept at the Russian State Archive of the Economy (RGAE).

12. Vadim Zagladin and Ivan Frolov, *Global'nye problemy sovremennosti: nauchnye i sotsial'nye aspekty* (Moscow: Mezhdunarodnye otnosheniia, 1981).

13. Viktor Los', "Global'nye problem kak predmet kompleksnykh nauchnykh issledovanii (Nekotorye itogi izucheniia global'nykh protsessov mirovogo razvitiia)," *Voprosy filosofii* 12 (1985): 3–17.

14. The Club of Rome was one of the several transnational elite networks that appeared in the postwar era. An examples of a similar associations would be the Mont Pelerin Society. For more on the organizational power of transnational elites, see Andrew Kakabadse and Nada Kakabadse, eds., *Global Elites: The Opaque Nature of Transnational Policy Determination* (Basingstoke, UK: Palgrave Macmillan, 2012).

15. For more, see Elodie Vieille-Blanchard, "Technoscientific Cornucopian Futures versus Doomsday Futures: The World Models and *The Limits to Growth*," in *The Struggle for the Long- Term in Transnational Science and Politics: Forging the Future,* ed. Jenny Andersson and Eglė Rindzevičiūtė (New York: Routledge, 2015), 92–114.

16. Paul Edwards, "The World in a Machine: Origins and Impacts of Early Computerized Global Systems Models," in *Systems, Experts and Computers: The Systems Approach in Management and Engineering, World War II and After*, ed. Agatha C. Hughes and Thomas P. Hughes (Cambridge, MA: MIT Press, 2000), 221–254.

17. Immediately criticized as flawed and imperfect, this experiment of projecting world development up to the year 2050 nonetheless stirred huge interest from the scientific community: in just four years a further nine major world development models were created. Gvishiani, "Methodological Problems," 22–27. For a discussion of concerns about world population and scientific planning of global systems, see Matthew Connelly, *Fatal Misconception: The Struggle to Control World Population* (Cambridge, MA: Harvard University Press, 2010).

18. Gvishiani, *Mosty*, 77.

19. Forrester's model was discussed in a symposium on trends in mathematical modeling, organized by the Italian National Research Council and UNESCO in December 1971. In addition to Dennis Meadows, participants included prominent Russian scientists, such as the mathematician Nikita Moiseev and the specialist in economic modeling Kirill Bagrinovskii, as well as the leading American futurologists Olaf Helmer and Alvin Toffler. Nigel Hawkes, ed. *International Seminar on Trends in Mathematical Modelling, Venice, 13–18 December 1971* (Berlin: Springer Verlag, 1973).

20. Interview 35, March 4, 2014; Meadows et al., *Groping in the Dark*; Gvishiani, *Mosty*.

21. Jay Forrester, "System Dynamics and the Lesson of 35 Years," in *A Systems-Based Approach to Policymaking*, ed. Kenyon De Greene (Berlin: Springer, 1993): 199–240.

22. Viktor Gelovani, Vladimir Britkov, and Sergei Dubovskii, *SSSR i Rossiya v global-noy sisteme (1985–2030): rezultaty globalnogo modelirovaniia* (Moscow: Librokom, 2009), 48; Efremenko, *Ekologo-politicheskie*, 104; Interview 29, April 15, 2013.

23. Interview 22, December 13, 2012.

24. Sergei Dubovskii, "Global'noe modelirovanie: voprosy teorii i praktiki," *Vek globalizatsii* 2 (2010), 57; Sergei Dubovskii and O. A. Eismont, "Long-Range Modelling of the USSR Economy," in *The Future of the World Economy*, ed. Wilhelm Krelle (Berlin: Springer Verlag, 1989), 311–324.

25. Gvishiani, *Mosty*, 141.

26. H. S. D. Cole, C. Freeman, M. Jahoda, and K. Pavitt, eds., *Thinking about the Future: A Critique of "The Limits to Growth"* (Brighton, UK: Sussex University Press, 1973).

27. Barbara Ward et al., *Science, Technology and Management: Who Speaks for Earth?* ed. Maurice F. Strong (New York: W. W. Norton, 1973).

28. Carl Kaysen, "The Computer that Printed Out W*O*L*F," *Foreign Affairs* 50, no. 4 (July 1972): 660–668.

29. "Rapporteur notes," March 9, 1973, Washington, DC, NAS, IIASA Archives, Laxenburg, Austria.

30. "Rapporteur notes," March 9, 1973; Raiffa, *Analytical Roots*; Meadows et al., *Groping in the Dark*.

31. Howard Raiffa, *An Initial Research Strategy for the International Institute of Applied Systems Analysis*, February 1973, IIASA Archives, Laxenburg, Austria.

32. The IIASA global modeling conferences scrutinized the Mesarovic-Pestel model (1974), the Latin American labor model (Bariloche, 1974), the Dutch model of international relations in agriculture (MOIRA, 1975), and the British Systems Analysis Research Unit model (SARU), which was developed by the Environment Agency (1976) and hence the only one funded by governmental body. Its Version, SARUM 76, was used by OECD Interfutures scenarios. Other models discussed at IIASA included the MRI (Polish national model, 1976), as well as the UN world model and the Futures of Global Interdependence model (FUGI, 1977) (Meadows et al., *Groping in the Dark,* 2–4).

33. The inability of global models to produce conclusive results led to a redefinition of the purpose of modeling, from policy prescription to less formal insight. For instance, in 1979 at IIASA Olaf Helmer created the Global Economic Model (GEM), not to "solve the problems directly," but to lead to "a better intuitive understanding of the problem structure." Olaf Helmer and L. Blencke, "GEM: An Interactive Simulation Model of the Global Economy" (working paper RR-79-4, IIASA Archives, Laxenburg, Austria, 1979), 2.

34. A. G. Ivakhnenko and V. G. Lapa, *Cybernetics and Forecasting Techniques* (New York: Elsevier, 1967); cf. Reuben Hersh, "Mathematics Has a Front and a Back," *Synthese*, 88, no. 2 (1991): 127–133. See also an internal debate in the VNIISI yearbook, *Modelirovanie protsessov global'nogo razvitiia: sbornik trudov VNIISI*, 8 (Moscow: VNIISI, 1979).

35. Interview 31, April 10, 2013.

36. Nikita N. Moiseev to Dzhermen Gvishiani, 1980, ARAN, f.1918, op.1, d.463, l.4.

37. See Wynne, *Models, Muddles and Megapolicies*, 5; Bill Keepin and Brian Wynne, "Technical Analysis of IIASA Energy Scenarios," *Nature* 319 (December 20, 1984): 691–695.

38. See United Nations Statistics Division, http://unstats.un.org/unsd/statcom/stacom_archive/brochures/for%20web/Brochure%20-%20IT.pdf. Accessed March 19, 2016.

39. Wassily Leontief, Ann Carter, and Peter A. Petri, *The Future of the World Economy: A United Nations Study* (Oxford: Oxford University Press, 1977), 1.

40. The archival documents reveal active correspondence between the leaders of the newly established TsEMI, the UN, and Western economists. Jakob Mosak to Nikolai Fedorenko, February 5, 1965, ARAN, f.1959, op.1, d.92, l.19–20.

41. Nikolai Fedorenko to Jakob Mosak, UN HQ Bureau of General Economic Research and Policies, ARAN, f.1959, op.1, d.92, l.18; Nikolai Fedorenko to Wassily Leontief, n.d., ARAN, f.1959, op.1, d.92, l.60. These documents are not dated, but both are filed in folders dated 1965.

42. Dzhermen Gvishiani to Nikolai Fedorenko, February 17, 1966, ARAN, f.1959, op.1, d.129, l.15.

43. Ibid.

44. Leontief's father was a professor who organized strikes in his grandfathers' factories. Bernard Rosier, ed., *Wassily Leontief: Textes et Itinéraire* (Paris: Éditions la Découverte, 1986), 78–80.

45. Wassily Leontief, "The Decline and Rise of Soviet Economic Science," *Foreign Affairs* (January 1960): 261–272; Rosier, *Wassily Leontief*, 80, 90–92; Engerman, *Know Your Enemy,* 97.

46. The Soviet philosophers appreciated Leontief's world model, calling it "more realistic" than the models sponsored by the Club of Rome. Zagladin and Frolov, *Global'nye problem sovremennosti,* 11, 182, 189.

47. Bockman, *Markets in the Name of Socialism*, 18.

48. Rosier, *Wassily Leontief.*

49. Leontief's study involved demographic, economic, and environmental spheres with benchmark years of 1980, 1990, and 2000. The world was divided into fifteen regions, each region comprising forty-five sectors of activities. The regions were linked via imports and exports of forty classes of goods and monetary transfers.

50. Leontief et al., *The Future*, 1–3.

51. Ibid., 2, 34–35.

52. Nikita Moiseev, *Algoritmy razvitiia. . . . Akademicheskie chteniia* (Moscow: Nauka, 1987), 5.

53. Nikolai Timofeev-Resovski was a pioneering population geneticist. For more about him, see Vasilii Babkov and Elena Sakanian, *Nikolai Timofeev-Resovskii* (Moscow: Pamiatniki istoricheskoi mysli, 2002); and Yakov G. Rokityanskij, "N. V. Timofeef-Resovski in Germany, July 1925–September 1945," *Journal of Bioscience* 30, no. 5 (2005): 573–580. For more about Vladimir Vernadskii, see Jonathan Oldfield and Denis Shaw, "V. I. Vernadskii and the Development of Biogeochemical Understandings of the Biosphere, c. 1880s–1968," *British Journal for the History of Science* 46, no. 2 (2013): 287–310.

54. Interview 34, April 5, 2013.

55. A. A. Petrov, *Nikita Nikolaevich Moiseev: sud'ba strany v sudbe uchenogo* (Moscow: Ekologiia i zhizn, 2011), 56.

56. Moiseev, *Kak daleko*.

57. Moiseev was skeptical about econometrics in general and even more so about Soviet econometrics, yet for him economic modeling was a lesser evil. Moiseev wrote that in order to succeed, Soviet economic forecasting had to be based on "strictly scientific modelling systems" and not "unreliable expert surveys." Nikita Moiseev, *Prosteishie matematicheskie modeli ekonomicheskogo prognozirovaniia* (Moscow: Znanie, 1975), 62; Nikita Moiseev to Dzhermen Gvishiani, 1980, ARAN, f.1918, op.1, d.463, l.16.

58. Curiously, even at VNIISI global modeling was split into the environmental and the economic, and these two groups worked in parallel and did not directly collaborate. (Interview 29, April 15, 2013.)

59. Other milieus where Soviet global models of various kinds were developed included econometric modeling at IMEMO, under Mylishka at the Main Geophysical Laboratory in Leningrad, under Marchuk and Dynikov in the Novosibirsk branch of the Soviet Academy of Sciences, even at the Moscow State University (Dubovskii, "Global'noe," 55). It was Stanislav Men'shikov, the vice director of IMEMO, who conducted econometric research at IMEMO as early as 1968 and later in Novosibirsk. (Interview 34, April 5, 2013.)

60. Nikita Moiseev, V. V. Aleksandrov, V. F. Krapivin, A. V. Lotov, Iu. M. Svirezhev, A. M. Tarko, "Global Models: The Biospheric Approach (Theory of the Noosphere)," *Collaborative Papers*, Laxenburg, Austria: IIASA Archives, July 1983.

61. In 1987 Gelovani was also appointed as the head of the Soviet branch of the World Laboratory. The World Laboratory was an interesting Cold War effort: established in 1986, it was an NGO initiated by Paul Dirac, Petr Kapitsa, and Antonino Zichichi. It was recognized by the UN and dedicated to facilitating East-West and North-South scientific exchanges. Stanislav Emel'ianov, ed., *30 let institute sistemnogo analiza Rossiiskoi akademii nauk: istoriia sozdaniia i razvitiia Institutea sistemnogo analiza, 1976–2006 gg* (Moscow: URSS, 2006), 129.

62. Interview 34, April 5, 2013.

63. "Otchet," 1982, ARAN, f.1918, op.1, d.492, l.4.

64. Lawrence Gates developed a model called OSU AGCM, which was detailed, but also faster and, unlike other American models, did not require that much of computer memory (only 100 Kb), which was very important for Soviet scientists who worked on the slow BESM-6. "Otchet," 1978, ARAN, f.1918, op.1, d.421, l.88.

65. Ibid., l.89.

66. Interview 31, April 10, 2013.

67. For an early publication discussing human impact on environmental change, see William L. Thomas, *Man's Role in Changing the Face of the Earth* (Chicago: University of Chicago Press, 1956).

68. Interview 33, February 14, 2014.

69. I draw on my interviews with the scientists who work or used to work in the Soviet Academy of Sciences' Computer Center.

70. Moiseev kept close connections with French scholars: taught French by his grandmother, he was less comfortable with English and there were many Russian exile scientists in Paris who were keen to welcome him. Petrov, *Nikita Nikolaevich Moiseev,* 50.

71. "Otchetnyi balans," RGAE, f.9480, op.12, d.343, l.9.

72. "Poiasnitel'naia zapiska," RGAE, f.9480, op.12, d.343, l.13, 18.

73. Clemens's interview with Alexander King, February 4, 1987 (Clemens, *Can Russia Change?* 138). See also Dzhermen Gvishiani, "Methodological Problems of Global Development Modelling," 33.

74. VNIISI was created on Gvishiani's initiative and in alliance with systems theoretician Boris Mil'ner, economist Stanislav Shatalin, and OR specialist Stanislav Emel'ianov. Stanislav Emel'ianov and A. Porshnev, "Vklad B.Z. Mil'nera v razvitiiu nauki upravleniia," *Rosiiskii zhurnal menedzhmenta* 4 (2004): 156.

75. Emel'ianov, *30 let*, 132–135.

76. For example, Gvishiani invited Vadim Sadovskii and Stanislav Emel'ianov to the meeting with Raiffa at the GKNT in November, 1972. RGAE, f. 9480, op.9, d.1716, l.110.

77. RGAE, f.9480, op.12, d.343, l.20; RGAE, f.9480, op.12, d.1865, l.4.

78. Dubovskii, "Global'noe," 56. Given that VNIISI's computer was produced by a major American computer producer, Digital Equipment Corporation, and the embargo on exporting computer technology to the Soviet Union, its road to VNIISI must had been an interesting one. Frank Cain, "Computers and the Cold War: United States Restrictions on the Export of Computers to the Soviet Union and Communist China," *Journal of Contemporary History* 40, no. 1 (2005): 131–147.

79. Gelovani et al., *SSSR i Rossiya*, 16.

80. Andersson, "The Great Future Debate."

81. Gelovani et al., *SSSR i Rossiya*, 18.

82. Men'shikov also knew J. K. Galbraith, whom he met at a lunch with David Rockefeller in the US Embassy in Moscow in the mid-1960s. In 1988 Men'shikov and Galbraith coauthored the book *Socialism, Capitalism and Co-existence: From a Bitter Path to a Better Prospect.* Stanislav Men'shikov, *O vremeni i o sebe* (Moscow: Mezhdunarodnye otnosheniia, 2007).

83. Leontief et al., *The Future*, iii; Men'shikov, *O vremeni*.

84. VNIISI was informed by Krelle's study, a joint project between the IIASA and the University of Bonn, 1985–1987. Wilhelm Krelle, *The Future of the World Economy: Economic Growth and Structural Change* (Berlin: Springer Verlag, 1989). Between 1984 and 1989, by Krelle's invitation, VNIISI took part in this project, where Brekke, Gelovani, and Kay developed scenarios of global development on the basis of American, Soviet, and Japanese models (Dubovskii, "Global'noe," 57; Emel'ianov, *30 let*, 141).

85. Interview 28, April 15, 2013.

86. Gelovani, Britkov and Dubovskii, *SSSR i Rossiya,* 64; Dubovskii and Eismont, "Long-Range Modelling."

87. Gelovani, Britkov and Dubovskii, *SSSR i Rossiya,* 7.

88. Nikolai Fedorenko, *Vspominaia proshloe, zagliadyvaiu v budushchee* (Moscow: Nauka, 1999), 387.

89. Interview 31, April 10, 2013.

90. Michael Ellman and Vladimir Kontorovich, eds., *The Destruction of the Soviet Economic System: An Insiders' History* (Armonk, NY: M. E. Sharpe, 1998): 76–85.

91. Efremenko, *Ekologo-politicheskie.*

92. D. Chernikov, A. Batizi, N. Volkov, and A. Ivanov to Thomas Lee, November 28, 1986, IIASA Archives, Laxenburg, Austria.

93. Gelovani, Britkov, and Dubovskii, *SSSR i Rossiya,* 48, 80.

94. Dubovskii, "Global'noe," 56–57.

95. Ibid., 58.

96. Interview 28, April 15, 2013.

97. Nikita Moiseev to Dzhermen Gvishiani, 1980, ARAN, f.1918, op.1, d.463, l.12.

98. Donald MacKenzie, *Mechanizing Proof: Computing, Risk, and Trust* (Cambridge, MA: MIT Press, 2001).

99. P. N. Fedoseyev, "Topical Problems of Our Time," in *Science, Technology and the Future: Soviet Scientists' Analysis of the Problems of and Prospects for the Development of Science and Technology and Their Role in Society*, ed. Evgenii Velikhov, M. Gvishiani, and S. R. Mikulinsky (Oxford: Pergamon, 1980), 3–20.

100. Efremenko, *Ekologo-politicheskie.*

101. Petrov, *Nikita Nikolaevich Moiseev*.

102. K. V. Ananichev's meeting with the Japanese delegation, "Zapis' besedy," GKNT (April 13, 1972), RGAE, f.9480, op.9, d.1716, l.37.

103. Gvishiani, *Mosty*, 239.

104. Wynne, *Models, Muddles and Megapolicies*," 12–13.

6. FROM NUCLEAR WINTER TO THE ANTHROPOCENE

1. Evangelista, *Unarmed Forces*, 73.

2. I use the terms "nuclear winter study" and "nuclear winter project" interchangeably. There were many outcomes to the project on the environmental consequences of nuclear war, and some of them pointed to milder effects, which were not described as a nuclear winter. However, as the nuclear winter became a distinct brand of this project, and for the sake of brevity, I decided to use "nuclear winter" throughout the chapter, although strictly speaking this is not an entirely correct expression.

3. Iurii M. Svirezhev, *Ecological and Demographic Consequences of Nuclear War* (Moscow: Computer Center of the USSR Academy of Sciences, 1985), 6; Evgenii Velikhov, "Sovetskaia programma mira i zadachi sovetskih uchenykh," in *Klimaticheskie i biologicheskie posledstviia iadernoi voiny*, ed. Evgenii Velikhov (Moscow: Nauka, 1987), 24; Robert McNamara, *Blundering into Disaster: Surviving the First Century of the Nuclear Age* (London: Bloomsbury, 1987).

4. See the 2012 issue of *The Bulletin of the Atomic Scientists*.

5. Lawrence Badash, *A Nuclear Winter's Tale: Science and Politics in the 1980s* (Cambridge, MA: MIT Press, 2009); Paul Rubinson, "The Global Effects of Nuclear Winter: Science and Antinuclear Protest in the United States and the Soviet Union in the 1980s," *Cold War History* 14, no. 1 (2014): 47–69. Badash cites the work of Lynn Eden in passing, but does not engage more deeply with the issue of the status of fire research in the United States in the 1970s and 1980s. Extrapolating from Eden's study, it can be suggested that the prognosis of nuclear winter was met with skepticism partially because of the prevailing view on the unpredictability of fire. In turn, had Eden paid more attention to the nuclear winter study, perhaps she would have traced a link between the growing evidence of the environmental consequences of nuclear war, caused by fires, and the US government's sudden support for fire research. Lynn Eden, *Whole World on Fire: Organizations, Knowledge, and Nuclear Weapons Devastation* (Ithaca, NY: Cornell University Press, 2004).

6. Paul Edwards, "Entangled Histories: Climate Science and Nuclear Weapons Research," *Bulletin of the Atomic Scientists* 68, no. 4 (2012): 28–40.

7. Dipesh Chakrabarty, "The Climate of History: Four Theses," *Critical Inquiry* 35, no. 2 (2008): 197–222.

8. Chakrabarty, for instance, wrote "the industrial way of life has acted much like the rabbit hole in Alice's story; we have slid into a state of things." Chakrabarty, "The Climate," 217.

9. David R. Jardini, *Out of the Blue Yonder: The RAND Corporation's Diversification into Social Welfare Research, 1946–1968* (PhD dissertation, Carnegie Mellon University, 1996); Rohde, *Armed With Expertise*; Andersson, "The Great Future Debate."

10. S. M. Amadae, *Prisoners of Reason: Game Theory and Neoliberal Political Economy* (Cambridge: Cambridge University Press, 2016).

11. The essence of nuclear strategy is articulated in a chain of strikes and retaliations: the preemptive strike or first strike, the counter strike or launch-on-warning strike, and the retaliatory strike. Pavel Podvig, *Russian Strategic Nuclear Forces* (Cambridge, MA: MIT Press, 2001), 50; Francis J. Gavin, *Nuclear Statecraft: History and Strategy in America's Atomic Age* (Ithaca, NY: Cornell University Press, 2012).

12. Herman Kahn, *On Thermonuclear War* (Princeton, NJ: Princeton University Press, 1960). For more about the rationalization of nuclear strategy at RAND, see Kaplan, *The Wizards of Armageddon,* and Ghamari-Tabrizi, *The Worlds of Herman Kahn*.

13. Evangelista emphasized the importance of this point, arguing that Soviet-Western interaction had a substantial effect in institutionalizing the notion that scientists were important actors, messengers between the opposing governments. Evangelista refers to Jeremy Stone for explication of this rationale. The empowerment, it seems, was mutual. Evangelista, *Unarmed Forces*, 138; Jeremy J. Stone, *Strategic Persuasion: Arms Limitations through Dialogue* (New York: Columbia University Press, 1967).

14. Snyder, Jack L. *The Soviet Strategic Culture: Implications for Limited Nuclear Operations*. RAND Report R-2154-AF, September 1977. Available online at https://www.rand.org/content/dam/rand/pubs/reports/2005/R2154.pdf.

15. Kahn, *On Thermonuclear War*.

16. Clemens, *Can Russia Change?* 78. Nevertheless, nuclear calamities were, at least publicly, held at an optimistic minimum: in the 1960s US nuclear strategists claimed that about 80 percent of the American population would survive a nuclear exchange. Lee Clarke, *Mission Improbable: Using Fantasy Documents to Tame Disaster* (Chicago: University of Chicago Press, 1999).

17. Badash, *A Nuclear Winter's Tale*, 8.

18. See Podvig, *Russian Strategic Nuclear Forces*; Jonathan Coopersmith, "The 'Normalcy' of Russian, Soviet, and Post-Soviet Science and Technology Studies," *Technology and Culture* 47, no. 3 (2006): 623–637.

19. In the 1960s the Politbureau of CPSU assumed a form of the top nuclear warfare commanding organization; the specific elements were worked out by the Ministry of Defense and General Staff. The nuke tests in the Soviet Union were conducted under the umbrella of the Ministry of Medium Machine Building (Minsredmash) and the Ministry of Defense. The Defense Industry Department at the Computer Center was mainly excluded from decision-making, while foreign policy was devised by the Ministry of Foreign Affairs. For a full overview, see Podvig, *Russian Strategic Nuclear Forces,* 39–40. Some research groups at the Academy of Sciences' institutes were also involved. For instance, nuclear strategy for the balance of powers was developed at the Institute for Systems Research in Moscow. Emel'ianov, *30 let*, 133–136.

20. Podvig, *Russian Strategic Nuclear Forces,* 9, 14, 16, 18–20. The negotiations were resumed with Gorbachev in power in 1985. In 1988 Gorbachev renounced Brezhnev's doctrine or intervention into other countries, and international class struggle was no longer the foundation of Soviet foreign policy. The START I treaty was signed in July 1991.

21. Kai-Henrik Barth, "Catalysts of Change: Scientists as Transnational Arms Control Advocates in the 1980s," *Osiris* 21, no. 1 (2006), 187.

22. One of the first postwar East-West scientists' meetings took place in the Conference on the Peaceful Uses of Atomic Energy in Geneva, 1955. In the same year, the American physicist Victor Weisskopf was invited to visit Dubna, one of the key Soviet military research towns. The 1955 events that set the path for Pugwash already included a group of four Soviet scientists led by Aleksandr Topchiev, who endorsed Russell-Einstein's statement. For more, see Evangelista, *Unarmed Forces*, 29, 31.

23. Clemens, *Can Russia Change?* 121–122.

24. Evangelista, *Unarmed Forces*, 88.

25. Badash, *A Nuclear Winter's Tale*.

26. A similar argument is pursued by Kelly Moore, who points out that not all social movements aim to change legislation. Instead, wrote Moore, social movements often seek to change norms or behavior, the effect on which may be revealed only in the long term. Kelly Moore, *Disrupting Science: Social Movements, American Scientists, and the Politics of the Military, 1945–1975* (Princeton, NJ: Princeton University Press, 2008), 15.

27. For instance, Arbatov referred to both ecological crises and the nuclear winter study as the key reasons to look for a new US-Soviet strategic agreement. Georgy A. Arbatov, "Where Should We Go from Here: A Soviet View," in *Windows of Opportunity: From Cold War to Peaceful Competition in U.S.-Soviet Relations*, ed. Graham T. Allison, William L. Ury, and Bruce J. Allyn (Cambridge, MA: Ballinger, 1989), 297.

28. Badash, *A Nuclear Winter's Tale*.

29. Frank von Hippel, "Gorbachev's Unofficial Arms-Control Advisers." Soviet scientists were quite confident that the nuclear winter report would convince the Soviet government that a nuclear arms' race was a waste of resources. Gelovani et al., *SSSR i Rossiia v global'noi sisteme* (Moscow: Librokom, 2009).

30. With the exception of Paul Edwards. Paul Edwards, "Entangled Histories."

31. A prominent commentator on Russian society, Masha Gessen, described Moiseev as a rare example of a nonconformist Soviet intellectual who enjoyed a high status in both academic and governmental circles. See Masha Gessen, *Dead Again: The Russian Intelligentsia After Communism* (London: Verso, 1997), 27. Gessen, however, was not correct on several important details: Moiseev was not involved hands-on in the design of the nuclear winter model and his travels abroad did not appear to be restricted; indeed, Moiseev traveled widely in the West both before and after the nuclear winter report.

32. See Collier and Lakoff, "Vital Systems Security"; and Claudia Aradau and Rens van Munster, *Politics of Catastrophe: Genealogies of the Unknown* (New York: Routledge, 2011).

33. See Kline, *Cybernetics Moment*.

34. Rohde, *Armed with Expertise*.

35. Stephen Schneider, interview by Robert M. Chervin, January 10–13, 2002, 75–76, transcript, American Meteorological Society, University Corporation for Atmospheric Research, available online at http://nldr.library.ucar.edu/repository/assets/ams/AMS-000-000-000-191.pdf.

36. M. K. Kerimov, "Kratkaia istoriia Vychislitel'nogo tsentra imeni akademika A. A. Dorodnitsyna Rossiiskoi Akademii Nauk (k 50-desiletiiu so vremeni osnovaniia)," *Zhurnal vychislitel'noi matematiki i matematicheskoi fiziki* 46, no. 7 (2006): 1178. Also, the scientists at the Computer Center designed a game to simulate military actions among three (unnamed) states, which, according to Moiseev, was intercepted by the CIA. "Protokol" (December 14, 1983), ARAN, f.1918, op.1, d.537, l. 66–67.

37. Interview 33, February 14, 2014.

38. Vassily Sokolov et al., "Turning Points: The Management of Global Environmental Risks in the Soviet Union," in *Learning to Manage Global Environmental Risks,* vol. 1, *A Comparative History of Social Responses to Climate Change, Ozone Depletion, and Acid Rain,* ed. The Social Learning Group (Cambridge, MA: MIT Press, 2001), 139–166.

39. Edwards, *A Vast Machine*. The first meeting of East and West seismologists was organized to discuss the control of nuclear tests, in July 1958. According to Evangelista, in this meeting it appeared that Western and Soviet scientists knew so much about each other that they did not need an introduction. In addition to the seismologists' meeting, one should mention that the World Meteorological Organization, established in 1947, sponsored a global atmospheric research program in 1967. The World Weather Watch, established in 1963, was another important organization facilitating East-West contacts. Evangelista, *Unarmed Forces*, 60–61.

40. SCOPE was funded through national membership, but its projects received support from various UN agencies, WHO, business corporations such as Exxon and Shell, and Ford, Carnegie, and other American foundations. Gilbert White, "SCOPE: The First Sixteen Years," *Environmental Conservation* 14, no. 1 (1987): 7–13.

41. The collaborations based at SCOPE led to the setting up of the Intergovernmental Panel for Climate Change.

42. Soviet side was represented by the scientific secretary N. K. Lukianov and G. A. Zavarzin.

43. In 1948 the Computer Center belonged to the Institute of Precision Mechanics and Computer Technology; in 1956 it was transferred to the Steklov Institute of Mathematics, although even then the center was an independent unit with its own directorship and budget. Kerimov, "Kratkaia."

44. Gregory D. Crowe and Seymour E. Goodman, "S. A. Lebedev and the Birth of Soviet Computing," *IEEE Annals of the History of Computing* 16, no. 1 (1994): 4–24.

45. Kerimov, "Kratkaia."

46. Nikita Moiseev, *Byt' ili ne byt' . . . chelovechestvu?* (Moscow: n.p. 1999), 7; Moiseev, "Otchet" (February 13–17, 1978, March 2, 1978), ARAN, f.1918, op.1, no.421, l.85–87, 92.

47. For more on Kovda, see Oldfield and Shaw, "V. I. Vernadskii."

48. This, and the fact that the figure of a founding father is very popular in the Russian scientific and literary culture, may well explain why Russian historiography nominates Moiseev as the central figure in the nuclear winter project. See, for instance, V. G. Gorokhov,

ed., *Sotsialnaia i ekologicheskaia otsenka nauchno-tekhnicheskogo razvitiia* (Moscow: Rossiskoe filosofskoe obshchestvo, 2007), 4. Indeed, although Moiseev never detail-managed the project, his personal support was vital. Interview 31, April 10, 2013; Interview 34, April 5, 2013.

49. Having dedicated many pages to detail his experience of the new and powerful Cray-1 computer (installed at NCAR in 1977), Aleksandrov pointed out huge American investments in the atmosphere sciences. He referred to a decision by the National Ocean and Atmosphere Administration to provide the laboratory of Geophysical Dynamics at Princeton University with the Cray-2, an expensive supercomputer, to argue that the studies of the interaction of ocean and atmosphere were of extreme importance. ARAN, f.1918, op.1, d.421, l. 84–112.

50. Nikita Moiseev, *Kak daleko,* 211.

51. ARAN, f.1918, op.1, d.421, l.84–86. The idea of sending Soviet atmosphere scientists to the United States was voiced as early as 1976. The length of stay was to be one year due to the complexity of the work, but in 1977 the American side insisted on cutting this stay to six months. When the scientists arrived in the United States in 1978, the stay was further shortened to five months, so short a time that, wrote Aleksandrov, it was impossible to complete his task on an "unfamiliar computer system."

52. Vladimir Aleksandrov, "NCAR is Host to Two Soviet Scientists," *Staff Notes* (NCAR's internal newsletter) 13, no. 21 (June 2, 1978): 1–2.

53. ARAN, f.1918, op.1, d.421, l. 87–91, 125–126.

54. Schneider, interview, 136.

55. ARAN, f.1918, op.1, d.421, l.92.

56. Ibid., l.112.

57. Anatolii A. Dorodnitsyn to Georgii K. Skriabin, January 6, 1983. ARAN, f.1918, op.1, no.522, l.189.

58. ARAN, f.1918, op.1, d.421, l.85.

59. Ibid., l.150–151; Moiseev, *Kak daleko*.

60. According to the report kept at ARAN, the title of the film is "The General Circulation of the Atmosphere in January as Computed by Cray-1." ARAN, f.1918, op.1, d.421, l.150–151.

61. Moiseev, *Kak daleko*, 242–243.

62. Anatolii Dorodnitsyn, ed. *Matematicheskie modeli ekosistem: ekologicheskie i demograficheskie posledstviia iadernoi voiny* (Moscow: Nauka, 1986), 9.

63. There was also a simpler version, in which marshland was substituted for ocean. Nikita Moiseev, V. V. Aleksandrov, and A. M. Tarko, *Chelovek i biosfera: opyt sistemnogo analiza i eksperimenty s modeliami* (Moscow: Nauka, 1985), 5, 109.

64. Evangelista, *Unarmed Forces*, 154.

65. V. V. Aleksandrov, "Otchet," n.d. ARAN, f.1918, op.1, no. 485, l.23.

66. Schneider, interview, 74–79.

67. For a description of the cumbersome process of traveling abroad during the Soviet era, see Paul R. Josephson, *Lenin's Laureate: Zhores Alferov's Life in Communist Science* (Cambridge, MA: MIT Press, 2010), 139–146.

68. The US-Soviet agreement to collaborate in the protection of environment was concluded in 1972.

69. A. A. Dorodnitsyn to G. K. Skriabin, January 6, 1983, ARAN, f.1918, op.1, d.522, l.190.

70. ARAN, f.1918, op.1, d.522, l.191. The same proposal asked for permission for the American scientists from Livermore Laboratory, NYU in Stony Brook, and Gates of Oregon University to visit the Computer Center.

71. In September 1982 a declaration was signed at the *Pontifical Academy* of Sciences by representatives of thirty-six science academies, including the United States, the United Kingdom, France, and the Soviet Union, stating that nuclear weapons should not be either instruments of politics or war. Velikhov, "Sovetskaia programma," 24.

72. Later Velikhov became an informal science advisor for Gorbachev on nuclear issues. Velikhov and Moiseev were put in charge of a scientific council that dealt with the consequences of Chernobyl. Barth, "Catalysts of Change," 185, 195.

73. Weick, *The Social Psychology of Organizing*.

74. Clarke, *Mission Improbable*, 36.

75. Badash, *A Nuclear Winter's Tale*, 47–116.

76. The empirical data and causal relations were provided by experimental studies in atmosphere and ecology research, but drawn by way of analogy from rather exotic studies, such as the investigations of dust clouds on Mars and in the stratosphere, related to the project Mariner 9 (1971) and historical cases of smoke emissions, such as Tambora volcanic eruptions and large urban fires.

77. I base this account on Aleksandrov's report, filed in the archives of the Russian Academy of Sciences. Oddly, the files do not seem to be complete; for instance, other sources mention the participation of Moiseev and Golitsyn, although this was not indicated by Aleksandrov or other documents. Also, the consulted files do not contain reports from the Washington conference launching the nuclear winter report. ARAN, f.1918, op.1, d.522.

78. ARAN, f.1918, op.1, d.522, l.7, 8.

79. Aleksandrov was also receptive to Sagan's note that there may be a migration of dust clouds from the Northern hemisphere to the Southern hemisphere. ARAN, f.1918, op.1, d.522, l. 13.

80. The interviews testify to the fact that Velikhov was inspired to establish this committee by Lown, who insisted that Velikhov needed "a think tank" in order to have better access to policy makers. Evangelista, *Unarmed Forces*, 160.

81. Velikhov, "Sovetskaia programma," 3, 19.

82. von Hippel, "Gorbachev's Unofficial Arms-Control Advisors," 41.

83. Evangelista, *Unarmed Forces*, 51–52; Holloway, *Stalin and the Bomb*.

84. Velikhov, "Sovetskaia programma," 6. See also Anatolii Dorodnitsyn, ed., *Ekologicheski i demograficheskie posledstviia iadernoi voiny* (Moscow: Nauka, 1986).

85. Hersh, "Mathematics Has a Front and a Back."

86. Interview 34, April 5, 2013; Interview 31, April 10, 2013.

87. Moiseev et al., *Chelovek i biosfera*, 108.

88. Moiseev, *Kak daleko*, 245.

89. Svirezhev, *Ecological and Demographic Consequences*, 31–52.

90. Eden, *Whole World on Fire*, 290.

91. Maurice Marois, ed., *Documents pour l'histoire,* vol. 3, *Les grandes conférences internationales: l'homme et la planète* (Paris: Editions Rive Droite, 1997), 249.

92. Marois, *Documents pour l'histoire,* 250.

93. Because I did not find support for this in the archival records of the Computer Center, I base this statement on my interview with a member of the group (Interview 31, April 10, 2013). Also, in his memoir Moiseev wrote that he spoke about nuclear winter at the Helsinki meeting. See Moiseev, *Kak daleko.*

94. Aleksandr Tarko and Valerii Parkhomenko, "Iadernaia zima: istoriia voprosa i prognozy," *Biosfera* 3, no. 2 (2011): 164–173.

95. Interview 31, April 10, 2013.

96. Nikita Moiseev, *Razmyshlenie o sovremennoi politologii* (Moscow, 1999).

97. Another roundtable discussing the international physicians' movement was broadcast by Ostankino in June 1982. Evangelista, *Unarmed Forces*, 155.

98. The project was implemented by Gosteleradio and the Unison Corporation. For more, see Helene Keyssar, "Space Bridges: The U.S.-Soviet Space Bridge Resource Center," *PS: Political Science and Politics* 27, no. 2 (1994): 247–253. At that time the broadcasted Soviet-American discussions were not completely glossed, but often featured quite sharp debates and disagreements; see Ellen Mickiewicz, *Split Signals: Television and Politics in the Soviet Union* (Oxford: Oxford University Press, 1992), 50–53.

99. Vladimir Pozner, *Parting with Illusions* (New York: Atlantic Monthly Press, 1990), 253, 228; V. V. Mukusev, *Razberemsia: fragmenty interv'u, vystuplenii, stati, stsenarii i rassledovaniia raznykh let* (Moscow: Nauka, 2007), 56.

100. Erlich et al., *The Cold and the Dark: The World after Nuclear War* (New York: W. W. Norton, 1984).

101. Interview 33, February 14, 2014.

102. On the initiative of Allen, with representatives of Internews, Kim Spencer of Internews negotiated with Gosteleradio. Erlich et al., *The Cold and the Dark*, xviii–xix.

103. According to Greenaway, Thomas Malone was instrumental in convincing SCOPE to undertake the project which was to become ENUWAR, using his informal method of telephoning. Greenaway also noted that SCOPE only sought to deliver "objective" and "hard data" to the policy makers, as opposed to concrete policy guidelines. Frank Greenaway, *Science International: A History of the International Council of Scientific Unions* (Cambridge: Cambridge University Press, 1996), 179.

104. White, "SCOPE," 9.

105. "Otchet," May 1984, ARAN, f.1918, op.1, d.546, l.15–16.

106. See, for instance, Peter C. Sederberg, ed., *Nuclear Winter, Deterrence and the Prevention of Nuclear War* (Westport, CT: Praeger: 1986).

107. It was Leo Szilard who in 1964 voiced the idea that scientists' meetings that would not be torn by political tensions should be funded by the Vatican. In 1982 the *Pontifical* Academy of Sciences held a meeting on the nuclear arms race at which Velikhov represented the Soviet side. Evangelista, *Unarmed Forces*, 158.

108. Velikhov, "Sovetskaia programma," 21, 23.

109. Moiseev et al., *Chelovek i biosfera*, 126.

110. Schneider, interview.

111. "Otchet," 1985, ARAN, f.1918, op.1, d.568, l.2.

112. "Otchet," ARAN, f.1918, op.1, d.546, l.2–3.

113. Interview 31, April 10, 2013.

114. ARAN, f.1918, op.1, d.585, l.3, 17.

115. The total five-year budget for the project was 137,200 / 77,700 rubles. Svirezhev's group received 68,700 / 49,000 rubles. ARAN, f.1918, op.1, d.540, l.2, 25; Dorodnitsyn, *Matematicheskie modeli ekosistem,* 9.

116. Interview 31, April 10, 2014.

117. Moiseev, *Kak daleko*.

118. Nikita Moiseev and I. T. Frolov, "Vysokoe soprikosnovenie: obshchesto, chelovek, i priroda v vek mikroelektroniki, informatiki i biotekhnologii," *Voprosy filosofii* 9 (1984): 40.

119. For instance, a commentary on Gorbachev's "new thinking" stated that the United States posed nothing less than an "anthropogenic threat" and explicitly referred to Vernadskii in describing the world as a noosphere. V. M. Gavrilov and M. Iu. Sitnina, "Militarizatsiia kosmosa: novaia global'naia ugroza," *Voprosy filosofii* 11 (1985): 98–99.

120. Viktor Los', "Global'nye problem kak predmet kompleksnykh nauchnykh issledovanii (Nekotorye itogi izucheniia global'nykh protsessov mirovogo razvitiia)," *Voprosy filosofii* 12 (1985): 3–17.

121. Vadim Zagladin, "Programmnye tseli KPSS i global'nye problemy," *Voprosy filosofii* 2 (1986): 3.

122. Moiseev et al., *Chelovek i biosfera*, 5.

123. Schneider, interview, 110.

124. Moiseev et al., *Chelovek i biosfera*, 9. For more on Vernadskii, see Vaclav Smil, *The Earth's Biosphere: Evolution, Dynamics and Change* (Cambridge, MA: MIT Press, 2003). Some environmental modelers were acutely aware of the implications of this instrument on the notions of human agency and control. Science intertwined with philosophy and the history of ideas in a serendipitous way: for instance, it was during his stay at the IIASA in 1984 that Rafal Serafin, a Polish scientist, wrote the report connecting the ideas of Vernadskii, de Chardin, Lovelock, and Moiseev.

125. Moiseev, *Kak daleko*, 235.

126. Norbert Wiener, Arturo Rosenblueth, and Julian Bigelow, "Behavior, Purpose and Teleology," *Philosophy of Science* 10, no. 1 (1943): 18–24.

127. Moiseev et al., *Chelovek i biosfera*, 9.

128. Barth, "Catalysts of Change."

129. Focusing on the role of Sagan, Lynn Eden suggests that the nuclear winter campaign was mainly directed toward the "outside," building "public and political support" for the reduction of nuclear arms, whereas fire researchers, such as Hal Brode, played "an inside game," addressing the internal needs of this research area. However, this thesis suffers from "the Sagan effect": the nuclear winter study was also part of the inside game, as it was successfully used to increase the priority status of atmosphere research. Eden, *Whole World on Fire*, 240–241.

130. Moore, *Disrupting Science*; Albert O. Hirschman, *Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States* (Cambridge, MA: Harvard University Press, 1970).

131. Naomi Oreskes and Erik M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (New York: Bloomsbury, 2010). I base this on the study of Leon Gouré's file at the Hoover Institution Archives.

132. Moiseev et al., *Chelovek i biosfera*, 11.

7. ACID RAIN

1. Göran Sundqvist, "Fewer Boundaries and Less Certainty: The Role of Experts in European Air Policy," in *Governing the Air: The Dynamics of Science, Policy, and Citizen Interaction*, ed. Rolf Lidskog and Göran Sundqvist (Cambridge, MA: MIT Press, 2011), 203–207.

2. Robert G. Darst, *Smokestack Diplomacy: Cooperation and Conflict in East-West Environmental Politics* (Cambridge, MA: MIT Press, 2001), 15, 21.

3. VanDeveer, "Ordering Environments"; Duncan Liefferink, *Environment and the Nation State: The Netherlands, the European Union and Acid Rain* (Manchester, UK: Manchester University Press, 1996). See also Lidskog and Sundqvist, eds., *Governing the Air,* and Anthony Patt, "Separating Analysis from Politics: Acid Rain in Europe," *Review of Policy Research* 16, nos. 3–4 (1999), 104–137. For documentation, see Joseph Alcamo, Roderick Shaw, and Leen Hordijk, *The RAINS Model of Acidification: Science and Strategies at Europe* (Dordrecht: Kluwer Academic, 1990).

4. Albert Weale, *The New Politics of Pollution* (Manchester, UK: Manchester University Press, 1992).

5. Lidskog and Sundqvist, *Governing the Air*.

6. Interview 26, March 20, 2013.

7. C. S. Holling to Allan Hirsch, October 29, 1981, Folder Resources & Environment Core/Acid Rain, IIASA Archives, Laxenburg, Austria.

8. Lidskog and Sundqvist, *Governing the Air*.

9. Valentin Sokolovskii, "Fruits of a Cold War," in *Clearing the Air: 25 Years of the Convention on Long-Range Transboundary Air Pollution*, ed. Johan Sliggers and Willem Kakebeeke (New York: UN Economic Commission for Europe, 2004), 7–14.

10. Sokolovskii, "Fruits of a Cold War"; Alcamo et al., *The RAINS Model*.

11. Darst, *Smokestack Diplomacy*, 99.

12. "USSR's participation in IIASA's transboundary air pollution study," Eliodoro Runca, February 4, 1983, IIASA Archives, Laxenburg, Austria; C. S. Holling to Iurii Izrael', February 17, 1983, IIASA Archives, Laxenburg, Austria.

13. Iurii Izrael' et al., *Kislotnye dozhdi* (Leningrad: Gidrometeoizdat, 1983).

14. "Izrael' Iurii Antonievich," *The Ministers of the Soviet Era.* http://www.minister.su/article/1248.html. Accessed March 19, 2016.

15. "Valentinu Georgievichu Sokolovskomu 85 let," *Priroda Rossii*. http://www.priroda.ru/events/detail.php?ID=10865. Accessed March 19, 2016.

16. Darst, *Smokestack Diplomacy,* 95.

17. "Rapporteur notes," NAS meeting, Washington, DC, March 9, 1973, IIASA Archives, Laxenburg, Austria.

18. John M. R. Stone to M. Kirby, December 3, 1981, folder "Resources & Environment Core/Acid Rain." IIASA Archives, Laxenburg, Austria.

19. Eliodoro Runca to C. S. Holling, August 16, 1982, IIASA Archives, Laxenburg, Austria.

20. Darst, *Smokestack Diplomacy,* 96.

21. Eliodoro Runca and T. Jozseffi to C. S. Holling, June 16, 1982, IIASA Archives, Laxenburg, Austria; "Acid Rain," *Options* 1 (1984), 4.

22. The IIASA scientists simultaneously developed a proposal to model a decision-aid for US-Canadian transboundary pollution. A model to address North American acid rains was developed at NCAR in the summer of 1983, funded by the Environmental Protection Agency and the National Science Foundation.

23. I base this on the correspondence kept in the folder "1983, Env-Tasks Acid Rain," IIASA Archives, Laxenburg, Austria.

24. Allan Hirsch to Chester Cooper, January 28, 1983, IIASA Archives, Laxenburg, Austria.

25. C. S. Holling to Dzhermen Gvishiani, February 10, 1983, IIASA Archives, Laxenburg, Austria.

26. Kauppi to Leen Hordijk, October 9, 1984, IIASA Archives, Laxenburg, Austria.

27. Project description by C. S. Holling, "Transboundary Air Pollution: Acid Rain," February 11, 1983, 2, IIASA Archives, Laxenburg, Austria.

28. Klaus A. Sahlgren to C. S. Holling, March 1, 1983, IIASA Archives, Laxenburg, Austria.

29. Allan Hirsch to Janusz Kindler and Eliodoro Runca, February 14, 1983, IIASA Archives, Laxenburg, Austria.

30. Leen Hordijk to Thomas Lee, October 25, 1984, IIASA Archives, Laxenburg, Austria.

31. Report by Leen Hordijk, "Acid Rain," January 1985, 1, IIASA Archives, Laxenburg, Austria.

32. The long-range transport model was produced by EMEP, which refers to the Cooperative Program for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe.

33. Göran Persson to Eliodoro Runca, February 7, 1983, 2, IIASA Archives, Laxenburg, Austria.

34. Outline of IIASA study, "Acid Rain," draft, circa April 1983, 1–5, IIASA Archives, Laxenburg, Austria.

35. C. S. Holling to research leaders, March 17, 1983, IIASA Archives, Laxenburg, Austria.

36. Allan Hirsch to Igor' Ganin, May 10, 1983, IIASA Archives, Laxenburg, Austria.

37. Eliodoro Runca to C. S. Holling, September 8, 1983, IIASA Archives, Laxenburg, Austria.

38. Eliodoro Runca to J. Kindler, memo report, June 9, 1983, IIASA Archives, Laxenburg, Austria.

39. Allan Hirsch to Eliodoro Runca, June 13, 1983, IIASA Archives, Laxenburg, Austria.

40. United Nations Economic Community for Europe to C. S. Holling, September 1, 1983, IIASA Archives, Laxenburg, Austria.

41. Jenny Andersson, "The Great Future Debate."

42. Leen Hordijk to Vitalii Kaftanov, October 6, 1983, folder "Env-Tasks Acid Rain." IIASA Archives, Laxenburg, Austria.

43. C. S. Holling, Program/Project Summary Sheet, February 1983, 1–2, IIASA Archives, Laxenburg, Austria.

44. I base this and other personal details on my conversation with the scientist involved in the acid rain project.

45. Eliodoro Runca to J. Kindler, a memo report, June 9, 1983, IIASA Archives, Laxenburg, Austria.

46. Leen Hordijk to C. S. Holling, July 2, 1984, IIASA Archives, Laxenburg, Austria.

47. Jag S. Maini to Chester Cooper, May 29, 1984, IIASA Archives, Laxenburg, Austria.

48. Leen Hordijk to Alcamo et al., May 3 1984, WMO Meeting in Garmisch-Partenkirchen, April 30 through May 4, 1984, IIASA Archives, Laxenburg, Austria.

49. Shell transferred 34,800 Austrian schillings to the acid rain project. Leen Hordijk to ACI members, September 6, 1984; Leen Hordijk to Chester Cooper, August 3, 1984, IIASA Laxenburg; Outside Funds Report, March 26, 1985, IIASA Archives, Laxenburg, Austria.

50. James Fay to Thomas Lee, 10 November 1984, IIASA Archives, Laxenburg, Austria.

51. Allan Hirsch to Chester Cooper, September 27, 1984, IIASA Archives, Laxenburg, Austria.

52. Leen Hordijk to Chester Cooper, September 7, 1984, IIASA Archives, Laxenburg, Austria.

53. Darst, *Smokestack Diplomacy,* 96.

54. Leen Hordijk to C. S Holling, February 9, 1984, IIASA Archives, Laxenburg, Austria.

55. Leen Hordijk to C. S Holling, July 30, 1984, IIASA Archives, Laxenburg, Austria.

56. Klaus A. Sahlgren to C. S Holling, August 30, 1984, IIASA Archives, Laxenburg, Austria.

57. The British study was led by C. S. Watson of Cambridge. Leen Hordijk to ACI Group, October 2, 1984, IIASA Archives, Laxenburg, Austria.

58. C. S Holling to Eliodoro Runca, July 11, 1983, IIASA Archives, Laxenburg, Austria.

59. Leen Hordijk to Paul Medow, February 13, 1985, IIASA Archives, Laxenburg, Austria.

60. "Abstract of IIASA Acid Rain Project," January–July 1984, 1–3, IIASA Archives, Laxenburg, Austria.

61. Donella Meadows and J. M. Robinson, *The Electronic Oracle: Computer Models and Social Decisions,* reprinted with forward by Dennis Meadows and John Sterman. (Albany, NY: System Dynamics Society, 2007).

62. "The IIASA Acid Rain Interactive Model: A Brief Overview and Some Very Preliminary Results," February 10, 1984, IIASA Archives, Laxenburg, Austria.

63. Leen Hordijk to Thomas Lee, September 30, 1984, IIASA Archives, Laxenburg, Austria.

64. Leen Hordijk to Chester Cooper, "Briefing for T. Lee," July 30, 1984, 1–2, IIASA Archives, Laxenburg, Austria.

65. F. Kenneth Hare to C. S. Holling, July 11, 1984, IIASA Archives, Laxenburg, Austria.

66. "Abstract of IIASA Acid Rain Project," January–July 1984, 5, IIASA Archives, Laxenburg, Austria.

67. "Outline of IIASA study 'Acid Rain' " (draft, circa April 1983), 4, IIASA Archives, Laxenburg, Austria.

68. The term "maps over time" was used to describe computer-generated images of scenarios, see letter from Wolf-Dieter Grossmann to Boris Segerstahl, March 7, 1984, IIASA Archives, Laxenburg, Austria.

69. Sokolovskii, "Fruits of a Cold War," 12.

70. C. S. Holling to Godwin Obasi, May 7, 1984, IIASA Archives, Laxenburg, Austria.

71. Interview 37, October 22, 2014.

72. Brenda Marder, "A Master of Openness without Disclosure," *Brandeis Review* 7, no. 1 (1987).

73. See letter from Leen Hordijk to Andersson, August 3, 1984, IIASA Archives, Laxenburg, Austria.

74. Leen Hordijk to Chester Cooper, "Briefing for T. Lee," July 30, 1984, 1–2, IIASA Archives, Laxenburg, Austria.

75. Thomas Lee to Iurii Izrael', September 26, 1985, IIASA Archives, Laxenburg, Austria.

76. Chester Cooper to Ganin, July 31, 1984, IIASA Archives, Laxenburg, Austria. Bert Bolin and Paul Crutzen participated in the IIASA feasibility study for ICSU/SCOPE.

77. "Sostav," June 10, 1985, IIASA Archives, Laxenburg, Austria.

78. Thomas Lee to Iurii Izrael', January 17, 1985, IIASA Archives, Laxenburg, Austria; Vitalii Kaftanov to Thomas Lee, January 14, 1985, IIASA Archives, Laxenburg, Austria.

79. William Clark to Vitalii Kaftanov, January 11, 1985, IIASA Archives, Laxenburg, Austria; William Clark, "Organization of the USSR Biosphere Meeting: Tasks in Need of Attention," January 11, 1985, IIASA Archives, Laxenburg, Austria.

80. Fitzhugh Green, "Sparks of Bilateral Congeniality," *EPA Journal* 13, no. 1 (1987): 38.

81. Interview 26, March 20, 2013.

82. Atsushi Ishii, "Scientists Learn Not Only Science but Also Diplomacy: Learning Processes in the European Transboundary Air Pollution Regime," in *Governing the Air: The Dynamics of Science, Policy, and Citizen Interaction*, ed. Rolf Lidskog and Göran Sundqvist (Cambridge, MA: MIT Press, 2011), 183.

83. As in the case of the nuclear winter project, the RAINS model was criticized by the Americans who had a more sophisticated model, but theirs took much longer to run than the IIASA model.

84. Marie-Laure Djelic and Sigrid Quack, eds. *Transnational Communities: Shaping Global Economic Governance* (Cambridge: Cambridge University Press, 2010).

85. Eden, *Whole World on Fire*.

86. Leen Hordijk to C. S. Holling, February 9, 1984, IIASA Archives, Laxenburg, Austria.

87. Arbatov, "Where Should We Go from Here." For more about the institutionalization of environmental crisis management in the Soviet Union as a result of the series of disasters, see Marc Elie, "Late Soviet Responses to Disasters, 1989–1991: A New Approach to Crisis Management or the Acme of Soviet Technocratic Thinking?" *Soviet and Post-Soviet Review* 40, no. 2 (2013): 214–238.

EPILOGUE

1. Edwards, *The Closed World*, 1.

2. Stephen Gill, "The Global Panopticon? The Neoliberal State, Economic Life, and Democratic Surveillance," *Alternatives: Global, Local, Political* 20, no. 1 (1995): 1–49.

3. The systems approach, in this way, is an example of what sociologist Tony Bennett calls a "liberal government via milieu," an idea that involves technical infrastructure and material settings. However, if for Bennett government via milieu is a top-down strategy, where the elites steer subordinate subjects who were unable to self-regulate themselves, the Soviet system-cybernetic governmentality may be called bottom-up governance via milieu, wherein scientific experts seek to set limits on the activities of the Communist Party. See Tony Bennett, *Making Culture, Changing Society* (New York: Routledge, 2013), 36–37.

4. Dean, "Liberal Government," 42.

5. Here I refer, first and foremost, to the work of Aaron Wildavsky and Russell Ackoff, specializing in "mess" or ill-structured problems. See also David Dery, *Problem Definition in Policy Analysis* (Lawrence: University Press of Kansas, 1984); Peter deLeon, *Advice and Consent: The Development of the Policy Sciences* (London: Russell Sage, 1989); and studies conducted by Mark Thompson at IIASA.

6. "An Assessment of IIASA's Position and Potential in Today's World," September 1987, 4, IIASA Archives, Laxenburg, Austria.

7. Pickering, *The Cybernetic Brain*, 19.

8. Ibid., 32.

9. Roland Barthes, *Mythologies* (London: Vintage, 1993), 139.

10. Foucault, *Security, Territory, Population*, 101.

11. On restructuring policies and Gvishiani, see Anders Åslund, "Gorbachev's Economic Advisors," in *Milestones in Glasnost and Perestroyka: Politics and People,* ed. Edward A. Hewett and Victor Winston (Washington, DC: Brookings Institution, 1991), 74–94.

12. See an interview by David Todd and David Weisman with Gerald North, Part 3 of 3, March 4, 2008, Conservation History Association of Texas, Texas Legacy Project Records. http://av.cah.utexas.edu/index.php?title=TexLegacyProj:North_gerald_2438&gsearch=gerald%20north. Accessed March 18, 2016. North visited the Soviet Union for the first time in 1976 and then again to participate at Aleksandrov's seminar in Vilnius, Lithuania, in 1981.

13. Evgenii Velikhov, "Sovetskaia programma mira," 9–10.

14. Moiseev, *Kak daleko*.

15. Loren Graham and Irina Dezhina, *Science in the New Russia: Crisis, Aid, Reform* (Bloomington: Indiana University Press, 2008).

16. Eglė Rindzevičiūtė, "The Birth of the Soviet Anthropocene: Nikita Moiseev and the Transformation of Soviet Governmentality" (paper presented at the Ninth World Congress

of the International Council for East European Studies, Makuhari, Japan, August 3–8, 2015).

17. Sven Erik Jørgensen, "Obituary for Yuri Svirezhev," *Ecological Modelling* 216, no. 2 (2008): 81–88.

18. Dmitrii Pisarenko, "Utechka 'mozgov': kak vernut' rosiiskikh uchenykh?" *Argumenty i fakty* (March 21, 2012). http://www.aif.ru/society/education/31975. Accessed March 18, 2016.

19. Nikita Moiseev, *To Be or Not To Be: Humanity's Dilemma* (Moscow: Noosphere, 2002), 21.

20. For a discussion of bureaucracy and new modes of management, see Paul du Gay, "New Spirits of Public Management . . . 'Post-Bureaucracy,'" in *New Spirits of Capitalism? Crises, Justifications, and Dynamics,* ed. Paul du Gay and Glenn Morgan (Oxford: Oxford University Press, 2013), 274–293. For privatization of expertise see Diane Stone, *Knowledge Actors and Transnational Governance: The Private-Public Policy Nexus in the Global Agora* (Basingstoke, UK: Palgrave, 2013).

21. Alexandr Styhre, *Management and Neoliberalism: Connecting Policies and Practices* (New York: Routledge, 2014).

22. Davies, *The Limits of Neoliberalism*; Stephen Collier, *Post-Soviet Social: Neoliberalism, Social Modernity, Biopolitics* (Princeton, NJ: Princeton University Press, 2011).

23. For an outline of the history of evidence-based policy in the area of public health, see Katherine Smith, *Beyond Evidence-Based Policy in Public Health: The Interplay of Ideas* (Basingstoke, UK: Palgrave Macmillan, 2013).

24. Bockman, *Markets in the Name of Socialism*, 2; Johanna Bockman and Gil Eyal, "Eastern Europe as a Laboratory for Economic Knowledge: The Transnational Roots of Neoliberalism," *American Journal of Sociology* 108, no. 2 (2002): 310–352.

25. Bockman, *Markets in the Name of Socialism*, 216–217.

26. Bockman attributes the following reforms as a neoliberal package: deregulation, liberalization of trade and capital flows, anti-inflationary stabilization, and privatization of state enterprises. Bockman, *Markets in the Name of Socialism*, 4.

27. The first IIASA distinguished lecture was delivered by the Russian economist Abel' Aganbegian, the public face of Gorbachev's economic reforms.

28. Daniel Stedman Jones, *Masters of the Universe: Hayek, Friedman, and the Birth of Neoliberal Politics* (Princeton, NJ: Princeton University Press, 2013), 7–8. For the central role of the Institute of Economic Affairs in the development of a network of neoliberal experts, see Marie-Laure Djelic, "Spreading Ideas to Change the World: Inventing and Institutionalizing the Neoliberal Think Tank." http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2492010. Accessed March 18, 2016.

29. P. O. Aven, S. S. Shatalin, and F. Schmidt-Bleek, "Economic Reform and Integration, Proceedings of March 1–3, 1990 Meeting" (CP-90-4, July 1990), iii–iv, IIASA Archives, Laxenburg, Austria.

30. In his memoir, Richard Rose writes that it was at IIASA that he was persuaded by Russian economist Petr Aven to conduct a comparative survey on public opinion in Russia and Eastern Europe. Then the neoliberal Institute of Economic Affairs gave him an initial grant to conduct a Russian study. Richard Rose, *Learning about Politics in Time and Space* (Colchester, UK: ECPR, 2013), 133–134.

31. I have begun this inquiry in Rindzevičiūtė, "The Future as an Intellectual Technology."

32. Susanne A. Wengle, "Engineers versus Managers: Experts, Market-Making and State-Building in Putin's Russia," *Economy and Society* 41, no. 3 (2012): 435–467.

33. For more on Georgii Schedrovitskii, see Rindzevičiūtė, "The Future as an Intellectual Technology."

34. Iver B. Neumann, "Russia as a Great Power, 1815–2007," *Journal of International Relations and Development* 11, no. 2 (2008): 128–151; Rindzevičiūtė, "The Future as an Intellectual Technology."

35. Wengle, "Engineers versus Managers," 444.

36. Edward Lucas, *The New Cold War: Putin's Russia and the Threat to the West* (London: Bloomsbury, 2009).