

The political life of prediction. The future as a space of scientific world governance in the Cold War era

Jenny Andersson, Egle Rindzeviciute

▶ **To cite this version:**

Jenny Andersson, Egle Rindzeviciute. The political life of prediction. The future as a space of scientific world governance in the Cold War era. 2012. hal-01361235

HAL Id: hal-01361235

https://sciencespo.hal.science/hal-01361235

Preprint submitted on 6 Sep 2016

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

LES CAHIERS EUROPEENS DE SCIENCES PO.

> N° 04/2012

The political life of prediction The future as a space of scientific world governance in the Cold War era

> Jenny Andersson

> Eglė Rindzevičiūtė

SciencesPo. | Centre d'études européennes

Les Cahiers européens de Sciences Po.

n° 04/2012

December 2012

JENNY ANDERSSON
EGLĖ RINDZEVIČIŪTĖ

The political life of prediction
The future as a space of scientific world governance in the Cold War era

Jenny Andersson is CNRS researcher at CEE, Sciences Po. She is the author of several studies on the transformation of social democracy (*Between Growth and Security. Swedish Social Democracy from a Strong Society to a Third Way*, Manchester University Press, 2006, *The Library and the Workshop. Social Democracy and Capitalism in an Age of Knowledge*, Stanford University Press, 2010) and a number of articles on the history of prediction and futures studies, most recently "The great future debate and the struggle for the world", in *American Historical Review*, vol.117, nr 5 December 2012, p. 1411-1431.

Contact: jenny.andersson@sciences-po.fr

Eglė Rindzevičiūtė received her PhD in Culture Studies from Linköping University, Sweden in 2008 and is currently a Researcher at CEE, Sciences Po within the ERC-funded research project FUTUREPOL. She is the author of *Constructing Soviet Cultural Policy: Cybernetics and Governance in Lithuania after World War II* (2008) and many peer reviewed articles and book chapters about the history of contemporary governance in Europe.

Contact: egle.rindzeviciute@sciences-po.fr

The political life of prediction
The future as a space of scientific world governance in the Cold War era

Abstract

This working paper explores the role of the future as a space of scientific exchange and dialogue in the Cold War period. We argue that in East and West the governance of the future were understood as both intellectual and technical problem that, importantly, challenged existing notions of the nature of liberal democratic and communist political regimes. Casting the future as a governable sphere led to the development of new forms of scientific governance which sought explicitly to depoliticize the future and turn it into a new transnational domain of technocratic politics. The paper focuses on the parallels and exchanges among American and Soviet futurologists. East-West collaboration was essential to the invention of the future as a governable technoscientific space, situated beyond political dispute.

Citation : Jenny Andersson & Eglė Rindzevičiūtė (2012), "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*****, n°04.**

Introduction

Problems to do with prediction, futurity and anticipation are rapidly coming to the forefront of social science in a range of different disciplines, for instance in political sociology and social studies of science and technology (STS) and anthropology (Brown and Michael 2003, Adam 2005, Mallard and Lakoff 2010). To this we can add a number of key works in the history of science (Rosental 2003, Dahan Dalmedico 2007, Hartmann and Vogel 2010).This emerging interest in the history of prediction has been underpinned by a growing focus on the circulation of ideas (Kott 2008, Connelly 2009) and on the transnational as a particular site of production of knowledge and policy (Guilhot 2008).

However, the emergence of forecasting, futurology, or futures studies, activities that shared their interest in predicting or scientifically enacting long term changes, on both sides of the Iron Curtain in the 1960s and 1970s, are hitherto little studied. Holding that these developments have ever so much to say about the interplay between new manifestations of scientific production and constellations of political power in this period (see Andersson 2012), this paper pinpoints predictive knowledge and technologies and their role in shaping a particular scientific approach to policy making in the period from the 1960s on. A particular focus is on the role of prediction as a new form of transnational science in this period and the idea of the future as a particular space of neutral or apolitical governance.

We focus on forecasting, a particular type of predictive knowledge, a transnational field that developed in and through a range of contacts between scientists, experts and policy makers in the transnational arena. In addition, not only did such expert activity take place beyond the boundaries of the nation state, but forecasting also emerged as a particular form of expertise that was specifically about world order and the global. We explore the ways in which forecasting was developed to intervene into world order, particularly East West relations, and the way that it aimed to structure a common field of intervention for scientists and policy makers on both sides of the Iron Curtain. As shown in recent Cold War studies, East-West collaboration was indeed constitutive for the creation of specific scientific expert knowledge practices (Sarasmo and Miklossy 2011). Framed as rational (although both sides understood rationality in clearly ideological and political terms) and as a neutral space of possible interaction, forecasting was in fact an instrument that facilitated emerging structures of global governance, as we show in the case of the IIASA.

From the late 1960s and early 1970s forecasting systematically articulated an idea of common futures, of future challenges that would impact countries, populations and natural environments around the globe. The idea of common long-term problems for all Mankind was used as a device to establish connections between the opposing political regimes in East and West. Such projections of world futures as global, i.e. originating in common challenges that could not be coped with on the national level of governance, were to a large extent dependent on key breakthroughs in science and technology as well as the organisation of technoscientific production from the 1960s on. Here the key breakthroughs were the rise of computer modelling that allowed for simulation of the future states and interdependences of increasingly complex system, as well as the emerging global networks of scientists. It is therefore very interesting to explore the way in which forecasts postulated that some future issues were global and suggested that these issues had to be governed on a transnational level. Since the global was ridden by ideological and military confrontation between capitalism and communism, the new "policy sciences" (see OECD 1964) were invented as a possible politically neutral ground for managing global futures. Within this realm, potentially divisive issues not only within but also between countries could be addressed. Cold War technoscience developed not only as a kind of diplomatic language of expertise, used by both the governments and private foundations, as suggested by a previous historic orientation around diplomatic and cultural history (Ninkovich 1981, Dittman 2001, Yale 2003, Riska Campbell 2011), but as a quintessentially political form of depoliticizing of control and constructions of world order by placing them in the field of science (see a similar argument made by Clemens 1990).

In line with recent studies of scientific transfers in East West relations, we suggest that Cold War struggle for super power supremacy assumed particular forms that involved defining global issues and tackling them through collaboration in spheres that were constructed as non-ideological (Rindzeviciute 2010). Forecasting, being a form of technical expertise for resolving highly strategic issues of control, planning, security and military interests on both sides, was particularly indicative of this. Forecasting relied on cybernetics and systems analysis: theoretical frameworks that incorporated prediction as an essential component of governance and control and emerged in the 1940s.In the field of forecasting, there was mutual interest from American and Soviet scientists to follow the methodological advances of the other, and governments shared this interest in an area understood at the time as strategic not least because of the nuclear threat. Such interactions, ranging from espionage and monitoring to translation of texts and even direct collaborations, were in place in the period from the mid-1960s on, and they set the scene for collaboration at a later stage

of Cold War relations when more direct forms of interaction at co-organised conferences, publications and even institutions were developed.

We suggest that this shift in the content and use of prediction, from a tool of war (radar tracking, arms race), competition (market research) and rivalry (technological innovation), to ideas of common challenges was made possible through re-invention of technoscientific governance. The history of this new type of governance was tightly connected to the development of systems analysis. The idea of East-West institute, which was to become the International Institute of Applied Systems Analysis (IIASA, established by the US and Soviet governments in Laxenburg, Austria in 1972), was initiated by John F. Kennedy's and Lyndon B. Johnson's governments in the mid-1960s. A sustained East-West collaboration at IIASA was envisioned as a platform to forge a new mode of interaction between authoritarian and liberal democratic regimes. While part of our paper focuses on the role of IIASA, our intention is to write neither an institutional nor diplomatic history of prediction. Instead we will lay out the simultaneous construction of new scientific knowledge (forecasting and systems analysis), a new political world order (where non-state actors take an increasingly important role) and a new type of governance (which relies on scientific expertise that transcends national boundaries). In our view, this pushes the analysis of prediction from the genealogies of scientific production as such, to an analysis of the way that both the construction and use of prediction is a matter of power and political play, particularly in the East West relations that we study.

This paper consists of three sections: first, we discuss the emergence of a global field of prediction, and the actors and networks that structure it in the long period of the Cold War on both sides of the Iron Curtain. Second, we lay out the idea of common future challenges which emerged in the period from the late 1960s to the early 1970s, and third, we focus on the creation of the IIASA as an embodiment of these ideas of a neutral space of scientific governance.

The emergence of a global field of prediction: from war games to the post-industrial society

The interest in various forms of prediction – forecasting, scenario methods, technology assessment, systems theory, cybernetics, futurology or futures studies – boomed in the period from the mid-1960s to the mid-1970s with a surge in reports emanating from scientists associated with a number of institutions such as the American RAND corporation, the OECD, and eventually, the IIASA. From the mid-1960s, following the publication of a

number of reports aimed at a high level of policy planning, such as the 1964 Delphi study at RAND (Helmer and Gordon 1964). Eric Jantsch' OECD paper on technological forecasting (Jantsch and OECD 1967), or the OECD report on science policy in 1964, forecasting emerged as what might really be described as a new gospel. Pervasive spread of forecasting in many diverse disciplines and sectors could be compared with scientific management and rationalization discourse that came to dominate the interplay between social science and policy in the interwar period.

The promise of this new gospel was to provide new analytical tools for understanding "complex societies" or societies that were perceived, in the mid- to late 1960s, as moving rapidly and confusingly from stable forms of industrial capitalism to much more chaotic and unforeseeable post-industrial structures, where the role of politics as the central organising mechanism was reduced. Post-industrial societies, wrote the sociologist and forecaster Daniel Bell in his 1973 book, A Venture in Social Forecasting, which by then recapitulated thoughts that Bell had first advanced in the networks of forecasters in the mid-1960s , were societies of complexity, that could not be coordinated by existing forms of planning, but required an extension of the horizon both in time and complexity. Post-industrial societies, societies in which information flowed freely, required forecasting, in Bell's interpretation a form of decision theory which could lay out the multitude of potential futures facing decision-makers (Bell 1973).

It can be suggested that the breeding ground for the forecasting was the idea of complexity and uncertainty, the dismissal of linear or evolutionary accounts of growth or progress, and the idea of social development as potentially chaotic. Linear forms of planning were not sufficient in complex systems; hence new forms of anticipation, encompassing ever more factors and ever longer stretches of time, had to be developed. It is important to note that such complexity was perceived as being beyond traditional class-based political ideology – which had in any case by now been dismissed as dead. Forecasting was, like its intellectual sibling systems analysis , often perceived as a quintessentially technocratic activity: at the early stage, forecasts were geared to the producing of closed futures, i.e. reducing complexity and outlining singular paths of development (see Armatte 2007). For instance, as Schmidt Gernig has suggested, a key purpose of forecasting was the creation of new forms of expertise of "policy science", in other words, ways of scientificising policy making (Schmidt Gernig 2003). This effort was well reflected in the design of the Delphi study, produced by Olaf Helmer and Theodore Gordon at Rand in 1964, which was presented as a crucial step in a new scientific approach to policy issues, and this idea of

delineating, in a scientific, systematic and rational way, the options available for decision making, was a central impetus of the new science (Helmer and Gordon 1964).

By its own advocates, forecasting was indeed understood as a new science, which offered the promise of accurate prediction. RAND forecaster Olaf Helmer optimistically argued in a range of papers and articles that forecasting made prediction possible, since science could now, with the help of new analytical tools of computers, amass the totality of available information about ongoing developments. Debates on forecasting were conducted in technocratic terms, meaning that they approached social and political problems as issues of management. In this vein, production of the knowledge about the future was understood as a "social technology" aimed at perfecting human society by forging individual and social choices to better future use. "Selecting among the array of possible futures" was a matter of "great social responsibility" for a new generation of scientists, most of them mathematicians or astrophysicists (Helmer 1964).

The rise of forecasting in the 1960s was linked to several key developments in science going back into the first decade after the war. Already in the 1950s scientists wrote about on-going "cybernation" or a spread of cybernetic sciences as a new universal and transdisciplinary approach (George 1959, Dechert 1966). The influence of cybernetics to great many disciplines has been outlined by, for instance, Celine Lafontaine (2004) who analysed cybernetisation of linguistic structuralism and post-structuralism. In turn, Jon Agar (2003), Slava Gerovitch (2002), Paul N. Edwards (1996) and Philip Mirowski (2002) suggested that origins of "cyborg science", in other words the computer-driven (both technologically and metaphorically) shift in mathematics and economics towards game theory and rational choice theory can be found in the experiments in prediction that stemmed from attempts during the Second World War with cybernetic modelling of airstrikes.

Forecasting was directly related to both the methods and broader mentality of governance as shaped by the cybernetic approach. The father of cybernetics, the American mathematician Norbert Wiener, was rather strongly against using statistical time series to predict other than strictly technical phenomena, e.g. economic or social developments. He held this kind of prediction as being technically flawed, because one could never have the complete data about the initial state of the system in question, be it a population or society (Wiener 1965: 25). However, many other scientists were much more optimistic about the breadth of the uses of prediction.

In addition to cybernetic theory of control via information loops, rationalist approaches such as the development of game theory and simulation following the book by John von

Neumann and Oscar Morgenstern set an influential paradigm in thinking about rationality of political behaviour (von Neumann and Morgenstern 1944, Amadae 2003). Drawing on rules of formal logic, game theory claimed to predict at least several possible moves of the opponent. The possibility of prediction offered by "gaming" was based on the presumption of the rational behaviour of actors, but also on the condition that the actors shared the knowledge about the rules. Game theory was used in a wide variety of approaches to prediction from the 1960s on, maybe most importantly in nuclear strategy and military war games as they were developed particularly at the American RAND Corporation from the early 1960s, but also in the USSR (Kaplan 1991, Connelly et al 2012, Moiseev 1993/2002). It became a central impetus on international relations, where the new scientific methods of prediction were instrumental to the creation of a new field organized around the study of a multitude of different actors whose moves were made predictable based on the presumption of rational material interests of nations (Guilhot 2008).

Despite its self-representation, forecasting was not a neutral activity: it was permeated with political ambitions to increased control. It could be argued that forecasting developed, on both sides of the Iron Curtain, with an eye to both domestic and international struggles over direction and future. In the West, forecasting spread from its origins in military planning, nuclear strategy and war games to cover a range of different activities, including industrial developments and technological forecasting or so called technology assessment, particularly around military technologies and information systems. Forms of social forecasting became prominent particularly from the mid-1960s, drawing on Lazarsfeld's and Parsons' work in applied sociology, tracking patterns of social behaviour, preference formation, electoral shifts (Bell 1973). In the Soviet Union, forecasting of social development was included in the agenda of the Institute for Concrete Social Research at the Soviet Academy of Sciences (est. 1968), theoretical and methodological issues of social forecasting were discussed in the numerous seminars organised by the Soviet Association for Scientific Prognosis (1969-1971) (see also Firsov 2012). In political science, behaviourism and decision theory was at the heart of a range of new approaches. Forecasting was thus not just a particular activity of science, but also allowed for key shifts within the (social) sciences at large – moving them closer to policy and claiming an influence on decision making. In fact the claim to prediction was at the heart of the post war generation of social science, turned to application, use, and decision – and arguably, it was central in new configurations between science and policy East and West.

As we will show, the question of collaboration and bridge-building is crucial, but in the first half of the 1960s, forecasting was dominated by security concerns of the blocs and the

question of rivalry and domination of world order. On the American side, forecasters ranging from the nuclear strategists at RAND to the more dovish sociologists, lawyers or economists – Daniel Bell, Edward Shils, Stephen Graubard, Eugene Rostow – were part of a security political nexus linking the State Department, the Council for Foreign Relations, the Congress for Cultural Freedom (and through the latter the CIA) and the Ford Foundation. This network of actors joined by anticommunism and scientific positivism played a key role in structuring an international field of prediction. From 1960, the Ford Foundation, under the leadership of first Shepard Stone (previous high commissioner for occupied Germany), then McGeorge Bundy (previous national security advisor to Johnson on East West relations, NATO and nuclear strategy), targeted the area of forecasting as one of particular importance for the social sciences. The Ford Foundation had been instrumental in exporting management studies as part of the new post war social sciences to Western and Eastern Europe since the early 1960s, meanwhile Bundy was, according to Gemelli, a strategic mediator in the establishment of IIASA (Gemelli 1998, 2001:197). Forecasting was the next step in this programme, in which management techniques were now to be applied to politics in the domestic as well as the international field.

From the point of view of these American actors, forecasting was a form of modernization theory (Gilman 2003). The "modernization theorists"(Shils, Yale Law School Dean Gene Rostow and his brother Walt, Kenneth Arrow, Karl Deutsch, John Neumann, Oscar Morgenstern) were keenly interested in forecasting, which seemed to offer possibilities for prediction of nuclear strategy and events in international relations, but also in preference shaping and value systems of Western masses, potentially disturbing aspects such as non-conformist social behaviour (for instance, the so-called Commission for the Year 2000 chaired by Bell was highly concerned with the emerging protests against the Vietnam war and the problem of the hippie generation). Forecasters were thus part of a network which was organized around the belief in the foreseeability of tensions between the two different world systems as well as within the world system as a whole (Andersson 2012 and Andersson ongoing).

The development of forecasting in the West was thus strongly influenced by the shifting foreign policies and the American interest in the re-creation of Europe in general. Numerous power struggles, both political and institutional ones, marked the creation of this new domain of knowledge, and it would appear that the perceived need to control potentially volatile and unforeseeable developments domestically and in the international arena went hand in hand, despite the way that previous research has usually targeted the idea of nuclear control. In this context the development of forecasting as a device of technoscientific

governance in the Soviet Union stands out as a similar process of rethinking and reorganising state governance, and as a response to similar issues in the internal as well as the international environment. However, Soviet forecasting was ridden by its own unique issues that will be accounted for in the next section.

Forecasting in the Soviet Union

Forecasting, known in the Soviet Union as both predvidenie and prognozirovanie (foresight and prognosis, in Russian), dated back to the debates on five-year plans in the 1920s. In the discussion about the first Soviet state five-year plan, Vladimir Rudnev-Bazarov proposed that scientific technical innovation was a continuous process and therefore insisted that the Soviet plan should not define the means and goals to a minute detail. Instead the plan should be written as a "plan-prognosis", by which he meant an open process of planning that produced both directives and prognoses, as well as "set the goals and genetically ground the implementation in the scientific basis" (Klebaner 2004:153).

However, under Stalin's rule in 1928-1953, the political context turned to be extremely hostile to this notion of planning. Politically set goals were to be implemented regardless of existing constraints, financial and human costs. In turn, experts' governance was reduced to finding the ways for the implementation of a plan that was set by the top politicians (Kotkin 2007, Josephson 1996). Furthermore, Stalinist governance relied on raw force, arbitrary terror and personal alliances. It was loyalty and not scientific knowledge, or even engineering skills that mattered. Many scientists were prosecuted not exactly because their ideas conflicted with Marxism-Leninism, but because they were unfortunate to be treated by other scientists or party members as personal enemies (Krementsov 1996, Klebaner 2004: 153-155).

After the Second World War, due to both the intensifying Cold War, anti-Western policies and internal political struggles in the Soviet academia many approaches, including Wiener's cybernetics, were officially banned in the Soviet Union as erroneous bourgeois science. The ban was eventually lifted after the famous Khrushchev's speech that rejected Stalinism in 1956. In the late 1950s and early 1960s the Soviet government was increasingly concerned about being left behind the economic development of the Western countries. Some of the pre-Stalin theorists who contributed to the prognosis field were rehabilitated, for example, Konstantin Tsiolkovskii, but not Rudnev-Bazarov. In turn, many Soviet scholars actively engaged in the growing field of cybernetic research that was quickly extended (at least, in theory) to economic, social and humanities fields (Gerovitch 2002, Rindzeviciute

2008). In the context of the experience of Stalin's arbitrary terror, a worldview that proposed orderly systems, self-regulated by cybernetic control, appealed to some Soviet scholars and policy makers as a kind of freedom. In their popular book The Contours of the Future (1965) the historian Igor Bestuzhev-Lada and science-fiction writer Oleg Pisarzhevskii suggested a term "prognostics" (prognostika in Russian) to designate a new disciplinary field of knowing and governing the future (Grazhdannikov 1988:10-11). According to Bestuzhev-Lada (1970:6) prognostics was a science about laws and methods used in prognosing. Technical instruments of prognosis included surveys, expert evaluations, statistical extrapolations, probability theory, game theory, as well as prognostical computer modelling. Prognostical modelling was based on a stochastic and probabilist approach to the future development (Lada 1970:7). Although forecasting remained clearly subordinated to communist planning that sought to define closed and deterministic futures, scientific rationality contained a promise of more predictable peace and less arbitrary terror.

As the Soviet government sought to rejuvenate its technoscientific base and resume contacts with the Western scientists and industrialists, it came to face a new challenge. The era of centrally enforced industrialisation was confronted with the ideas about post-industrial economy and society that gained momentum in the West. Visions of a new economy, based on fully automated factories, questioned and sought to undermine the established political discourses in both East and West. Increasing automatisation and changing nature of control constituted political vulnerability "from inside", that was further reinforced by a new kind of vulnerability "from outside" as the fast advancing satellite and rocket technology made both Soviet and Western territories open to surveillance and invasion.

In this context technology of forecasting went hand in hand with tightening of control and reshaping of the very nature of control. In spring 1966 the 23rd CPSU Congress announced the development of forecasting (previdenie, prognozirovanie) in order to make planning more scientific (Bestuzhev-Lada 1970). This coincided with Kosygin-Brezhnev's era that involved intensifying centralisation of administrative control. Bazarov-Rudnev's view of prognosis-based planning was still regarded as highly controversial; hence measures were taken to make sure that prognosis was not understood as an alternative to the plan. Politically centralised planning was understood as the very core and identity of Soviet system. Similarly, explicit and numerous statements were issued that cybernetic control did not replace, but operationalised Party-based decision-making and governance.

These multiple precautions suggest that forecasting, just like cybernetic control, were regarded as having a strong potential to transform Soviet regime beyond recognition. In this way the 1960s were not only the period of the intense Cold War and arms race, but also a

time of transformation of the entire worldview. System-cybernetic technoscience bore both promise and threat of political implications for both Soviets and Western governments.

In the early 1970s, a massive regrouping in the Soviet landscape of forecasting took place. The historian Gordon L. Rocca suggests that the governmental uses of scientific prognosis may have been compromised by the Prague Spring, in which distinguished Czech forecasters took an important role (Rocca 1981:232). While this might be quite true, the role of inside institutional politics in the reorganization of forecasting research should not be underestimated. For example, as a consequence of the internal complaints about excessively liberal atmosphere and non-communist views, the Institute of the Concrete Social Research at the Academy of Sciences in Moscow was reorganized: the institute lost about three fourths of its staff and the director and although it continued doing social forecasting, the atmosphere was not conducive to academic freedom and innovation. The Soviet Association for Scientific Prognosis and the Public Institute for Social Prognosis, the organisations that sprang from below and united hundreds of scientists across various disciplines, were closed down (see Firsov 2012, also Mespoulet 2007). From the Institute of the Concrete Social Research, some prognosticians were transferred to the State Committee of Science and Technology (GKNT), directed by Dzhermen Gvishiani, who, together with Bundy and Howard Raiffa was the key actor behind the establishment of IIASA. Other prognosticians, especially those who worked with mathematical models of prognosis, were transferred to the State Planning Committee (Gosplan). These changes were bitterly criticised by Igor Bestuzhev-Lada, both a committed member of the communist party and internationally famous promoter of the future studies in the Soviet Union. In his memoir, Bestuzhev was highly critical of Gvishiani's Committee, writing that it "was not able to engage in any meaningful research", whereas Gosplan hardly needed any social forecasting at all (Bestuzhev-Lada2004).

Here Bestuzhev hints at an important discrepancy between belief in the scientific rationality and imperatives of practice that was inherent to Soviet governance. Forecasting demanded formal rationalisation of economic relations and management, as well as vast statistical data in order to produce extrapolations. In contrast, the really existing Soviet planning process was highly informal, based on clientelism and bargaining. A combination of formal rationalisation with informality that prevailed in Soviet governance was explosive: it threatened revealing widespread corruption and ineffectiveness in Soviet economy. Furthermore, a probabilistic forecasting implied a mentality of governance that was alien to the CPSU vision: in his memoir Gvishiani admitted that the idea that Soviet politics and society may face non-deterministic futures was not at all popular with high CPSU officials

(Gvishiani 2004:103). The next section shows that it was in the sphere of concerns about the issues that featured across the globe where Soviet forecasters gained some autonomy.

Common challenges and future as global space of governance

The idea of establishing and deepening collaboration with Soviet scientists was, as we will see, a crucial factor behind the American interest in IIASA. However, IIASA was not the only platform for East and West to meet: in the late 1960s, there were a number of such attempts to create an international milieu of forecasting in order to establish it as a form of scientific expertise capable of responding to world challenges. Forecasters themselves produced a number of such initiatives. Scientists connected to RAND proposed an international lookout institution. Other European futurists embarked on a wave of creation of institutes and think-tank organisations, focused on the idea of future problems and future challenges. However, from 1966 on, it appeared that the American long-term interest in developing European institutions for forecasting became less prominent. IIASA, we suggest, emerged as the central site for East-West collaboration, where global future challenges were conceptualized as "common problems of advanced societies" (Levien and Winter 1967:9). The origins of the idea of common problems can be traced to both the Operations Research (OR), which specialised in solving technical "problems", and development theory, which postulated common trajectories of modernisation, mentality of governance.

Now, systems analysis and computer modelling that were developed at IIASA brought in significant modifications to this OR/development approach. First, as Raiffa (1973:13) had put it, IIASA was interested "not primarily to solve the particular problem but rather to use the problem to help sharpen techniques, concepts and approaches to problem-solving that could be transferred to a myriad of other problem situations". Then, the method of systems analysis required to study certain phenomena, such as population or change in energy resources, beyond the national borders. Developing computer technology allowed faster processing of ever larger sets of the data. The two trends converged in the first World models that were commissioned by the Club of Rome and developed by the MIT mathematician Jay Forrester. The famous Forrester and his assistant Meadows models constructed the world as interplay of several interdependent systems, where changes in one area could have radical consequences in another (Meadows et al 1972, Vieille Blanchard 2007, 2011). Such models rapidly developed in complexity in the period from the late 1960s to the late 1970s. While forecasting in the early period of the 1960s was mainly concerned with questions of stability and optimal balance, for example, the economic growth, by the late 1960s the objects of

global predictions were increasingly about instability and potential crisis of the world system. The famous report The Limits to Growth (Meadow et al 1972), commissioned and publicised by the Club of Rome, was probably the most illustrative example of a prediction of global change and the way that it was directly linked to questions of unsustainability and disaster (Moll 1991, Vieille Blanchard 2011). Although Forrester's model featured some method flaws, the main importance of the report was that it stirred heated public and scientific debates and contributed to a larger public visibility of technoscience and interconnectedness. The analysis of the modelled results in the report showed the problems of imbalance and disorder were embedded in the existing technical, social and natural systems. Hence, solutions for these problems were also to be sought with help of methods of system analysis.

The Club of Rome was an interesting phenomenon of its time. Its creation in 1968 followed on a series of initiatives within the OECD with using the policy sciences in planning, for instance (sic) the interfuturs programme. The Bellagio declaration (1968) spoke of a serious social crisis, brought on by the interaction of manifold social, economic, technological, political and psychological forces that could no longer be handled internally by separate scientific disciplines and national institutions. Instead, these issues required international planning capable of handling systemic complexity: "It is in relation to this crisis that we feel the planning function and related arts such as forecasting to assume new significance…" (Bellagio Declaration, November 2 1968, in Futures 1:3 March 1969). Forecasting was thus understood as a new scientific method capable of defusing social conflict, rationally analysing value conflicts, and recreating systemic balance in a system prone to disorder.

The idea of common problems also stemmed from the so-called convergence debate which was part of the argument about post-industrial societies on both sides. Observations of the Soviet economy and comparisons of statistical data was an important source of prediction already from the 1950s (falling back on forms of national accounting from the interwar period) (see Engerman 2009). The Marshall plan and the reconstruction of Europe after the war led to the production of comparative statistical data around questions of political economy and industry. Since the Soviet economy had been perceived by some as the miracle of large-scale industrialisation in the interwar period, a lot of post war attention was focused on how it would behave in the decades after the Second World War. By the 1960s such statistics allowed for the conclusion, among such forecasters as Daniel Bell, that, in terms of technoscientific, industrial and even social development, the Soviet system did not seem so very different from the capitalist one. Technoscientific revolution appeared to have

created a form of transnational class society that faced similar problems of value change, automation, urbanization and pollution both in the East and the West.

It is important to note that some daring Eastern European intellectuals, especially those from Czechoslovachia and Poland, announced the coming of convergence and post-industrial society in order to criticise self-isolationism and social conservatism of state socialist regimes (Richta et al 1968/1973). Convergence and post-industrialism were much more carefully approached by Soviet intellectuals: the official Marxist-Leninist view demanded for a straightforward rejection of the idea of any convergence between capitalist and communist regimes. Indeed, the idea of convergence was interpreted by some ideologues as yet another proof of the crisis and decline of the capitalist system (e.g. Dziubenko 1974).

However, belonging to the post-industrial world meant belonging to the First World. Soviet policy makers could not help wishing to be included in the club of "the problems of advanced industrial societies". As "post-industrialism" was charged with deep political implications, it was, therefore, replaced with "advanced industrialism". In turn, "common problems" were chosen very carefully so that they would not explicitly question the legitimacy of the communist regime. The problems of advanced industrial societies were, first and foremost, future energy demand and supply as well as water resources management. At a later stage more subversive problems were added to the list, such as the population studies and climate change. This is exactly the case of co-production of technoscience and political governance that was explicated in the work of IIASA.

Forging a New Governance for a New World: IIASA

In 1966 the US president Lyndon B. Johnson announced a vision of a scientific institute dedicated to "the shared problems of industrial nations" and working as a bridge between East and West (McDonald 1998; see Riska Campbell 2011). There was a diplomatic rationale to this project, but it was neither the only, nor a dominant one. For example, one of participants of a brainstorming about the new institute in Washington, January 1967, a RAND scientists Roger Levien said that "the principal purpose of this planned centre is involving the Soviet side into a continuous non-political dialogue about methods of analysis of general socio-economic problems" (Gvishiani 2004:93). A later document (April 1967) stated: "After the end of World War II in the advanced countries there emerged interrelated approaches for solving problems which emerge in society, which are characterised by the use of formal mathematical and computer methods. In the Soviet Union

and in the countries of Eastern Europe the use of mathematical analysis and computer technologies developed within a framework of 'cybernetics'. These methods and means of systems analysis of societal problems are active and promising stimulus for international cooperation (...)" (Ibid: 97).

In 1967 R.E. Levien and S.G. Winter, Jr. of RAND Corporation developed a proposal for "an International Research Center and International Studies Program for Systematic Analysis of the Common Problems of Advanced Societies." Levien and Winter envisioned staff of 150-250 and 50-150 visiting researchers at a cost of 3 to 5 million USD per year(Levien and Winter 1967: 7, 15). It was planned to situate this reasonably large institution in a politically neutral country, Austria, Switzerland and Sweden were named as candidates (Ibid, 8). The funding could be channelled through the US National Science Foundation and the Soviet Academy of Sciences (Ibid, 16-17). Indeed, the subject areas outlined by Levien and Winter were later on used for IIASA, an institution that never grew bigger than 100 scholars.

The formation of IIASA was simultaneous invention of a new discipline (systems analysis) and a new world that was defined by it. The sciences that were called in to service came from rather specific fields all of which belonged to the so-called rationalist and modernisation theory school. A distinguished decision-scientist and game theorist Howard Raiffa of Harvard University was invited by Bundy to participate in the negotiations with the Soviets, as well as a selection of "defence intellectuals" (Kaplan 1991), such as Carl Kaysen. On the Soviet side, the key negotiator was Dzhermen Gvishiani, who held a long interest in the Western methods of management and acted as the head of several Soviet foreign missions and the vice-director of the Soviet State Science and Technology Committee (GKNT).

Furthermore, as IIASA was intended to be multilateral, it would also serve as a vehicle for both West-East and East-East scientific knowledge transfer. For the Soviet side, the envisioned IIASA was an important way to access to mainstream Western literature: back in the 1960s-70s this was an important problem. As argued by Austin Jersild, the Soviet Union in many ways strongly depended on the technoscientific achievements of the Eastern European state socialist countries (Jersild 2011). The Eastern European scholars, in turn, were not mere puppets of the communist regime, but also actively sought contacts with the Western colleagues, as much as the conditions permitted (Sarasmo and Miklossy 2011). Scholarly work from Czechoslovakia, Poland and Hungary were important contributions to the academic field of forecasting. However, the policy implications remain to be explored: for

example, when interviewed one of the authors of Poland 2000 report recalled that the practical implications of this study were limited.

For the US the idea to create IIASA was driven by a dual intention. First, it can be suggested that by working with the top communist scientists the Americans hoped to train their opponent (or co-player in the Cold War strategy) to become a more rational actor and a better nuclear strategy partner. From this point of view IIASA was a workshop were the future predictability of both sides was forged. Second, IIASA was seen as a platform for sharing the data for the purposes of computer-based modelling. It is difficult to overemphasise the importance of international data issue in the 1960s-70s. True, as Edwards noted, the international institutions that facilitated meteorological data exchange among the countries from Eastern and Western blocs emerged as early as in 1963. However, such venues of "infrastructural globalism" were quite rare in the 1960s (Edwards 1996). Furthermore, the envisioned East-West institute would not just facilitate access, but also produce new relevant data. Co-production was a crucial component in generating trust in the data: Western scholars did not always trust the data supplied by Soviet scholars: a close collaboration, it was hoped, would ensure a better production of the data and help to generate more trustworthy accounts.

In this way, IIASA emerged as an important consequence of these great power games was redefinition of the world and reshaping of the political role of technoscience. IIASA was dedicated to the institutionalisation and professionalization of systems analysis. The main political use of this approach was not just practical utility: systems theory, coupled with cost-benefit approach that was popularised by Hitch and MacNamara commanded big respect and proved able to claim being political neutral and universal method of governance. Systems analysis, it seemed, could be used to depoliticise East-West cooperation on a global agenda. For example, RAND experts Levien and Winter wrote that there was a good grounds for a new transnationalism in the area of fighting "the unwanted side effects of urbanisation and industrialisation" (Levien and Winter 1967).Noting that if "policies and institutions may not transfer readily across national boundaries, methods of analysis, operational techniques, and technology do", RAND scientists insisted that "no single nation has a monopoly of method, experience, or technology; all would benefit from truly international, cooperative effort to resolve issues they all face"(Ibid, 2). "Formal techniques" that came under a variety of names of operational research, programme budgeting, systems analysis, cybernetics, linear programming, they all, wrote Levien and Winter, were "relatively independent of social structures and national values". They were "only tools" and, moreover, they were universal tools: there was no such thing as Eastern or Western operations

research, but only “operations research”. The goals are formulated by policy makers in their own national frameworks. Therefore, concluded Levien and Winter, these universal and a-political techniques can served as a vehicle for international cooperation (Ibid, 3).

A few years later, the methodological guidelines outlined that IIASA’s purpose was to solve “concrete and practical problems”. It was noted that the systems approach developed at IIASA was in principle based on quantitative methods. The problems that were “political” (such as race relations) or deeply “national” and hence a subject of national sovereignty, were deemed as “too complicated” for the Institute to engage with. IIASA was to study the problems that had “a substantial quantitative content” and were “intrinsically international, either because it is a world problem or because it is an important common problem”.

Forecasting was integrated in IIASA’s research agenda early on. A report by Philip Handler, the President of the American National Academy of Sciences, about the negotiations with the Soviets about the organisation and research agenda of the planned institute included “scientific research and development process design, management and prediction (using extrapolatory, analytical and logical techniques and expert opinion evaluations), including methodology for K and D scientific and practical output evaluation, methods for E and D budgeting, organising ‘problem oriented’ interdisciplinary research”. The suggestion included a focus on “methodology for long range planning in education”, as well as large scale management, information systems and computer technologies, including methodology for large economic sector computer simulation. However, forecasting did not constitute a separate field on the IIASA’s research programme. The Limits of Growth was criticised by the scholars associated with IIASA. Carl Kaysen (1972), for example, went long to emphasise that IIASA did not approve of Forrester’s methodology and that they did not support the ambition of global modelling given the existing shortcomings of both techniques and data. Furthermore, although Aurelio Peccei was actively involved in the early talks about the IIASA, for some time the Institute actively tried to dissociate itself from the Club of Rome, because the Club of Rome became identified with Malthusian approach and The Limits of Growth. The reasons for this dissociation were not only scientific, but also political: the Soviet Union wanted more growth and preferred not to question this subject area. However, although to start with the Brits (Solli Zuckerman) and Soviets (Dzhermen Gvishiani) were negative about explicit collaboration between IIASA and the Club of Rome, they rather soon adopted a more positive attitude. Here Howard Raiffa was a broker who promoted a gradual shift to global statistical modelling at IIASA, as well as initiated collaboration with the Meadows.

In this context it is understandable why in the 1970s IIASA scholars exercised a rather cautious approach and did not use global modelling of the future in their own studies. It was held that predictive global modelling was still immature and flawed and IIASA could not risk its nascent scientific reputation. However, IIASA research leaders understood that global modelling could not be overlooked. IIASA, in this way, chose to act as a mediator in the construction of this new international field of knowledge production (Levien 1977:12). By the initiative of Raiffa, series of Global Modelling Conferences were arranged at IIASA in 1974-1981 (Raiffa 2005:98). These conferences, one focused on Pestel-Mesarovic model, another one on Fundacion-Bariloche model, brought together various groups that created "world models" together to critically assess the issues of such modelling. These groups, it was suggested, would have otherwise never met and IIASA emerged as the central institution for global modelling. In the 1980s, however, there has been a shift away from the global level to more localised models.

In addition to the global modelling workshops, the internal research programmes at IIASA featured devising of great many prognoses, scenarios and forecasts. The most significant advances were made in theoretical development of systems approach and gearing of this approach to decision-making (the programme for Systems and Decisions Sciences was oriented to mathematical decision analysis). In the applied areas, the most distinguished contributions included the international studies of population, which moved from descriptive models of migration, to highly sophisticated studies. In 1976 IIASA organized a conference on Real-time forecasting and control of water resources. From 1983 the Energy Programme at IIASA, headed by Wolf Häfele, explored the future demands and supply of the energy up to 2030 with a clear bias to the nuclear energy production. That the energy programme research featured strictly quantitative and technical terms, in the 1980s was recognised insufficient as it missed social, economic and political aspects. In 1981 a new project, the Process of International Negotiations was launched, which marked a big shift in what was considered being neutral and hence appropriate research agenda at IIASA. In the early 1970s such a topic would have been deemed too sensitive, but, it has been argued that a decade of IIASA's work contributed to building up a political mutual confidence between the US and the Soviet Union.

The uses of IIASA demand further studies. The conducted interviews support statements that were earlier made by other researchers (Clemens 1990, 159) that Western scientists wanted access to Soviet data, whereas Soviet scientists wanted access to Western models and methods. But most importantly, at IIASA, both sides engaged in surprising collaboration, that resulted in developing together new models, producing new data and,

perhaps most importantly, defining the world anew as subject of global modelling. Defined in this way, the world could no longer be partitioned: the conditions for its understanding demanded sharing and mutual comprehension.

Concluding remarks

This paper is a preliminary attempt at a political history of the future, and part of the Futurepol project at Sciences Po. We have argued that the 1960s and 1970s saw a surge in predictive methodologies as part of what is known in the period as "policy sciences", such as cybernetics, systems analysis and forecasting. Their definitions and boundaries, as well as their political usage, was blurred and overlapped in significant ways. We propose here that the role of these predictive sciences must be understood, in the Cold War context, as effects of developments in science, but also as responses to a series of perceived problems in contemporary societies of the time, but that were referred to an emerging arena of global scientific expertise. Among these problems were problems associated with the idea of the postindustrial society and changing economic, social and demographic conditions, but we have also stressed the idea of complexity and interdependence in the world system. The paper has also brought out the way that East-West relations played a central role in such conceptualisations of the need for science as a form of global governance, and how such East-West transfers were crucial impetuses behind the shaping of prediction as a specific field of intervention. In this process, we propose, arguments of the depoliticised and neutral character of science served, in actual fact, to work out quintessentially political problems to do with the Cold War struggle but also to an emerging realm of global governance. An argument to be made is that attempts to control and govern such relationships on level of world order coincided with concerns with how to control developments internally, in the West as well as in the East.

References

Adam, B. (2005). *Future Matters*. Amsterdam: Brill.

Agar, J. (2003). *Government Machine: A Revolutionary History of the Computer*. Cambridge, MA: The MIT Press.

Amadae, S.M. (2003). *Rationalizing Capitalist Democracy: The Cold War Origins of Rational Choice Theory*. Chicago: The University of Chicago Press.

Andersson, J. (2012). "The Great Future Debate and the Struggle for the World". *American Historical Review*, vol. 117, issue 5:1411-1430.

Autio-Sarasmo, S and Miklossy, K. (2011). *Reassessing Cold War Europe*. London & New York: Routledge

Bell, D. (1973). *The Coming of Post-industrial Society. A Venture in Social Forecasting*. New York: Basic Books.

Berghahn, V. (1998). "Shepard Stone and the Ford Foundation". *The Ford Foundation and Europe (1950s-1970s). Cross-Fertilisation of Learning in Social Science and Management.* Brussels: European Interuniversity Press: 69-97.

Bestuzhev-Lada, I. (1970). *Okno v budushchee: Sovremennye problem sotsialnogo prognozirovaniia*. Moscow: Mysl.

Bestuzhev-Lada, I. (2004). *Svozhu schety s zhizniu: zapiski futurologa o proshedshem i prikhodiashchem*. Moscow: Algoritm.

Boudia, S. (2012). "La genèse d'un gouvernement par le risque". Bourg, D., Benoit Joly, P. (eds), *Du risque à la menace*. Paris: Editions PUF:69 -89.

Brown, N. and M. Michael (2003). "A Sociologyof Expectations: Retrospecting Prospects and Prospecting Retrospects." *Technology Analysis and Strategic Management* **15** (1): 3-18.

Connelly, M. (2009). *Fatal Misconception. The Attempt to Control World Population*. Cambridge MA: Harvard University Press

Clemens, W.C. (1990). *Can Russia Change? The USSR Confronts Global Interdependence*. Boston: Unwin Hyman.

Dahan Dalmedico, A., Ed. (2007). *Les modèles du futur*. Paris: La Découverte.

Dechert, S.R. ed (1966). *The Social Impact of Cybernetics*. Notre Dame & London : Notre Dame University Press.

Dittmann, F (2009). "Kooperation trotz Konfrontation Wissenschaft und Technik im Kalten Krieg", *Osteuropa* 59:101-119.

Dziubenko, A. A. (1974). "K kritike filosofskikh osnov burzhuaznoi futurologii". *Sovremennyi determinizm i sotsialnoe predvidenie,* Novosibirsk: RAN IIFF.

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

Engerman, D. C. (2009). *Know Your Enemy: The Rise and Fall of America's Soviet Experts*. Oxford: Oxford University Press.

Firsov, B. (2012). *Istoriia sovetskoi sotsiologii: 1950-1980-e gody. Ocherki*. Saint Petersburg: Izdatel'stvo Evropeiskogo universiteta.

George, F.H. (1959). *Automation, Cybernetics and Society*. New York : Philosophical Library

Gemelli, G. (1998). *The Ford Foundation and Europe (1950s-1970s). Cross-fertilisation of Learning in Social Science and Management.* Brussels: European Interuniversity Press.

Gemelli, G. (2001) "Building Bridges in Science and Societies During the Cold War: The Origins of the International Institute for Applied Systems Analysis (IIASA)", In: Gemelli, G. (ed) *American Foundations and Large Scale Research: Construction and Transfer of Knowledge*. Bologna: Clueb.

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

Gilman, N. (2003). *Mandarins of the future. Modernisation theory in Cold War America*. Baltimore: John Hopkins University Press.

Grazhdannikov, E. (1988). *Ekstrapoliatsionnaia prognostika: Klassifikatsionnoe i matematicheskoe modelirovanie v istoricheskikh i prognosticheskikh issledovaniiakh*, Novosibirsk: Nauka.

Guilhot, N. (2008). "The Realist Gambit. Post War American Political Science and the Birth of IR Theory." *International Political Sociology* 2: 281-304.

Gvishiani, Dzh. (2004). *Mosty v budusheie*. Moscow: Editorial URSS.

Gvishiani, Dzh. (1973). "Preface". *The International Institute for Applied Systems Analysis: Background Information, Provisional Research Strategy (preliminary version for restricted circulation)*. Laxenburg, Austria. IIASA Archives.

Hartmann, H. and J. Vogel (2010). *Zukunftswissen. Prognosen in Wirtschaft, Politik und Gesellschaft seit 1900*. Frankfurt: Campus.

Helmer, O. and T. J. Gordon (1964). *Report on a Long-Range Forecasting Study*. Santa Monica: RAND corporation.

Helmer, O. (1964). *Social Technology*. New York: Basic Books.

Jantsch, E., (1967). *Technological Forecasting in Perspective*. Paris: OECD.

Jersild, A. (2011). **"**The Soviet State as Imperial Scavenger: “Catch Up and Surpass” in the Transnational Socialist Bloc, 1950–1960". *The American Historical Review* 116(1):109-132.

Josephson, P. (1996). *Totalitarian Science and Technology*. Atlantic Highlands, NJ: Humanities Press.

Kaplan, F. (1991). *Wizards of Armageddon*. Cambridge Mass.: Harvard University Press.

Kaysen, C. (1972). "The Computer that Printed Out W*O*L*F*". *Foreign Affairs* 50(4): 660-668.

Klebaner, V.S. (2004). “V.A. Bazarov: myslitel’, uchenyi, grazhdanin”. *Problemy prognozirovaniia* 6:151-156.

Kott, S. (2008). "Une « communauté épistémique » du social ?. Experts de l’OIT et internationalisation des politiques sociales dans l’entre-deux-guerres." *Genèses* 71(2): 26-46.

Kotkin, S. (1997). *Magnetic Mountain: Stalinism as a Civilization*. Berkeley: University of California Press.

Krementsov, N. (1996). *Stalinist Science*. Princeton, NJ: Princeton University Press.

Lafontaine, C. (2004). *L'empire cybernétique: Des Machines à penser à la pensée machine*. Paris: Seuil.

Levien R. and Winter S.G. (1967). *Draft Proposal for an International Research Centre and International Studies Program for Systematic Analysis of the Common Problems of Advanced Societies*. The RAND Corporation, April 1967, pp.1-22. Archives at IIASA, Laxenburg.

Levien, R. (1977). *IIASA after Five Years. Retrospect and Prospect*. IIASA, Archives at IIASA, Laxenburg,November 1977, pp.1-44. Archives at IIASA, Laxenburg.

Mallard, G., Lakoff, A. (2010). *How Claims to Know the Future Are Used to Understand the Present: Techniques of Prospection in the Field of National Security. Social Knowledge in the Making*. Chicago: University of Chicago Press.

McDonald, A. (1998). "Scientific Cooperation as a Bridge Across the Cold War Divide: The Case of IIASA". *Annals of the New York Academy of Sciences* 866(30):55-83.

Mespoulet, M. (2007). "La renaissance de la sociologie en URSS 1958-1972. Une voie étroite entre matérialisme historique et "recherches sociologiques concrètes"." *Revue d'histoire des sciences humaines* 16: 57-86.

Mirowski, P. (2002). *Machine Dreams. Economics becomes a Cyborg Science*. Cambridge: Cambridge University Press.

Moiseev, N.N. (1993/2002). *Kak daleko do zavtrashnego dnia... Svobodnye razmyshleniia 1917-1993*, Moscow: Taideks Ko.

Moll, P. (1991). *From Scarcity to Sustainability. Futures Studies and the Environment*. Brussels: Peter Lang.

Ninkovich F. (1981). *The Diplomacy of Ideas; US Foreign Policy und Cultural Relations. 1938–1950*. Cambridge: Cambridge University Press.

Yale, R. (2003). *Cultural Exchange and the Cold War: Raising the Iron Curtain*, Pensylvania: Pensylvannia University Press.

Podvig, P. ed. (2001). *Russian Strategic Nuclear Forces.* Cambridge, Mass: The MIT Press.

Raiffa, H. (2005). *Analytical Roots of a Decision Scientist: A Memoir*. Unpublished manuscript (28 June 2005), IIASA Archives, Laxenburg.

Raiffa, H. (1973) "A Provisional Research Strategy". *The International Institute for Applied Systems Analysis: Background Information, Provisional Research Strategy (preliminary version for restricted circulation)*. Laxenburg, Austria. IIASA Archives.

Richta, R. (1968/1973). *La civilisation au carrefour*. Paris: Seuil.

Rindzeviciute, E. (2010). “The Politics of Governance in an Authoritarian Regime: Hybridization and Purification of Cybernetics in the Soviet Union”. *Archiv fur Sozialgeschichte* 50: 289-309.

Rindzeviciute, E. (2008). *Constructing Soviet Cultural Policy: Cybernetics and Governance in Lithuania after World War II.* Linköping: Linköping University Press.

Riska-Campbell, L. (2011). *Bridging East and West. The Establishment of the International Institute for Applied Systems Analysis in the United States Foreign Policy of Bridge Building, 1964-1972*. Helsinki: The Finnish Society on Science and Lettres.

Rosental, P. A. (2003). *L'intelligence démographique. Sciences et politiques des populations en France (1930-1960)*. Paris: Odile Jacob.

Schmidt-Gernig, A. (2003). "Forecasting the Future: Future Studies as International Networks of Social Analysis in the 1960s and 1970s in Western Europe and the United States". *Culture and international history*. J. Gienow-Hecht and F. Schumacher. Oxford: Berghahn.

Stonor Saunders, F. (1999). *Who Paid the Piper? The CIA and the Cultural Cold War.* London: Granta.

Tournes, L. Ed. (2010). *L'argent de l'influence. Les fondations américaines et leurs réseaux européens*. Paris: Editions Autrement.

Vieille Blanchard, E. (2007). "Croissance ou stabilité? L'entreprise du Club de Rome et le débat autour des modèles". *Les modèles du futur*. A. Dahan Dalmedico. Paris: La Découverte.

Vieille Blanchard, E. (2011). *Les limites à la croissance dans un monde global. Modélisations, prospectives, réfutations*. Unpublished doctoral dissertation, Centre Alexandre Koyré, Paris.

von Neumann, J. and O. Morgenstern (1944). *Theory of Games and Economic Behaviour*.

Wiener, N. (1965). *Cybernetics: or Control in the Animal and the Machine.* Cambridge Mass.: The MIT Press.

Zaloga, S. (2002). *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000*. Washington DC: Smithsonian Institution Press.