Across an Ideological Divide: IIASA and IIASANET*

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I. Introduction

During much of the second half of the Twentieth Century, the borders between eastern and western Europe were considered an Iron Curtain. But in 1966, United States President Lyndon Johnson made a surprising announcement.[1] Surprising because of the hot war in Vietnam and the Cold War between the US and the Soviet Union. The US was going to seek the cooperation of the Soviet Union to set up a residential research center where scientists from East and West could collaborate. The focus of the scientific collaboration would be the solution of large-scale problems common to advanced economies. Two types of such problems were recognized, those problems which know no borders such as air or water pollution and those problems which are common to all countries such as urban growth or health care delivery. The government of the Soviet Union was receptive. Such a center was founded six years later in 1972 in Laxenberg near Vienna, Austria. It still exists today. The name chosen for it was the International Institute for Applied Systems Analysis, abbreviated IIASA (pronounced yəsa).[2]

In this paper, I look at the context and motivations behind IIASA that helped its founders cross an ideological divide to foster international scientific collaboration. Then I look at the sharing at IIASA of international computer network research and the attempt by the IIASA Computer Science Project to create a functional computer communications network and an internetwork linking East and West. I end by relating the spread of the Internet into Central and Eastern Europe in the 1990s to the work done at IIASA in the 1970s and raising the question was IIASA a success?

II. IIASA

The immediate large context around 1966 was the escalation by the US of the war in Vietnam. In the Soviet Union, the 1964 change in leadership from Khrushchev to First Secretary Leonid Brezhnev and Premier Aleksei Kosygin was related to the ongoing need for economic reform.

Around President Johnson in 1966 were policy advisers[3] including McGeorge Bundy.[4] Bundy had left his position as Special Advisor to the United States President to be the president of the Ford Foundation but he remained active as one of Johnson's inner circle. These advisors, while advocating the bombing of North Vietnam, also argued that US interests in Europe and its image abroad would be served by "constructive political, diplomatic and economic initiatives to Eastern Europe and the Soviet Union."[5] Aware of

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the growing sentiment in Europe in favor of détente, a US National Security Action Memo (NSAM) was issued calling for Johnson to "actively develop areas of peaceful cooperation with the nations of Eastern Europe and the Soviet Union . . . to help create an environment in which peaceful settlement of the division of Germany and of Europe will become possible."[6] Offering cooperation in the solution of global problems like pollution and acid rain was expected to be attractive as was "providing Western instruction in … modern management."

On the Soviet side, there were people close to the top leadership especially around Jermen Gvishiani,[7] the Deputy Minister of the Soviet State Committee on Science and Technology who argued there could be mutually beneficial exchange between socialism and capitalism, at least on the level of management science. The Soviet leadership gave cautious support in part because it was taking on the task of rationalizing centralized economic planning and was open to Gvishiani's argument that there was a scientific aspect to US business management theory.

Both Johnson and Kosygin were given encouragement in the direction of East-West cooperation when they met unexpectedly in June 1967. Kosygin was in New York to address the extraordinary session of the United Nations in connection with the 1967 Six-Day War in the Middle East. Johnson proposed a meeting. At the last minute, the Soviets accepted. The meeting was precisely half way between New York City and Washington, D.C in the small town of Glassboro, New Jersey. The president and the premier discussed the issues of the serious situation in the Middle East and much else. They found each other "capable of showing good will and searching for mutual understanding."[8] Also, in nasty weather, over 2000 local people gathered, by all accounts spontaneously, to cheer on what they saw as an example of international cooperation. The homemade signs welcomed Kosygin as a friend and there was little of the usual popular hostility because of the Vietnam war toward Johnson.[9]

Gvishiani and Bundy were assigned by their respective sides to carry on the negotiations despite the tension in the world over the division of Germany, the Vietnam war, the Middle East conflicts and the Soviet invasion of Czechoslovakia in 1968. Howard Raiffa[10], the eventual first Director of IIASA explained later that Gvishiani and Bundy shared a belief in the potential value of an East-West center for research of solutions of complex problems neither side could solve alone. The problems were of two types, 'universal' and 'global'. At IIASA the term universal would be used for problems that effected many countries within their own bounders, such as health care delivery or urban planning. Global problems would be those which would involve many or all countries for their solutions like human contribution to climate change or management of oceans. Raiffa reasoned that the world was interdependent and volatile so both sides were willing to work toward cooperation even while there was competition. A sort of unconscious "global concern" was emerging.[11] Also, there was great respect for science at all levels of Soviet society. International scientific collaboration would be welcomed by the Soviet people as it would be by much of the world.

All contradictions during the negotiations were tackled in general with a mutual desire to succeed. The first agreement between Gvishiani and Bundy was that the East-West center should be multilateral. That was decided so as to give IIASA stability during the times of highest US-Soviet tension. But that agreement raised the question of the German Democratic Republic (GDR). The US and its allies did not recognize the GDR. In June 1968, the first proposed East-West meeting of experts to consider the new center had only attendees from the West because the SU rejected the asymmetric treatment of the two Germanys. Still a goal of both sides was eventual German reunification of some sort. The solution, which took a while to find, was simple. The new institute would be de jure non-governmental, would be scientific in spirit and open to others besides the initiating parties. Thus science academies and the like in the participating countries not governments would be the sponsoring institutions and would be treated equally. Support and payments from governments would be in the background. For example, the US National Academy of Science (NSA) would represent the US in IIASA and would contribute the US portion of the funding. NSA participation in IIASA would in turn be supported by money from the US National Science Foundation (NSF). Gvishiani suggested that there should be only one official language to avoid linguistic problems. And that language should be English. There were no objections. That way also, when written in English, the work of Eastern scientists could be better known in the West and Eastern scientists would have a chance to improve their English and therefore their access to the work of Western scientists.

Even though IIASA was to be multinational and non governmental, US and Soviet prominence was assured by the agreement that the Director of IIASA would be an American and the Chairman of the Council which would oversee the director and the operation of IIASA would be from the Soviet Union. Recruitment of first-rate scientists was agreed to be the highest priority. Only in that way would IIASA have any chance of doing substantial research and win respect and the chance to recruit similar scientists after the first batch. That would require paying salaries that showed respect for the hard work and talent forefront science requires and the living and work conditions should be conducive to comfort for the scientists and their families. The US offered $1,000,000 to $2,000,000 annual contributions. The Soviets matched the offer. It was agreed to require the other governments to insure that their sponsoring academies would in total pay the same amount. The GDR insisted on paying the same as the Federal Republic of Germany (FRG) and Bulgaria the same as Japan.

Despite consideration of UK and France and Italy, Austria was really the only possible host country. Starting with its State Treaty in May 1955, Austria was neutral between East and West. Austria recognized the GDR. Also, Austria was anxious to have the East West center in its country to increase its role as an East-West gateway. It offered incentives including an 18th century Habsburg castle it would renovate at Laxenberg near Vienna.

III. IIASA is Born

It took six years to put all these agreements together and craft a charter. But also, the heightened climate of détente made 1972[12] a favorable time for IIASA to be founded.

On October 4, 1972, the representatives of science academies and similar organizations from 3 continents and 12 countries: Bulgaria, Canada, Czechoslovakia, the Federal Republic of Germany, France, the German Democratic Republic, Italy, Japan, Poland, the UK, the US and the USSR met in London to sign the charter founding IIASA.

The Preamble of the Charter[13] gathered the rationale and arguments that had been made to arrive successfully at the founding meeting. The rationale included that "the spread and intensification of science and technology generates problems of an increasingly complex nature . . . " The solution of such complex problems requires international co-operation making "use of computer technology, systems analysis methodology and modern management principles." The Preamble captured what perhaps was the driving principle for the setup of the East-West institute, "that international cooperation between national institutions promotes co-operation between nations . . ." To the tensions of the Cold War was added a hedge of co-operation and internationalism. A goal of the research institute, described in charter, was "…to initiate and support collaborative and individual research [and to – ed] devise means of enhancing appreciation of this type of research among scientists from all nations." Gvishiani as Chairman convened the first Council meeting, insisted everyone speak English and led the discussion that approved Raiffa as the first director. IIASA was born.

Figure 1: Some of the signers of the IIASA Charter, October 4, 1972
(Source, IIASA website[14])
Shown from the left: Philip Handler, President of the US National Academy of Science; Dr. P. Warren, UK Cabinet Officer; Lord Solly Zuckerman, former Chief Scientific Adviser UK; Jermen Gvishiani, USSR State Committee for Science and Technology, Chairman of the IIASA Council until 1987, Andrei Bykov, USSR, Secretary to IIASA until 1979, Alexander Letov, USSR, IIASA's first Deputy Director.

IV. IIASA Computer Science Project

A little less than one year later, from September 24 to 27, 1973 there was a IIASA conference concerned with computers and computing. It was one of seven conferences convened to plan the research agenda for IIASA. It met in the Schloss Laxenberg, by then IIASA's functioning home. The "IIASA Planning Conference on Computer Systems"[15] drew world renowned scientists like Victor Glushkov, the father of Soviet cybernetics and information theory, and John McCarthy, the father of time-sharing computing and an early pioneer in the field of artificial intelligence in the US. The other ten National Member Organizations (NMOs), as the sponsoring science organizations were called, also sent solid scientists.

What should be the research agenda for the Computer Science project? What role can computers play in the collaborative research on complex systems for which IIASA was founded? Several areas of possible computer science research were explored, including software development and artificial intelligence. However the importance of research in computer networking emerged as a central concern.[16] McCarthy discussed the advantage of computer networking giving access to programs on the machines on which they were developed. He cited the success of the ARPANET in the US, the first large-scale packet switching computer network. Gianfano Capriz added that Italy was involved in a project to develop a computer network, the European Informatics Network (EIN), proposed by the European Economic Community to connect computing centers in West European countries. Another participant contributed that a system of hardware and software was being developed in the USSR to potentially control an entire national economy. Perhaps IIASA could research how such national systems could interact with each other.

Hiroji Nishino from Japan saw computer systems as a means of improving communications and collaboration. Emphasizing the cross border essence of IIASA, Raiffa agreed it was IIASA's goal to open communication channels between researchers in socialist and non-socialist countries. Raiffa also proposed IIASA as a hub of a network "to tie together the libraries of the member nations."[17] The human-computer system was proposed as appropriate for systems analysis and that it might be "a micro-version of analyzing a computer network."[18] A delegate expressed interest in ascertaining "the time in the future when, for a reasonable price, everyone will have access to information of his choice."[19] A delegate from Bulgaria suggested that IIASA hold a conference on computer networking toward the end of 1974. A word of caution was voiced by another delegate. He reminded everyone how fragile the telephone connection was just between Laxenberg and Vienna. The conference *Proceedings* summed up the discussion reporting that there was ". . . urgent interest in real problems connected with implementation of international computer networking. It was proposed that study of prospects of linking east-west lines across Europe should commence with IIASA perhaps attempting to coordinate present activities of the European Community and various postal-communication systems at work on the problem." [20]

As suggested, the following year, on October 21 to 15, 1974, IIASA convened a "Conference on Computer Communication Networks".[21] This time many of the most important scientists and pioneers of computer networking attended. The *Proceedings* had many maps and diagrams of functioning and projected computer networks around the world, like, SINTO net in Poland, KUIPNET in Kyoto University in Japan, TYMNET a commercial network in the US, the SITA an international airline reservations network, and the LIBRIS interlibrary network in Sweden. There was much mention of the CYCLADES (in France), NPL (in UK) and ARPANET (in US) networks as the most advanced. Those three networks were based on packet switching technology which allowed the greatest speed and efficiency for transmitting computer based communication. It was the vision of interconnecting these three and other packet switching networks that had partially motivated Robert Kahn to initiate the internetworking project at ARPA in 1973.

Peter Kirstein from the UK, a leading participant in ARPA's internetworking project, gave a detailed discussion of public data networks. He stressed that the outstanding problem to be solved was that of the international interconnection of computer networks. He pointed to the internetwork protocol research of Louis Pouzin in France and to that of Vinton Cerf and Robert Kahn in the US, recently reported in their articles, "A Proposal for Interconnecting Packet Switched Networks" and "A Protocol for Packet Network Intercommunication" respectively. Both Pouzin and Cerf were in attendance. Pouzin in fact was the chairman of the Conference and delivered a presentation based on his seminal article.

Donald Davies from the UK, director of the NPL network group, made a presentation titled "The Future of Computer Networks". He had been the first or one of the first scientists to argue the merits of packet switching and gave it that name. At the conference, Davies explained Pouzin's concept of CATENET as a way of regarding the complete collection of interconnected networks as a single communications system, what came later to be called the Internet. Davies cited many of the articles that set the foundation for computer networking to be a science. In that open scientific and technical literature, the ARPANET, CYCLADES and NPL networks were fully described and analyzed. Davies stressed the same two articles on internetworking protocols that Kirstein had mentioned, commenting that the present time "is a period of rapid development in this critical matter of international standards for data communication."[22].

Leonard Kleinrock, an ARPANET pioneer, described some technical aspects of the ARPANET, pointing to more of the journal articles documenting its development and operation. Dr. Z. Zhelesov from Bulgaria spoke about "Some Problems of Multimachine Systems". He suggested IIASA sponsor visits to the ARPANET and CYCLADES to acquaint IIASA researchers with the capabilities and peculiarities of these networks.[23] Jacques Vallee a guest at the conference from the Institute for the Future in Menlo Park California reported on the projected use of computer networks for international teleconferencing.

Three delegates from Canada observed that IIASA has as its mission to investigate problems of global or universal importance with results useful to policy makers. They felt computer network research and experimentation met that criterion but that such work should be in conjunction with other international groups like the International Network Working Group (INWG), technical subgroup 6.1 of the International Federation for Information Processing (IFIP). "IIASA might consider participating in the activities of this group."[24] IIASA might also consider a permanent connection to the ARPANET or CYCLADES networks.[25] They suggested that IIASA consider also societal questions needing interdisciplinary work. For example, "international management problems for computer networks [which] require . . . an international body." What form of management, what structure of an international body with a worldview is needed? They concluded, "A system analysis of this organization and management problem is desirable and might be tackled as a IIASA project."[26]

Alexander Butrimenko from the Soviet Union, the IIASA Computer Science Project Leader, put forward a vision of IIASA as a center for East-West collaborative scientific work and also as a hub or gateway connecting computers installed in various national institutions facilitating the understanding and solutions of problems of a global scale.[27] He felt IIASA was in a favorable position to help create internationally acceptable protocols to make possible the communication of scientific data across borders and political divides.[28]

Beginning in early 1975, the IIASA Computer Science Project attempted technically rather simple cross-border experimental data transmissions. Experimental bilateral sessions were briefly established between IIASA and Edinburgh, Moscow, Paris, Budapest, Warsaw, Brataslava and a few other centers. The project also explored the question of network interconnection. The next conference was focused on that theme and was called “Workshop on Data Communications”.[29] It was jointly sponsored with the IFIP as had been suggest by the Canadians and took place September 15-19, 1975.

Andre Danthine from Belgium, presented there a talk on "Host-Host Protocols and Hierarchy". His theoretical work described the general characteristics needed for distributed processes to communicate.[30] He compared characteristics of the ARPANET, CYCLADES and the Cerf-Kahn (TCP) protocols. The advantages and drawbacks of the protocols were considered, but the author explains that there were not yet adequate performance studies to support any choice among them.

Peter Kirstein presented again, this time on the uses of the ARPANET node in the UK. He reported that the University College London (UCL) node was used by researchers from widely different fields in many unforeseen ways. The diagram he presented (Figure 2) showed the sites collaborating on the experimental implementation of the Cerf-Kahn

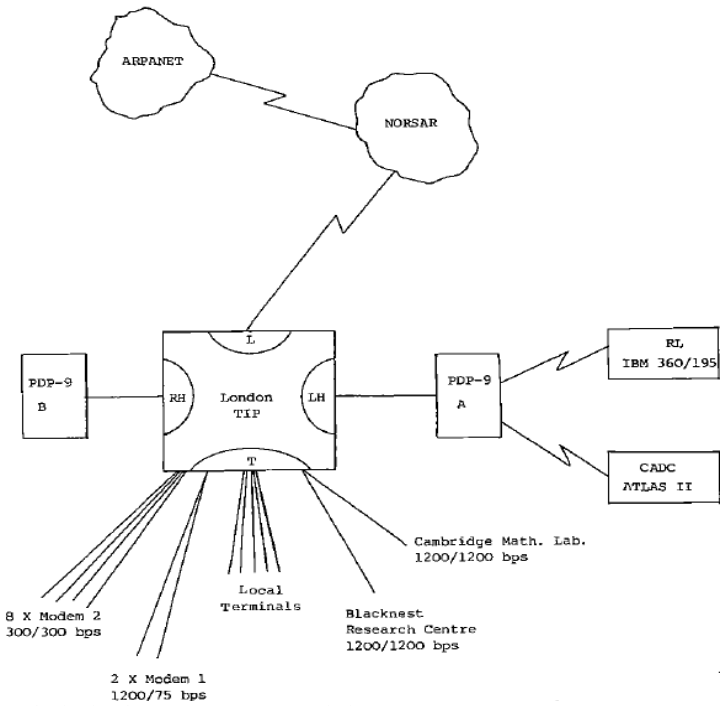

Figure 2: The UCL Node linked to NORSAR and the ARPANET (Source, IIASA, 1975, p. 54)

Protocol that Danthine discussed, interconnecting the UK node, a Norwegian node and the rest of the ARPANET in the US. Kirstein's presentation was part of an international effort to share and stimulate protocol development. At this workshop there were researchers from at least 14 countries: Austria, Belgium, France, Federal Republic of Germany, the German Democratic Republic, Hungary, Italy, Japan, Netherlands, Poland, Switzerland, Union of Soviet Socialist Republics, United Kingdom and United States. The Cerf-Kahn protocol was later called TCP/IP or the Internet protocol suit. Scientists from East and West were learning about the Internet protocol development as it was happening and from some of those actually doing the research.

V. IIASANET

Butrimenko, together with J. Sexton and V. Dasko presented details of the planning of the "IIASA Data Communications Network." The IIASA Computer Science project now had participants at IIASA from 10 countries, almost evenly split between East and West. Butrimenko, Dasko and Sexton described the planning of what they called IIASANET an effort to link computer centers mainly in Central and Eastern and then link them to those in Western Europe. They offered several suggested configurations. One configuration (See Figure 3) envisioned connecting computer centers in Moscow, Bratislava, Kiev, Vienna, Budapest

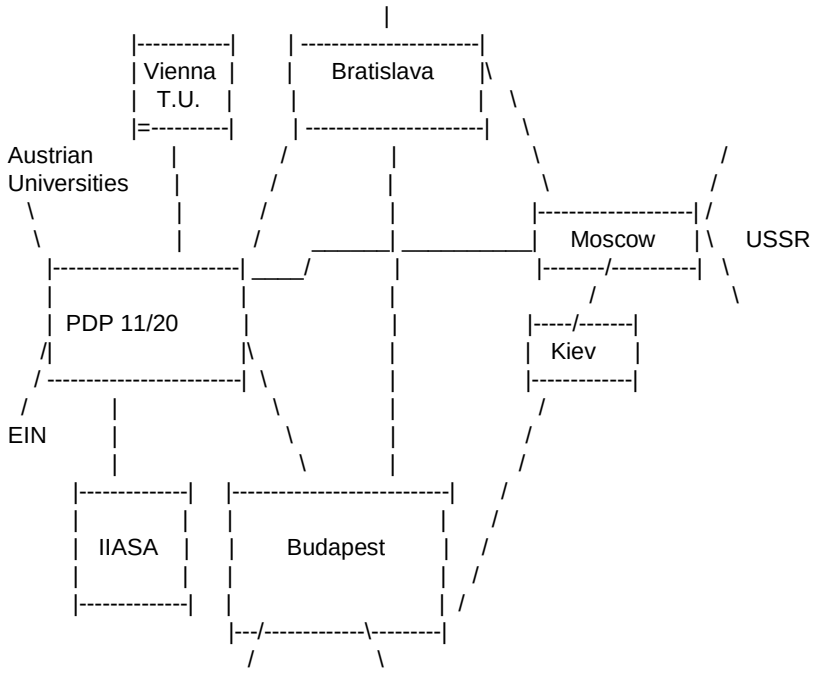

Figure 3: A Proposed IIASANET Configuration, September 1975 (Source, IIASA, 1975, p.142)

and at IIASA. This system would link to a network serving Austrian universities and to the EIN being developed to connect West European computer centers. The connection with Moscow would link IIASA with computers in the USSR that were going to connect with the Institute of Control Science in Moscow. Another possibility was that Austria would join the EIN so that when IIASA linked to the Austrian academic computer network, IIASA would gain connection via EIN with the major computer centers in Western Europe. Initially, EIN was envisioned to connect computers or computer networks in UK, Switzerland, France, Spain and Italy. (See Figure 4)

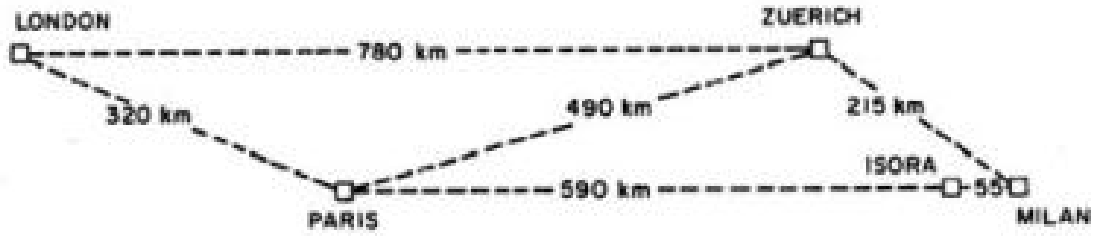

Figure 4: One version of the planned European Informatics Network (EIN)
(Source, "Cost Project 11")

From the start, Butrimenko's group reported, IIASANET was being designed for internetworking. For example one of the considerations was that the packet switching protocol IIASANET would use would have to be one compatible with the choice being made by the EIN development team. That would probably include the 'D' format header proposed by Pouzin. They wrote, "It is probably time for the individual network projects

at least throughout Europe, to unite their efforts . . . to establish internetworking as a tool for data communication in scientific research."[31] From the viewpoint of computer networking, they saw Europe as a single entity. They were surprised at the interest shown and new requests to participate they received. Most of the actual experimentation however was between IIASA and Moscow and IIASA and Budapest. Also, all connections were at slow speeds. If IIASA were to go to higher speed connectivity, it would have to solve the problem of the high cost of conditioned telephone lines.

After the workshop and into 1976, pairwise experimentation continued but no connections were yet maintained on a permanent basis. At a meeting in Budapest in April 1976, 19 national institutions were represented, 12 of which committed themselves to active participation in the IIASA Computer Network. Butrimenko reported on this meeting at a IIASA conference in May 1976.[32] He showed a diagram indicating the centers expecting to participate and their hardware. (See Figure 5)

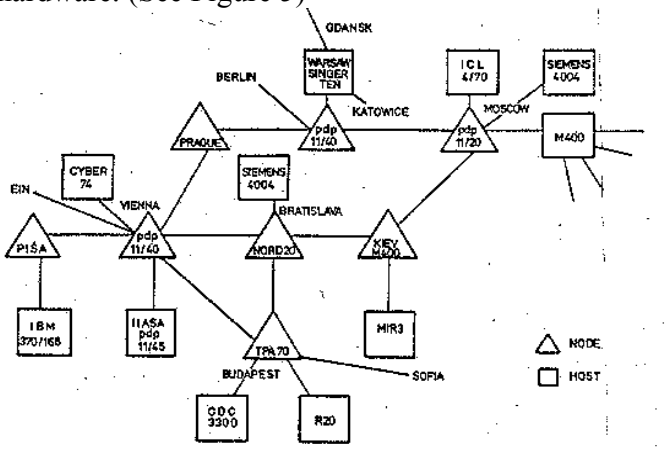

Figure 5: Plan of IIASANET April 1976 (Source: IIASA Conference '76, Vol. 2 p. 210)
(Countries included: Italy, Austria, Hungary, Bulgaria, GDR, Poland, Ukraine and Czechoslovakia, with connections to the EIN of Western Europe)

This plan included computers at Pisa, Italy; Kiev, Ukraine; 3 centers in Poland; 2 centers in Czechoslovakia; Vienna, Austria; Budapest, Hungary; Berlin, GDR section; and Sofia, Bulgaria. A link to EIN was included, but the work was mainly with computer centers in Eastern Europe. There was general agreement to accept a Hungarian designed operating system NOTA for the nodes and that each center should send a researcher to Laxenburg so they could work together on the necessary protocol layers. The next step would be to construct the communications subsystem. For that, the IIASA project would need cooperation from the post, telephone and telegraph (PTT) authorities in each participating country.

In 1979, Butrimenko reported[33] that his project was still pursuing the goal of mediating international scientific communication and realizing IIASANET as a gateway between national computer systems and networks. A permanent connection had been established in June 1977 to Pisa in Italy where CNUCE (Instituto del Conseglo Nazionale delle Recherche) was a node in the Italian national academic network (CNR). The Hungarian and Polish national networks were coordinating their protocol choices so as to be able to interconnect with IIASANET. Butrimenko stressed that, more than a network of

technology, IIASANET was becoming a network of people who understood technical problems in a similar way. He added that IIASA would inevitably only have resources for a small computer and some of the connections could be provided only over dailup lines. He showed a diagram of the then general scheme for IIASANET. (See Figure 6)

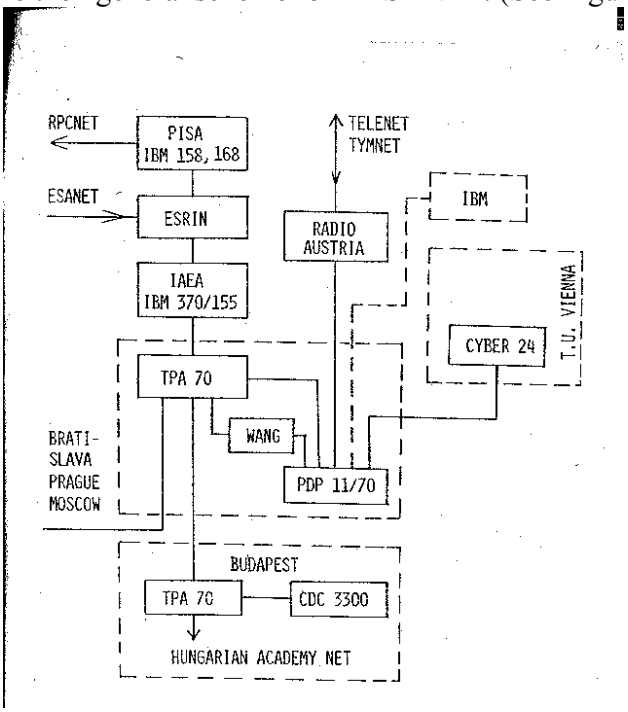

Figure 6: The General Scheme of IIASANET, June 1979 (Source, Butrimenko, 1979)

There were connections which already allowed IIASA scientists access to European Space Agency (ESRIN) and the International Atomic Energy Agency (IAEA) databases and via TYMNET to research centers in North America. Large computers at Pisa and Technical University (TU) in Vienna were now regularly accessed from Laxenburg. The main provision in this scheme was for connections to Central and Eastern European countries. In practice, however, the telephone line connections to and in Eastern Europe had inadequate switching. By one report there were only two main dialup lines from Austria to the East and they were used mainly for voice traffic. Butrimenko was now stressing that the node in Budapest was perhaps the gateway between national centers he had hoped IIASA would be. The IIASA computer Science project had so far solved some of the problems in at least experimental and simple ways to provide transborder data flow. But mainly IIASA facilitated an interchange of people, information and ideas.

VI. 1980s: Withdrawal of US Government Support for IIASA; Disappearance of EIN and IIASANET

By 1979, Butrimenko reported difficulty in getting cooperation to solve the legal and financial problems of access to interlinked computer systems. Especially, IIASA had no resources to pay for higher quality lines and the PTTs involved were not yet interested in developing lines for data communication which might challenge the telephone system and its particular technology. Researchers developing EIN reported similar difficulty. In both Eastern and Western Europe at about the same time there was reluctance of the PTT

establishments to support packet switching technology which was different from the circuit switching technology with which they were familiar. Not until TCP/IP was conquering the world in the 1990s did the PTTs overcome this reluctance.

After 1979, IIASANET and EIN as actually functioning physical networks were no longer reported on in the technical literature. In 1980 Butrimenko stepped down as Project Leader at IIASA in order to head a similar project in the Soviet Union[34]. Still the IIASA node was in use in the 1980s. For example, in 1980 connections were made to and through IIASA from Hungary on the average of 2 ½ hours per day and in 1982 connections were made from Hungary to Moscow and Leningrad which could have been routed to IIASA. The resources the IIASA node made accessible in Hungary were the ESRIN and IAEA database and via TYMNET databases at Lockheed Corporation in the US.

IIASA had found interest in computer networking in all its many National Membership Organizations. IIIASA experiments, workshops and conferences helped spread knowledge of networking and internetworking theory and technology and to familiarize researchers on both sides of the East-West divide with each other's achievements and progress. Besides the commercial like problems that arose when dealing with the PTTs and the legal differences in different countries, IIASA technicians reported technical difficulties as well.[35] Basically, only pairwise connections and terminal access were achieved. The technology and protocols were still being developed in the 1970s and the political differences still presented obstacles to agreements to cooperate in permanent transborder communication between East and West.

In the United States in 1980, Ronald Reagan was elected President. Soon after Reagan took office in 1981, the US government announced its intension to withdraw its share of the funding for IIASA. New policy advisors, especially around people like Richard Pearle were advocating an emphasis in US foreign policy on competition and diminished areas of cooperation with the Soviet Union. However, scientists and science advocates in the US succeeded in having funds for IIASA reallocated in 1981. They could not succeed in 1982 when the President's office required that the US National Academy of Science (NAS) sever its ties with IIASA. Again many scientists and science policy advocates opposed the move. They were able to replace the NAS as the US sponsoring National Membership Organization with the American Association for the Advancement of Science (AAAS) and to raise some money from foundations and later from corporations to keep US scientific involvement with IIASA alive. Many IISAS projects were kept on track. But projects such as interconnecting East and West computer networks were unable to maintain their progress. Still IIASA survived and the US government returned as a supporter of IIASA eight years later.

VII. The Internet Spreads

Throughout the 1980s, computer network activity associated in some way with IIASA continued. Permanent connection was maintained especially with Budapest as a hub. A connection between Budapest and Vienna and to IIASA was maintained but the vision of a IIASANET was no longer being considered.

The US, Norwegian, UK collaboration did help elaborate the TCP/IP internetworking protocols. These were implemented throughout the 1980s especially in the US, the UK, the Republic of Korea and elsewhere. The political upheavals in Eastern Europe in 1989 and the early 1990s helped weaken some of the obstacles to interconnecting computers and the computer networks of different countries in East and West Europe.

In the mid 1990s, the TCP/IP Internet spread all over the world. The Internet found fertile ground in Eastern Europe, especially Hungary and Russia, plowed by the period of efforts by the IIASA Computer Science Project. IIASA as an East-West center had helped create a community of scientific collaboration on the questions of international computer networking. It had also stimulated interconnectivity experimentation. The Internet became on a world scale what the IIASA Computer Science Project had hoped to implement at lease for Europe Today the Internet makes the global scientific collaboration IIASA was established to facilitate between East and West. IIASA survives into the Twenty-First Century, reoriented to continue international scientific collaboration on problems of large-scale systems and broadened to address some problems of the developing world, global change and economic restructuring. That work is being enhanced by the Internet just as the IIASA Computer Science Project had projected computer networks would help.

Champions of international scientific collaboration like that at IIASA would argue that the co-operative scientific work at IIASA helped in its small way to move the world mostly peacefully beyond the Cold War.[36] Others argue that there is little evidence that the increased understanding gained by individuals at IIASA had an effect on national policy processes.[37] Also, researchers trying to understand the spread of the Internet to Eastern Europe see importance in the IIASA Computer Science Project.[38] It helps when trying to understand the Internet to document and credit all the research efforts that made the Internet possible, those in Asia, Eastern and Western Europe, Africa, the former Soviet Union, in addition to the substantial US efforts which are often given all the credit. Vinton Cerf once said, "[T]he effort at developing the Internet Protocols was international from the beginning."[39] The Computer Science Project at IIASA played a role as did many other unsung projects which each deserve some credit.

VIII. Was IIASA a Success?

Was IIASA a success? Scientists from many countries, some of high distinction, from both East and West did come to IIASA and collaborate. Many found they could work together productively on common problems and found their common work could continue despite East-West political crises. Some of the scientific work done at IIASA is accorded world-class status such as its seven-year study of energy from a global perspective and a long-range view. While controversial, it is considered pioneering research and has influenced all energy studies after it. Scientists at IIASA with access to data from the whole world helped raise the question of the human contributions to climate change and possible global warming. Modeling at IIASA of the effect climate change will have on the world's agriculture and also of the sources of cross border acid

rain remain the classics in their field. IIASA alumni including in the computer networking field have become ministers and advisors to ministers in many countries.

On a personal level, IIASA made it possible for many scientists from Eastern Europe with minimal travel budgets to go by train to Vienna and participate in collaborative research with colleagues from Western Europe, Japan and the US and Canada. A particular example is that scientists from the GDR were able to attend truly international workshops and conferences even though the GDR and their passports were not recognized in Western Europe. Klaus Fuchs-Kittowski, a professor at the time at Humboldt University, was able, starting in 1974, to share his studies in selection of medical problems and in modeling of health care delivery and in 1975, his work in the semantic and syntactic components of the human-computer interaction with interested scientist from the US and elsewhere. He also learned about computer networking technology which he helped to spread in the GDR. Based on his biomedical and systems analysis of health care presentations at IIASA, he was invited on a number of occasions to the US, to Johns Hopkins University, to the Rand Corporation and to National Institute of Health sponsored events to share his healthcare research. He also helped establish a student exchange program for students at Johns Hopkins University in the US and Humboldt University in the GDR. His work became known throughout the world via IIASA publications.

But also Fuchs-Kittowski tells about the time in 1991 shortly after the end of the division of Germany. Faculty members of Humboldt University were subjected to a review. I am told as many as 800, including accomplished scholars were judged somehow to be inappropriate to continue in their positions at Humboldt. Fuchs-Kittowski was one so judged, despite his scientific contributions recognized internationally thanks to IIASA. He had one chance to appeal. The appeal examiner was also a IIASA alumnus. Still the appeal was turned down. In this case at least, IIASA had failed in its goal of generating a sustained mutual respect across the ideological divide.

The question was IIASA a success has a mixed answer. IIASA did make possible scientific co-operation among nations in conflict. Also, IIASA succeeded in spreading knowledge of computer networking and internetworking to scientists from both halves of Europe. But IIASANET never developed. Later when it was possible, the Internet spread rapidly over the connections IIASA had helped encourage. And while the withdrawal of support by the US government from 1982 to 1988 shows that politics can always play a role even in affairs of science, IIASA survived that withdrawal.

IIASA was and continues to be mostly a success perhaps because the practice and principles of science basically know no borders. Parallel with IISAS is the Internet. Perhaps its success so far is based on the same principle, that communication like science seeks to transcend borders. I use the history of IIASA to raise the question, will the Internet continue to spread, remain open and allow all to come on as equals despite political crises and ideological divides? Perhaps, studying the history of IIASA can give lessons that will help that to happen.

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Notes

[1] December 15, 1966 1:30pm White House News Conference. See also, address of US President Lyndon Johnson, "Making Europe a Whole: an Unfinished Task", Department of State Bulletin, October 24, 1966 (as cited by 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*, edited by Giuliana Gemelli, ClueB, Bolongna, 2001)

[2] See Howard Raiffa, "How IIASA Began", http://www.iiasa.ac.at/docs/history.html and Alan McDonald, "International Institute for Applied Systems Analysis (IIASA): Systems Analysis as a Bridge Across the Cold War Divide", *Annals of the New York Academy of Science*, Vol. 866, 30 Dec 1998, pp. 55-83. Also, IIASA reprint PR-99-6 April, 1999.http://www.ciaonet.org/conf/nyao2/nyao2ab.html (access restricted)

[3] For example, Francis Bator, a Deputy National Security Advisor, George Christian, Johnson's Press Secretary and Walt Rostow, National Security Advisor are mentioned in the literature along with the prominent role played by McGeorge Bundy.

[4] McGeorge Bundy's career included Dean of Harvard University, Advisor for National Security to US President John Kennedy, and President of the Ford Foundation.

[5] NSAM 345: Nuclear Planning, April 22, 1966.
http://www.lbjlib.utexas.edu/johnson/archives.hom/NSAMs/nsam345.asp

[6] NSAM 352: Bridge building, July 8, 1966.
http://www.lbjlib.utexas.edu/johnson/archives.hom/NSAMs/nsam352.asp

[7] Jermen Gvishani helped found the Moscow State University Laboratory of Management Problems in 1962, authored *Sociology of Business* (1962) and promoted the mutual exchange of scholars in business administration. He was married to Lyudmila, daughter of Aleksei Kosygin. She was an internationalist in her own right.

[8] Ibid., note 1, Gemelli, pp 180-181. Gemelli is quoting from the unpublished Memoir of Jermen Gvishiani.

[9] Ibid., note 2, McDonald, pp. 57-58 and *New York Times*, June 26, 1967, p. 32.

[10] Howard Raiffa was the Frank P. Ramsey Professor of Managerial Economics, a joint chair held in the Business School and the Kennedy School of Government at Harvard University. His training was in game theory and competitive decision making. He was asked by Mc George Bundy to aid in the negotiations to bring about the founding of the East-West institute.

[11] Ibid., note 1, Gemelli, pp.161-164.

[12] 1972 was the year the US and China signed the Shanghai Communiqué (February 28). The two Germanys exchanged mutual recognition (December 21). The Treaty on the Limitation of Anti-Ballistic Missiles was signed May 26. US President Nixon also visited Moscow and the US shifted to favoring an East-West reconciliation as the basis of a post war European settlement eventually leading to some resolution to the German question. Before 1972, the US policy was German reunification should be the pre condition for a European settlement. (See Zbigniev Brezinski, *The Competitive Relationship*, 1972).

[13] The charter as amended can be seen online at http://www.iiasa.ac.at/Admin/DI/docs/council/charter.pdf

[14] http://www.iiasa.ac.at/docs/HOTP/Oct02/charter-1.html

[15] The conference papers are published in International Institute for Applied Systems Analysis, *Proceedings of IIASA Planning Conference on Computer Systems*, September 24 – 27, 1973, IIASA-PC-7.

[16]Glushkov was to say later that for IIASA to succeed its computer network project must succeed first.

[17] *Ibid.* note 15, p. 46.

[18] *Ibid.*, p. 44.
[19] *Ibid.*
[20] *Ibid.*, pp. 51-52.
[21] The conference papers are published in International Institute for Applied Systems Analysis, *Proceedings of a IIASA Conference on Computer Communications Networks*, October 21 – 25, 1974, CP-75-7.
[22] *Ibid.*, p. 37.
[23] *Ibid.*, p. 145.
[24] *Ibid.*, p. 246.
[25] *Ibid.*, p. 245
[26] *Ibid.*, p. 247.
[27] *Ibid.*, p. xiii.
[28] *Ibid.*, p. 22.
[29] The workshop papers are published in International Institute for Applied Systems Analysis, *Workshop on Data Communications*, September 15-19, 1975, CP-76-9.
[30] *Ibid.*, pp. 9-12.
[31] *Ibid.*, p. 150
[32] The conference papers are published in two volumes, International Institute for Applied Systems Analysis, *IIASA Conference '76*, 10-13 May, 1976. Butrimenko's report is in Vol. II, pp. 201 – 214.
[33] Butrimenko, Alexander (1979) "Computer Networking for Scientific Collaboration: The IIASA Case", in *Euro IFIP'79*.
[34] Head of the Department for Computer Networks and Information Services at the Institute for Applied Systems, Academy of Sciences, USSR, 1980 to 1983.
[35] See Ronda Hauben, "The Vision of Computer Networking and its Influence on East-West Relations and the GDR," online at: http://www.columbia.edu/~rh120/other/misc/chemnitzpap.doc.
[36] See for example, an article about Pugwash, a political collaboration of scientists, Metta Spencer, "'Political' Scientists," p.8, online at: http://pugwash.org/reports/pim/pim1.htm
[37] Ibid., note 2, McDonald, p. 76.
[38] See for example, ibid, note 35, and the chapters by Frank Dittmann and Klaus Fuchs-Kittowski in a forthcoming book of papers from the "Computer Networks, the Internet and Netizens" symposium at the 22nd International Congress of History of Science, July 26, 2005 in Beijing, China.
[39] Vinton Cerf, "How the Internet Came to Be" in *The Online User's Encyclopedia*, Bernard Aboba, Addison-Wesley, November 1993, page 530.

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