the individuals, or small group of individuals, offering flexible, customised service based on innovative software design. But not all ICT-related employment requires high-level software design skills: much of it calls for person-to-person skills in education, health, leisure activities and so on. These are areas of work which use ICT but will induce individuals to train for them for the same reasons as in the past - because people want to work with people and will pick up whatever skills they need in order to do so.

It is hard to see what sort of new 'rigidities' would unambiguously bring social gains in this context. As always, there are good arguments for publicly providing and/or financing general education at all levels, and that routinely encompasses the provision of IT skills these days. But more than ever before, individuals are going to have to structure their own work/employment/activity packages in future - and what is required is all the flexibility we can get to allow individuals to invest in the skills they need *and want* as the techno-economic environment evolves around them.

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Science Policy: New Mechanisms for Scientific Collaboration between East and West
edited by Valentin A. Koptyug and Jean Klerkx (Kluwer, Dordrecht, 1995), pp. xxxiii+256, US$ 145.00, ISBN 0-7923-3227-X

Six years after the collapse of the Soviet Union, the Russian Academy of Sciences and its numerous research institutes and centres are still experiencing traumatic times, facing such problems as finding research funds, lack of infrastructure, brain drain, legislation changes and establishing research priorities. In addition, the total turmoil and criminalisation of the Russian economy, the decline in living standards and political instability do not facilitate this transition period. On the other hand, after the years of separation and isolation during the Cold War, there are Western research institutions which are interested in cooperating with Russia and carrying out joint research. This book is a collection of papers from a workshop on finding ways for scientific collaboration between the Russian Academy of Sciences and the West organised by NATO (held in Novosibirsk, Russia in November 1993) and attended by scientists from 17 countries representing research institutes, universities and international organisations, such as NATO's scientific bodies, UNESCO and the Council of Europe.

For people who are interested in science policy (understood as policy for science rather than science for policy), the book reflects the language of the 1990s placing the discussions in the context of ecologically sustainable development and the Agenda 21, networking, and global problems. The openness about research programmes, locations, participants, funds and timeframes is an important aspect although some of the papers take this to the extent of apparent similarities with institutional annual reports and lack any analysis or policy implications.

As with most published conference proceedings, the materials from this workshop cover a variety of themes, approaches and writing styles. There is no other uniting concept than the willingness and initial attempts for cooperation in fundamental research expressed by the Russian scientists and their counterparts from the developed countries. The most common barriers for collaboration relate to finding research funds. The research areas range

from regional studies of the Siberian lake Baikal to space contamination, material science programmes and information systems.

The majority of the articles describe cooperation within the so called International Research Centres of the Siberian Branch of the Russian Academy of Sciences (RAS). The RAS is perhaps the world's largest active research institution (not a granting body as is the model in most western countries) which inherited the former Academy of Sciences of USSR. Its Siberian Branch was established more than forty years ago as part of the giant plan for the economic and social development of Siberia and Russia's Far East and has some hundred research institutes and development organisations in academic towns, such as Tyumen, Omsk, Novosibirsk, Tomsk, Yakutsk, Keremovo, Krasnoyarsk, Irkutsk and Ulan-Ude. All these sites were considered to be of strategic importance to the former USSR and were closed to visitors. In 1991 the Presidium of the Siberian Branch of RAS launched a programme for the development of International Research Centres on the basis of the existing research institutes and centres. Fifteen such centres were created in order to stimulate the involvement of scholars from all around the world so that scientists could work together with Russian researchers using the existing facilities and expertise. For example, the projects in the Siberian Synchrotron Radiation Centre have brought together researchers from UK, Germany, France, India, Korea, Belgium, US and China. As a rule, international teams have to find their own funding to carry out the research in Russia and the experience shows that foreign researchers spend about 3 to 6 months working on the premises of the international centres in Siberia. One of the useful features of this publication is the sharing of the knowledge and positive experience from cooperation accumulated in the initial years of operation of the international centres.

The book is structured in three parts. The first chapter covers some institutional issues and the role of RAS, NATO's scientific exchange programmes, UNESCO and the Council of Europe in the prevention of the dismantling of scientific institutions and in the provision of financial support for research teams. The second focusses on the experiences of the international research centres in the field of environmental problems, interdisciplinary studies of Lake Baikal, natural sciences and technological applications and socio-economic and humanitarian studies. The last chapter looks briefly at some information and education related issues. The list of priority areas and topics (an appendix to the book) is also of interest, however, it is not clear what the policy implications are from defining them.

Although most of the papers claim to take a multidisciplinary, interdisciplinary or systems approach to the subject of study (e.g. the study of Siberian boreal forests by Vaganov, Isaev and Nilsson or the studies of environmental problems resulting from air traffic and space mission by Meier, Fomin and Kharitonov and by Fomin *et al.*), they do this methodologically in a very fragmented way. For example, the assessment of the resource potential of the Siberian forests (pp. 40-42) looks only at the forests as a source for wood resources and forest vegetation without taking into account the animal world, impacts on climate, people (including indigenous people), water resources, air, etc.; the suggested integrated sustainable development methodology by Bonfa from the Italian Research Association for the Mediterranean (pp. 81-86) does not include any environmental nor social impact assessment. None of the projects described in the proceedings has a community involvement component which perhaps is *au pair* with the chaos in the Russian economy but in the long run this approach can have very significant social implications.

I found some of the data from particular research projects of concern and deserving of greater analysis. Unfortunately, only few of the papers take the issues to the level of policy conclusions or suggestions. One of these exceptions is the discussion of the space contamination by 3.5 million fragments of space debris orbiting the Earth where Fomin *et al.* sug-

gest the principle of self-clearance or removal to be established. A contrary example is the paper by Zamaraev, Thomas and Block (pp. 141-152) on catalytic materials which does not discuss the trends towards environmentally harmless catalysts and does not express an active position as far as legislative regulations are concerned.

My expectations for any research carried out in the 1990s are that moral and ethical issues should be contested and not left on the periphery. Obviously, value judgements have not been part of the aims of the workshop as this was lacking in most papers, which makes the framework of sustainability falsely pretentious. The most striking example is the paper by a team of eleven authors from the Altai International Centre for Humanitarian and Biospheric Research based at the Novosibirsk's Institute of Cytology and Genetics of the Siberian Branch of RAS on genetic effects of radiation and other man-made pollution in Siberia (Shumny et al., pp. 69-80). The aim of the study was "the development of test systems and methods for assessment of the genetic consequences of nuclear tests in the Semipalatinsk region and, in broader terms, assessment of the genetic consequences of the effects of man-made factors on populations and ecological systems in the Altai territory" (p. 69). Significant data has been collected on humans, rodents, chironomids and plants and the results from the study provide evidence that there are genetic and functional anomalies as a consequence from the nuclear tests. Nevertheless, the team does not pose the question why were the nuclear tests carried out, why were people, including children, plants and animals constantly exposed to radiation. They do not touch on any social, personal, health or medical treatment issues related to the affected people who have provided them with a data base "large enough to estimate spontaneous mutation at chosen loci" (p. 74). Moreover, the team concludes that "further studies under natural conditions and model situations are needed" (p.78) which can be interpreted as a support from the Altai scientific community for the continuation of the nuclear tests in the region.

Only a few papers deal with information technology issues and are most significant in presenting a clear picture of how far behind the rest of the world the scientists from Russia in the current information age are. However, it is optimistic to see that most research projects have an information component and it can be expected that the situation will change in the near future. Other grounds for optimism can be found in the area of education and training of future research personnel although the papers recognise the recently decreasing social status of scientists and the relative unattractiveness of this profession for young people.

As the statement from the workshop points out, "the role and responsibility of science for the humankind will significantly increase entering into the 21st century" (p. 253). The book is an attempt at opening the barriers between Russia and the rest of the world, in sharing knowledge and joining efforts in the face of the global problems. It provides some very valuable information about the functioning of the new mechanisms for research cooperation within the International Research Centres and presents a number of success stories. While the book is also indicative of serious problems with Russia's scientific endeavours, it leaves room to hope for an improving climate of understanding and change.

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