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Report of Working Group 5
Globalization and Technology

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The group discussed papers under three heads: equity in the global economy, information technology haves and have-nots, and biotechnology and development. Although with such a broad agenda, extensive in-depth discussion was unrealistic, issues were identified for possible more detailed studies. These are itemised in the summary.

Equity in the global economy

Six papers were discussed in the first session. These addressed intrinsic problems of capitalism, equity and human rights, foreign debt, education in Afghanistan, knowledge and poverty elimination, and relocation of international agencies.

Possible threats to the long-term stability of global capitalism were proposed. The first is chronic insufficient economic demand, further eroded by technological change. Secondly, large material and energy throughputs overload the planet's ecological systems. Finally, a relentless tendency towards greater complexity and pace is reflected in capitalism's technologies, institutions and social relations. Under the constraints of global capitalism, the paper argued that we can sustain the biosphere only by developing institutions, regulations, and social arrangements so elaborate that they will suffocate economic growth.

It was argued that Article 1 (1) of the Universal Declaration of Human Rights: "All human beings are born free and equal in dignity and human rights" implies a lever towards reducing socio-economic inequalities. This Article ought to be reflected not merely in institutions and their accessibility to all, nor just in principles of due process, but also in outcomes. The degrees of substantial inequality that exist can be seen as a violation of Article 1.

Technology and knowledge are needed to fight poverty. However, technology has been important historically in creating inequity. The challenge is to harness it as an instrument for equity. Developing countries must have the capability to adapt technology to their needs, and the first world must share with them the fruits of technology. Yet global forces – especially relating to trade – may increase inequity. There is no level playing field between mass production technologies and microenterprises. Intellectual property rights (IPR) can make matters worse – think only of health in Africa. Equity must be inclusive, and must include equity with respect to IPR. Technology should also be used to empower women – and there are many successful examples of this.

It was argued that external public debt is increasing poverty, sometimes dramatically. Unless we reverse this tendency, we will end up broadening so-called 'Islamic terrorism' to include 'African' and 'Latin-American terrorism'. A public debt Pugwash Study Group could tackle the relationship between increasing poverty and debt.

A small step was suggested that might significantly reduce economic and social inequity: relocate international agencies to countries relevant to their mission. For example, the Organisation of American States could move to South America, or the World Health Organisation to sub-Saharan Africa.

Since the power of political and economic groups partly explains the present inequity, can this situation be changed only by countervailing power? Or is an internal value change possible – an internal acceptance that the international situation should be refined? Are there things Pugwash can do to introduce other concepts into the existing system so the world evolves in a more equitable direction? Are there actions that can be taken to perturb the frequently observed graphs quantifying 'cumulative advantage' – for example those showing the majority of the world's food/health/resources are in the possession of the minority? If we understood the dynamics of this apparently universal set of curves, we might be able to bias them in favour of reducing inequity.

Information Technology Haves and Have-nots

One of the main reasons for past failures to alleviate poverty may be our failure to focus on technology as a major driver of socio-economic transformation, in particular information technology. It may break down barriers to knowledge and participation, and consequently play a significant role in development and the alleviation of poverty.

The digital divide between developed and developing countries was graphically illustrated. This gap is not only large, but also increasing for some developing

countries. The Internet might be seen as an intellectual technology. It can give everyone access to writing and to knowledge, and to intellectual tools.

A case study of India was presented, detailing the current state of its IT infrastructure and regulatory environment. Some successful, innovative experiments illustrated how enhanced IT access could improve local economics through access to market prices. Enormous innovation can be locally driven – bottom-up changes can result in imaginative ways of using – and tinkering with – the network to meet local need.

Problems in developing the infrastructure were seen as not economic per se – rather they relate to the politics of adjusting market arrangements to take advantage of the technology. With proper policies using market led growth and appropriate subsidies, it was argued that the infrastructure can be developed effectively.

The linkage of IT use to development was queried. How much research is there on the impact of IT on societies and individuals in the developing world? The lack of such studies was acknowledged, though gut economic instinct suggested that in the long term the benefit is likely to be enormous. However, even when the infrastructure is there, success in use can be a hit-or-miss affair. The social substrate on which the technology is introduced is important. To be successful, IT development has to take into account local needs and ideas. Experience has shown that when the Internet is available rurally, people learn to use it in ways previously not thought of. The information accessed is converted into what is useful to local people. Western ideas and western quality control may not be appropriate. Private initiative and appropriate technology are. In India, development of IT locally has empowered women, and their status has indeed risen as a consequence of increased IT access.

Some argued that the effective use of IT tools requires literacy. As less than half the world is literate, it was argued that illiteracy needs to be conquered before IT is considered a priority. Good teachers are needed to teach writing and its use as a tool. However, experience shows that children easily learn to use the net – first for amusement, then for information. But what about the variable quality of information on the web, and its use for propaganda? It was counterargued that quality control is needed – just as in any educational procedure. Teachers are important in selecting information, and in educating children in the use of the net.

It was further pointed out that as the African situation is so desperate, we have no choice but to use the resource despite these problems – the teacher shortage and quality are so stretched that ‘traditional’ teaching is likely to be similarly defective anyway. We have to be able to deliver formal education with a severe teacher shortage: using IT-based distance learning, a handful of good teachers can reach and teach many students. This is true at tertiary as well as lower levels.

Computers as a means of education delivery were discussed. However, as there is no convincing data to demonstrate the value of computers in extending the abilities of the teacher, studies need to be undertaken. Producing material for computer-assisted learning is resource intensive. Yet good material is essential. It would be a severe mistake to transport without modification courses developed in, for example, the US – the material must relate to the situation in which it is being used, and hence must be developed locally.

Where is the infrastructure to keep computers going? Using IT students as interns to service the infrastructure was suggested. Moreover, it is important to simplify both the hardware and the software. The 'simputer' developed in Bangalore recognised the hardware problem, and using open source software – as is increasingly done in commerce and industry in the developed world – is not only less resource intensive, but also facilitates local development.

Suggested ways forward to help poorer societies become more knowledge-based included a co-ordinated, global effort by institutions such as the World Bank, UNDP, UNESCO and other NGOs. Regulatory policies should encourage, not suppress, innovation and experimentation.

In summary, policy, income, literacy, and education were seen as the major barriers to effective exploitation of IT in development. Different members of the group gave different emphases to these. But none of them were seen to be insurmountable.

Biotechnology and Development

(a) Biomedical Research and the developing world.

Biomedical R&D and related patent protection is driven by 'high-income clients' and their diseases. There is an ample supply of scientists with the ability and desire to work on diseases prevalent in developing countries. What is often absent is the finance for such R&D. Even when appropriate drugs exist, patent protection makes their use in poorer communities unaffordable.
Suggested ways to tackle this problem included making patent protection (or extension) conditional on pursuing work on diseases of little interest to the developed world. Or is straight public subsidy a better way? Or can we find – together with workers in the pharmaceutical industry – imaginative mechanisms that liberate the industry from its current competitive constraints so that such research can proceed effectively? A Pugwash workshop bringing together those in industry with other stakeholders may be a way to begin to look for a solution.

(b) Genetic modification in third world agriculture.
It was argued that it is economic interests that are promoting biotechnology as a 'magic bullet' that will revolutionise third world agriculture. Yet studies have demonstrated lower yields of genetically modified crops, no reduction in the use of pesticides, increased pest losses, reduced variability, development of pesticide resistance and effects on nitrogen-fixing flora. Small farmers are being pushed out, yet there is evidence to suggest a major role for small farmers, who are often repositories of indigenous knowledge. Evidence in indigenous farming systems of an inverse relation between size and productivity implies we should invest in the small farm approach. To benefit the rural poor, agricultural research and development should operate 'bottom-up', using and building on resources already available.

The outcome of the Mexico City May 2002 Workshop on The Impact of Agricultural Biotechnology on Environmental and Food Security' was summarised. In addition to the six principles identified at the workshop to guide agricultural biotechnology research and policy making, on which Pugwash was recommended to organise future meetings, a number of further issues were raised. To address the ethical, economic, social, and environmental dilemmas that have emerged from the development, use, and release of GMOs, the broad spectrum of applications of transgenic organisms must be discussed, rather than just focussing on those technologies related to agriculture. These again could give rise to future themes for workshops.

Two questions were asked at the beginning of the discussion. First, can GM feed 9-10 billion people by 2050? Secondly, will it benefit the poor? If the answer to either question is no, then GM techniques should not be a priority. Ability to even use the technology is not necessarily available in poorer countries. A case in point is that of Argentina, which has large GM plantings. However, the recent economic problems are preventing farmers being able to buy the needed fertilisers. A consequent drop in production of some 40% has been estimated.

Both small farmers and public institutions are hamstrung by IPR. Consequently, they have to do deals with private companies, and then the agenda changes. The patent system allows firms to monopolise tools for new development. This is a choice society makes to give a temporary advantage to a monopoly. But in its present application, it has gone too far – it no longer promotes innovation but stifles it. A Pugwash Workshop might look at ways of restructuring the patent system to retain some protection for the inventor, but without stifling further development.

(c) Location of research infrastructure.
The pros and cons of siting appropriate research institutions in the developing world, where the need is both recognised and immediately relevant, were

discussed. The International Rice Research Institute in Bangladesh has resulted in an eight-fold increase in production. In medicine, some questioned why there are so few tropical medicine research facilities in the tropics. Again in Bangladesh, an institute set up for cholera research later developed wider roles in public health, nutrition, and disease prevention. Perhaps research on malaria and HIV should be centred in Africa, fostering additional research infrastructure.

Some caution was expressed about this idea. For example, is it sensible to site an institute working on cholera in a place where there is no clean water? The history of CGIAR (Consultative Group for International Agricultural Research) was brought up as a cautionary tale. Even though the funding apparently came with no strings attached, the outcome was not as hoped – with suggestions that there were strings which resulted in the importation of inappropriate ideas. There was also a view that institutions in the developing world should not be limited to those that deal only with 'local' problems. Science in the developing world must aim to be comprehensive. As it is not practical to send significant numbers of young people to work at the International Centre for Theoretical Physics in Trieste, why not set up an Institute of Mathematics in Nigeria? We talk about asking what Africans want, but generally only in the context of immediate issues such as health, poverty, and hunger. Pugwash should address this issue of sustainable science for developing countries.