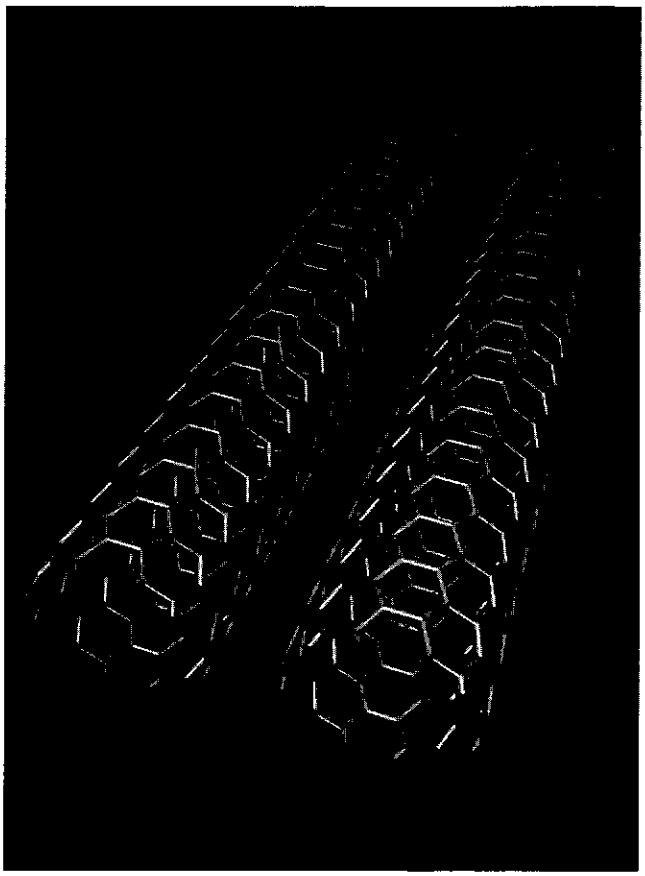
The No-Nonsense *guide to*
New Technologies and Social Justice

MACG

'We discover technical truths about the world through science and technology. High-energy physics, molecular biology, astronomy – sophisticated science makes God's creation intelligible. Scientific data help cure disease and enrich civilization. And now a dazzling new world is breaking open around the convergence of nanotechnology, biotechnology, cognitive science, and information technology. Before the scientific age, our explanations centred on dark forces, mystery, the gods. Today we have truth tested by laboratory research and electronic instruments.'[1]



Two single-walled nanotubes, the basis of many structures in nanotechnology. Photo: accelrys.

The new technologies that convergence is producing are no longer the stuff of 'science fiction'. They are impacting global security, surveillance, health, ecosystems, biogenetics, longevity, information and communication.

The development and use of these technologies raise important ethical questions. And as with every new technology, new marginalised groups (those without access) are being created, which raises the equally important question of social justice.

In particular, cybernetics – the science of communications and automatic control systems in both machines and living things – is having a revolutionary impact on education and culture, on genetic research and evolving biotechnologies, on food production and the health of people.

Cybernetics has enhanced the destructive capabilities of military technology, with grim repercussions for peaceful coexistence. Its integration with other technologies has led to applications that not only contest prevailing worldviews, but also the very nature of human self-understanding.

There is enormous and sometimes sinister political and commercial interest in using new technologies to organize and control people. It is the potential misuse of such power, especially regarding access to and control of information and knowledge, that raises the most concern.

Instrumental power, symbolic power and structural power are three ways of shaping human behaviour. 'In today's information-intense society, however, it has become clear that information is not only a distinct form of power in its own right, but has moved to centre-stage, dominating the uses of all other forms of power and changing how other forms of power come into being and are exercised.'[2]

Biotechnology

Broadly defined, biotechnology is a term that applies to all practical uses of living organisms – anything from microorganisms used in the fermentation of beer to the most sophisticated application of gene therapy.

One way of thinking about biotechnology is to consider two categories of activities: those that are traditional and familiar and those that are relatively new. Within each category can be found technologies that are genetic – that involve modification of traits passed down from one generation to the next – and technologies that are not.

A prime example of traditional genetic biotechnologies is selective breeding of plants and animals. The rudiments of selecting plants and animals with desirable traits and breeding them under controlled conditions probably go back to the dawn of civilization, but the expansion of knowledge about genetics and biology has developed selective breeding into a powerful and sophisticated technology.

Many new biotechnologies do not involve modifications of traits passed on to the next generation. A good example is monoclonal antibodies (highly specific preparations of antibodies that bind to a single site on a protein) which have many diagnostic applications, including home pregnancy testing kits. Many biotechnology companies are engaged in these sophisticated, but noncontroversial, technologies.

In contrast, mammalian cloning is a new biotechnology that does not involve gene modification, but is nevertheless highly controversial. Cloning reproduces adult mammals by transplanting a nucleus from adult cells into an egg from which the nucleus has been removed and allowing the egg to develop in a surrogate manner. The resulting individuals are as similar to the adults from which the nuclei were taken as identical twins are to one another.

Although this procedure has profound implications for human reproduction, it does not modify specific traits of an individual, but rather transfers a whole nucleus containing a complete set of genetic information.

The new technology that can affect future generations is genetic engineering, a technology based on the artificial manipulation and transfer of genetic material. This technology can move genes and the traits they dictate across natural boundaries – from one type of plant to another, from one type of animal to another, and even from a plant to an animal or an animal to a plant. Cells modified by these techniques pass the new genes and traits on to their offspring.

Genetic engineering can be applied to humans to replace or supplement defective genes. Where engineering is intended to cure disease, it is called gene therapy. Potential applications that are not related to disease, such as the modification of traits like height, are sometimes called genetic enhancement.

But 'enhancement' itself is a controversial notion. 'As much as human enhancement technology will become an enabling technology for the few, it will become a disabling technology for the many. I believe that we need to change the whole system towards *distributive justice*, giving the enhancements first to those who need them most... If we go on as we are today we will see the appearance of a new underclass of people - the unenhanced.'[3]

Nanotechnology

Nanotechnology is a field of research and innovation concerned with building 'things' – generally, materials and devices – on the scale of atoms and molecules. A nanometre is one-billionth of a metre: ten times the diameter of a hydrogen atom. The diameter of a human hair is 80,000 nanometres.

At such scales, the ordinary rules of physics and chemistry no longer apply. For instance, the characteristics of materials, such as their colour, strength, conductivity and reactivity, can differ substantially between the nanoscale and the macro. Carbon 'nanotubules' are 100 times stronger than steel, but six times lighter.

Nanotechnology is hailed as having the potential to increase the efficiency of energy consumption, help clean the environment, and solve major health problems. It is said to be able to massively increase manufacturing production at significantly reduced costs. Products of nanotechnology will be smaller, cheaper, lighter yet more functional and require less energy and fewer raw materials to manufacture, claim nanotech advocates.

However, there is a worry that the science and development of nanotechnology will progress faster than policy-makers can devise appropriate regulatory measures. For this reason informed debate must take place to determine the balance between risks and benefits.

Nanotechnology holds the promise of new solutions to problems that hinder the development of poor countries, especially in relation to health and sanitation, food security, and the environment.

Nanotechnology could one day lead to cheaper, more reliable, systems for drug-delivery. For example, materials that are built on the nanoscale can provide capsules that protect and secrete the enclosed drugs in a slow and controlled manner. This could be a valuable solution in countries that don't have adequate storage facilities and distribution networks, and for patients on complex drug regimes who cannot afford the time or money to travel long distances for medecines.

Water purification could benefit from filters structured on the nanoscale offering the promise of better and cheaper systems that are long-lasting. Other similar technologies could absorb or neutralise toxic materials, such as the arsenic that poisons the water-table in many countries including India and Bangladesh.

But will these innovations reach the people most in need? The ETC Group has expressed concern that the control of nano-technology research and development will remain in the hands of industrialised nations. The result would be a bias towards developing applications that benefit rich countries, but neglect the needs of the poor.

And what of the unknown? Is nanotechnology over-hyped? Can it fulfil its promise without comprising social norms and security? Are the claims of what nanotechnology can achieve realistic? Or is it a runaway technology destined to wreak havoc on human health and the natural environment?

Assessing the role of nanotechnology and guiding its progress will require the cross-sectoral involvement of scientists, governments, civil society organisations and the general public. Informed debate is essential.

Gender equality

New technologies raise the stakes for gen der equality advocates. New technologies are not neutral; they reflect and, in fact, incorporate social arrangements and power relations. Moreover, the science and technologies themselves are interrelated; the governments seeking to regulate them are linked by trade and aid relationships; the companies looking to develop and sell them use the processes of globalization to reach larger markets and to locate more resources and raw materials.

Women's rights are particularly threatened by new genetic technologies because their development requires extensive testing on women and their genetic materials. As debates rage on about cloning and other reproductive and genetic technologies, the issue of experimentation and testing is often overlooked. Much of the stem cell research and cloning mentioned in these debates will require huge numbers of eggs, which must be donated by women. Egg donation is invasive and potentially dangerous.

Debating the merits of cloning and this kind of human experimentation is premature without considering the health and safety of the women that would be needed to pursue the research. Beyond safety, there are a number of other specific women's rights issues that need to be addressed: access and equity, reproductive choice, commodification of life and, specifically, of women's bodies.

Some women are involved in developing new technologies, but many more can become involved in critically interrogating it, asking important questions about its use, and presenting alternatives.

Technologies can and do alter the balance of gender relations and roles. Gender relations are also transformed as reproduction, thanks to assisted reproductive technology, moves into the laboratory and the domain of (often male) scientists and biomedical enterprises. Some technologies are immediately related to women and their specific social or biologically defined roles, but this does not mean that women should not be involved in debating other technologies such as biological weapons.

It is important to highlight not only what impacts on women directly, as women, but also what impacts on their equality and their ability to access and enjoy their rights.

The need for an international convention

In June 2005 the ETC Group began discussions with a number of governments, intergovernmental agencies, and civil society organizations aimed at developing a long-term strategy to address the introduction of significant new technologies.

Although some would like to see a *sui generis* Nanotech Protocol similar to the Biosafety Protocol, there is growing sympathy for establishing an intergovernmental framework that would allow for the monitoring and evaluation of new technologies as they evolve from initial scientific discovery to possible commercialization.

ETC Group argues that a generic, transparent, facility could earn the confidence of governments and society as well as of the scientific community and could reduce unproductive posturing and debate. For the purpose of discussion, ETC group has called this new facility the International Convention for the Evaluation of New Technologies (ICENT).

ICENT could be a legally binding United Nations Treaty. Its aim would be to create a socio-political and scientific environment for the sound and timely evaluation of new technologies in a participatory and transparent process that supports societal understanding, encourages scientific discovery, and facilitates equitable benefit-sharing.

Additionally, the objective is to clarify the need for such a convention, to stimulate high-level and societal discussion, and, to encourage national and regional legislative and institutional initiatives that would complement an international agreement.

Nations in the South will welcome the early warning, open assessment, and facilitated access elements of the initiative. Some risk assessment and regulatory

expenses would be secured at the international level.

The North – including scientific organizations, industry, and governments – will welcome an end to unpredictability and societal distrust and the establishment of a generalized, non-crisis approach to technology diffusion.

Global civil society will welcome a transparent and participatory process with both early listening and technology conservation/diversification potential.

Given the tremendous developments expected in technological convergence at the nano-scale and, in particular, developments in nanobiotechnology (synthetic biology), it is important that negotiations begin as soon as possible.[4]

Why are these issues important?

New technologies have enormous potential to help tackle issues of social justice and development in today's societies. But they also have the capacity – in both the short and the long term – to change us as human beings. As a World Council of Churches' report remarks:

> 'It is important not only to notice, but to understand, the shift away from science and technology as instruments and tools for human development towards the much more sophisticated notion of their power and capacity to transform and to re-design the basic elements of matter – and thus the building blocks – of the community of life as we know it. Newly emerging technologies are paving the way for the commodification of life at a much more basic level. The debate on patent laws and corporate power shows this clearly. But the process has even deeper consequences for the understanding of the earth community and the broader web of life as well as the place and role of human beings for life in community and creation.'[5]

It is urgent for everyone in society to take part in and contribute to a wide-ranging and far-reaching debate about the social, cultural and ethical questions raised by new technologies and their applications. Civil society – including the churches – must play a critical role in determining how such technologies affect our common future. ■

Notes

1.'Truth at the frontiers of science', by Clifford G. Christians, in *Media Development* 2/2006, pp. 6-10.
2. 'The Meta-Technologies of Information' by Sandra Braman, in *Biotechnology and Communication*, p. 35. Lawrence Erlbaum Associates (2004).
3. 'The unenhanced underclass' by Gregor Wolbring in *Media Development* 2/2006, pp. 30-45.
4. ETC Group Report, Communiqué No. 89, July-August 2005. See http://www.etcgroup.org/
5. Science, Faith and New Technologies: Transforming Life, Vol. I: Convergent Technologies. WCC Geneva, 2006.

Further reading

Science, Faith and New Technologies: Transforming Life Volume I: Convergent Technologies

World Council of Churches and WACC, with Bossey Ecumenical Institute (2006)
Handbook on the challenges posed by newly emerging technologies to people of faith. It is a discussion starter aimed at encouraging urgently needed study and reflection by churches, theological faculties and ecumenical bodies in close cooperation with each other.
http://wcc-coe.org/wcc/what/jpc/pa-booklet-nano1.pdf

Science, Faith and New Technologies: Transforming Life Volume II: Genetics, Agriculture and Human Life

World Council of Churches and WACC (2006)
Discussion-document by the Working Group on Genetic Engineering of the Justice, Peace and Creation Team. This document deals first with the implications of genetic engineering applied to human life and then turns to the implications for agriculture.
http://wcc-coe.org/wcc/what/jpc/pa-booklet-bio.pdf

Fearfully and Wonderfully Made: A Policy on Human Biotechnologies

National Council of Churches USA (2005)
This document begins with a theological discussion of our anthropology or self-understanding particularly in regard to biotechnologies which now hold potential for altering ourselves and others for generations to come. A second major section discusses the Church's calling especially in relation to faith and science, biotechnology and ethics, and pastoral care. A third section describes the key challenges for Church engagement.
http://www.ncccusa.org/pdfs/BioTechPolicy.pdf

Communicating with angels: Being digital, being human?

World Association for Christian Communication (2006)
The 2/2006 issue of WACC's journal *Media Development* examines different aspects of the impact of new technologies on global society. Articles include 'Human communication and the convergence agenda' by Cees J. Hamelink, 'Truth at the frontiers of science' by Clifford G. Christians, 'Faith, hope, love and new technologies' by Albert van den Heuvel, 'Convergent technologies: Future perfect or imperfect?' by Philip Lee, 'Genetic technology and the UN Disability Convention' by Majid Tumusani, 'The unenhanced underclass' by Gregor Wolbring, 'The jolly IT giant' by Max Ediger, and 'Understanding the new sciences in the pursuit of life' by Pradip N. Thomas.

This No-nonsense Guide is a resource from the World Association for Christian Communication, compiled by Philip Lee.

The World Association for Christian Communication (WACC) promotes communication for social change. It believes that communication is a basic human right that defines people's common humanity, strengthens cultures, enables participation, creates community, and challenges tyranny and oppression. WACC's key concerns are media diversity, equal and affordable access to communication and knowledge, media and gender justice, and the relationship between communication and power. It tackles these through advocacy, education, training, and the creation and sharing of knowledge. WACC's worldwide membership works with faith-based and secular partners at grassroots, regional and global levels, giving preference to the needs of the poor, marginalised and dispossessed. Being WACC means 'taking sides'.

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