



BONN INTERNATIONAL CENTER FOR CONVERSION

B · I · C · C

bulletin

No. 33

October 2004

Improving the Human Being? ***When nano-, bio- and information technology and cognitive science join forces***

by Jürgen Altmann

Everybody is aware of advances in computers, genetics, biology and medicine. New ethical debates arise from the possibilities of pre-implantation diagnosis and human cloning. Other visions, formerly treated as “science fiction”—such as real artificial intelligence or social robots—have been much harder to achieve than imagined by pundits. This may change in the next 20 years, at least when the outcomes of a series of US-government-sponsored workshops that started in December 2001 in connection with the National Nanotechnology Initiative are taken as an example. The results of the first of these remarkable conferences, titled “Converging Technologies for Improving Human Performance”,¹ show that nanotechnology, biotechnology, information technology and cognitive science (NBIC) converge at the fundamental level, namely the nanometer (1 nm = 10⁻⁹ meter) scale, where atoms and molecules interact according to the same laws both in living systems and in abiotic natural or artificial processes.

But what are these technologies? *Nanotechnology* is the analysis, understanding and manipulation of matter at structure sizes from 0.1 to 100 nm. *Biotechnology* utilizes and modifies the molecular basis of cell processes, from genetics to the biochemistry of proteins. In *information technology* the challenge to reduce the size of computers even further is accepted, so that soon new hardware principles will be required, maybe with molecules as switching and storage elements. Some predict that computers will transcend the raw processing power of the human brain in 20 years. AI and robotics are progressing, but at a slow pace. *Cognitive science* is advancing the understanding of brain functions using imaging techniques, multi-electrode sensing and neural prostheses. Progress in one of the areas tends to reinforce advances in the others; e.g., more powerful computers allow for a better modeling of molecular processes which in turn results in a better

understanding of the biochemistry and mechanics in cells, and leads to new molecules that can be used to build smaller, and even more capable computers.

The 2001 workshop listed 20 visions to be attained in the next 10–20 years, among which are

- fast, broadband (human) brain-to-machine interfaces both for civilian and military purposes,
- robots and software agents operating on principles compatible with human goals, awareness, and personality,
- a more durable human body, more resistant to many kinds of stress, biological threats, and aging processes,
- control of the genetics of humans, animals and agricultural plants, with widespread consensus about ethical, legal, and moral issues.

Some individual contributions at the workshop went even further, reporting of nano-implant devices, reversing aging, and “artificial people”.

“Some predict that computers will transcend the raw processing power of the human brain in 20 years.”

To the observer, the border to “transhumanism”—the idea of overcoming human existence by some better form—is increasingly difficult to

see. The concept of “molecular nanotechnology” as advertised by E. Drexler, that is universal molecular assemblers capable of synthesizing anything, including replicating themselves, was not discussed.

Even so, it is obvious that the envisaged possibilities to change matter—including human—will have tremendous implications for society. The need for an ethical base on which decisions on NBIC can be made was mentioned several times, but never discussed in detail. Risks were practically not addressed. In Europe, there is quite a different approach to this topic².

Military applications of these technologies give rise to particular concern. They were covered in a special section on “National Security”, where the general approach was that “it is essential to be technologically as far ahead of potential opponents as possible”. Special uses were seen in miniature sensors, high-speed processing and communication; uninhabited combat vehicles; warfighter education and training; chemical/biological/radiological/explosive detection and protection; warfighter systems; non-drug treatments for an enhancement of human performance; and a brain-machine interface.

Whether fast advances in military uses of NBIC technologies are favorable to global security was not discussed; related dangers, such as arms races with potential opponents, new threats, terrorist uses, etc. were not mentioned at all. Motivated by extreme requirements and aggravated by secrecy, military R&D may undermine barriers to non-medical body manipulation that exist in civil society. Whereas such work would be done in considerable transparency in the United States, there are many other countries that are less open in military matters. Present US programs in this direction focus on biochemical modifications that allow for seven days of activity without sleep or aim at a brain-machine interface (as of yet non-invasive for humans).

Nobody will object to the many positive uses NBIC technologies will bring, such as stronger but lighter materials in cars, more efficient solar cells, membranes for water filtration, neural prostheses for paralyzed patients. However, extremely powerful computers, miniaturized omnipresent sensors, autonomously moving micro-robots and non-medical body implants do pose dangers to privacy and democratic society. Society will have to regulate these technologies to prevent misuse. Since military uses would exploit the destructive potential by intent, it is all the more important to introduce preventive arms control measures to the international community.

Building on first investigations on nanotechnology,³ BICC, together with other partners, is preparing a project proposal on the dual use of nanotechnology and converging technologies.

¹ www.wtec.org/ConvergingTechnologies.

² "Converging Technologies—Shaping the Future of European Societies". Report of a High-Level Expert Group, 2004, <http://europa.eu.int/>.

³ J. Altmann, Military Uses of Nanotechnology: Perspectives and Concerns, Security Dialogue 35 (1), 61-79, March 2004.

Dr Jürgen Altmann is currently research fellow at the Institute for Experimental Physics III at the University of Dortmund, Germany.

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BICC (Bonn International Center for Conversion) is an independent, non-profit organization dedicated to promoting peace and development through the efficient and effective transformation of military-related structures, assets, functions and processes.

**This newsletter is published quarterly by
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An der Elisabethkirche 25, 53113 Bonn, Germany.

Responsible for this issue: Heike Webb (editing) and Katharina Moraht (layout and publishing management).

**Phone: +49-228-911960
Fax: +49-228-241215
E-mail: bicc@bicc.de
Internet: www.bicc.de**

Staff Spotlight:



Susanne Zacharias

Susanne Zacharias (Germany) who joined BICC in February 2003 as the Personal Assistant to the director, Peter Croll, is in charge of all organizational matters of the director's office.

She is also responsible for the preparation and the follow-up of the BICC Board meetings—the Supervisory Board, the Board of Trustees and the International Board. She prepares internal meetings, such as the regular meetings of the management and the general staff and takes care of the follow-up. In BICC's international work she holds a key position by being responsible for the Director's communications with the International Board and BICC's international partners such as UN Departments, NUPI, SIPRI, IGAD and all other strategic partners.

Another important task of hers is to make sure that communication between the director and BICC staff goes smoothly; there she prepares events like a future search conference, a discussion forum for key issues of BICC's work. She also lends a helping hand at public events of BICC. Susanne is highly appreciated with her colleagues because of her excellent organizational skills and because she is always willing and concerned to help others.

Susanne has a diploma as translator for English and Spanish from the Fachhochschule Köln (Cologne polytechnic). During her studies she spent two years in Spain and Italy. Before she came to BICC she worked with a German-US science promoting foundation and an international computer consulting company.

Susanne is a "Bonnerin". She was born and grew up in Bonn and spends her free time attending cultural events, meeting friends or hiking in the "Siebengebirge", the romantic mountains nearby, or along the banks of the river Rhine. Moreover, she enjoys cooking and fashion. When travelling she loves to go to Finland and the Baltic States.

→ For further information please contact
Susanne Zacharias at sz@bicc.de

Economy of Violence in the Niger Delta

A new research project aims to provide a preliminary study of the dynamics of violence in the Niger Delta region of Nigeria. It is closely related to the BICC project on war economies.

With an estimated 85 percent of total state revenue coming from oil, one can safely say that oil is the 'lifeblood' of Nigeria. The biggest share of Nigeria's oil fields is found in the Niger Delta. In the past, Delta residents seriously disrupted oil production, because it was polluting their environment and because they received little compensation for loss of livelihood as most revenues went to the state. It seems that the little money that was made available was not used appropriately. Even though government policies appear to have improved since the transition to democracy in 1999, this has not led to a decrease in the instances of violence.

Some features stand out in the dynamics of violence in the Delta. The level of oil bunkering (large-scale theft) is substantial, with an estimated 10–15 percent of total production 'disappearing', thus implying sophisticated organizational criminal forces. Some of the money obtained is allegedly used to arm Delta militias. New levels of weaponry and organizational structures raise serious concerns about the militias' linkages with international criminal networks and violence.

Based on extensive field research, the project plans also to inform stakeholders about the issues mentioned above. It might lead to further in-depth research at a later stage. A publication is planned for 2005.

For further information please contact
→ Wolf-Christian Paes at paes@bicc.de

De-escalation of Violent Conflicts

Some have compared certain aspects of the "war against terror" such as threat perceptions, ideology, or its potential for military escalation, to the Cold War. Indeed, in the light of the numerous problems we are facing when dealing with the international management of conflict since 1989, and even more since 9/11, a second look at the bipolar world order of the Cold War may prove a useful endeavor.

The annual conference of the Arbeitskreis Historische Friedensforschung (Peace History Society), titled *The De-escalation of Violent Conflicts after 1945—A Comparative History of Conflict Resolution*, 10–12 December 2004, at Evangelische Akademie Loccum, will study successful and failed strategies of how to de-escalate violent conflicts in the second half of the 20th century.

Historians and political scientists from Germany, the UK and the US will discuss the effects of *détente* during

the Cold War, and compare these with approaches to de-escalate primarily intra-state or domestic militant conflicts in the 1990s, such as in the Horn of Africa, the Middle East, or in Northern Ireland. Do prevailing principles of world order and the imbalances of power influence de-escalation strategies? What are the dynamics of de-escalation, in terms of timing, or with respect to the root causes of a conflict? Which stakeholders or actors are right when it comes to de-escalatory interventions? Are the prevention of war and armed violence, and the promotion of human rights and democracy conflicting or inclusive goals for de-escalation?

For further information on the conference sponsored by BICC and others please contact
→ Corinna Hauswedell at ch@bicc.de

Aging Stockpiles and Surplus Weapons in Ukraine

Ukraine has in storage an aging inventory of Small Arms and Light Weapons (SALW)—over 7 million pieces—and huge stockpiles of ammunition—about 2.5 million tons. These stocks are a legacy of WW II, the Cold War build-up against NATO, stocks left by Soviet Forces while withdrawing from East Germany, Czechoslovakia, Hungary and Poland, and surplus weapons resulting from the restructuring of the Ukrainian Armed Forces. Many of these stocks are stored in the open, with over 300,000 tons of ammunition requiring urgent disposal. Safe disposal of these massive stocks exceeds the capabilities of the Ukraine by far. It can destroy some 20–25,000 tons of munitions annually, but at least 50–70,000 tons would have to be destroyed.

Ukraine's aging stocks of ammunition and SALW are a major safety threat to people and infrastructure and a potential security threat to the region at large. If these threats are ignored, they may also lead to the theft of unprotected explosives by terrorists, illegal arms trade, and militarization of ethnic conflicts in Ukraine's neighborhood. Even if the requested international support was provided to the Ukraine, it would spend the next 10 years at least just to minimize the increasing risks from unserviceable ammunition.

The BICC project, mainly conducted by the Ukrainian Center for Economic and Political Studies (UCEPS), will assess the full range of risks and challenges posed by the aging stocks of ammunition and SALW, develop policy recommendations for the Ukrainian government and external donors, and identify principal lessons for other CIS countries. The planned project duration is August–December 2004.

For further information please contact
→ Andreas Heinemann-Grüder at hg@bicc.de

BICC Publications

In addition to its annual *conversion survey*, the *BICC/DCAF security sector governance and conversion studies* and other books, BICC publishes *reports*, *briefs*, and *papers*. These series analyze the international conversion process, report on conversion projects and experience gained, and offer scientific as well as practical know-how. Further details can be obtained at www.bicc.de/publications/.

Festschrift *10 Jahre BICC. 1994–2004* / **Festschrift** *10 Years BICC. 1994–2004*, October 2004

brief 30:

Michael Brzoska and Peter J. Croll (eds.), *Promoting Security: But How and for Whom? Contributions to BICC's Ten-year Anniversary Conference*, October 2004

paper 35:

Edward Mogire, *A Preliminary Exploration of the Linkages between Refugees and Small Arms*, July 2004

paper 36:

Deba Mohanty, *Changing Times? India's Defence Industry in the 21st Century*, July 2004

paper 37:

Scott Lewis, *Rejuvenating or Restraining Civil War: The Role of External Actors in the War Economies of Sudan*, September 2004

BICC/DCAF security sector governance and conversion studies:

no. 8 Marina Caparini (ed.). 2004. *Media in Security and Governance. The Role of the News Media in Security Oversight and Accountability*. Nomos Verlagsgesellschaft, Baden-Baden

no. 9 Jocelyn Mawdsley, Marta Martinelli and Eric Remacle (eds.). 2004. *Europe and the Global Arms Agenda: Security, Trade and Accountability*. Nomos Verlagsgesellschaft, Baden-Baden

BICC Notes

On the occasion of its 10th anniversary, BICC invited the interested public to an **Open Day** on 16 September 2004. Around 120 citizens of Bonn came to obtain information on the work of the center and participated in the talks about “*Demobilization and reintegration in Bosnia-Herzegovina*” (Tobias Pietz), “*Small arms—a worldwide threat*” (Julie Brethfeld) and “*UN resolution 1325—gender roles and international security*” (Renée Ernst). The final events of the day were the private view of **the photo exhibition “Caucasus—poor domicile of freedom”** of Janek Sliwka in the foyer of the BICC premises which is shown until the end of the year, and the following **discussion “Caucasus—region of conflict on the border of Europe”** with mit Andreas Heinemann-Grüder (BICC), major general, retired, Dr. Dietrich Genschel and Zaur Gasimow (Baku, Azerbaijan). BICC is intending to organize another Open Day in the year 2005.

For further information please contact

→ Susanne Heinke at pr@bicc.de

On the occasion of a visit by **Rosa Namises**, MP of the Namibian opposition, who was invited by the “Initiative Südliches Afrika” (INISA) e.V., BICC organized a **public round table discussion** which took place on 30 September 2004 at BICC. Rosa Namises talked about current questions concerning internal policy and the development of democracy in Namibia.

For further information please contact

→ Susanne Heinke at pr@bicc.de

In cooperation with the Peace Counts Project, GTZ, WDR 5, the Center for International Cooperation Bonn GmbH (CIC) and the city of Bonn, BICC is organizing **the public event “The dangerous mission of Padre Presiga”** on 6 October 2004 at the UN House Carstanjen in Bonn. Padre Giovanni Presiga will report about his peace work in Columbia after Fritz Hempler’s (GTZ) introduction into the subject.

For further information please contact

→ Susanne Heinke at pr@bicc.de

Since 1999, the two organizations “The Association for Mental Health Protection of War Veterans and Victims of Wars 1991–1999” and the German “Ohne Rüstung Leben (ORL)—Life Without Weapons” have been running a trauma center for war veterans of the Balkan wars in Novi Sad, Serbia. On 7 October 2004, Vladan Beara, Dr Predrag Miljanovic and Ursula Renner will discuss the problematic issue of traumatization and reintegration with Mr. Beara giving a **presentation on “Post-Traumatic-Stress-Disorder (PTSD) as an Obstacle for the Social Reintegration of War Veterans: The Case of Serbia”** at BICC.

For further information please contact

→ Susanne Heinke at pr@bicc.de

Dr. Hans Blix, former Executive Chairman of the UN Monitoring, Verification and Inspection Commission (UNMOVIC) in Iraq and former Director General of the International Atomic Energy Agency (IAEA), will speak on the occasion of the **‘United Nations Day’** on 22 October in the partner year of the City of Bonn and BICC about **“Human security—Disarmament and development”**. Bärbel Dieckmann, Lady Mayoress of the City of Bonn, will speak the opening words, Joke Waller Hunter, Executive Secretary of the UN Framework Convention on Climate Change (UNFCCC), will welcome Dr. Blix and the public. Peter Croll, Director of BICC, will introduce the topic and facilitate the discussion with Dr. Hans Blix. On 23 October, BICC will be amongst numerous other international organizations and institutions presenting their work in development cooperation on the market square in Bonn and will discuss the topic *“From ‘blood diamonds’ to teakwood—Who profits from civil war economies and ‘unfair trade’ ”*.

For further information please contact

→ Susanne Heinke at pr@bicc.de