



Newsletter Knowledge NBIC Project

www.converging-technologies.org

Published twice a year

The KNOWLEDGE NBIC newsletter, published twice a year, aims to disseminate information on converging technologies among social scientists and become a platform for networking across disciplinary boundaries between natural and social scientists. Regular features will include an update on project and partner activities; reviews of interesting links; reports on events or publications; and short articles on relevant overarching themes. Contributions from researchers working on issues related to converging technologies are welcome. Contact us at info@converging-technologies.org.

The project

The KNOWLEDGE NBIC project was launched in Spring 2006 with the support of the European Commission's Sixth Framework Programme. The project is a study of the patterns of knowledge production of four key S&T fields, namely nanotechnology, biotechnology, information technology and cognitive science. These fields, it is claimed, are converging, hence the term 'Converging Technologies' or NBIC to describe them.

The project is coordinated by Nico Stehr, Karl Mannheim Chair for Cultural Studies at Zeppelin University and involves, in addition to the Zeppelin University team, research teams from the Universities of Warwick and Tel-Aviv, ITAS Karlsruhe, the Polish Foundation for European Scientific Cooperation and The Interdisciplinary Centre for Comparative Research in the Social Sciences in Vienna and Paris.

The KNOWLEDGE NBIC project partners are carrying out historical and sociological analyses of the changing field of NBIC in order to explore its institutional settings and research trajectories. The project also involves charting public debates and processes surrounding the introduction of

specific policies for monitoring and regulating new knowledge and technologies.

In the first six months, work on the project has concentrated on setting the stage for our exploratory research by reviewing the relevant literature, establishing a database of relevant contacts across Europe, and contemplating the issues to be dealt with in a series of interviews to be carried out with programme managers and scientists over the next months.

In this and subsequent newsletters, we will be reporting on the progress of our work in addition to introducing readers to specific themes, books and events related to the converging technologies field. Information on the project, as well as this newsletter in electronic form, is available on the project's Web Site at www.converging-technologies.org.

The 'Converging Technologies' Paradigm(s)
The 'convergence' paradigm that has received the most publicity in the last years is that associated with the enhancement of human performance. In an NSF report from 2002, Mihail C. Roco and William Sims Bainbridge called for more investment in basic research that prepares the "synergistic combination" of diverse technologies based "on material unity [...] and technological integration" at the nanoscale (Roco and Bainbridge 2002: ix). This, they argued, should make it possible in the long-term, to create new materials and devices, including bio-nano processors mimicking cellular processes that both capitalize and impact on human intelligence and open new prospects for the human body. The metaphor that describes this vision is best captured by the words of one of the participants of the NSF 2002 workshop, W. Wallace: "If the Cognitive Scientists can think it, the Nano people can build it, the Bio people can implement it, and the IT people can monitor and control it." (Roco and Bainbridge 2002: 13). The question of course remains, what this infamous 'it' should be.

The visions on converging technologies outlined in the NSF report resonate closely with those expressed by Eric Drexler in *Engines of Creation* published in 1986 (Anchor Press). Drexler contributed massively to the popularization of nanotechnology but also to its mystification. His main interest – and later that of the authors of the NSF report – focuses on the possibilities unlocked by molecular ‘manufacturing’. The challenge of nanotechnology is not so much about making happenings on a very small scale observable, or even the construction of very small machines; its challenge lies in the fact that once within the nanoscale, the properties of molecules (and cells) can be reconstituted by being open to manipulation. However, there is still a long way to go from arriving at the nanoscale to being able to engage in molecular manufacturing in any effective and secure way.

Judging nanoscience and nanotechnology more cautiously, UNESCO warns against concentrating attention on the specific vision(s) entailed in molecular manufacturing when assessing the opportunities and challenges entailed in the converging technologies paradigm (UNESCO 2006). Similarly, the High-Level Expert Group established by the European Commission to “foresight the new technology wave” (EC 2004), is keen to distinguish its own positive programmatic visions regarding converging technologies from those of the NSF by insisting that what Europeans are (or should be) interested in are the possibilities for using the new knowledge and technological tools to effect engineering for the mind and not engineering of the mind.

The debate as to what converging technologies can achieve and whether it is acceptable – ethically and morally – to pursue their development in this sense will not be settled in the near future, but will accompany us in the years to come (just like the debate on stem-cell research or GMOs). It should, however, already now be clear that there will be no definite answers to the substantial questions raised by this new S&T field.

In the meantime, however, the convergence

paradigm is gaining in significance at another level, namely that of research programming and funding. The term ‘convergence’ or ‘converging’ is not always used explicitly in this context. Nevertheless, both at the European level and in several national environments, research is being actively promoted – both by the public and private sectors – that seeks solutions to key challenges in the fields of health, education and infrastructure, as well as environment and energy, through innovations at the nanoscale and the synergistic combination of insights and techniques from what previously used to be distinct disciplines. In this process, new educational curricula emerge that appear to blur both the institutional boundaries between science and technology, on the one hand, as well as those between physics, chemistry, biology and engineering, on the other.

So much for appearances. But is what appears also that which is? To what extent are the scientists involved in this ground-breaking research also advocates of the underlying logic and teleology of converging technologies? And, if the converging technologies paradigm(s) is/are indeed bringing about an institutional re-engineering of the science field, what does this mean for the future of science, or indeed the ethics of science? These are some of the questions addressed by the KNOWLEDGE NBIC project to be reported upon in future editions of this newsletter.

Interesting Links

The ‘links’ section of the project’s Web Site www.converging-technologies.org provides a regularly updated list of interesting links on converging technologies.

On discourses on converging technologies, take a look at:

<http://www.wtec.org/ConvergingTechnologies/> for the NSF 2002 report on the potential of converging technologies for enhancing human performance,

http://cordis.europa.eu/foresight/technology_wave.htm for the European Commission’s

more cautious vision on converging technologies, or

<http://2100.org/Nanos> for Canada's approach to the emerging new field.

The UNESCO Ethics of Science and Technology Site at www.unesco.org/shs/est provides a good overview of the relevant ethical questions in this and other new technology fields. The recently published report on The Ethics and Politics of Nanotechnology (2006) available at <http://unesdoc.unesco.org/images/0014/001459/145951e.pdf> is one of the best brief and comprehensive reports on this topic currently available. Following the recommendations of this and similar reports to pay more attention to the safety and toxicity aspects of nanotechnology, the OECD has launched in September 2006 a working party on manufactured nanomaterials as a subsidiary body of the Chemicals Committee (www.oecd.org/ehs)

The European Nanotechnology Gateway at www.nanoforum.org is an equally useful platform for keeping up with developments in the nanotechnology field which is at the core of the converging technologies paradigm. In addition to providing information on scientific developments and industrial applications, it brings readers up to date on risk assessment endeavours and regulatory initiatives.

The results of an expert survey on envisioned developments in nanobiotechnology, including their time frame, was recently published by ICTAF, one of our partners in the KNOWLEDGE NBIC project, in the framework of the Nano2Life (N2L) Network of Excellence:

www.ictaf.tau.ac.il/N2L_expert_survey_result_s.pdf

The European Commission is planning a major RTD investment programme in nanoscience and nanotechnologies. The Action Plan for 2005-2009 can be read at the European Commission's Web Site on nanotechnology at: www.cordis.europa.eu/nanotechnology/action_plan.htm

Review

European Forum on Nanosciences: A Converging Approach across Disciplines

19-20 October 2006

by Liana Giorgi, ICCR

The first European Forum on Nanosciences was organized by COST in Brussels on 19-20 October 2006, bringing together some 300 researchers, policy-makers and business representatives from across Europe. The goal of the forum is to promote multi-disciplinary / converging approaches on nanosciences through networking and the exchange of information. The programme was quite dense, comprising key note talks and four panel sessions, in total just under twenty presentations over two days in addition to a round table.

The forum was successful in communicating a comprehensive overview about nanosciences to a diverse audience. The presentations ranged from the very scientific about some of the latest developments in nanotechnology in the medical sciences, the energy sector, electronics and ICT to the more strategic concerned with the structuring of the research community in terms of human and financial resources. In between, we also heard something about 'prudent' forms of science communication regarding nanotechnologies, the ethical questions that might emerge out of this new field, as well as the public debates on this topic that are beginning to emerge around Europe, partly in the framework of top-down 'pro-active' initiatives financed by national governments or the European Commission.

The scientific and technological advances in the field of nanoscience are undoubtedly inspiring. This is a promising field not least because of the scope of transferability across disciplines, but also because it is possibly bringing about a gradual break-down of the boundaries between theoretical and basic research, on the one hand, and applied research, on the other hand. It is not unlikely that future theoretical advances in the fields of biology, physics or chemistry will emerge out of technological insights at the level of the pathology underlying various diseases

of application, just as a better understanding might be brought about out of knowledge gathered at the clinical level as to the ways different people react to different medicines. From this perspective, the call for more investment in long-term basic research is more than justified.

This said, the analyses regarding the structuring of the research area were somewhat of a *dejà-vu*: calls for more investment into long-term basic research; for more multi- and inter-disciplinary work already at the stage of the education and training of young researchers; the fears that we might be losing (yet again) the eternal competition *vis-à-vis* the United States; and that, in the era of the knowledge society, we might soon be facing a major lack of skilled and innovative researchers. These comments are, in the meantime, standard statements in any research conference at national or European level, even in the social sciences. This suggests that there may possibly be something fundamentally wrong about the way in which the European RTD is currently developing – structurally, as well as with regard to funding schemes. There seemed to be a marked agreement amongst forum speakers of a need for more discussion in this area; this, however, has to take place in a multi-disciplinary environment. Within the framework of the European Research Area, we (the scientists) tend to accept a fragmentation of our profession according to so-called thematic priorities. These distinctions (i.e. according to the source of our funding) appear today more systematic and important than even disciplinary lines. But what this also implies is that we have accepted a division imposed from above, rather than self-organizing ourselves according to real scientific and research interests. This inevitably reduces our bargaining power as a research community as we probably all end up representing our own specific stakes: those of nanoscience vs. those of material science vs. information science vs. even social science. At the same time, we all continue to emphasize multi- and inter-disciplinarity and the project of the knowledge society. The gaps between ideology and practice

have never been greater.

Where the conference was weakest was in the representation of the social and political aspects of the convergence paradigm(s). There was an interesting, even if hurried, presentation by Göran Hemeren on the ethical issues arising out of nanoscience; and Louis Laurent of the National Agency for Research in France gave an overview of the open questions and public debates in this field, but, unfortunately, was the last panel speaker. The first keynote speaker, Giovanni Carrada, an Italian journalist, gave an intriguing presentation about science communication advising (nano)scientists to keep a low profile and be human-centred rather than high-profile and technology-driven in order to avoid a negative hype like that which emerged against GMOs. The difficulty with Carrada's presentation, however, was that he tended to confuse democratic consultation and active citizen participation with science communication and public relations. The message of his presentation was more about scientists learning to communicate strategically, and less about promoting open discussion of emerging science and technology. The social and political aspects of converging approaches in science and the development of nanoscience were perhaps most pointedly addressed by the comments and questions of audience members. As an interesting reflection, none of the speakers addressing social science questions actually came from the social science community, a fact that must raise questions with respect to the success of the inter and multidisciplinary converging approach that is currently being emphasized as central to the European vision on convergence.

Women in the audience were, unfortunately, the minority. However, many audience members will likely recall the vision of the professional woman of the future presented, probably quite innocently, by Gian Mario Maggio of Create-Net. 'Mary', the professional woman of 2020, we were told, will not only have access to an intelligent jacket that will scan her e-mails already after morning coffee; she will own a cabriolet car (BMW, Mercedes or Alfa Romeo)

that reads her happy birthday messages on her way to the airport; and will be all-round healthy having been monitored by miniature sensor devices installed in her bed and operating while she sleeps. Not only must we ask who really wants to be under constant medical observation (acknowledging that in some cases this might be viewed as beneficial due to old-age fragility, living alone and/or suffering from chronic illness), but also: how representative is 'Mary' of our labour force? And, moreover, of the female population? Why of all women or, better, of all individuals, is she chosen to advertise the future of nanotechnology? What does this tell us of nanotechnology? If and when already recommending the adoption of a low-key, human-centred approach to communicate nanotechnologies, it is necessary to also take a bit care about who these humans are and to recognize that, whether it be within discussions of education programmes for nanoscience, use of nanotechnologies, or representations of nanoscience and nanotechnology gender is not neutral.

In all, the Forum, attempted to address questions concerning the state of the art of nanoscience, with individual speakers working to communicate context specific nanoscience to an audience whose diversity in terms of specialist knowledge was likely significant. The statements of the closing roundtable discussion, and the questions of audience members within this last activity, made it clear that there is much future work to be done, if the aim truly is to integrate social, political, structural, and technical perspectives and expertise into the fabric of European nanoscience and nanotechnology.

Forthcoming own events

November 2006

In November 2006, we will launch a cyberconference on the issues addressed in this newsletter. In the course of this conference – to last six weeks – we will invite scientists active in the research fields covered by NBIC, as well as social scientists studying the institutional pathways and ethics of scientific research to contribute their

comments to a series of provocative statements on converging technologies, their actual impact and future implications. Look out for the launch announcement at www.converging-technologies.org/cyberconference2006

Jacquelyne Luce of Zeppelin University and partner to our project is presenting a poster entitled *Bypassing Assessment: The Disappearance of Technological Convergence in Everyday Life* at the NTA2 Conference 'Technology Assessment in World Society', 22-24 November, Berlin.

December 2006

The NBIC and converging-technologies paradigm will be part of the agenda of the conference 'EU Cohesion Policy and the opportunities for Poland's S&T' organized by our Polish partner FEWN at the Jablonna Palace in Warsaw.

May 2007

A workshop on 'Converging Technologies: Research Trajectories and Institutional Settings' will take place in Vienna on 14-15 May 2007. The call for papers for this workshop (and for their subsequent publication) will be published on the project's Web Site at www.converging-technologies.org/events.html towards the end of October. The deadline for submission of abstracts is the 15th December.

The next newsletter

Our next project newsletter will be published in January 2007 and will include a summary of the proceedings of the cyberconference, preliminary results from the first round of expert interviews, as well as the detailed agenda of the May 2007 workshop.

Comments and feedback

We are very happy to receive feedback on this newsletter. Do not hesitate to contact us if you have comments or ideas about what you would like to see covered by the newsletter, or indeed if you would like yourself to write a contribution.

Contact us at info@converging-technologies.org