Input Task Force: Decision Makers 2010

Conclusions and Agenda for the Future

In May 1999, the Research Group on the Global Future convened thirty rising decision makers from around the world for a discussion on the themes for the Hoechst Triangle Forum. (Complete details are available on http://www.hoechst-forum.uni-muenchen.de/events/index.html) Closing the conference, Professor Werner Weidenfeld listed five key areas for further research:

• Coping with speed. Participants agreed that the pace of change appears to be accelerating, and that both societies and leaders need mechanisms for coping with rapid changes.

• Civil society needs to be strengthened. While it cannot replace the state or private enterprise, civil society fills gaps left by both. Future societies that do not have sufficient balance among the three will serve their citizens poorly.

• Demographic change will place stresses on all industrialized countries, and most developing ones as well. As societies age, they will need to redefine work and to reshape the structures that provide for people in retirement.

• Our concept of privacy is under fierce pressure. The ability to store and transmit personal information rapidly to many different end-users means that individual reliance on secrecy, anonymity or even discretion can no longer be assured. Our societies are seeking new balances in the trade-offs between the benefits of widespread information and personal privacy.

Participants in the conference offered additional key points:

Dr. Gregory Stock
• The speed of change adds up to a qualitative difference
• Unified global responses to the problems addressed here are probably bad ideas; we should preserve the opportunity for solutions to compete
• We need to incorporate biotechnology into our existing models for making medical decisions. They are both adequate and allow for case-by-case examination of circumstances.

Dr. Moira Gunn
• Responsible use of information can be programmed into the networked structures that we build. We must ask computer science to respond to our societal needs, not ask our society to adjust to what the computer companies want to provide.

Jon Bingen
• Common denominator of problems listed is building a legitimate, functional state with proper financing.

Josef Janning
• Looking explicitly at urban communities will demonstrate many of the points raised during the conference

Robbie Oxnard Bent
• Dialogue about the future should be as broadly based as possible

Dr. David Brin
• We should look more at non-zero-sum alternative means of dispute resolution
• We need to revisit the discussion about whether or not some ideas are inherently toxic

Conference Summary

Shaping Future Societies: The Digital and Biotech Revolutions

Dr. Gregory Stock, Director of the Program on Medicine, Technology, and Society at the University of California, Los Angeles opened with strong words: „We are living in a time of unprecedented change ... the technologies we are developing today are ready to tear us from history.“ Life grows complexly, but through a series of bursts, and we are on the verge of a change comparable with the development of multicellular organisms. **That change is the fusion of technology with life**, the effective creation of a global super-organism. This change has consequences, and the two most important are conscious reshaping of the earth's biosphere and turning technology back on ourselves, transforming what we mean by human. The development of genetic technology is completely embedded in mainstream medical research (e.g., curing disease, fertility research, animal research, and the human genome project), and attempting to stop be both impossible and immoral. **The biggest divide that genetic technology will likely produce is generational: we may be terribly uncomfortable with these things, but our children probably won't be.** By controlling its evolution, humanity is about to leave its childhood.

Dr. Moira Gunn, host of TechNation, laid out some important numbers to consider when looking at the digital revolution: there are 200 million PCs in the world, but 12 billion microprocessors. The average American encounters 72 microprocessors before lunch; 85% of working adult Americans use a PC; 90% of US schools are connected in some way to the internet; and 83% of US businesses have some form of internal computer network. In sum, the interconnectedness of almost all machines starts to look like the emergence of a worldwide consciousness. This leads to four challenges:
• Privacy - balancing the rights of individuals, the needs of society, and the desires of business
• Literacy - preliterate persons are excluded from this text-based consciousness
• Societal Protection - we have to find the technical means to be civilized in cyberspace
• International Economy - the future is integrated, and everyone has to come to terms with that.
Finally, despite all of the recent changes, people are still people. The drives, desires, hopes and fears that have long been with us are not going to go away any time soon.

Highlights of the discussion that followed include:

Prof. Kriengsak Chareonwongsak - Their history may lead the Europeans to worry more than other people about technology's advances. Asia is more economically driven.

Dr. David Brin - As ambient levels of fear in a society fall, people can broaden their horizons to think about problems more distant than the next mean and about persons outside their immediate family circles. What is the best way to lower fear in a society? How can we foster competition that does not call for the elimination of opponents?

Dr. Christoph Erhart - Digitalization may let us see the arrival of efficiency in govenment. It's important to remember, though, that in democracies we may not get the „best" solution, but the most widely accepted one. (Think of Windows and the Macintosh.)

Beyond Technology: The Shape of Globalized Societies

Mr. Joop de Vries, Executive Director of RISC - Future in Paris, France opened the discussion on social changes not driven by technology. Although technological change will have a profound impact on our lives and lifestyles, he would not regard technology as the "key actor." The concept of "actor" implies action, which in turn implies that there is a degree of freedom and choice. In that sense, 'the people' collectively are the actors shaping the 'rules of the game,' not the leaders. People will decide how new rules will be developed and in modern democracies, the leaders follow.

When we refer to winners and losers, we have to define what game we are playing. Looking at societies and individual people - in contrast to countries or companies - the situation is less straightforward. At the macro-level, winners are those who have challenging jobs, are part of networks, are on-line, and financially well-off. Losers are the people with low skills and little money, and who are afraid of change. However, for society as a whole the main question is whether people see themselves as winners or losers. They apply their own criteria, which only in part are connected with the 'winners and losers' criteria at the macro-level.

Rabbi Walter Homolka discussed the role of non-governmental organizations (NGOs) in solving global problems. NGOs clearly have various positives sides: they challenge wrong, demand change, they can offer alternatives - very often NGOs are addressing political issues where their expertise is sought. But they also have serious drawbacks that limit their effectiveness at the international level:

1. NGOs are very unstable.
2. NGOs are heavily dependant not only on public appreciation but also on media attention.
3. NGOs are single-issue-oriented.
4. NGOs are stuffed not so much by researchers and analysts but by believers.

5. NGOs suffer from quite insufficient organizational structures.
6. NGOs need an enemy.
7. NGOs have no democratic legitimacy.

He added, „I would say there is no other process than politics and people that elect their representatives that than can take of the kind of framework we need to go into the future. And I therefore would urge to discuss how we could reach a reformation of the political process."

Professor Kriengsak Chareonwongsak of the Institute of Future Studies for Development in Bangkok, Thailand, gave an Asian perspective on these issues. „The picture of industrialised society as it will be in the next 10 years I would like to paint, is a set of complex, overlapping and related observations of the future. There will be five critical, non-technological forces which will shape industrialized societies over the next 10 years:

1. Demography
2. Natural resources and the environment
3. Values
4. World order
5. Global interaction."

Society in 2010 will comprise both tension and co-operation at all levels, internationally, nationally as well as socially. Changes will take place gradually, step by step. Some of the potential tensions would need considerable adjustments and people will need to be more adaptable as the speed of change increases. And it will be a very challenging society to live in.

In the discussion that followed, Dr. Hans Fleisch offered a point-by-point rebuttal of Rabbi Homolka's comments on NGOs. He concluded, „What I see as a solution: We should think in three sectors: the governmental sector, the for-profit private sector, and the third sector which includes NGOs and foundations. They are driving forces of the future. Those who partner with institutions from other sectors will be the winners and the players of the future. And those countries will win where there is a good partnership between the government and the non-governmental including the private for-profit sector. This three-partnership-model and partnership, in principle, will solve many problems."

Steven O'Connor saw potential solutions for Western Europe in the energetic capitalism in Central and Eastern Europe, while Jude Milhon offered the idea of „benign conspiracies" - non-governmental non-organizations that link people world-wide who are interested in particular issues. Connectivity has the potential to solve democracy's problem of scale. Dr. Gregory Stock said that in this context, supra-nationalism to eliminate conflict is probably a bad idea, and that the only way societies learn is through trial, error, and adaptation. Yoshimasa Hayashi added that it is important for government to reach down to smaller scales in order to build acceptance among the population.

Priorities for Tomorrow: How Do We Start Building the Future Today?

Speaking in a private capacity, William Wechsler of the US National Security Council based his views on two building blocks: first, digitalization and biotechnology are both revolutionary and permanent changes; second, the state will not wither away in a world changed by technology. Digitalization and biotech are also positive developments, as they will create wealth throughout the world. Though the state as such will not disappear, states will likely be transformed in several ways:

Federalization and transparency will both increase;
The nationalist state will decline in importance;
Small states will benefit more than others from increasing supranationalism; and
Globalization will make the consequences of policy differences more dramatic.

Both technological revolutions will give new and powerful tools to people who want to do harm. This is important for everyone in the developed world, but particularly for the United States, which rates as the world's number one target. To limit vulnerabilities, the government is working on improving terrorism preparedness, on critical infrastructure protection, and on shrinking the time between development of weapons and development of defenses against them. In particular, efforts are underway to improve detection equipment, to identify anomalous activits, to deter states from undertaking aggressive biological attacks, and to build „surge capacity" into hospitals and vaccination capabilities.

Richard Barbrook, of the University of Westminster's Hypermedia Research Centre, took issue with the idea that the coming high-tech world is a break with the world of today. In particular, the internet is not a break with the past, but a speeding up and intensification of industrialization. Modernity is a process, rather than a steady state, and a slow process at that. For example, the internet is making real the theoretical right to a free press that was clearly articulated as much as two hundred years ago. Rights that have long been held by persons only in theory are finally being realized in practice. In the future, this may make education and social services actually fulfil their promises as well.

What's happening with the intensification through technology?

1. Work is being re-valued. In the digital world, we are seeing a revival of artisan work. Skill is a key concept, and autonomy over the pace of work is a central demand of high-tech workers. Many are also insisting on owning their own means of production.

2. We are seeing new methods of work, new means of organizing collective labor. The success of both Linux and MP3 shows the power of the gift economy. With new approaches, the gift economy begins to hybridize with both state and market.

Input Task Force: Decision Makers 2010

The end of the twentieth century has supposedly brought the end of utopian visions. Paradoxically, though we may not be driven by grand visions, we may be closer to fulfilling them than ever before.

Rafael Lopa, a Project Director for the PLDT Foundation and Executive Director of the Benigno Aquino Foundation in Manila, said that the questions of the global future are more than philosophical. In the light of the state of our world today, they are truly practical and urgent concerns. Humanity is currently caught in a race for more and more progress, more and more technology to get somewhere fast. Where that is, is not exactly clear. And what we want to achieve when we get there is even more vague. The fundamental truth that every individual matters, and that the good of society is every person's responsibility, is what has been taken for granted in the mad rush towards the future. We could look on helplessly and allow technology to dictate its rules and values on us and our children. Or we could be pro-active and give our children the values and priorities not only to survive the relentless onslaught of progress and development, but recognize the good in it and harness this for the betterment of mankind.

Input Task Force: Biotechnology

Key Results
• Our perceptions of what is „natural“ have varied considerably over time
• Where to concentrate scarce research resources is a vital societal question
• Biotech embraces a wide variety of fields, from medicine and agriculture, through computing and materials science
• Biotech’s relative simple tools will encourage vast amounts of innovation
• Individuals in modern, plural societies are unlikely to allow the wishes of the majority to constrain their choices about biotechnology
• European public debate on biotechnology is long on hopes and fears, but short on substance

Dr. Bernd Kirschbaum of the Center for Applied Genomic Research pointed out that **in the seventeenth century the dissection of human corpses was forbidden as blasphemous, whereas nowadays we simply take it for granted** and consider it a necessary part of medical study. Will genetic engineering undergo a comparable change of public acceptance? Will future generations have a hard time seeing how we could get so worked up about the implementation of a new technology?

Kirschbaum's rhethorical step into the past efficiently opened up a lucid introduction to the range of possibilities that a deep understanding of the genes will bring about: At present we are just starting to know a lot about data in the genes, because we have learned how to read them. However, we know far less about the processes that use this data to make cells or organs, to provoke defects or diseases. For the time being, this means that people are faced with the dilemma of not knowing what to do with genetic knowledge: People can, for example, know that they face an increased risk of cancer thanks to a faulty gene - yet our chances of providing curative treatment are still very low.

But this seems to be just a temporary problem, as Kirschbaum explained. With better tools for DNA analysis and much more knowledge about whichgenes do what, our picture will get sharper and sharper. There is reason enough to think that in the coming decades we will trace the causes of more diseases, develop more life-giving medicines and find innovative therapies when because discoveries keep leading to new techniques, with which yet more discoveries can be made. The biomedical advances that we have experienced over the last ten years have already blurred into rising productivity. As Kirschbaum estimated, the market share of genetically engineered pharmaceuticals will have already risen to 17 percent by the year 2000.

We have to look at what biotechnological breakthroughs will cost us, and in which research fields we will concentrate our resources. It also means that scientists and society as a whole should not turn a blind eye to bioethics but enter the next stage with considerable foresight and responsibility.

Dr. Boris Steipe of the University of Munich’s Genetics Center joined in the argument that biotechnology may be a key technology with a potential to transform societies. Its capacity for technological advances in a

large segment of today's medical, chemical and agricultural markets is quite obvious and can be readily extrapolated from today's developments. We have copied nature's techniques for genetic variation and added a few of our own, we are now beginning to read the genetic record on a large scale and todays markets are readily taking up our developments. "Green" genetic engineering, for example, is already on its way to increase crop yields and safeguard harvests. Among its goals are plants that are more resistant to diseases and pests (reducing requirements for agrochemical intervention), may contain less allergens, more nutrients or withstand unfavourable environmental conditions. Bio-based nanotechnology is another direction in which the field may evolve. Steipe defined goals such as novel materials (from textiles to plastics to construction engineering), novel technologies (biosensors and catalysts) and visions how nature's bottom-up engineering paradigms might be applied to attain these goals: evolutionary optimization, small-scale structuring through self-organization and self-replicating entities.

Undoubtedly, the most profound medium-term impact is felt to occur in medicine. Steipe emphasized that for the first time in history we are launching a large scale, coordinated attack to cure diseases at their root, not just treat their symptoms. It appears to be a logical consequence, that ultimately we will be able to prolong life significantly by considering - and treating - aging as a genetically influenced disorder.

But there are less obvious aspects which deserve further attention. One of these is **the technology's simplicity, allowing a large and diverse number of small and medium-scale enterprises to be competitive in their respective fields on a global level**. A continuous influx of academic creative potential and increased efforts to shorten the time until innovation reaches the market will drive the creation of many new future market opportunities. The successes of biotechnology will shape society's perception of the problems it would like to see solved. This scenario of wide-spread, localized, small-scale development raises the question of whether any control by society is conceivable. Indeed, Steipe related that the past history of genetic engineering has been accompanied by ethical considerations, but that any influence on the topics of the field and its dynamics was far from obvious.

Steipe's remarks emphasized the ambiguity that is perceived today in biotechnological progress. The discussion which followed the presentations evolved around the major social impacts which healing diseases and stretching the life-span would impose upon societies. The necessary transformation of our health care and pension systems, the consequences of a further increase in population growth, the spectre of discrimination against those who may wish to grow naturally old - these are currently open questions. We have to proactively adress these developments and we have to formulate guidelines of how we are going to deal with them, before the reality of change is imposed upon us. **Individuals in modern, pluralistic societies will hardly let themselves be restricted in their choices, even if these choices may appear unethical by the standards of a majority.** There will be no obvious consequences from asking whether and how much of these developments we actually want. It is all the more important to take the debate on ethics and responsibility beyond its current role of commenting the present, to formulate practical guidelines and clear-cut goals for the future. "For example, human dignity is a concept everyone will readily subscribe to, but how many

would agree on what this concept precisely means or how we would apply it to concrete cases?" he asked.

In the light of all the social impacts involved, Dr. Reiner Anselm of the University of Munich's Institute for Systematic Theology agreed that the ethical dimension of the biotech revolution would confront us with essential questions. But the guiding line that humanity needs already exists. Kant's categorical imperative ('Do only those things that you would wish to see become universal practice') and the respect for the dignity and autonomy of the individual can serve as the pivotal points of all debates on technology and ethics. Thus, they can also provide the necessary orientation in all fields of biotechnological applications. The production of genetically engineered insulin, for example, would not cause ethical problems. Even the different forms of genetic therapy could not entirely be rejected, since they might help to vanquish severe genetic disorders which jeopardize the individual's life. But at the same time he conceded that we are already trapped in a number of situationswhich would pose the slippery slope problem. At present we are neither close to overseeing nor to mastering all the risks which genetic therapy might imply. For example, introducing new genes into an adult might have many more side effects than we presently anticipate; or, genetic treatment may increase vulnerabilities to other disorders. It is this kind of complexity, embodied in various specific questions, which makes the ethical approach so difficult. According to Anselm, people tend to refrain from things that they are not able to fully understand in a situation like that. "When you're in doubt, play safe, vote no," would be a common reaction which governs the initial public response to almost every technological advance. (at least in Germany and/or Europe but perhabs less in the U.S. and China). The only way out? Only a more vivid and vigorous public debate will enable us to start making choices about how we want to shape the world.

Further discussion made it clear that future societies will have to put up with major social implications as biotechnology moves forward. The scientific progress and its various applications seem to produce developments at such a dynamic pace that society fails to keep up with the possibilities. As a result, policy measures continously tend to lag or fall behind. Questions which we now consider urgent (for example the reform of the pension system, as Professor Werner Weidenfeld remarked) might prove obsolete sooner than we expect. All discussants consented that the promise to prolong life (be it by tailored viruses, cellular grafting, smarter medical drugs or genotype choice) comprises a fundamental challenge to come to terms with. A longer life span would offer us more benefits and choices but also force us to decide what we want, individually and collectively. Substantial and sensitive issues such as the future of our social systems, the consequences of a further population growth, our attitudes towards health, disease and age as well as the access to healing (one must consider that therapy might remain expensive and exclusive) will be questioned.

The view of Chinese culture provided a clear counterpoint to European wrangling over ethical fine points. "How might China react to the biotechnologial revolution?" Weidenfeld asked Professor Paul Ulrich Unschuld who is a noted expert on the history of Chinese medicine and who travels to China regularly. Unschuld clearly expressed the Chinese would not share the German/European worries and ethical concerns. The Chinese would make use of every biotechnological facet accessible in order to overcome deeply rooted

and historically ingrained fears of hunger and death. Their conception of knowledge also varies considerably from ournotion of advance and progress. (He described the Chinese approach as "cognitive dynamics;" knowledge which derives from past generations and eras is not regarded as outdated and can therefore easily coexist with today's knowledge) Thus, Unschuld's remarks sharply illustrated that the Western concept of morality and ethics - the underlying principle of many of the questions discussed during the evening - will definitely not apply as a universal values system.

In short, European biotechnology has its work cut out for it in the social and political realms: the public is alarmed, but not informed. The scientists would welcome guidance on goals and priorities, but they hear mainly worries and fears. Moreover, these worries are often based on irrational concepts of what biotechnology is about, and what its possibilities are. Thus participants in the public dialogue are often talking past each other. In contrast, worries in Asia and America are not nearly as strong, and what little public dialogue exists on biotechnology tends to focus on possible applications, or possible

Input Task Force: Digitalization

Key Results:
• Central control of information belongs to a bygone age
• Flattening hierarchies through networking may paradoxically increase concentrations of power
• Digitalization amplifies existing patterns of comminication, for better and for worse
• Economics of scarcity do not apply to the digital world, undecutting many of society's assumptions
• Digitalization challenges received wisdom about social cohesion
• The digital revolution requires innovation at the individual level

Dr. Gabriele Hooffacker, Director of Hooffacker and Partners, reminded participants of the revolutionary impact that digital communications have already had. She recounted her experience as one of the early organizers of Glasnet, one of the earliest providers of internet connections in the Soviet Union. She had just returned from a Glasnet conference in Moscow - August 1991 - when the tanks rolled in the coup against Gorbachev. Glasnet provided the outside world with a valuable live connection to Moscow in a time when one of the plotters' key objectives was to control all outgoing information. Furthermore, people working against the coup could get an accurate picture of the outside world's reaction, which boosted their resistance. **Control of information passed away from the state machinery and into the hands of the people**; by helping to flatten the information hierarchy, Glasnet helped change history.

But flattening hierarchies may not necessarily bring the results that its proponents claim. Dr. Hooffacker drew an analogy between a future networked world and the Middle Ages. **In a networked world, the incremental advantages of a technology or a given company may be so great that it achieves a nearly permanent dominant position,** comparable to a strong medieval kingdom. People organized into smaller units may have little power in such a world, leading to social relations closer to those of lord and vassal than the more equitable relations that prevail today. The interchangeability of locations in digital work may paradoxically bring less mobility to most people, rather than more.

Against this dystopic scenario, she posed a more hopeful vision, propelled by the same forces of digitalization and globalization. For starters, computerization is spreading throughout societies, and not only in highly industrial societies. Prices are continuously falling and public access is increasing, so to talk simplistically about 'information-rich' and 'information-poor' does not really illuminate the shape of future societies. Furthermore, the hierarchy-levelling effect of digitalization can give smaller groups the ability to compete against much larger organizations that would have an insurmountable advantage in a non-digital world. The future Middle Ages, in this sense, could bring widespread prosperity along with a more humane scale of social and political interaction than prevailed in industrial society.

The key dynamic, Dr. Hooffacker observed, is that **networked systems tend to amplify the means of communications that already exist** in an organization or group. If communications function well, they will function better when networked; if they function poorly, they will likely get worse. The future is still clearly up to us to shape.

Professor Dalia Marin of the University of Munich addressed economic aspects of the digital revolution. **In a nonmaterial economy, the principle of scarcity no longer applies.** This has profound implications. Most of modern economics turns on the scarcity of physical goods: only one person can posess a particular thing; resources are finite; once something physical is used up, it is gone. In a nonmaterial economy, these rules no longer apply. One person having an idea does not prevent another person from having that same idea. In fact, the more people who have a particular idea, the more useful it may become. Software standards provide a useful example of this effect. Furthermore, the raw materials of a digital economy are limited only by human creativity; that is, they are effectively infinite. Ideas are not used up in the same way that gasoline or food is used up. Thus the nonmaterial economy offers the prospect of unlimited growth.

Economists looking at these fundamentals of the nonmaterial economy are finding positive and negative aspects for society as a whole. Prospects of infinite growth, of diminishing dependence on scarce natural resources for prosperity, and welfare based on knowledge are all attractive propositions for post-industrial societies. On the other hand, the transition to a nonmaterial economy will cause dislocation comparable to the transition from an agricultural to an industrial economy. Further, by reducing the value of difficult physical labor, it will reduce the status of many male breadwinners, with possible social difficulties to follow. By laws of increasing returns, and the so-called superstar effect (in which a well-known practitioner can earn far more than an equally skilled but less known person), a nonmaterial economy may bring about a distribution of wealth that offends many citizens' concept of justice. Professor Marin observed that in an advanced economy, income changes brought about in the digital revolution may separate a broadly-based middle class into richer and poorer groups, with incomes more divergent than they are today.

One of the current questions about the relationship between the material and nonmaterial economies is whether or not massive investments in information technology have improved productivity. Professor Marin cited figures showing that productivity gains did not match the claims that were being made for the new economy. On the other hand, many technical questions of measurement remain, and understanding the transition from industrial to information economy is as much an open field as developing concepts of the nonmaterial economy itself.

Warnfried Dettling, an independent writer and thinker, offered seven theses on the influence of globalization and digitalization on society and the world of work, emphasizing the changes in Western Europe and the paradoxical effects of the digital revolution.

First, globalization leads to redistribution of wealth both among and within nations. Islands of wealth will develop within generally poor countries; pockets of poverty will emerge (or persist) within generally rich countries. First, second and third world conditions can be found within a given society.

Second, globalization tends to make industrialzed societies richer as a whole, but also to increase disparities within them. Globalization brings, and requires, concentration on high value-added activities. Those who can

contribute high levels of added value will see their relative earnings increase; those who miss opportunities will find it harder to catch up.

Third, the digital revolution - the third industrial revolution - brings even greater consequences than globalization. This revolution changes not only the amount of work done in a society but also the type of work that is done. Although digital societies will on the whole grow richer, there are critical questions to be answered in the organization of the working world, in the organization of social cohesion, and in the organization of individual life plans.

Fourth, work in the digital era will be more intelligent and more fulfilling, but it will also bring greater responsibility down to the individual level and increase the consequences of individual errors. Production in the digital era is also likely to take place among small, professional, homogeneous units. This will further encourage the segmentation of society. At the other end of the social scale, the demand for unskilled labor will likely drop dramatically.

Fifth, **the digital revolution raises the question of social cohesion.** Dettling asked if Brazil was the model of the future. Will there be solidarity between winners and losers in the new economic order? We should consider economic inequality separately from social inequality and ensure that flexibility in work relations also benefits the social contract.

Sixth, these **thoroughgoing societal changes require innovation at the individual level.** Instability of work in time and space leads to uncertainty in making individual life plans. The optimal way for a person to cope with these changes is far from clear. This places considerable stress on personal relations, families, and social capital. In such a world it is important for a society to make generous provision for second chances; otherwise, unwillingness of individuals to take risks could hold back the society as a whole.

Finally, digitalization and globalization require a change in mentality. In this area, decision-makers in advanced societies would be well advised not to make globalization a scapegoat for structural changes that are taking place anyway; to focus their energies on finding win-win solutions; and to consider the area of life-politics. That is, people’s expectations for their lives have a pronounced impact on how their lives turn out; leadership can and should affect those expectations in a positive fashion.

In the discussion that followed, participants took exception to a number of points raised by the speakers. For instance, Josef Janning asked if the digital economy would really be as friendly to women as Professor Marin suggested, since clerical jobs, in which women were traditionally overrepresented, are being eliminated at least as quickly as manual jobs, in which men were traditionally overrepresented. Kurt Vogler-Ludwig questioned the means of measuring productivity as well as the proposition that ideas don’t die out. In the discussion that followed, participants argued matters of definition; at the end most agreed

that while the durability of ideas was not in doubt, their commercial viability might well have a limited time span. Jürgen Turek suggested that the discussion on winners and losers might be leading us in the wrong definition. If we define winners solely as those who have more money or material goods, then we are missing out on a good part of the flexibility that the digital revolution promises to bring. New forms of work, new forms of organization bring with them new definitions of success. Many people may value the freedom and increased flexibility more than additional money, and this aspect should not be overlooked in a discussion on winners and losers. At the end of the day, digitalization present both quantitative and qualitative problems for industrialized societies. On top of normal changes in populations, the forms of work, of education, of social relations, and, lastly, political relations are all affected by pervasive networking of computers. While we are still arguing about the definitions for social science or politics, the digital revolution is changing the premises on which our arguments rest. As all of our participants emphasized, the pace of change is not likely to slow any time soon.

Input Task Force: Envisioning the Future

Twenty-five of Germany's foremost future researchers discussed their visions of the global future at a workshop convened in Munich by the Center for Applied Policy Research.

I. The Discrepancy Between Politics and Society

Networking and digitalization are working fundamental, lasting changes on modern economies and altering the underlying assumptions of both society and politics. **Unfortunately, political actors and institutions are among the last to recognize these changes.** Established structures in industrial and post-industrial societies are dissolving, but politics "is acting as if all of these structures were still completely stable," as Werner Weidenfeld observed in reaction to a presentation by Uwe Jean Heuser. Many signs point to a real loss of political institutions' ability to steer change in a networked world. Weidenfeld also observed that politicians seem to be giving up their ambitions to lead in the face of the dynamics of the digital revolution.

In Heuser's view, politics can recover its position and offer new answer to the extent that it frees itself from outmoded structures, that it recognizes the differences between forms and functions. Heuser cited the conception of the welfare state as a "provider of universal happiness" as an example of outmoded thinking. New social initiatives are plugging the gaps that cry out for political response. **What can the state do?** Heuser said the state should offer more subsidiary solutions and organize itself more participatively in order to offer citizens support as they take solutions into their own hands. Gerow von Randow, who leads the Reform Workshop at Die ZEIT together with Heuser, took a similar line in his remarks. He spoke in favor of more elements of direct democracy; "everyone cooperates, everyone has responsibility." For the networked world, von Radow offered the metaphor of the city, a place of vibrant subcultures and coincidental encounters. In such a world improved communications improve the chances for many kinds of reform, as experiments multiply and work to learn from one another.

Josef Janning, the Deputy Director of the CAP expressed a certain skepticism about participatory forms of electronic democracy. Each person believes that his or her opinion will be taken into account, but that will not necessarily be the case. With these objections, Janning opened the field to the question of how systems will be steered in the future, of whether we are entering an **"era of technocracy that dares not speak its name."** In Janning's view, a social structure based on networking can easily lead to decision processes that are no longer based on convincing fellow citizens but rather on comforting every articulated opinion. Societal decisions will be made that express diverse opinions in the results but that do not allow for convincing and changing views in a discursive process. It is far from clear, in Janning's view, that the expression of the totality of opinions will actually lead to clear consensus on decisions that must be made.

II. Technology, Nature, Changing Behavior

Attacks on nature inevitably come back to haunt us, often wth a very long reaction time. This central thesis from the talk by Frederic Vester was also a running theme in the discussion that followed. Vester took it up himself when he said that without a change in our values and our consumer behavior we are headed for ecological catastrophe. Sustainable, environmentally compatible technologies will not, by themselves, be

enough to protect us. As Vester said, "We must change our behavior, either willingly or under the pressure of events." He noted that **reinsurance companies are already paying for the consequences of climate and environmental damage** and are taking action to minimize their losses. These actions are not just cutting back on coverage but also researching the causes and workings of environmental change and working to modify social behaviors.

Peter Hennicke, Deputy Director of the Wuppertal Institute for Climate, Environment and Energy, took on Vester's point of view in the discussion. Although at the end of the day he agreed with Vester, Hennick pointed out the real effects and improvements available through efficient and regenerative technologies. These offered the chance to bring our society into better balance with the envrionment, but had to be introduced along with a process of social learning so that, for instance, climate protection in 2050 could be valued more highly than taking the car out for a spin today. Politics and market must offer models that accept and integrate nature into human processes.

III. What Should Future Scenarios Do?

That scenarios are not predictions was not disputed. **Scenarios of the future can work as early warning systems** that combine empirical analysis and trends with precise descriptions of social developmments to offer working strategies for contemporary or future problems. Jürgen Gausemeier of the Heinz Nixdorf Institute demonstrated how shaping factors and detailed analyses of particular fields can be combined through scenario techniques to provide useful insight into future developments. These tools are not always welcomed by decision makers, noted Hans-Jürgen Nantke, leader of the Federal Envrionment Ministry's working group "Agenda 21." Why are scenarios unwelcome in areas such as tourism or agricultural policy, he asked. Probably because leaders are unwilling to accept the true state of affairs or the decisions forced by a clear statement of facts.

Gero von Randow brought up another aspect of the uses to which scenarios can be put. In his view, they serve the function of building group dynamics.

As an instrument of underpinning pre-existing goals or opinions, they were less useful, but as a means for getting the parties to an issue to think together rather than in opposition, they could be very helpful. Karlheinz Steinmüller agreed, adding that future research should avoid formulating goals and values, but rather open up possibilities.