



# Europäische Akademie

zur Erforschung von Folgen wissenschaftlich-technischer Entwicklungen  
Bad Neuenahr-Ahrweiler GmbH

Direktor:  
Professor Dr. Carl Friedrich Gethmann

## Newsletter

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### Editorial

Study groups of the Europäische Akademie are the means to a variety of ends: e.g. they shall reflect on systematical and methodological questions that typically appear with interdisciplinary work on ethics of science and technology assessment, and they shall serve the academy's scientists as a forum for discussions on questions concerning their own research area. The study group "Practical Philosophy" is concerned especially with the normative premisses each technology assessment study has to make, e.g. the supposed standards of rationality, the adequacy criteria for the reconstructive shaping of decision scenarios and not the least of general principles of action that would be chosen by (due to whatever standard) rational actors. So they concentrate on typical argumentative moves and pitfalls as e.g. the argument of potentiality, the slippery slope argument, the naturalistic fallacy and the like; it focuses on relevant concepts as for example anthropo-, patho- and other "centrism", universalisability, generalisability and moral relativity, or the differences between description, prescription, recommendation, and others. In addition, the group discusses the publication plans of its members and is preparing one of the upcoming symposia of the academy. Since most of the current members of the study group do research in bioethics, discussions of bioethical issues are a central part of the group's work. Coordinator of the group is Dr. Georg Kamp.

The Newsletter reports about the work of the study group "Practical Philosophy" at regular intervals. GK

### Focus

## Integrated Climate Research. Coupling of Models from Natural and Social Sciences

Gernot Klepper

Whether the world has become more complex or whether we are becoming increasingly aware of its complexity is a matter of conjecture. In any case, there is a consensus of opinion, in the meanwhile, that many problems can only be adequately analysed using a trans-disciplinary approach. Today, even extending into the area of research funding, it is expected that "Global Change" research is conducted in a practically oriented manner, taking account of its complex internal processes by means of an interdisciplinary and integrative approach. This paper deals with the progress and difficulties involved in the integration of natural and socio-scientific models in the field of climate change, using as an example the combination of the DART model (Institute for World Economy, Kiel) with the NICCS model (Max-Planck-Institute for Meteorology, Hamburg).

The german version of this article is available at [www.europaeische-akademie-aw.de](http://www.europaeische-akademie-aw.de) / Die deutsche Fassung dieses Texts kann auf der Homepage der Europäischen Akademie abgerufen werden unter: [www.europaeische-akademie-aw.de](http://www.europaeische-akademie-aw.de).

Climate change is one of the most conspicuous examples of a problem concerning humanity as a whole; a problem which in its entirety can no longer be grasped within any single discipline. Climate change has been caused by the activities of man, i.e., roughly speaking, the industrial revolution, which, through technical advances coupled with the utilisation of fossil energy sources, enabled an economic growth of hitherto unprecedented dimensions. For a long time it was not realised that, accompanying this economic growth, the climate system of the earth was, and still is, also being changed in a manner previously unparalleled and that as a result of this, a large number of natural processes on earth are being influenced, too. This whole complexity of inter-related, intertwined changes is circumscribed today by the term *Global Change*.

Therefore, in order to understand the composition of the inter-related effects

of global change, it is inevitable that we must understand the economic and societal processes that are determined by the utilisation of earth's natural resources. At the same time, the assessment of the consequences of these societal and economic processes demands a profound understanding of the complex inter-actions within the system of nature. Ultimately, learning to understand both of these together will culminate in research into the "earth system".

While the implementation of a fully integrated "earth-system analysis" as yet remains a vision for the future, the first steps have already been made towards the partial coupling of disciplinary models. This procedure is already widely applied among the natural sciences. The process is less advanced within the social sciences; possibly because in this field there are more normative aspects and therefore there is more "heart-searching" involved. But although the coupling of natural and social scientific models has a tradition referring back to but a few years and in spite of all the difficulties involved, progress has also been made in this field, too.

Nevertheless, the question arises whether a combination of natural and social scientific knowledge in integrated models is really necessary or conducive to extending our knowledge. The desire to understand the earth system as a whole or even to incorporate it into a model is certainly illusory. The necessity to integrate, however, arises more from the definition of the problem, i.e. the processes of economic and societal decision-making cause lasting changes in our natural environment and thus requires practically oriented action to be taken. This process of global change should be brought under control and modified.

The criteria according to which the integration should be effected will therefore have to correspond adequately to the demands posed in the adequate definition and solution of the problem. However, this does not mean that the way to solve the problem is prescribed but rather that in view of the complexities involved, several different approaches are required since the incorporation of all socio-scientific aspects in one single frame of modelling is not possible. This becomes more apparent when one looks more closely at the *Integration Requirements* and, at the same time, if one regards the problem definition and tries to formulate precise alternatives for action.

Problem-oriented research is confronted with two-fold challenge:

- It has to integrate different disciplines. This poses new demands on the methodological approach and the quality criteria of disciplinary research within a trans-disciplinary context.
- Since it is problem-oriented, it has social consequences that are possibly far reaching and of long duration. Thus to reinsure the quality of the research itself gains a much greater significance compared to those cases where more abstract research is conducted without direct social bearing. For this reason, a special eye has to be kept on the reliability of the results with regard to the presuppositions of the models.

These aspects have to be taken into account when integrating natural and socio-scientific models. Accordingly, a simple, coupled socio-economic climate model would have to incorporate the following factors: Within the economic system greenhouse gas emissions are produced that influence the climate system. In turn, changes in the climate system cause changes in the processes of nature on earth – so-called "impacts"; These impacts can have negative repercussions on the

economic systems, e.g. by adversely affecting agricultural production or by other damage caused by extreme weather conditions. These impacts may also directly affect human beings, e.g. by causing ill effects on health or general well-being. All of these impacts are appraised by human society and lead to political action that either involves preventive measures against negative climate change or adaptive measures to cope with changes that have already taken place. Ideally, a system of this nature should be modelled as a complete cycle, i.e. it should also include the feedbacks between the climatic and, political and/or economic components. Above all, this is of paramount importance if one seeks an optimal strategy for climate policy. However, even models that are not completely autonomous can give important indications as to the dimensions involved in climate change and its effects on the economy. As an example, the Max-Planck-Institute for Meteorology in Hamburg together with the Institute for World Economy in Kiel have used a combination of a natural scientific model and an economic model to simulate the effects of climate change on economic development. The objective of the undertaking was to identify the different effects of climate change in the various regions and to examine their consequences on the individual economies whereby the process of globalisation on the goods and factor markets was to receive explicit consideration.

The economic model DART (Institute for World Economy) is a multi-regional, multi-sectoral and dynamic, general equilibrium model with which it is capable to compute world economic development scenarios.

The climate model NICCS (Max-Planck-Institute for Meteorology) is an "impulse-response representation" of a three-dimensional carbon cycle of the oceans combined with a coupled ocean-atmosphere model. It comprises two components: the global carbon cycle model, which translates the CO<sub>2</sub> emissions into a time path of the CO<sub>2</sub> concentrations in the atmosphere and a regional climate change model, in which the changes in the CO<sub>2</sub> concentrations are translated into regional climate effects. With the help of impact functions, which translate climate changes into changes in agricultural productivity, the effects of utilising fossil fuels can be shown in a combined model system.

The CO<sub>2</sub> emission paths of the DART model are translated into temperature and precipitation changes during the period 1990–2030. In view of the wide

variety of impact parameters to be found in the relevant literature, two impact scenarios were selected: the "high impact" scenario based on parameter values from studies that rather produce negative effects, while the "low impact" scenario presupposes minor effects.

It can be seen that strong negative effects are only to be expected in India and China, but that the impact parameters are at the same time fraught with considerable uncertainties, which is reflected in a wide degree of variation in the two scenarios. The direct effects will naturally cause feedback repercussions in the economic systems of the various regions. If we presuppose the pessimistic scenario, the prices for agricultural products in the Asian countries will rise as a result of increasing scarcity. This will lead to an increase in work, energy and capital investment in the agricultural sector and thus impede economic development in other sectors. At the same time, the volume of imported foodstuffs in these countries will increase, which will effect changes in the structure of world trade. In concrete terms, there would be an increase in agricultural goods imports on the part of the third world while at the same time there would be an increase in exports especially profitable for North America and Europe. All in all, the effects with regard to welfare would be of minor dimensions if we disregard India and China. The reduction in the level of welfare would remain below one percent compared with a development under constant climate conditions.

The results of the model combination of NICCS and DART illustrate important relationships that are of great significance in assessing the possible consequences of climate change and, at the same time, they show in which areas great progress can be made in the modelling of climate change and where the limits are respectively. They can be summarised as follows:

- The analysis of climate change without modelling the economic adaptation processes both among the economic sectors within one individual economy as well as among the economies of different countries would lead to an overestimation of the costs involved.
- Even presupposing impacts of catastrophic dimensions, far-reaching economic effects in the next decades are not to be expected. China and India remain the exceptions, where in the worst case a reduction in welfare of up to ten percent may be expected.
- The simulations of the combined models refer only to a time period up

to 2030. Up to this point the climatic effects of the increase in emissions in the past years and decades will not have made full impact on the climate system. Therefore it is hardly surprising that the effects on economic development are small at first. More significant effects will show themselves in the long term but for the time being it is not yet possible to model them since there are no calculable scenarios for economic development towards the end of this century. But at the latest at this point humanity will be confronted with the full effects of the greenhouse gas emissions that are being produced today.

This contribution is a summary of the author's lecture given at the symposium "Integrative Modellierung zum Globalen Wandel" (Bad Honnef, 25 January 2001). An extended version will be published soon in the book series of the Europäische Akademie "Wissenschaftsethik und Technikfolgenbeurteilung" by Springer-Verlag.

Professor Gernot Klepper, PhD, is head of the Research Department of Environmental and Resource Economics at the Kiel Institute for World Economics. He is member of the Europäische Akademie's project group "Climate Prediction and Precautions".

## Working groups

### **Climate Prediction and Precautions**

The project group prepared its final report to be evaluated by the Scientific Advisory Board of the Europäische Akademie. A vote on the acceptance of the final report can be expected from 2 October 2001 on after the Advisory Board's meeting.

Chair: Professor Dr. Meinhard Schröder (University of Trier)

Project coordinator: Dr. Stephan Lingner (Europäische Akademie)  
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### **Environmental Standards. Low dose effects relations and their risk evaluations**

The project group on "Environmental Standards: Low dose effects relations and their risk evaluations" met on 27./28. August 2001. The group welcomed two new members: Dr. Deborah Oughton, Agricultural University of Norway, Aas, who will work on the ethical aspects of standard setting and risk analysis, and Dr. Peter Jacob, GSF, Institute for Radiationprotection, Neuherberg, whose interests are in modelling of dose-effect curves of radiation.

Chair: Professor Dr. Dr. Christian Strefler, IWE Essen

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### **Standards of Living**

The Europäische Akademie is planning to install a new project group "Standards of Living". The project is to be realized as a cooperation with St. Gallen University, Switzerland (Professor Dr. Dieter Thomä). In order to specify the scope of subjects and disciplines involved under the heading "Standards of living" an informal meeting took place on 4<sup>th</sup> September in Bad Neuenahr-Ahrweiler. Beside the obvious involvement of Philosophy and Economy a number of other disciplines are of equal importance, such as International Law, Psychology, Developmental Sociology, and Social History.

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## Conferences

### **Autumn Conference 2001: "Information Security – Electronic Signatures – Data protection"**

The Annual Autumn Conference will be held on 21–23 November 2001 in Bad Neuenahr-Ahrweiler at the SETA Hotel. The Europäische Akademie's symposium is supported by the msc Multimedia Support Center GmbH. Speakers from universities, research institutions and industry will present lectures on "information society". They will concentrate on the key issues of information security, electronic signatures and data protection.

The academy's Annual Autumn Conference is divided into two parts: a workshop and a congress.

#### *Workshop: Electronic Signatures*

The Europäische Akademie offers a 1-day workshop on 21 November on electronic signatures. This includes principle elements, concepts and applications. For many organizations and companies the completion of an internet presentation project is only the first step towards a successful e-commerce platform. The step from a web-presentation to the full commercial potential of an electronic market place with virtual payment often is an additional and necessary investment. The use of an electronic signature allows people to electronically sign any electronic document in a legally-valid and enforceable manner.

The workshop is addressed to the following target groups:

- companies planning to adopt electronic signatures at present or in the future,
- the representatives of administrative bodies and units which want to realize services for the citizen,
- management consultants involved in shaping the developments on electronic signatures.

#### *Congress: Security and Autonomy in the Information Society*

Speech is the most natural means of communication between people. The Europäische Akademie will bring together experts from science and industry to discuss the core issues that make an impact on security and autonomy in the information society. In particular, the congress will cover the important topics of information security and data protection. The congress is designed for:

- the community from universities, research institutions and industry concerned with IT,
- companies involved in developing and processing of IT-equipment,
- scientists concerned with IT issues from various disciplines (law, economics, political and social sciences, technology),
- consultants in e-business,
- representatives of administrative bodies dealing with IT-technology and decision-makers in politics,
- representatives of the general public,
- journalists involved in IT-subject matter.

#### *Conference Fees*

The fee for both conference events is EUR 500, for the single workshop EUR 350 and EUR 300 for the congress, student and doctoral students pay half rate (only for congress).

Workshop and congress language is German.

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### **Frühjahrstagung 2002: 13.-15. März 2002 in Bad Neuenahr-Ahrweiler "Nachhaltige Entwicklung und Innovation. Globale Perspektiven wirtschaftlichen Handelns"**

Die Europäische Akademie widmet ihre Frühjahrstagung im kommenden Jahr dem Thema Nachhaltige Entwicklung und Innovation. Die Schlagwörter 'nachhaltige Entwicklung' und 'Innovation' als Leitbegriffe zeitgemäßer Umwelt- bzw. Wirtschaftspolitik scheinen auf den ersten Blick einen Gegensatz

darzustellen: Die Forderung nach nachhaltiger Entwicklung verhindert Innovationen; Innovationen – als Motor wirtschaftlicher Weiterentwicklung – verhindern eine nachhaltige Entwicklung. Bei näherer Untersuchung wird jedoch deutlich, dass die Begriffe vielmehr als gegenseitige Ergänzung verstanden werden sollten: Ohne Innovationen ist an eine nachhaltige Entwicklung nicht zu denken; die Ausrichtung von Innovationen auf eine nachhaltige Entwicklung verbessert deren Wertschöpfungspotential.

Die Tagung präsentiert wirtschaftliche, wissenschaftliche und politische Perspektiven nachhaltiger Innovationen und Potentiale für langfristig verlässliche Rahmenbedingungen wirtschaftlichen Handelns. Als Präsentationsform ist eine Mischung aus Praxisdarstellungen und wissenschaftlichen Erörterungen geplant.

For more information on both conferences see

[www.europaeische-akademie-aw.de](http://www.europaeische-akademie-aw.de)

## Graue Reihe

### Neuerscheinung zu "Nachhaltige Entwicklung und Innovation im Energiebereich"

Unter dem Titel "Nachhaltige Entwicklung und Innovation im Energiebereich" ist eine Dokumentation des Kick-off-Workshops der gleichnamigen Projektgruppe erhältlich. Die in diesem Band (Nummer 28 der Grauen Reihe der Europäischen Akademie) zusammengefassten Beiträge der Projektgruppenmitglieder stellen den Ausgangspunkt der Arbeit dar, die im Sommer des kommenden Jahres abgeschlossen werden soll.

## Lectures

Michael Decker:

18.6.01 "Interdisciplinary Technology Foresight. A Quality Controlled Procedure", The 21<sup>st</sup> International Symposium on Forecasting, June 17-20, Pine Mountain, Georgia, USA

12.9.2001 "Autonome Roboter. Wird der Mensch bald ersetzt?", Heinz Nixdorf MuseumsForum, Paderborn

Minou Bernadette Friele:

9.7.01 "Die Bioethik-Konvention des Europarates. Probleme und Perspektiven", Graduiertenkolleg Essen

Carl Friedrich Gethmann:

21.6.01 "Information und Kommunikation", FernUniversität Hagen, forum philosophicum

7.9.01 "Der Ort des Erkennens. Zur Philosophie der Universität", Kolloquium "Die Idee der Universität" an der Fern Universität Hagen

12.9.01 "Ethical Aspects of technical safety", World Congress "Safety of Modern Technical Systems, Saarbrücken 12.-14.9.01

24.9.01 "Ethische Probleme der Forschung an embryonalen Stammzellen", BioEthik Kommission des Landes Rheinland-Pfalz (Mainz)

Felix Thiele:

23.7.01 "Ethische Fragen der Lebenswissenschaften", Lehrveranstaltung für die Teilnehmer der Wissenschafts-Hotline im Rahmen des Wissenschaftssommers 2001, Berlin

## New Publications

M. B. Friele: "The extent of collective responsibility in medical science", in: *Monash Bioethics Review*, Vol. 20, No. 3 July 2001, 62–75

C. F. Gethmann: "Die Einheit der praktischen Vernunft und die Vielheit der Kulturen", in: W. Fikentscher / R. Simon-Schaefer / C. F. Gethmann / N. Walter (Hrsg.), *Globale Gerechtigkeit*, Bamberg 2001, 13–29

C. F. Gethmann: *Schweineorgane für den Menschen*, Interview zur Xenotransplantation am 25.7.2001 im Saarländischen Rundfunk SR2

G. Kamp: *Logik und Deontik. Über die sprachlichen Instrumente praktischer Vernunft*. Paderborn (Mentis-Verlag) 2001

## Personalities



## Personalities

Dr. Riccardo Genghini is a notary in the district of Milan (Italy). In 1990 he founded SNG, a public notary office and legal consultant firm, specialised in IT law, with a special focus on privacy and security. He is one of the European leading experts in IT security and electronic signatures, deeply involved in the standardisation processes.

Since February 2001, he has been elected chairman of the Cen-ISSS Workshop on Electronic Signatures Standardisation, becoming a member of the Eessi Steering Group. He is also full member of Etsi and Eema.

He is the project leader of the European Project named "QualiSign" in co-operation with T.U. Graz.

Dr. Genghini has international co-operations and consulting agreements concerning IT security with Italian and International organisations and companies.

Since the making of Italian legislation on digital signature, Dr. Genghini and his staff have been involved in the making of the Italian legislation and participate to the making of other legislation, establishing positive relationships with governmental institutions. He is now member of the working group for the new Italian legislation implementing the European Directive on electronic signatures 1999/93/EC.

Dr. Genghini is member of the academy's project group "Electronic Signatures. Cultural Rules Responsibility".

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