How Independent Can Science Be?

European Stakeholder Conference
20–21 November 2012 in Berlin

Since 2005, the Federal Institute for Risk Assessment (BfR) has been holding regular stakeholder conferences which address higher level socio-political issues. The starting points here are always the work areas of the Federal Institute: risk assessment and risk communication. The events are documented in conference proceedings which can also be accessed digitally via the BfR homepage. In this series, “Safer than safe?” (2010), “Do ‘perceived‘ risks warrant action by the state?” (2008) and “How much does a crisis cost?“ (2006) have already been published. All of these publications are only available in German language.

Imprint

Conference Proceedings

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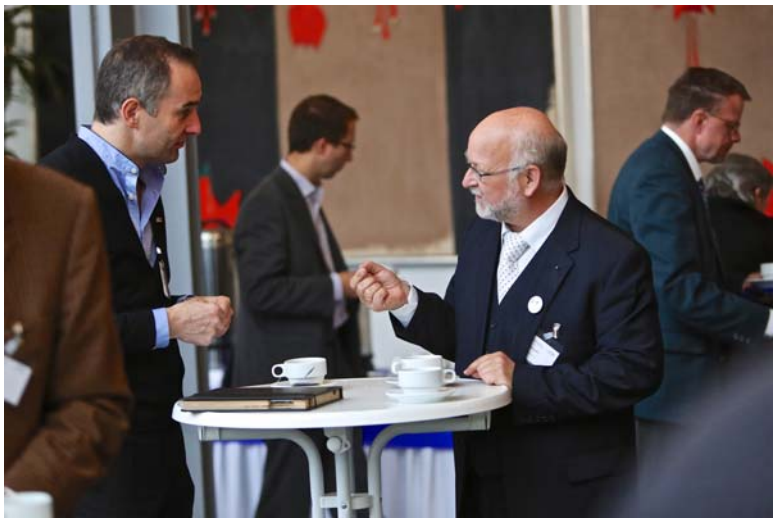

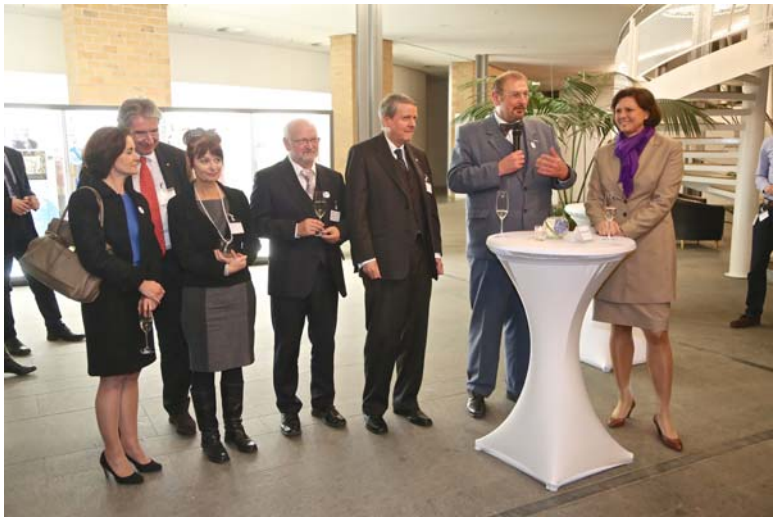

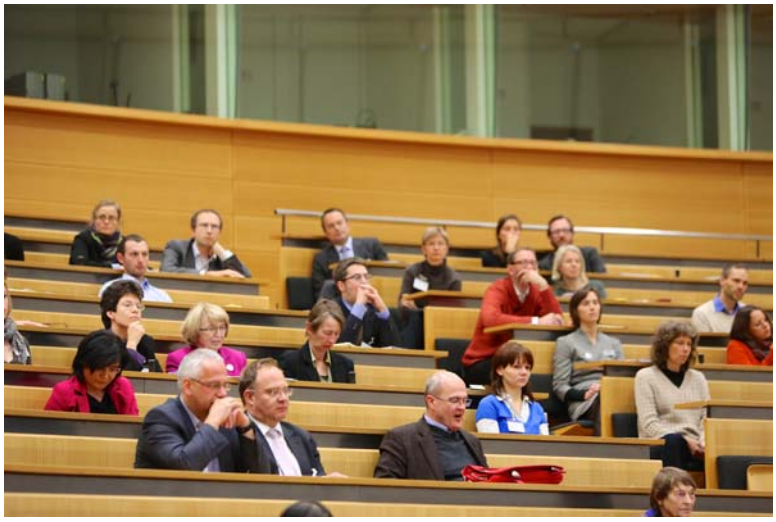

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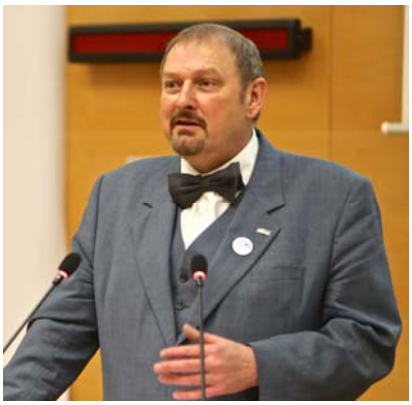


Professor Dr. Dr. Andreas Hensel,

President of the Federal Institute for Risk Assessment, Berlin

Dear Readers,

The tenth birthday of the Federal Institute for Risk Assessment (BfR) was the reason behind this event on the independence of science. In line with our tradition, we have planned it as a scientific symposium. When we were founded in 2002, the "von Wedel" report had just proposed the separation of risk assessment and risk management similar to the European system. Until then, the question as to the extent to which good politics is dependent on good political consulting had not been in the mindset of German politicians, but knowledge-based decisions have since taken hold in many areas. In actual fact the German parliament did make a very wise decision when it resolved that the BfR as a scientific authority should not be subject to any instructions in matters of risk communication. This separation allows independent, open and transparent communication.

Interestingly enough, industry also welcomed the creation of a scientific advisory body but at the same time and to the same extent, the protection of the consumer is of course one of our primary tasks. The food crises of the recent past, such as the EHEC outbreak and the detection of noroviruses in frozen strawberries, clearly showed that not only national aspects are involved in crises of this kind. From the simple fact that we import 31,000 tonnes of deep-frozen strawberries from China every year you can see that our systems must have an international alignment too. That is why we need standardised conditions not only on a national level but also within the framework of the European food authority in order to standardise laboratory analysis, utilise the manufacturers' self-check data for risk assessment in the ideal manner and coordinate the work of the national reference laboratories. This is a great challenge.

Today, we not only deal with the safety of food but also with that of animal feed, chemicals and cosmetics, as well as the risks that smoking involves. The BfR has made a decisive contribution in the last ten years towards addressing real and supposed risks. We have learnt in the meantime that supposed risks are at least as important as actual, scientifically provable risks because they have a direct influence on consumer behavior and can often trigger adverse reaction patterns in times of crisis. During the EHEC outbreak, 70 per cent of all Germans changed their eating habits and switched from tomatoes and cucumber to savoy cabbage. That is only possible if the public has understood our recommendations.

In my opinion, risk assessment and risk communication are inseparably combined with each other. There are of course limits. Science should not become politically active because cultural, economic and social aspects must always be considered too before a political decision is made. If we have agreed, however, that science can lead us to where there is a very severe lack of knowledge, then much more focus must be placed on how to deal with this lack of knowledge. Scientists are used to do this; they differentiate between classical ignorance, which can be resolved by making the appropriate experiment, and other dimensions of ignorance which can be seen in the fact that we are not even able to ask many questions today. From a specialist point of view, these differences must be elaborated so that it is then possible to reach a political decision on the need for safety research or the prioritisation of the work packages which have to be processed in connection with a risk assessment.

Science is being instrumentalised to an ever increasing extent. In addition to this, its falsification principle often reaches limits in areas such as product development. The Horizon Plan of the European Community clearly calls for the cooperation of science with trade and industry where there are distinct conflicts of interest in specific areas. The degree of openness and transparency is decisive here and is particularly critical in the health and food sector. If you were to conduct research into cars, every consumer would expect you to cooperate with the automobile industry, but it is being publicly discussed in the health sector at the moment whether the mere shaking of hands with a representative of the industry at an event organised by the industry could spread some terrible disease.

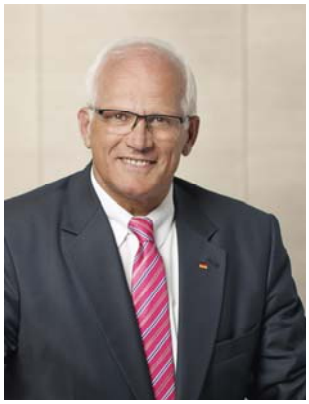
Our discussion is dedicated to the question of what independence consists of, how it has to be openly presented and where it ends. These questions not only affect us, but also the more than 50 other advisory departmental research institutions in Germany, not to mention the corresponding European institutions. I am particularly pleased that we were able to win over speakers from very different areas who will elucidate certain aspects from their point of view. The structure of our conference follows a tried and tested principle where the first day is dedicated to science and on the next day, all of the stakeholders can have their say and discuss the socio-scientific, philosophical and natural scientific aspects.

I am delighted with the many interesting presentations and controversial discussions which are documented in these conference proceedings and wish you some inspiring reading.

Professor Dr. Dr. Andreas Hensel

President of the Federal Institute for Risk Assessment

Greeting



Peter Bleser,

State Secretary at the Federal Ministry of Food, Agriculture and Consumer Protection, (BMELV), Berlin

Ladies and Gentlemen,

I am very grateful for the opportunity to speak to you on the occasion of this anniversary before my minister leads us on to the highlight of the event this evening.

You are not only celebrating an anniversary, you have organised a stakeholder conference on the subject of how independent science can be. That really is a very, very gripping question. Exactly ten years ago, on 1 November 2002, the law on the reorganisation of consumer health protection and food safety came into force. This set the separation of risk assessment and risk management in Germany on a solid footing, and the establishment of the Federal Office for Consumer Protection and Food Safety and Federal Institute for Risk Assessment as a consequence of the BSE crisis ultimately proved to be a further milestone on the way to improve food safety in Germany. After this crisis, the regaining of consumer trust was of essential importance. To ensure that it stays that way, the assessment of risks all along the food chain must be independent – firstly independent of political deliberations, secondly independent of economic interests and thirdly independent of the demands of crisis management. Whoever assesses risks must first and foremost be committed to two things: the principles of science and responsibility towards the general public. I believe that these are decisive objectives which essentially enable the credibility of this institution in the first place. The BfR fulfills this obligation and fully satisfies the high demands placed on it. The crises in recent years have shown that it was a good and correct decision to establish this institution. Together with its sister authorities, the BfR played a major role in overcoming these crises. The separation of risk management and risk assessment has proven its value already.

Within a short space of time, the BfR has developed into a risk assessment authority which enjoys a great reputation in Germany and many other member states of the European Union. It is the main reason why I would like to congratulate the BfR on its tenth anniversary and I would like to take this opportunity to thank your more than 750 staff members for what they do for this country. They have become truly indispensable. Politics needs specialised scientific knowledge and the legislative body in particular is becoming an ever more important source of demand for expert opinions. More and more often, governments and parliaments see themselves confronted with complex circumstances when formulating legislation. Members of parliament are bound by their conscience, but to represent the people effectively they have to rely on various forms of political consultancy as well as

opinion polls and a dialogue with representatives of associations, citizens' initiatives and other forms of political involvement. Even though not all political groups recognise science, this should not stop us from acquiring and adhering to an independent expertise whenever necessary.

Scientific political consultancy cannot and should not substitute the general social discourse, but it can pave the way towards it and should accompany it with criticism. Where this is concerned, I would request that you speak up if you think there has been a false development from a scientific point of view. The complexity of specific matters has had the result that many decisions can no longer be reached without expert knowledge. The important thing here is that political consultancy should be open and transparent. A loss of trust can result if this is not the case.

Departmental research in Germany is conducted through independent, subordinate, specialised scientific authorities as well as the external awarding of research contracts. Departmental research builds an important bridge between science, society and politics. One of the essential tasks of departmental research is political consulting in scientific matters. In 2008, a realignment towards excellence, more capability for the future and the optimum use of resources began in the area of departmental research at the Federal Ministry of Food, Agriculture and Consumer Protection. With this realignment, we have created the prerequisite for optimum and excellent scientific consulting of the federal government and are paving the way for the knowledge society in the areas of food, agriculture and consumer protection. The concentration of fields of research and interlinking of institutes with one another creates modern and flexible structures which ensure that departmental research is fit for the future within our institute, thus making the BMELV as a whole and the decisions we make fit for the future too.

Our minister has asked the scientific council to conduct an evaluation of the departmental research institutions in the years 2012 to 2016. This means that the institutions will be individually appraised by the scientific council for the first time. Perhaps findings will be made as to how we have to readjust and how we can continue to maintain the excellence of our institutions. Scientific society consultancy must be fundamentally free of non-scientific influence. Although this is the general consensus, it is not always practical reality by a long way. Medical research, for example, is often faced with the dilemma that many studies cannot be carried out at all without the industry on the one hand, while the question is raised on the other as to if and how the rules of good scientific practice are to be complied with under these outline conditions.

There are doubtless some scientific disciplines, especially in the area of fundamental research, where close contacts to the industry are not required. If sufficient public funding is then made available, this area can be loosely structured. In other cases, however, cooperation with industry is desired, and often even necessary, in order to include the knowledge that exists there, for instance, or to gain a better understanding of process stages. No matter whether we are dealing with plasticisers in plastic toys, bisphenol-A in beverage cans or printing ink on cornflakes packaging, the manufacturers and production process, as well as the type of use, often have a decisive influence on possible health risks. In cases of this kind, close cooperation with companies can make good senses and may even be necessary. It must be guaranteed in each instance, however, that scientists can research

independently. They may not be guided by the interests of the manufacturers and must be given sufficient leeway which must also be protected.

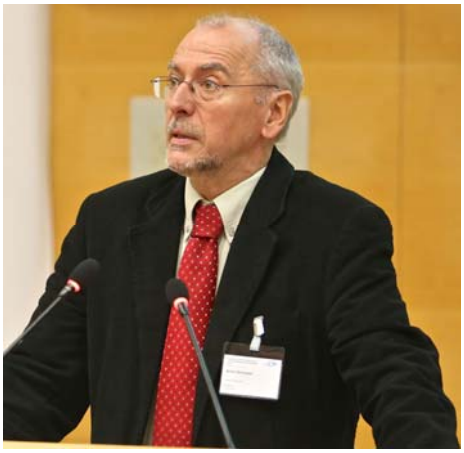
For the core competence of the BfR, the assessment of health risks, this means that scientists may and should express themselves free of influence and purely on the basis of scientific criteria, even if the data are incomplete. By way of example, we experienced a case of this kind in the early phase of the EHEC crisis. On the basis of the scientific knowledge available at that point, the BfR issued a warning in May 2011 against the consumption of cucumber, tomatoes and leaf lettuce in northern Germany. It was later established that the EHEC pathogen was transferred via contaminated sprouts. Over 50 people died of this food infection. As far as the precautionary principle is concerned, this early warning was correct and necessary as it served consumer health protection in Europe and Germany. The BfR consumption warning found an enormous echo in the media at the time, both nationally and internationally, as a result of which intensive political discussions were held. There were intensive consultations between Spain and Germany in particular and proceedings are still running in which damage claims are being asserted.

We put up a lot of money at the time to compensate fruit and vegetable producers for any damage they may have suffered. I can only repeat that the decision made in the situation that prevailed at that time was the right one and exactly the same decision has to be made again in similar cases, because the risk of issuing a warning too late is much too great. A similar example concerns strawberries from China contaminated with noroviruses, where it could also be seen that we were capable relatively quickly of tracing the source introducing the appropriate measures.

The Federal Institute for Risk Assessment is devoting itself to these and other important questions on the occasion of its tenth anniversary and at this two-day conference. I can only congratulate you on the way in which this institution has developed in the space of the last ten years. I am not only looking forward to this conference, I also hope that you will acquire fresh knowledge, thereby expanding the expertise of the institute. Credibility and scientific expertise are the capital of the BfR and are decisive for determining how it is perceived from the outside. On that note, I would again like to extend my sincere congratulations and express the great appreciation I have for the work that you do while also and above all wishing you all the very best for the future.

Moderator: Many thanks. Please now welcome Professor Armin Grunwald. He took a PhD in Physics and also studied Mathematics and Philosophy. Since 1999, he has headed the Institute for Technology Assessment and Systems Analysis at the Karlsruhe Institute for Technology, as well as the Office of Technology Assessment at the German Bundestag. Welcome, Professor Grunwald.

Why is the Independence of Science Important and What Does it Comprise?



Professor Dr. Armin Grunwald,

Karlsruhe Institute of Technology (KIT)

Ladies and Gentlemen,

Many thanks for the invitation. I was very pleased to accept because I greatly admire the Federal Institute for Risk Assessment and because the subject of the conference provides plenty of food for thought. I thoroughly enjoyed preparing the speech I have been asked to deliver and deliberating on the independence of science. If I were to conduct a survey here and now as to whether you are for or against the independence of science, I presume that the majority in favor would be of almost communist dimensions but despite this, it is still not easy to explain what it means and why it is considered important.

There is a lot of talk today about the threats to scientific independence. It used to be all about the struggle to gain and maintain the independence of the sciences from powerful rulers and sometimes against the will of the Church. The threat is seen from a different point of view nowadays. We will hear today in a number of speeches about how these threats are perceived and what should be done to do justice to the precious asset of independent science. We have this implicit idea in our heads that scientific independence is a good thing, a sort of ideal or desirable objective. I believe my task today is to say something about this ideal and then take a look at whether we are moving away from it and how we can refocus on it if necessary. In doing so, I would like to touch on the following points: first of all, what is scientific independence? Secondly, why is it important? Thirdly, what does it refer to? And fourthly, is autonomous thematisation a part of independence? To finish off, I would also like to say something about the limits.

What is scientific independence? I understand it to be that the sciences, i. e. the people who work in the corresponding institutions in a system called Science, are able to regulate their own affairs at their own responsibility. Autonomy is perhaps the best term for it; “autonomos” in Greek means self-legislation. In the same way that the law is intended to make judgments in accordance with purely legal criteria and disregard economic and political aspects, scientists should evaluate and improve findings using purely scientific methods and criteria and not be influenced by political, economic or other aspects. In the same way that it is the performance of the athletes and not political majorities which decides the outcome of sports competitions and the amount of financial support given by sponsors, where science is concerned it should be scientific creativity and the criteria of scientific excellence which decide on what is to be understood by sound scientific knowledge.

I would like to call this form of self-legislation independence. It was fought for over centuries in the course of the European Enlightenment. This independence is the subject of discussion today because there are different expectations and because many other forces are having an influence on science as a system. Doubt is the essential mechanism on which this self-legislation – the distinct ability to differentiate between the scientific and the non-scientific – is based. Doubt, dispute and scientific controversy are the medium in which the search of the sciences for truth and knowledge manifests itself. If you think about the threat to scientific independence, you should also give some thought to where these forms of scientific critique, doubt and mutual criticism and learning are being endangered.

This can only work if the scientific system does not have a hierarchy in which there is a "pope", a scientist-in-chief who dictates what good science and poor science are. The ideal notion here is that the critics who question the thesis of a colleague can themselves be subjected to criticism next time around. This produces an imagined symmetry between those who put forward scientific theses and those who criticise, doubt and reject them or attempt to refute them with counter-theses. This symmetry is only conceivable without a central instance which rules on the scientific nature as an authority. Ultimately, this involves the ability to assert an argument rather than holding a position of power within the scientific system. Even people without power, such as PhD candidates should, according to the theoretical expectation, be in a position through the results they produce to shake existing scientific thought patterns, paradigms and theories. There actually was a case once where a civil servant in the Swiss patent office revolutionised physics. It ultimately involves the autonomy to decide what good scientific arguments are and which methods, conclusions and evidence procedures are admissible.

This can be very different in certain cases within the individual disciplines. If you think about the wide range between applied ethics and process engineering or social science and chemistry, there are bound to be many very different methods. Independence, however, always means the same thing, namely that the sciences themselves have control of the decision-making processes on the scientific nature of their findings and not any prince, politician, entrepreneur or the media either. But why do we need a system like this? Isn't it strange that a society which has expectations on science thinks it is good that a system of this kind has a high level of independence in this self-legislation? It is conceivable that science could function without this self-legislation. Since it cannot at the very least be logically excluded that science subordinated to a state doctrine in an authoritarian state could theoretically produce good results too, there must be another reason and motivation behind scientific independence.

I would like to look back to European history here to identify the European Enlightenment in particular as an age in which the sciences made themselves independent. This was the time when self-legislation asserted itself and philosophy and scientific theory provided the arguments against the previous dominance of religions and absolute monarchs. Borrowing from Jürgen Habermas, the idea at the core of my hypothesis is that there are structural commonalities between the scientific search for truth and scientific knowledge on the one hand and the democratic debate about certain decisions in a society on the other. This may well surprise some of you, but if I base my case on the utopian ideal of a deliberative democracy in which people do not simply cast their vote every four or five years while otherwise some far-distant politicians go about their business, it can be seen that there is a

similar structure behind this image of democracy and the striving for scientific knowledge, namely the principle of the better argument. Ultimately, both scenarios depend on the doubt, criticism and debate that surround these arguments in order to function.

This is of course a normative ideal but nevertheless, and I agree with Habermas here too, contrafactual normative perceptions are not wrong merely because they have not been implemented in reality. Luckily, the commandment 'Thou shalt not kill' is not refuted just because it is not observed now and again. This is the way it appears to me to be here too: contrafactual ideals about the independence of science in line with the principles of putting across good arguments retain their power even if they are not always realised, because they allow us to exercise criticism as well as demand improvements in line with this ideal. Understood in this way, it can be recognised that the purpose of scientific independence cannot be to produce objective and perhaps even absolute truths. Doubt is an integral part of the system, an indispensable medium of its further development and independence. Science is not the keeper of the truth in the same way that perhaps a caste of priests once was in traditional societies.

I would also like to put forward the hypothesis here that scientific independence creates a separate form of legitimation for existing knowledge bases. I regard this legitimation as being of central importance for the functioning of a democratic body politic. The essence of the legitimation performance is that it must be possible at all times for people to convince themselves of the correctness, adequacy and scientific character of scientific knowledge. This is done by evaluating scientific findings in relation to their presupposition, theory, background, empirical results etc. This extends all the way through to the last foundations where scientific terms such as risk – one of the essential terms with which this institute is involved – are defined, or where scientific measuring processes are determined. The measuring of risks is in many ways a controversial topic. It must also be possible to question the scientific findings made on the basis of measuring processes of this kind in line with the presuppositions of the measuring process.

In synopsis, this means that in principle, it should be possible to dissect a complex scientific result into argumentation stages so that everyone can convince themselves that the arguments upon which they are based are good. This is a form of legitimation which can provide only the system of science. No caste of priests or shamans in a traditional society can produce this legitimation performance. In a society where traditional authorities of faith are missing, this form of legitimation is of essential importance for the role of the sciences in a democracy and in particular in scientific policy consulting.

This means that independence is linked with a promise of legitimation performance which in turn means an obligation of transparency. Sciences must be able to split up their findings in a transparent manner so that everyone can convince themselves of the scientific character of these assertions. Transparency is a vital component of this construct of scientific independence. You can't demand independence and refuse transparency. I believe this is in itself not logically possible.

This has many different consequences for political consulting. Scientific policy consulting has little to do with facts in my opinion. It goes without saying that it cannot be practiced against the facts of the matter, but it cannot exhaust itself in the process of producing facts. It is

always subject to the reservation of doubt too, because it relates to something which does not exist yet, such as the energy turnaround, regulation, food or the precautionary principle in connection with nanoparticles. It involves things which have to be decided and it includes assumptions, assessments and uncertainty. This is no longer factual knowledge but more the putting forward of arguments which should be as good as possible. This always requires going back to the basis of argumentation and the legitimation performance connected with transparency. My approach is to combine the topic of scientific independence with a democratic body politic.

But then, what does the independence of science relate to? First and foremost it relates to the results, of course. Scientific results produced to order would quickly be revealed as such in a scientific debate and could not produce the necessary legitimation performance. Science works without any bias as to the results which only materialise in the process of scientific research, experimentation, deliberation, mathematical modelling etc. Hypotheses exist beforehand, but results only appear in the course of the process. I believe these to be the simple facts of the matter, even though they are sometimes difficult to realise. It must be ensured that any doubts that arise can be expressed and openly discussed at all times. Freedom in the choice of method and quality assurance is also part of the independence of science. In an institutional science system, what is also needed is independence in determining the criteria for appraising the qualification work of the young generation of scientists and evaluating research institutions. The examples can be continued at random. Quality assurance deserves the greatest attention, because nothing harms the reputation of science as much as a lack of quality assurance. May I remind you here of a few PhD dissertations in recent years.

I'll get to the fourth point now: is autonomy in thematisation a part of the independence of science? My office, for example, works on behalf of the Federal German Parliament, the Bundestag, which determines the topics about which they want us to advise them. We are obliged by contract, however, to carry out work for the Bundestag in scientific independence, which means that we are responsible for the methods, results, transparency and legitimation performance. This does not appear to be a contradiction. 20 years of practice lie behind us along with several positive appraisals. The Helmholtz Association, to which the Karlsruhe Institute of Technology belongs, works on behalf of society in general, but who decides what society requires? It is not us scientists but rather the Federal Ministry of Education and Research (BMBF) and to an extent the Federal Ministry for Economic Affairs (BMWI), both of which provide us with research policy specifications to which we must then align our research. This is not as strict as it sounds, because we can also help to establish the agenda to a certain extent and there are negotiation processes and dialogues. But as the word specification implies, there is no symmetry here because the tasks are specified. It works, however, even though we have to be scientifically independent within the scope of these specifications and take responsibility for the quality of the results.

I believe, therefore, that autonomous thematisation does not necessarily belong to the independence of science. The relationship is more a gradual one here. It is important that the scientific system as a whole offers enough leeway to allow autonomous thematisation too, otherwise it would be pushed in a certain direction through external thematisation. It must always be possible to conduct basic research with freedom of choice regarding the topic. In applied research too, there must also be critical, unorthodox research which does not follow

the mainstream. Researchers should be allowed to develop alternatives so that they do not have to pursue a development which everyone else is currently pursuing. The energy turnaround is a current example of a movement of this kind. To achieve it, provisions will have to be made and we will be talking about the details of this at the conference.

In conclusion, I would like to touch on how independence can be secured. First of all, there are institutional mechanisms with an obligatory character. For example, my Office for Technical Impact Assessment is operated by the Karlsruhe Institute of Technology but I, as head of the office in Berlin, am not subordinate to my president in Karlsruhe. This is part of the contract between the Bundestag and Karlsruhe and the reason is clear: the Bundestag does not want the Karlsruhe Institute, which used to be a fairly strong stakeholder in nuclear issues, to use the Berlin office for its own lobbying purposes. That is why there are institutional provisions.

The second point has to do with funding. The independence of science is being jeopardised by a development which is marked by increasing pressure from third party funding, and there will be more talk about this too. Thirdly, there has to be a free publication system. Scientific discourse, dispute, controversy and doubt all need media platforms and thereby opportunities to develop. Scientific results have to be published in places where they can be found so that they can subsequently be discussed and criticised. We need a lively scientific community to take on this task and not allow itself to be compromised by career pressure, conformism and perhaps even the sideward glance to some third party funding to the extent that this self-control mechanism of science no longer functions. I see this as a serious risk because competitive pressure has become so strong. We occasionally reach limits where competition, which is in principle a positive thing, is so over-controlled that it sets self-destructive effects in motion.

Let me finish off by saying a few words about the limits of scientific independence. I believe that they exist and not only in reality but also in principle. Science is autonomous in the sense described above, but it is not self-sufficient. It has to be funded by society and it is only right that this funding is often linked with provisos in such matters as thematisation. I do not consider this restriction to be a problem as long as there are enough other spaces where topics can be picked up on at will. There are also system-immanent limits to independence, however, because scientists never pursue only the normative ideals of the best argument but also come to represent their own interests. This is both understandable and normal from a psychological point of view. As soon as someone carries institutional responsibility, it becomes almost mandatory that they campaign for their own concerns.

Here too, it is decisive that the scientific discourse, controversy and debate can unfold. We always move around between the conflicting priorities of normative expectations and ideals on the one hand and the powers that work against them on the other, no matter whether they emanate from the system itself or influence it from the outside. I find this area of conflict between the existing ideals and reality to be particularly exciting.

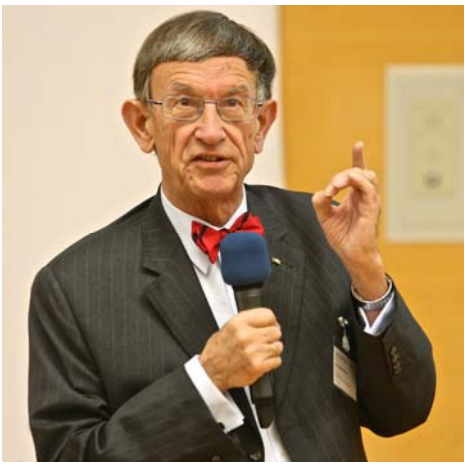
I would like to extend my sincere thanks and congratulations to the BfR for choosing this topic. I look forward to gaining more valuable knowledge and hope above all that you hold your course of scientific independence with social responsibility. Many thanks.

Moderator: Many thanks too. I would now like to give a very warm welcome to the past master of German science policy, Dr. Heinz Riesenhuber. He is a chemist, a member of parliament since 1976 and was Federal Minister for Research and Technology from 1982 to 1993. Dr. Riesenhuber is now Father of the 17th German Bundestag. Welcome.

The Independence of Science – an Illusion?

Dr. Heinz Riesenhuber,

Father of the Bundestag, Berlin



Ladies and Gentlemen,

I would like to thank you for the invitation and for the friendly welcome. More than anything else though, I would like to congratulate the BfR on the first ten years of its work with a mandate which is still being carried out on terrain which has not been fully marked out yet. In this regard, a stakeholder conference to mark the tenth anniversary would appear to be a very appropriate idea. The questions regarding the estimation of what has been achieved up to now and about new strategies and methods, as well as the institute's self-conception, are relevant to everyone involved with it.

Your mandate is to convey orientational knowledge to us in an ever more complex world. This not only affects the research itself, it is a meta-issue of research. It is all about understanding research, summarising and weighing it up, not just compiling it, but evaluating it too. You develop something which is necessary for orientation in a complex situation. You provide the basis for decision-making. Ideally, and we could have a controversial discussion on this, Mr. Grunwald, what you say is precisely separated from what you derive from it. You have to present the best available knowledge here but the borderline to the evaluation and recommendation has to be so precise that each individual still has the opportunity to make their own decisions on the basis of the knowledge compiled by you. The problem per se is an old one. In "Il Principe", Niccolò Machiavelli asserts that the politician should base his decisions on the best available knowledge, but this is an ideal situation. As a rule, science has to think for a long time before it says anything, whereas the politician has to decide quickly and hopefully not before he has given some thought to the matter. You have to lead us out of this dilemma.

How do we do this? Empirically, this was attempted in different ways over the past centuries. The Royal Academy in London was founded in 1660 and it published its first Technology Assessment Report on the state of the forests in 1664. The Royal Academy set some of its own agenda and was requested to perform other tasks. That which then developed in very different ad hoc committees over the centuries was fairly exemplary.

There is an academy in Germany too. When I had the honour to deliver a speech before the Royal Academy, its president emphasised full of unconcealed pride that it was the oldest

academy in the world. I replied hat he was right but for one small exception, because the Leopoldina is a few years older. It did not attain the international renown and splendour of the Royal Society in the centuries that followed. Only in this millennium has it re-established its universal reputation, but it did hold a very comparable discourse on the processing of problems over the years.

Above all in the 19th century, the dialogue grew between the ruling class and science. The founding of the polytechnics, for example, was recommended by scientists after they had made clear to the princes that future prosperity would essentially be based on the practical application of scientific findings. This produced the *Gründerzeit* in Germany, the Founder Epoch that took place in an iterative process between science and economics flanked by fundamental political decisions. The next 80 to 100 years weren't quite so prolific in this regard, as far as I can judge. When a country goes to war, the technology assessment is shifted into the background in favor of other criteria. If you then take a look at the development in the recovery period after World War 2, President Nixon's speech on the state of the nation in 1970 seems to me to have been one of the most interesting and most widely forgotten starting points in which for the first time, he regarded the world and the environment as one system which poses a challenge to us and with which we have to deal. This challenge is basically the challenge of an increase in knowledge which is getting faster and faster, because human knowledge doubles itself every four years. This does not make old knowledge irrelevant, however. Core knowledge remains, but the multiplicity of ramifications and wide variety of information that are called upon to solve complex problems are getting bigger and bigger. What became visible at that time was a view into a more complex world. If we know more, we can do more. Because we can do more, we are responsible to a greater extent for what we do. And because we are responsible for this, we must understand it so that we can deal with it properly.

The Office of Technology Assessment was formed in the USA in 1972 on this basis, and I will not be touching today on the scenarios of the Club of Rome or other isolated incentives. The Office of Technology Assessment existed until 1995. The reasons for its closure had presumably something to do with the conviction of some of the members of congress who believed that its assessments were too much dominated by another group of parliamentarians. This is the most polite form of the reasoning that I could find. When something like this happens, science is no longer a peacemaker; it is a cause for controversy on a fundamental level. This has the effect that an institution of this kind is no longer of any use and can even destroy itself. In its time, the Office of Technology Assessment conducted 750 studies some of which are structurally simple but which nevertheless stand out through their excellent professionalism. The transport of explosive substances is not a particularly complex subject but when it is dealt with professionally, taking all aspects into account including human interference, it becomes a great work. The institution also dealt with more complex topics such as acid rain and climate issues all the way through to their interactions with society. During this time, there was a base of excellent scientists who were highly committed but had a very down-to-earth attitude towards the result of their experiments. Shortly before the Office of Technology Assessment closed down, its results really were without bias.

We tried to establish a comparable institution in Germany. The first motion put forward by the conservative CDU/CSU parliamentary group in 1973 was rejected by a large majority. I then

formed a conspiracy with a colleague from the social democratic SPD parliamentary group in 1977/78 in an attempt to involve the ruling party at that time. I believe it was the only motion during this period which was jointly signed by a government and an opposition parliamentary group. When my colleague Ulrich Steger put it before the SPD parliamentary group, however, its chairman Herbert Wehner made an impassioned speech against the motion and accused Steger of collaborating with the opposition. We could argue about this kind of understanding of politics, but at any rate the project was shelved for a number of years. We then set up the inquiry commission on technology assessment in 1985. This was followed by the establishment of the Office of Technology Assessment at the German Bundestag in 1990 and the founding of your institute in 2002. You have accompanied us ever since with intelligence and specialised knowledge.

There were also attempts that failed, such as the TA Academy in Baden-Württemberg. I cannot outline all of the attempted approaches in detail here and I would only like to touch briefly on what are today the standard instruments of scientific policy consulting, such as councils of experts with different mandates, some of them established by law. We set up inquiry commissions on defined topics in which members of parliament work together with scientists to prepare reports which can form the basis of legislation. We have hearings to which we invite scientists with different views and positions and finally there are informal committees too.

One great and very pleasing development has been the strengthening of the academy landscape. Immediately after reunification, the Leopoldina initially rejected the proposal to turn it into a national academy because it did not feel it was up to the task at the time, but it has now been performing the tasks of a national academy since 2008. It has the remit and self-understanding of taking up a position on self-selected topics and on others about which its opinion is requested. Acatech was founded ten years ago as a technical academy and this institution also collaborates with the Leopoldina, other academies and occasionally with departmental research institutes too. What this means is that we currently have a landscape of political consulting in Germany that is stronger than ever before.

This raises the question of how this consultancy offer is received by politics, because it is ultimately politicians who are the addressees of these activities. There are several requirements which have to be fulfilled. It would be desirable, for instance, for politicians to be presented with material written in understandable language, but this is not always the case. There are some works of scintillating intelligence with great powers of fascination in the field of social science which are no fun to read. The reader excitedly awaits the result and the integration of its meaning into reality and ends up confused, albeit on a high level. This means that the manner of conveyance is decisive. If it is not right, the intelligence behind it is virtual.

Another question which has been touched on today concerns is the reliability of the result. Is it really impartial or is it somewhat biased? Nonsense can sometimes be talked among scientists but this is picked up on fairly quickly. The public, however, must be able to rely on the truth of what is being brought forward in line with the highest standards and highest demands of science. If the public is disappointed in this regard, catastrophic mistrust results where science can no longer get its message across, be it good or bad.

The question as to how science penetrates through to the general public is a big problem in itself. After Chernobyl there were many people who would no longer eat lettuce because they thought it was contaminated with radioactivity. I asked scientists at the time how much lettuce a person would have to eat to reach the legal limits. The answer was 68 kilos per day. This answer was released to the public as a curious fact on page 7 of a daily newspaper. It is a fundamental issue how present science is, how trustworthy, how defining for public knowledge.

This raises another fundamental question: how do we stop individual researchers from putting forward their personal hypotheses at the expense of the credibility of the scientific system as a whole? The temptation to do so can arise for various reasons, such as financial dependence or involvement in a system. Only when we are aware of backgrounds of this kind transparency can be produced. We have to know the backgrounds of a scientific assessment and be aware of the places where a bias could exist. In 1978, for example, I was given the honourable task of writing an energy programme for the CDU party. As there was no such thing at that time, one had first to understand the connections and shape them into a structure. As always, it is much more difficult to ask clever questions than to formulate reasonable answers. There were only a limited number of people at the time who had dealt with the topic in cross-section. There was, however, the energy industry. I then questioned its representatives about the individual types of energy: coal, oil, gas and nuclear. This produced a fairly accurate picture of reality, because we knew what the bias was.

How can an individual politician manage to find his or her way around in this impenetrable jungle of truths? Various strategies are pursued to do so. We could refer to publications but if we were talking about the euro crisis, for instance, we would be met with a barrage of differing opinions, usually only covering partial aspects. To make a judgement from this is no easy matter. We must take action nevertheless, because we cannot simply let things take their own course. Due to the fact that the stakeholders in the banking industry, for example, did not participate in the public discussion for years, the discussion was incomplete which in turn made it difficult to recognise the realities. This leads to another wish: public discussion of all relevant aspects of a topic with the involvement of all stakeholders.

Science should not simply wait until it is given these mandates, it should pick up on the relevant topics proactively. It does not happen very often that science begins to put across its arguments visibly earlier than politics. The ozone hole is an exception which was first thematised by science, and an American scientist was awarded the Nobel Prize for it. Politics reacted to it in a very short space of time, in Germany too. The Montreal Conference set the limiting values for fluorocarbons; Europe responded two years ahead of the Montreal schedule and Germany was two years faster than Europe. There were other topics of which science took no notice, such as the subprime crisis. There is practically no scientist who predicted that this American mortgage delinquency would blow up in our faces. On the subject of German unity, an excellent American historian once told me that every one of his colleagues could subsequently explain why German reunification was inevitable and necessary although none of them predicted it. Naming the relevant risks and developments in advance and making proposals on how to deal with them is a great challenge.

Addressing issues in a timely manner is also of significance in the field of ethics. When Hans Jonas published his book “The Imperative of Responsibility” in 1979, the political reaction in

the general public was zero. In my capacity as research minister, I approached the churches at the end of 1982 to request a statement on issues concerning medical handling of the human genome. Both of the two main churches in Germany replied that these were fascinating questions that they had not yet thought about but which they would be pleased to discuss. I would have preferred if the impetus for the discussion had been given by the churches and it turned out that we were not prepared for the most pressing questions in this area: 'What is possible from a medical point of view?' and 'Which of these will we be allowed to do?' I cooped up 50 people at the research ministry for two days to discuss these issues and the discussion was absolutely chaotic. Thereafter, we founded the Benda Commission. In 1990, after six years, we then passed the embryo protection law which found a large majority in the Bundestag because it was properly discussed, well balanced and prepared in a transparent process of dialogue. The prerequisite for this is independent scientists who are only subject to the laws of science where their work is concerned. That it would also be desirable for scientists to show some commitment in everyday life is another issue.

The number of scientists in the German parliament is fairly limited. When I first joined the Bundestag quite some time ago, I was not only the only chemist in the CDU parliamentary group but also the only natural scientist in the Bundestag. This may give rise to some strong feeling, but it does not necessarily promote dialogue in the actual matter. That is why I advocate more scientists in all political offices. Maybe you are considering taking on a task of this kind for a while, be it on local, regional or national government level, in a political party or society or anywhere else where opinions are formed. This also contributes towards making science independent, because only when there is a lively basic understanding of science in the general public is there a real chance of this helping us to shape opinions and decisions from the available knowledge.

In this spirit, I would like to convey my congratulations to your institute. I am looking forward already to seeing what you and your staff of 750 will have achieved in the next ten years. We will then listen, full of admiration, to the speech of a scientist from among your ranks who has been a member of the German Bundestag for the past eight years and has helped to shape opinion there with technical understanding and commitment. I am truly convinced that our society can function better with a little bit more rationality. It is certainly easier to take action without rationale in most cases, but it ultimately proves useful to tackle an issue with reason.

Moderator: Many thanks, Dr. Riesenhuber, for your lively presentation. The next speaker, Dr. Roger Pielke, is a mathematician and political scientist. He heads the Programme for Environmental Studies at the Cooperative Institute for Research in Environmental Sciences in Boulder, Colorado. Prior to that, he was a director at the Centre for Science and Technology Policy Research of the University of Colorado in Boulder. Welcome!

Scientific Integrity and Political Conflict: Are they Compatible?

Dr. Roger Pielke,

Jr. Centre for Science and Technology Policy Research, USA

Ladies and Gentlemen,

Thank you for that very gracious introduction. Let me add my congratulations to the BfR. I think, institutions of science policy are tremendously important in our society, and they are difficult to protect, so celebrations like this are very important. Here is the answer to the title of my presentation: yes, scientific integrity is compatible with political conflict, but I am going to make an argument that we maintain integrity of sciences through engagement between scientists and decision making, not through distance. Ultimately, it is the expert community that must exercise leadership in order to ensure the integrity of science. Unfortunately, scientists cannot depend upon the political process to do that for us.

Last night I had the chance to go to the Olympic stadion and catch a soccer game. In a soccer match, the referees on the pitch are really important for the integrity of the game. Usually, the supporters on both sides like to yell abuse at the referees – maybe the BfR has made similar experiences – but if I stand up in the crowd to cheer for the referees, whose job it is to stay independent, I might be looked at as weird and strange. The example illustrates pretty well the situation of scientific organisations. When it comes to topics such as energy, climate change and genetically modified organisms, people are very willing to take sides. Only a small group of people step back a second from the debates and talk about the integrity of the institutions and the people who make those decisions. Today, I'd like to focus on the integrity of the institutions that set up that interface between policy and science. So, I want to make three points in my presentation today, and I am going to do it through a number of different case studies.

Let me start by talking about hurricane Sandy in the United States. I would like to use this case to describe how science can become lost in a decision process when institutions are not well developed. I am sure you all heard about hurricane Sandy; I put 'hurricane' in quotation marks, because it may not have been a hurricane, when it struck land. The storm caused about 20 to 50 billion dollars of total damage. With most policies, there is a deductible, usually 1,000 to 2,000 dollars, which a homeowner must pay before insurance covers the rest. However, in several states along the coast of the United States, homeowners may be requested to pay 1 per cent, 5 per cent, perhaps even as much as 10

per cent of their property's value before the insurer coughs up a single penny. The idea here is to send a forward-looking price signal to homeowners to make them aware about the risks that they face by building on the coast, where storms can occur. It turned out that the National Hurricane Centre, which is the government agency responsible for tracking such storms, had changed the designation of Sandy from a hurricane to a post-tropical storm, just one hour prior to landfall.

I know some of the scientists at the Hurricane Centre and I am sure they did not have on their mind that they were making a 20 billion dollar plus decision. However, experts familiar with the transition from a tropical cyclone to an extra tropical cyclone know that this process usually occurs over many hours, if not days; it is not a sharp, big red line. Nevertheless, the decision was made one hour before landfall, and it caused a lot of anger and upset, due to the fact that the hurricane deductible did no longer apply. The insurance industry announced that they are going to sue the US National Hurricane Centre for making this decision. In reply to this, the Governor of New Jersey issued an executive order, stating that it is a violation of the law to call Sandy a hurricane now. Subsequently, Senator Schumer from New York got involved; he wrote a letter to the National Hurricane Centre and its parent agency.

In this case science has got lost in a process which developed into an entirely political deliberation about who pays and who bears the costs of the storm. The problem originated when the states passed laws on hurricane deductibles without having an institution that was fit for purpose to designate what hurricanes are. Maybe they could not foresee of the occurrence of a storm like Sandy, but they were relying on normal scientific mechanisms for a regulatory process that is subject to politicisation.

This is a cautionary tale illustrating the importance of having institutions that are fit for purpose when it comes to informed decision making. Once the advice enters the political process, decisions will be made not according to the characteristics of the storm, but according to those who win and loose in the political discussion. I had a chance to read through the BfR guidance document for health assessments. It obviously represents many of the best practices at this difficult interface. I do not want to go through all of them, but upon reading it becomes clear that there are considerable differences between conducting science for policymaking and science for science sake in academia. Even institutions like the BfR or the National Hurricane Centre are no guarantee of protection from politics.

I'll give you another example. I had a chance to sit on the evaluation team to assess the performance of the National Weather Service in the big Red River flood in North Dakota in 1997. Caused by increased water runoff due to snowmelt, the flood reached throughout the Red River Valley, affecting the cities of Fargo and Winnipeg, but none so greatly as in Grand Forks. The National Weather Service (NWS) had a long-standing forecast for the river to crest at 49 feet, which was the river's highest level during the 1979 flood. Despite a wide range of uncertainty, they put out one number, because they wanted to send a clear message to the public. The cities had been able to get their dikes to this level, but the river continued to rise past it. When we interviewed decision makers and the public, it turned out, that the message sent by the NWS was interpreted in a completely different way to what the experts had meant: decision makers understood that this flood would be only ten centimeters.

During the consultation process, I went to interview the mayor of East Grand Forks, and I asked him, whether he would have preferred to know the full range of uncertainty of the forecast. His answer was no; in his opinion, one number that the Weather Service stands behind would be sufficient to guide his decision on how high to build the levies and what parts of the city to allow to flood. Now, if a mistake was made in that one number, it would not be his fault, it would be the fault of the experts.

This experience illustrates a real problem. Experts try to send messages, and politicians may receive different messages: nowhere in the process there was a healthy respect for uncertainty, even ignorance, non-knowledge as we have heard earlier today, which makes it very challenging to have an institution like the BfR to deliver unwelcome advice. In the case of Grand Forks, the river would crest somewhere between 45 and 55 feet, according to the scientists' evaluation, which means that politicians would have to make very difficult decisions about how to manage uncertainty. The scientists have not been able to reduce that uncertainty in this case.

What I have explained in the case of Grand Forks occurs all the time, everywhere around the world. Remember the former Prime Minister of Denmark, speaking at the science conference prior to the Copenhagen Climate Conference in 2009. He took the stage and explained, that at the end of the day politicians would have to make a final decision and therefore would need the assistance of scientists to put this process in the right direction. In that respect, they should make sure to deliver fixed targets and certain figures, and not too many considerations about uncertainty and risk. This is the same message that I received from the mayor of East Grand Forks and it goes back to the idea that scientists can make politician's job easier by not presenting uncertainties and areas of ignorance.

Several weeks ago, Yvo de Boer, the former Executive Secretary of the United Nations Framework Convention on Climate Change said the next IPCC report will scare the wits out of everyone. We heard a little bit about the IPCC earlier today, they are trying to scare people as a mechanism of encouraging an energy transition, but their strategy has not worked anywhere, and it seemed that the IPCC has not quite learned that lesson. I want to point out that of all of the scientific organisations I am aware of, the IPCC is the only one operating without formal conflict of interest guidelines. So it is not simply the idea of trying to create a message based on sciences.

Here is another example. I was on a panel for the American Association for the Advancement of Sciences, AAAS, with the current US representative Bill Foster. He said scientists should expect that the information they deliver will inevitably be distorted in the political process. He then raised a difficult ethical question: If a scientist is aware of this danger, to what degree should he predistort his message, hoping the outcome would be a closer approximation to reality? We can laugh at this question, but I participated in several discussions with scientists who take this advice seriously. Nevertheless, this is a recipe for completely removing credibility, usefulness and impact of science over the long term, and yet this is part of the problem of engaging in politics. In L'Aquila, an amateur scientist was going out saying there is a big earthquake coming, based on his own studies of radon gas, which apparently have little or no scientific merit. The local authorities gathered their government scientists for a press conference to show that this fellow did not know what he was talking about. They send out the message that there was no reason to worry about an earthquake. It

turns out they overstated the certainty of their case. I am not an expert on Italian law, and I understand that this has a few more levels of review to go through, but this is a case where scientists were being arguably used in the political process to, again, convey a message.

I think it is very difficult for scientific organisations to actually stand up to the politicians that they serve. This is one area where independence is wanted. It is the independence of being able to talk about uncertainties in an open manner, of being willing to take a leadership position and not allow oneself to be used by somebody. How do we actually do this in practice? In my book “The honest broker” I try to present experts with a set of options for understanding how to engage the political process. I will go through this quickly with a little thought experiment. Imagine, if you will, that I have just shown up in Berlin, and I ask you where to go out for dinner tonight. In this example, you are the local expert, and I am the decision maker. There are several different ways how you could interact, and I will focus on just three different options: the science orbiter, the issue advocate and the honest broker of policy alternatives. Each of these categories reflects different ways of engaging with the system.

So, the science orbiter is like the concierge at my hotel. I can ask her to tell me three Bavarian restaurants within walking distance of my restaurant, or the closest pizza place. In this case, the decision maker drives a conversation, and the expert is just a resource to provide answers. Similarly, a politician can go to the expert and ask a question that can result in purely using the tools of science. I would not tell the concierge what I like. Nor would I ask her about her preference. This is the sort of interaction we see in science advisory bodies all the time. They do better and worse, of course. We know from Sheila Gessner's pioneering work that the science advisory process is often highly politicised, it involves different interests, business corporate interest, or government political interest, and therefore it is very important to structure these processes in a way that is legitimate, trustworthy and credible.

Why do the decisions of scientific advisory bodies do not compel particular courses of action? In the United States, there has been a debate for a number of years over what is called Plan B Emergency Contraception, the morning after pill. During the Bush administration, the Food and Drug Administration (FDA) was asked to pass judgment on whether there was an age threshold of safety for this particular contraceptive. The FDA panel concluded that the safety of the morning after pill is the same for a 13-year-old girl as for a 34-year-old woman. The Bush administration questioned the evaluation, and they put the age threshold at 18 years. Interestingly the Obama administration faced the same question about a year ago, when the FDA panel came back repeating that there is no age threshold for safety. Again, the Obama administration didn’t follow this evaluation, by using the same argument than before: everyone knows that girls are different than women. They put the threshold at the age of 17.

Of course, President Obama had an election coming up, and the last thing he wanted to deal with was a messy debate over abortion politics or parental consent. Therefore, he was acting just as the Bush administration did and decided on the basis of political interest, not based on science. And yet, if you look at the pages of the New York Times or Science magazine, his decision is characterised as one based on science. This is how we allow issues that are based political considerations to become politicised within our community. When scientists

say, science compels a particular decision, whether it is building a levy or approving a drug, we invite the politicisation of our own work. It is frustrating, sometimes, but the science orbiter, the job of answering questions, is not designed to drive particular political outcomes, but to be a resource in our democratic systems of governance.

Now let us go back to our initial description of the role of the issue advocate who seeks to affect outcomes in democratic systems. Asked about a restaurant close to my hotel you could give me a map of all the McDonald's fast food restaurants in Berlin. You are not lying to me, you are not misrepresenting information, you are trying to compel me to make a particular decision and to reduce my scope of choice. Issue advocacy is fundamental to democratic systems all over the world. It is an honorable and noble calling. And so, should you as a scientist decide to become an advocate for a certain cause that is wonderful. But it will not be simply science that leads you to those conclusions.

A long time ago, the president of the US National Academy of Sciences, argued that a scientist who becomes an advocate, will loses some of his scientific credibility. Perhaps this is true, but a scientist who pretends not to be an advocate, but actually is one, would also promote the erosion of scientific credibility. So my advice to scientists is, if you want to be an advocate, go for it. It is very important, it helps democracy work better. But do not pretend that it is science that drives advocacy.

The final and the third option here is the honest broker of policy alternatives. To stay with the metaphor, you can give me a travel guide, so I do not know where you want me to eat, but you at least show me the existing options. Of course, it might be frustrating to step back from the opportunity to influence the outcome and respect the politicians' right to make a bad decision. We all have to decide that personally, but as far as institutions of connecting science and policy are concerned, I would strongly vote for some place where the honest broker should sit. Not all decisions require an honest broker, but some of the most difficult and politicised ones would benefit from having this role. We are all familiar with using honest brokers. For example you might use travel websites and if you are like me, you may find these websites extremely useful, because they layout a spectrum of options.

Institutionalisation is no guarantee of protection from politics or policy success, and ultimately, it is the scientist, who has to take care of the integrity of our work. So, are scientific integrity and political conflict compatible? I think yes, sciences are very important to the decisions that we make, but the idea that we create boundaries between science and politics is not how it works. We have different ways of creating engagement, and we should be very explicit and open about how we construct that engagement, to make wise decisions. I run a web log where I talk about these things, and you are invited to participate. So thank you very much.

Moderator: Thank you, Dr. Pielke. The next speaker comes from a very lovely spot on this world, Parma in Italy. Catherine Geslain-Lanéelle has been Executive Director of the European Food Safety Authority since 2006. Prior to that, she held several responsibilities within the food sector. In 2000, at the height of the BSE crisis, she has been Director of the Food Department in the French Agricultural Ministry. Thank you for coming.

The Independence of Scientific Advice in Europe

Dr. Catherine Geslain-Lanéelle,

Director of the European Food Safety Authority (EFSA)

Ladies and Gentlemen,

I don't want to miss the opportunity to congratulate BfR for its achievements over the past decade. For an organisation, a period of ten years is very short, but it is very impressive to see the reputation that you have built in Europe. You have become a reliable partner, not only for EFSA, but also for the other national organisations, which emerged in the advent of the mad cow disease.

Today, we gathered to discuss a very important subject that has already commenced numerous discussions among well-known speakers. I would like to share with you the experience of an organisation such as the EFSA that is delivering scientific advice in cooperation with other EU agencies. To share our experience, I would like to address three main issues: at first, why did EFSA work on independence, and what did we do to ensure that we deliver unbiased scientific advice? Secondly, did it work? Have we been able to deliver not only unbiased scientific advice, but also trust, which is essential for us as a public organisation? Last, but not least, I would like to share with you some of our thoughts on the challenges of independent scientific advice.

So let me start with the first topic. It is quite clear, that we have many in common with the BfR. I already mentioned that we were founded as an answer to the mad cow disease crisis and the food scandals in the 1990s. BSE, dioxins and many others have seriously damaged consumer confidence and also the reputation of the national and European food safety systems that were designed to protect consumers. The general food law which is also celebrating its 10th anniversary was a bold and visionary step. It separated science from politics, and affirmed the role of science in the decision making process, in order to make sure that decisions that are made to protect public health, animal health and plant health, are based on evidence. What has happened in Germany is mirroring what has happened at the European level. We were founded in 2002 to give independent scientific advice and do risk communication related to anything that has an impact on food and food safety. As I said, we do not deliver new scientific knowledge; we bring in the existing scientific knowledge and translate it into knowledge that can be useful for risk managers. We try to bridge the gap between sciences and politics, and science and the public, to make sure that science is at the service of EU citizens. We also try to translate very complex issues into explanations that are clear and as simple as possible for both risk managers and laypersons.

From the BSE crisis we learned that the scientific advice should be build in an independent manner, before a decision to protect public health is made. The core values of EFSA, scientific excellence, transparency and openness, are directly derived from this experience; more recently, we have also added responsiveness. It is important to stress the necessity not only to give perfect advice; it should also fit for the specific purpose and may be required very quickly.

We had interesting comments by the previous speaker about these central questions. So, in our opinion, the issue of independence has to be looked at from a slightly different perspective compared to what has been shown in the first two presentations. Here we are talking about the independence of scientific advice, where we bring together all the scientific knowledge to summarise the current state of the art in relation to a certain issue. By delivering our summary, we already know that maybe tomorrow we might come up with a slightly different message, as the crisis develops or new insights about its origin may arise. This is quite challenging. To be prepared, we are working with 450 staff members in Parma, mostly scientists and colleagues with communication skills. Moreover, we rely on the expertise of member states, particularly in national scientific organisations such as the BfR, as well as university and research organisations. We have built a network of over 2,000 scientists with multi-disciplinary expertise.

How do we make sure that our scientific advice is unbiased, and is only influenced by robust science, and not by social, ethical, or economical considerations, which are legitimate, of course, in a society, but are beyond our mandate? Well, we have different pillars in our system. The most important ones refer to the way we operate and how we organise the decision making process at EFSA. We have built very strict, detailed and transparent procedures and rules in order to properly select the data that we are going to use, to involve competent experts with relevant expertise in the area that we are working on, and to apply best practices, for example by systematically referring to uncertainties. We are not only following these rules, but we also make sure that the public can scrutinise the way we are working, from the raw data to the final output.

Because we rely so much on the expertise of thousands of scientific experts, coming from university, research organisation or national food safety agencies, we have to make sure that they would not bring any bias to our scientific advice. For many reasons, today's scientists are working more and more with the industry, both at national and European level. Industrial cooperation has become a requirement of national and European public research, because it fuels the knowledge transfer in order to make innovative solutions available to the society. Of course, there are consequences – some scientists might be perceived as experts who could follow other considerations than just the delivery of good scientific advice. Therefore, we decided in the early days of EFSA to introduce a system by which we ask the scientists working with us to declare any interest that might be in relation with the activity that they are going to handle with us.

This is the pillar related to declaration of interest in our policy on independence and scientific decision-making process. We have built a lot of experience here. Obviously, the OECD guidelines are not always helpful in this respect, because they mainly address the work of public officials, employed by an organisation. Although we have scientists employed by the EFSA, we also rely on external scientists from universities, research organisations or

national food safety agencies. Of course, this creates some complexity. We are looking at their interest not in an absolute manner, but every time we think there might be a conflict of interest, we take a closer look at their involvement with commercial partners in the field they are going to work with us. Moreover, depending on the role of the scientist in our activities we might also have a different level of assessment of potential conflict of interest. I'll give you some numbers just to illustrate what we are doing. At EFSA, we are assessing every year over 8,000 declarations of interest of the experts working with us. You cannot participate in a meeting with us if we have not assessed positively your declaration of interest. Last year, for example, we have partially or totally excluded experts from our activities on 350 occasions. This is the outcome of this policy on declaration of interest.

Another key principle at EFSA is that an expert cannot review his own work. Today, everybody is concerned about commercial conflict of interest, but the intellectual conflict of interest can also be important. The next question arises about the effectiveness of our procedure. Did it help delivering unbiased scientific advice, and did it help to build trust in EFSA's scientific work? I would say 'yes', but of course, I have to declare a conflict of interest on my own behalf in this case. Nevertheless, my feeling is that clearly we have managed to deliver the separation of risk assessment and risk management. It is interesting to see here how the focus has shifted: when EFSA was created, people were more concerned about a potential influence of politics on science. Nowadays, the focus is more about industry possibly influencing our work. I guess we have managed this separation. However, like any other organisation in this field, we have also attracted some attention from non-governmental organisations in areas which are discussed controversially. The field of genetically modified organisms (GMO) has already been mentioned, but there are others as well, such as nano-technology, new chemicals like aspartame or bisphenol-A, where we have been challenged by some of these organisations.

In the Eurobarometer survey of 2010, we had asked a representative sample of European citizens whether European and national food safety agencies were delivering trustful independent scientific advice in their opinion. The overwhelming, majority, i. e. 73 per cent, responded with 'yes'. This is not bad, considering that European societies are confronted with a lack of trust in public authorities in general. However, for some of the controversial issues, like GMO, the answer was less enthusiastic. People were criticising that scientists in these fields are probably too close to industry. Typically, it is not the science they criticise, but more those who are delivering science. It is difficult here to engage a scientific debate with those who are criticising us, because the discussion would mainly focus on the conflict of interest. Holding this debate is somewhat frustrating for a science-based organisation such as EFSA, because we rather would like to debate about sciences. We want people to challenge our scientific output, but we have our backs to the wall instead, and discuss about conflict of interest. It was very encouraging to see that the European Court of Auditors has confirmed that among the four agencies that have been audited, EFSA and the European Medicine Agency have the most robust and advanced system when it comes to managing conflicts of interest. They have, of course, identified some shortcomings. Obviously, nobody is perfect. However, with our new policy in December 2011 and with the implementing rules in March 2012, we have addressed these shortcomings.

What about the challenges that we are facing? Based on the outcome of the audit mentioned above we shall focus our attention on enforcing our rules, our policies and our procedures.

We do not just want a nice paper in a cupboard, we want bring it to life, and we also have to properly explain and communicate it to the public, so that people can scrutinise the way we are working. We think this will help building trust over time.

Nevertheless, there are still many challenges left, which we can influence sometimes, but not always. First of all, although we have the mandate to deliver scientific advice only, we are sometimes criticised, particularly by NGOs, because we strictly adhere to this requirement. Well, if this is the only remit that we are given, we are proud of it. The second challenge lies in the complexity of the work we have to do. We are not just asked to evaluate health impact, but also to take a look at the impact on the environment, and to weigh risk against benefit or efficacy, as we say. In the case of new technologies and new products, very few data are available, so uncertainties are very high. Transparency is the keyword here. We need to make sure to disclose all the data we use and the way we operate. There is still room for improvement in this respect.

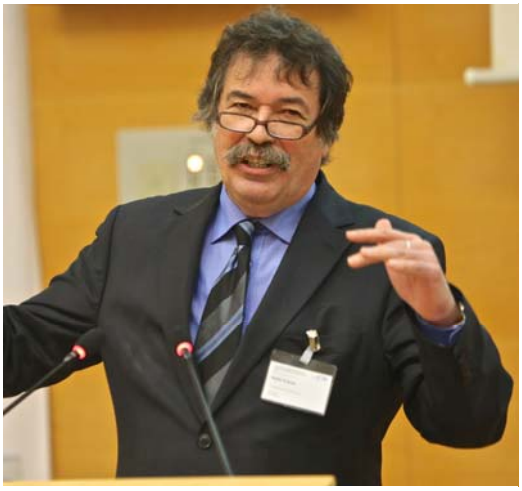
Furthermore, science advances very quickly, leading to ever-increasing uncertainties. This is not easy to communicate to the public. In addition, if we put science at the centre of decision making process, both on the national and the European level, politicians, governments and risk managers may be tempted to hide behind science. Of course, science is important, but there are social, economic, ethical values which are important in the decision. I think we need to continue working with risk managers and the other stakeholders, to make sure that we position everybody's work in such a way that citizens can scrutinise the role and responsibility of all of us, and do not conclude that scientist have taken the power and that they are the ones who are making the decision. Thank you very much for your kind attention.

Moderator: Thank you for your talk. Please join me now in welcoming Professor Dr. Walter Krämer, Institute for Economic and Social Statistics, Technical University Dortmund.

Independent Political Consultancy In Times of Economic Crisis: What Does the Reality Look Like?

Professor Dr. Walter Krämer,

Institute for Economic and Social Statistics, Technical University Dortmund



Ladies and Gentlemen,

As the only economist among the speakers, I am a bit of an oddity in a way. I am also a statistician, by the way, and I could tell you a few stories about dioxin, acrylamide, asbestos and BSE. I do not intend to do so today, however, because the reasons for this presentation are the current euro crisis and a call I put out to the world in summer 2012 along with 200 colleagues for us to think about the consequences of our actions. This was shortly after 29 June 2012 when Ms. Merkel had signed a document at a euro summit in Brussels whereby not only the debt-ridden countries as a whole but also individual banks threatened with bankruptcy could make use of the huge European bailout fund in future. With this signature, the liability risk of the countries with stable finances trebled from three trillion to around nine trillion euros. Just to remind you, that is almost four times the gross national product of the Federal Republic of Germany. We were met with a lot of criticism after this call for reflection. Finance Minister Schäuble is alleged to have bitten into the table with rage. I will get back to the politicians' reactions in a minute.

I would like to begin with a few general thoughts about the independence of economic science policy consulting, because the euro crisis is not the only economic problem we are currently facing. Similar imbalances are threatening in the health and pension insurance systems, in education policy and in social policy in general. Economists are getting involved everywhere, sometimes at the request of others, sometimes not. By the way, the assertion Mr. Riesenhuber made today that the economists did not foresee the subprime crisis is not quite true. I myself know of at least three or four dozen papers written by colleagues in which these risks were pointed out very clearly five years ago, but unfortunately nobody heeded them.

But now to the consultancy business: we have several organisations in Germany which deal institutionally with economic policy consulting. I myself was involved with several of these institutes, for example as Chairman of the Economic Council of RWI in Essen for eight years. I have also been a member of the Health Economic Committee of the Social Policy Association for 20 years and I am a former member of the advice board for the German Federal Government's First Report on Poverty and Wealth. In this regard, I have first-hand

experience of how economic policy consulting works in this country. I would like to present three versions of this.

Version 1: Politics fully agrees with what science is recommending but does not follow these recommendations. This is the situation in health and education policy, for example. Politicians remark again and again that although economists' statements on health policy in particular are technically correct, they are illusory from a political point of view. When Horst Seehofer was still an undersecretary at the Health Ministry, we got talking about the ecomomic aspects of the German health system after I had delivered a speech: "Mr. Krämer," he said, "you are right, but as a politician I cannot afford to say something like that in public," or words to that effect, and for him the discussion was over. The illusion which politicians like to spread around of cost savings in the health system through even more prevention belongs in this category too. If all smokers were to stop smoking, for instance, our health system would not get cheaper in the long run, it would become more expensive. It goes without saying that smokers cost more money as long as they are alive, but it is also clear that they die earlier. Calculated over and entire life span, they tend to cost the health system less than non-smokers do, so you save money. Our pension insurance system would also have gone bust a long time ago if it were not for smokers. Everyone knows this, but I am accused of being cynical every time I mention it. Since when is the truth cynical? It is just that politicians do not like to hear certain truths.

Let's pick another subject – education policy – and the catchword tuition fees. Every economist knows that the absence of tuition fees brings with it a massive subsidising of the upper and middle classes by the lower classes. The Social Democratic economics minister knows this too, but because he does not want to upset his high-earning clientele and their sons and daughters who study for free, he does not say so. Even Karl Marx clearly recognised this subsidising of the rich by the poor, by the way: "If […] 'higher' education institutions are free too, this merely means in actual fact that the higher classes have their education costs reimbursed by the taxpayer," he wrote as a comment to the Social Democrats' Gotha programme over 100 years ago, and every other economist says the same thing. No politicians will listen to this, however, because it costs votes. So much for the first mode of behaviour where even trivial scientific findings are swept under the carpet. A very sad state of affairs.

The second version of how to deal with economic expertise goes like this: you know the result in advance so you look for scientists who coincidentally happen to share precisely this opinion. No one else is asked. This is more or less the case with the "scientific" discussion of poverty in this country. The federal government's latest poverty and wealth report has only recently been presented to the general public. I was involved in the first one, but never again thereafter. Why not? Because I consider the entire approach to be extremely questionable from a scientific point of view, for not to say complete nonsense. These poverty reports hit the headlines nevertheless and when you read the small print in the press commentaries, you then ascertain that per definition, whoever earns less than 60 per cent of the average income is regarded as poor. Think for a minute what this means! Just imagine that all of our income were to increase two, three or ten-fold. What would then happen with those who have less than 60 per cent of the average? This percentage always remains the same. Just like a boat in a lock where the percentage of water below the waterline, i.e. the percentage of people below the poverty level, always remains the same regardless of how high the water

level, or the wealth level is, poverty is more or less permanently installed in this definition. You will search in vain for this opinion in official final reports, however; those who support it are silenced from a political point of view.

I'll now get to the third version, which is marked by attitude: the bringer of bad news is bad. We used to behead people of this kind, today we merely insult them. I am really ashamed of this third version when I see it in action, because its purpose is to systematically discredit the bringers of news which does not fit in with the general view of things and those who make recommendations derived from it.

This is precisely what is happening in the current euro crisis. You wouldn't believe everything I've had to listen to since the economists' appeal, even though the situation is crystal clear. The euro in its current structure is as good as clinically dead. If it is ever to be in a position where it can start reducing its huge mountain of debt by legal means, Greece would have to be 30 per cent cheaper in order to offer its goods in the global market at the same prices as its immediate neighbour Turkey. This devaluation is the sine qua non for the economic resurrection of that country. Greece has even begun to import sheep's milk cheese because their own is too expensive. In the days of the drachma, things were simple because all they had to do was devalue it. Within the eurozone, this can only be done by lowering Greek wages, prices and salaries by 30 per cent. Do you know of any democratic country in the world where it would be conceivable to even consider such a move? I do not believe it to be possible in any way, nor does any other economist, and that is why the Greek drama will never end as long as Greece remains in the euro zone. Every economist is fully aware of this and I believe every politician too, even if they won't admit it. But whoever says so in public is immediately portrayed as the villain of the piece.

You can read all about what was to become the euro crisis in several papers by my American colleagues Friedmann and Feldstein from the mid-90s. Like many other economists, these two foresaw every aspect of the crisis step by step, exactly the way it was to happen in reality. The authors also explain why politics does as it pleases despite this and does not listen to the economists. They accept the costs as being part of a supposedly higher and better cause. I myself am more than willing to pay a considerable sum for a united Europe, by the way, but the politicians don't tell the voters what the costs are. They don't tell them either that in its current form the euro is not the catalyst it is always claimed to be but rather the gloomy gravedigger of a united Europe. Whoever points this out is automatically a spoilsport. In my eyes, what German politics is currently doing with the voters is a prime example of massive stupefaction of the people.

Another side effect of the current euro crisis is the mind-boggling money printing that is going on at the moment. Because the southern eurozone countries are no longer able to finance their current account deficits with loans, they are simply printing the euros by themselves. This is not particularly conspicuous at the moment, because the central banks of the northern eurozone countries are collecting these euros back in. These are the famous target balances you have all heard of, but the process can't go on forever because it lays the cornerstone of inflation. I won't go into any more detail here but you can read all about it in the latest bestseller written by my friend Hans-Werner Sinn in which the mechanisms of money printing and its consequences are explained in detail. Inflation has always been the best way for all debtor countries to get rid of their debts. It is nothing other than the ice-cold expropriation of

small savers who don't have a lobby, unlike the large banks and companies quoted on the German stock exchange, all of whom earn loads of money with the euro. To my great delight, however, the German media who set the tone, such as *Der Spiegel*, have finally woken up to this topic.

I'll move on now to my next and last point, the banking crisis. There is no doubt that many banks in Europe are in a very, very bad state at the moment. I myself have shares in three of them, by the way: Deutsche Bank, Commerzbank and the Bank of Ireland. A few years ago, a Bank of Ireland share cost more than 20 euros. Today it costs nine cents. Most of the banks are in poor health because many items on the assets side of their balance sheet have lost dramatically in value. In normal business life, what then follows is bankruptcy and this is also what we recommend in our economists' appeal. The financiers – the people who lent the money to the banks – should also take responsibility for their investments and write them off if necessary, as some shareholders have already done by being made to pay considerable sums. The signatories of the economists' appeal argue that the owners, i.e. the shareholders, and the other financiers of the banks should initially bear the consequences of these false investments. And they could carry them too, because average pro capita assets in Greece and Portugal are not much less than ours and they are far greater in Spain and Italy. This is not to mention the roughly 20 trillion euros that the super rich have smuggled past the tax authorities and which are currently looked after in numerous tax havens around the world.

In particular these third party investors who lent their money to the banks – the large-scale investors and super rich – are being protected by the current stabilisation policy. These large-scale investors would appear to have a very good hold on politics all over the world. Proposals to remedy the current crises at their expense and not that of the taxpayer are very skillfully blocked in advance. That is why I have not sold my bank shares yet, because if things continue as they are, the bill will be footed by the taxpayer. The federal government is currently in the process of warding off bankruptcy from several ailing banks in Cyprus, whose main business is to bunker the billions in illict earnings made by Russian oligarchs. I am of course fully aware of the "too big to go bust" problem, but I regard it as an excuse in many cases. Especially in the case of Cyprus, I consider it a scandal of prime magnitude that German taxpayers are having to stump up so that Russian multi-billionaires can continue to enjoy the fruits of the cash they have illegally smuggled out of the country without punishment. If they invest their money in a bank in Cyprus and that bank goes bust, then they've lost their money. Why should we refund it?

The diagnosis of the 240 German-speaking professors brought us a lot of animosity and fierce criticism. After the appeal was published, there were angry protests on many different sides. There was politics on the one hand, because what politician likes to be accused of making a fool of the people. Then there was Wall Street, of course, and all of the other groups whose fortunes are to be rescued by the latest crazy bail-out schemes. Or how about the German export industry, represented by the Cologne Institute for Economic Research? Why did we receive poison pen letters from them as well? That is crystal clear too: BMW and Daimler receive payment for the cars they deliver to the crisis countries in euros, freshly printed in Milan or Athens and thereby indirectly borrowed from the Deutsche Bundesbank. In other words, the exporters get their exports paid for by the savers and taxpayers. Lots of criticism came from several economist colleagues too. I have a lot of friends at the Economic

Faculty in Frankfurt, for instance, but not one of them signed the appeal. *Honi soit qui mal y pense*. In general, an overproportionate number of the 240 signatories of my appeal are shortly before retirement age or have already retired, which means they have nothing more to lose and can say what they like.

This also implies that many economists who want to make a career for themselves don't say what they think. Should we hold this against them? My opinion here is to be found in the bible: Let him who is without sin cast the first stone. Neither is it dishonourable for scientists to represent economic interests but if they do so, they should not attempt to sell this partisanship as science.

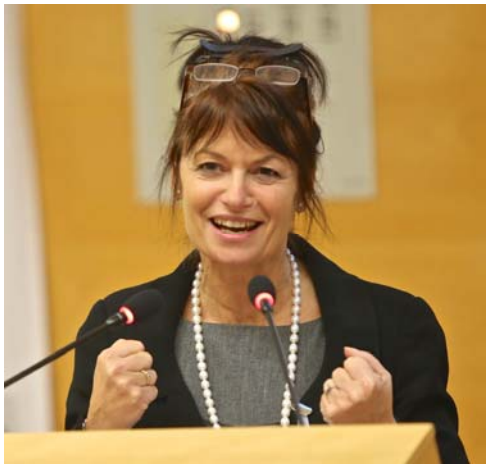
In conclusion and for the purpose of providing more information and details, I would like to make reference to the edition of the German Economic Review of January 2013 which I have published. I recommend that you pay particular attention to the essay by my Polish colleagues Kawalec and Pytlarczyk on the subject "Controlled Dismantlement of the Eurozone". The two of them argue along the same lines as the Hungarian large-scale investor George Soros, whose opinions you may know from the media. According to Soros, the trouble-maker is Germany, not Greece. It would be better if Germany left the eurozone. This is of course the height of heresy in Germany, but the world has never been saved by imposing a ban on free thought. I expect from my economist colleagues that they resist bans of this kind. I hope that my words have also given you some food for thought and I thank you for your attention.

Moderator: Many thanks, Professor Krämer, for this demonstration of independent or perhaps even rebellious science. Ladies and gentlemen, please join with me now to welcome the highest ranking representative of the European Commission to appear here today. Anne Glover from Scotland is Chief Scientific Adviser to the President of the European Commission and a former scientific adviser in Scotland. She is also a scientist with a chair for molecular and cell biology.

Living in the Real World

Professor Dr. Anne Glover,

Chief Scientific Advisor of the European Commission, Brussels



Ladies and Gentlemen,

Listening to today's presentations and discussions actually made me a little depressed, although I don't think there is any need for a pessimistic attitude. In my opinion, we have a system that is good and delivers right across the board for lots of aspects. However, I agree with the previous speaker that our system is not perfect, which is no problem, as long as we have the will to try and improve. So, let me just take you on a little tour of science and evidence and discuss the topics where we really would need to devote effort. Which knowledge is needed so that our citizens in Europe can benefit from? And what is the role of European science on a global level?

Nobody would deny that science and technology is part of everybody's life today. We use technology for communication; we depend on science in the field of health care, in environmental protection, or in food safety, to ensure that we will not be harmed. We rely on a radio-controlled alarm clock to wake up in the morning, a GPS car navigation system to drive to work, and a computer for our business activities or for communicating with our friends. Every tool we use goes back to science, engineering and technology. However, interestingly, the confidence of Europeans in technology has declined substantially within the last five years, according to the Eurobarometer. We used this survey system of the European Union to ask whether technology generally makes people's life better or worse. In 2005, almost 75 per cent of survey participants agreed that science makes their life better and is a force for good. In 2010, however, much more people were concerned about technology, and more people are afraid that in fact technology is not necessarily delivering a positive impact to their lives. Paradoxically, when taking a look at the office or the home of those who are concerned, it is full of technology, which they are keen to make use of.

What are the reasons behind all of this? I think the results tell us something about people's risk tolerance and the ability to bear risks. Living without risk is simply not possible. In my opinion this is positive, because I would regard myself as a risk-taker in life. And due to this attitude, I have had, and I hope I will continue to have, a most exciting, rewarding, productive life. My attitude goes back to the fact that I am prepared to take risks, because I am carefully balancing pros and cons: what is the worst that could happen? If I could die, then my risk

assessment comes flying straight in, and prompts me to analyse that risk. But for lots of other risks, I look at the potential reward against the risk and I decide, in that case, what is the good thing to do? We always talk about risks, but in many cases we lose sight of the reward.

I recommend that you might do a test at the next party that you go to. Say the word risk, and ask people to respond spontaneously by saying another word they immediately think of. I have done this several times and, needless to say, that the most frequent answer is danger, whereas the word that comes to my mind first, is opportunity or challenge.

I do not know, how I have escaped, what I would call the 'European disease'. Risk management and risk assessment, most importantly, are enabling tools which allow us to move forward, to take advantage of new opportunities, while minimising risk. We cannot get rid of risk. All of you took an enormous risk coming here today, or eating your lunch. But the reward is that you are alive – if you do not eat, you will certainly die. I am trying not to be simplistic in my view, but it is a truth, that we need to consider not only about the risk, but also about the reward.

I found a very nice example which illustrates the pitfalls of handling risks. Back in 1929, at the end of the age of silent films, there was a campaign warning about the danger of watching sound films, because it might damage your hearing. Seeing this, people might have been very concerned about the new technology. Of course, the advert has been launched by musicians who played in cinemas to accompany silent films; it was in their vital interest to highlight the danger of listening to ‚talkies'. Roger Pielke told us earlier this morning about a category of people called issue advocates. So, if we hear about a risk, we definitely need to be careful of who is telling us what. Transparency is of course crucially important in this respect. The disclosure of conflicts of interest is a very useful tool to achieve transparency. It helps us to decide whether we are facing an issue advocate. However, this tool is not just for scientists, it is for everyone. So when people criticise scientists, I want them to disclose their conflicts of interest in the same way as scientists do. This is something we should all ask for.

The example, I just told you, dates back to 1929. In 2012, a lot of people are concerned about mobile phone masts, Wi-Fi and mobile phones. But interestingly, I met a lot of people who complain about mobile phone masts being close to their home or their children's school and take out their mobile phone to answer a telephone call. If we want to use a technology, we have to accept some obligations. If we want full coverage, then they might need to be close to us. We need to work hard to minimise any potential impacts of such masts, but we need to decide as a society, what we are prepared to accept.

Here is another example: I live in Belgium, where some municipalities in Flanders have declared themselves to be GMO-free zones. However, I do not know how they can be free of genetically modified organisms, if the municipality next door is not. Anyway, many people think GMO food is somehow very risky, although they often do not know the reasons. If one compares the risk of GMOs with other issues that people are more familiar with, one might be surprised about the absolute levels of risk. For example, people are extremely concerned about terrorist attacks. Consequently a lot of protective action is requested. But, the actual number of terrorist attacks is in fact minimal. The same applies to a plane crash. A lot of people are extremely anxious about flying in planes, and yet, if you look at it as a mode of transport, we all know it is quite safe.

We are very complicated when it comes to analysing risk, reward and perception of risk. Many people, for example, will be killed in Berlin today because of a car accident. However, it will not be reported, due to the fact that it is quite frequent. Does this mean that we reject cars as a form of transport? No, we do not, because we like the reward of driving a car. It is convenient to us and we accept the risk, although, inherently, we know it is dangerous. On the other side, the public dread is very high with nuclear power. Yet, the number of deaths per terawatt hour of energy produced is in fact incredibly low. I am not trying to ask you to be in favor or against nuclear power. I am just asking you to look at the evidence. We all know that the impact of Fukushima was very large, and it was a major stimulus for Germany changing its energy policy. But do people die from nuclear power? No, they do not. Conversely, a lot of people are killed in generating power through coal-fired power stations, but we accept that.

Well, I am simplifying the argument, because I do not talk about hazard, I am just talking about the absolute numbers of people dying. So, risk perception influences us, and it thus also influences politicians. Politicians might know the evidence and they might understand that the risk is low. However, when it comes to supporting policies in a particular area, aspects others than evidence might become important. Take a look at the voting in favour of genetically modified organisms in the European Council. Any time a proposal related to GMO comes in, Austria and Luxemburg vote 100 per cent against; while Sweden and the Netherlands are more or less voting 100 per cent in favour. But the scientific evidence is the same in Austria as it is in Sweden or the Netherlands. Yet, politicians are behaving very differently. So, what are the reasons? Obviously, citizens in Austria are not the same as citizens in Sweden. Their culture, their history, views and opinions and perceptions are different. Moreover, their feeling of obligation, the economies are also different. For me as a scientist, it is very easy to communicate, that there is robust evidence. Yet, politicians are in a position where they do not always respond to the evidence, because citizens do not empower them to. The power is ultimately with the citizen.

So, I leave you with a take-home message: Do not let go of your responsibility once you vote for a politician and he or she becomes elected. Unfortunately, most citizens don't ask their politicians to be accountable. So, if I was an Austrian citizen being interested in evidence, I would be asking my member of European Parliament: why did you vote against evidence? As a society, I would argue that we need to take more risks. If we take no risks, we have no progress. A lot of the things, that I highlighted, are extremely risky. And yet, we have decided that we live in an amazing time. We look back historically, thinking that it must have been wonderful in the days of Galileo. Actually, it could not be more exciting now. There is knowledge being generated every day which allows us to do so many wonderful things.

We need to have an open mind. If we do not take the risk, others will take it. The European leadership is very obvious in a number of areas of science, for example, in the car industry. In some other areas, such as biotechnology, we fall behind. In Europe we create knowledge and we support scientists to do that. But when it comes to using the knowledge for innovative forms of transport, new healthcare, different types of crop, our ability to withstand climate change or even understand climate change, we pull back. That's why we are often coming in afterwards. We let someone else check it out, do all the work, and then decide to come in afterwards. But we lose our advantage if we do that. Therefore, we need to consider how to better balance the risk and reward when it comes to new knowledge.

How do we do this? Firstly, we need politicians who will look at evidence and not cherry-pick it. We cannot just accept knowledge when it reinforces our own opinion or our own prejudices. We must try and force ourselves to look at knowledge or evidence with an open mind. Steven Chu, a noble prize-winning scientist and Secretary of State for Energy in the US, once said that we are all entitled to our own opinions, but we are not entitled to our own facts.

I think we as scientists are not particularly good at communicating evidence. We learn to speak science and we forget to speak, in my case, English. However, it is really important that we communicate, because if we do not, then we leave a gap to be filled by others. We need citizens to embrace science and to demand the highest level of risk assessment for new knowledge, but they need to be open to knowledge being applied, because, ultimately, they will benefit. We also need media that will report things in an unbiased, engaging and informative way. Again, scientists must be very proactive in delivering knowledge in a way that attracts the attention of media. Media do not just report controversial discussions; they convey emotions. Remember, science is culture, just as poetry or literature. We cannot just stand back and think: maybe someone else will do it. As scientists we have to do it.

I just want to add some remarks about putting the risks into perspective. In the UK, the chance of winning the lottery is incredibly small. But yet, people buy a ticket every week. The psychology of that is interesting in itself: you do not buy a ticket because you think you will not win. You buy a ticket because you think you might win. So, humans can be optimistic and inspirational. Of course it is a little bit more likely, that you are killed by a lightning strike or by an incident at a nuclear power station. There are only a few things in life that are certain. Death is one of them. Someone, who celebrated a big birthday just recently, asked me whether I do not just hate getting older. In fact, I love getting older – the alternative is awful, which is: I am dead.

Finally, let me briefly come back to radiation dosage. When the nuclear accident of Fukushima happened, I was Chief Scientific Adviser in Scotland; and I was very much involved in how we responded to this incident and how we gathered information to find out what was actually happening in Japan. While everybody started talking about microsieverts and exposure, I had to go and find out more about the actual measured values. I am a biologist and I do not normally use this kind of measurements. But people became very concerned about exposures of one microsievert. Actually, on last Friday, I was exposed to one microsievert, when visiting the European neutron source for research in Grenoble. For a minute I was nervous, until I realised that if I had eaten just ten bananas, I would have got one microsievert, because there is a lot of potassium in bananas with some radioactive potassium isotopes. By the way, in terms of radiation eating one banana equals walking once through the airport security scanner. More importantly, I would get a lot more radiation when flying from Europe across the pole to the US. So, we are all exposed to radiation, some of these levels are much lower than the exposure in Tokyo after the Fukushima incident. I had four CT scans recently, with quite a lot of radiation. However, it was really helpful to have this scan and I am glad I had it. Of course, we need to minimise harms.

I would like to make you aware of a very interesting website www.informationisbeautiful.net. The author David McCandless, has tried to take bits of everyday information, that we find quite hard to absorb and visualise them – all with the minimum of words. Personally, I find it

incredibly useful, because it gives me a visual way to compare different types of risk and put them in context.

This brings me to the conclusion: risk assessment is absolutely crucial. It helps us to reduce risk, but it also gives us the ability to use knowledge and to move forward, which is a fundamental imperative of the human species. I would argue: there is no point in funding scientific research, if we are not going to use the knowledge. So, independent institutions, for example like the BfR, help us to assess risks and to come to evidence-based decisions. Thank you for your attention.

Moderator: Thank you, Professor Glover. Just one little question: how does President Barroso react when you talk about science to him?

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Prof. Glover: President Barroso is a lawyer by background, but he is passionately interested in science. In fact, I have to say that he surprised me by his interest in science. I think, the mere fact that President Barroso has decided to have a Chief Scientific Adviser at the Commission, in itself highlights the wish to try and push evidence up the agenda. Nevertheless, we have 27 member states, with a diversity that brings in an enormous challenge. So, as well as working with Barroso, I try to work with member state governments and the European Parliament, because the parliamentarians have responsibility as well.

Moderator: Thank you for your talk. Welcome to Professor Dr. Ulrich Bartosch. He is a professor of education at the Faculty of Social Work at the University of Eichstätt. But today he joins us in his capacity as chairman of the Federation of German Scientists.

Is the Independence of Science Still an Objective of University Education? Critical Questions on the Latest Developments

Professor Dr. Ulrich Bartosch,

Catholic University of Eichstätt-Ingolstadt,
Chairman of the Federation of German Scientists

Ladies and Gentlemen,

I'd like to begin by extending the sincere congratulations of the Federation of German Scientists to the Federal Institute for Risk Assessment and saying thank you for the opportunity to speak here. I would like to give an impulse on the subject of education. My topic is without doubt far distant from the others, but perhaps I can pick up a little bit on Mr. Grunwald's deliberations on science in a democracy and on the last presentation, because the appropriate education and training are also required for the estimation of risks.

1. Preliminary remark

As I have been a member of the German Academic Exchange System's (DAAD) team of German Bologna experts for many years, possible undesirable developments in university reform are a matter close to my heart. In essence, therefore, I will be emphasising that the *value* of independent science – as a prerequisite of independent science policy consulting – has to be a target value of scientific training. It would appear at the moment that the *exploitation* of science is the focus of interest in Germany. When scientific training merges more and more with the economic system as a constructive component, however, and starts to be spelled out in its language, the question has to be asked as to whether credible, independent science policy consulting as a whole is perhaps in jeopardy. To put it concisely and provocatively, I maintain that the current development in (basic) scientific education and training could also permanently change science policy consulting and in essence endanger its independence too under certain circumstances. I will therefore deal with this concern as briefly as possible here in the areas of vocational training, study courses and Research and Development at university.

I will use the time to make a few remarks about the independence of science which have not stood in the limelight so much up to now. Where we have discussed in the last presentations the question of independence, the influencing of research institutions and the controlling of research projects through the allocation of funds, I would now like to ask you to glance for a few minutes at a very small factor in the game of science: the individual researcher.

My worry is that we could lose an important part of what we need if we want to maintain and establish the independence of science. To do so we need researchers who carry independence within themselves and show character traits which are indispensable to research in this form. I maintain that research which is organised in large corporate campaigns has an individual perspective at the same time and that scientists should be equipped with special *character traits*, which can be described as *competences* in the best sense of the word. We could presumably reach an agreement relatively quickly as to the nature of these competences. These traits would include honesty, accuracy, reliability, responsibility, the ability to work independently, independence of judgement, as well as freedom of mind and a fundamentally critical and inquiring attitude based on solid reasoning.

Regardless of the extent to which each individual researcher was to deviate from these requirements, our common understanding that this would be a deviation from the normal would remain. We have discussed several examples of deviation in our republic in recent months, such as those concerning doctorates.

2. What forms the personality of a scientist?

What actually forms the personality of a researcher? This question may sound a bit old-fashioned but if we accept the development of the competence of future scientists as a task, it has to be asked. An obvious quick answer would be that this happens while studying at university. Training in each respective scientific discipline also helps to shape the scientist, of course. An explorative attitude is developed through explorative action which is in turn marked by disciplinary theories and methods. The basis of this is formed by a healthy amount of curiosity which motivates people to look beyond their horizons, take risks and take on tedious tasks as well.

But how can this strange property be encouraged? There are meritorious approaches for the support of interest in research even in early childhood education. Initiatives such as the “Haus der kleinen Forscher” (Little Scientists’ House) already cater for small children’s curiosity to get to the bottom of things. Good approaches in this area create space for children to make their own experiences in the truest sense of the term instead of attempting to instruct or lecture to them about natural science. At school too, in a system which could most certainly be further developed as a place of independent development, the idea of independent research is prominently promoted by programmes such as “Jugend forscht”, a German contest for young scientists.

Our own actions form the basis of individual education processes. In Germany in particular, we do not regard education – that individual and collective concept somewhere between informative impetus and economic needs – as the filling of empty containers, but rather as an active, constructive process of debate with, and appropriation of the world, through a subject which forms by itself. It develops its own, individual personality for as long as it lives – the plasticity of our brain, which exists over our entire life span, provides good arguments for this assumption. Accordingly, learning as the basis of education distinguishes us as humans – living is learning. Learning educates if it leads to the development of the person as a whole and not merely to the addition of skills.

Let us turn to the university with these two thoughts: a) “An explorative attitude is developed through explorative action” and b) “Education happens as a self-development through active debate with an appropriation of the world”, and look for the approaches to university education. Although the concept of “explorative learning” can also be found to an extent in the current discussion, we are actually taken back to a debate of the early 1970s when ideas for universities were formulated in the “Weizsäcker University Plan” which are very helpful for our current discussion. I would like to single out this draft because it could clarifiy the difference between the reforms of that time and those of today.

3. “Explorative learning” in the Weizsäcker University Plan of 1970

The motive behind Ernst Ulrich von Weizsäcker’s reform deliberations, which are better known to scientists today in completely different contexts, was the search for unconventional possibilities of curricular reform quite literally by means of a “modular principle”. At that time too, the starting point was “the fear that in the course of the streamling of study courses that was being propagated everywhere, the last remnants of interdisciplinary studying introduced by Humboldt would be sacrificed in complete contrast to the requirements of the modern vocational world which is again looking for the combination of the subjects”. This sounds very up-to-date. The approach was inspired by a look at American universities which were already implementing a modular principle and credit system.

Several of these solution approaches appear very familiar to us today. The inclusion of correspondence course opportunities in an overall concept of university education corresponds precisely with today’s activities in the field of virtual teaching. We are also more than well aware today of the danger of “technocratically” perverting the university and “preserving” it from explorative learning through schoolification.

The concept of “explorative learning” was presented as a didactic principle by the Federal Conference of Scientific Assistants (BAK) in 1970 and formed the pivotal element of the modular comprehensive university. It criticised the fact that study courses only qualified students for research activities after certain basic knowledge had been imparted:

“The predominant teaching methods and learning processes are often fundamentally different as regards the required skills and behavioural forms, which depend on the research situation, and do not prepare for them where this is concerned.“

In this way, the intrinsic motivation of the students was destroyed and the character of the study course reduced to examination requirements. This trend could be strengthened with the introduction of short-term study courses, the BAK feared, but science is always “dynamic implementation, a process of research and contemplation” and must therefore be practiced right from the beginning. We find a competence list for scientists which is very similar to the previously mentioned ideas:
“If review, social responsibility, work allocation, methodical competence, the ability to communicate and cooperate, flexibility of mind, openness for new developments and criticism, commitment and integrity have to be promoted for every practical scientific profession, participation in the scientific process is even more important than the teaching and learning of certain skills and knowledge, even in vocational training”.

Even though the text most certainly does differentiate between the various science cultures, it actually makes a determination which is missing in our current debate on the recognition and differentiation of university education and vocational training. A unifying, general definition of scientific work is made here in which reference is made to:

"…the structural equality of the situation of the researcher in all areas, the task of exploring an as yet unstructured field and the activities which characterise this exploration: the discovery or resumption of a (lost) problem and its ever more precisely refined definition; the formulation of hypotheses; the planning of strategies; the inventing or selecting of methods; experiments in variations; probing for alternatives; diversions, set-backs, accidental findings, "fruitful moments" and critical examination of results; independence in all of these stages and a risk of failure which varies with the scope of the task".

Explorative behaviour has to prove its value as a "problem-related research and development activity" within the framework of scientific work and as "explorative and creative work" in a daily practice consisting of rapidly changing situations.
Explorative learning therefore has fixed components:

- Independent choice of topic
- Independent strategy
- Unlimited risk
- Scientific entitlement
- Verifiable results
- Presentability and external scrutiny.

To comply with these requirements, the organisation of the lessons, examinations and individual learning processes has to be adapted accordingly.

4. The Bologna Process as an alternative plan to explorative learning?

Is the Bologna Process an alternative to explorative learning? If we were to ask students, for example, whether the university focuses on "explorative learning" in times of Bologna, thereby guaranteeing the education of scientists, I fear that the answer would be distinctly negative. Study á la Bolognese is experienced as schoolified and accelerated. The construction of the study courses is often more reminiscent of production lines in the automobile industry than research laboratories. "Just in time" is taught there and the minimum period of study is propagated as the maximum period of study. University learning is supposed to be without diversions, without loss of time and with maximum exploitation potential. The organisation of the universities and courses of study is being aligned to this and there are several examples to illustrate this. All of them also stand for a development which is being discussed as the "economisation of the university", but I won't pick up on this explicitly here.

One of the objectives of studying is "employability", which basically means a student's suitability for a certain job after graduation. We could also say that whoever studies should subsequently be fit for the employment market. Consequently, representatives of professional practice are also involved in the accreditation process for study courses. As members of the panel of experts, they have to decide whether the course of study on offer

can comply with the qualification requirements of the job market. A crucial control instrument of “management” is the university councils. They usually consist to up to 50 per cent of external members, most of whom are well-known personalities from the business world who are intended to make their input to the strategic planning of universities by providing their entrepreneurial expertise and knowledge of the needs of the labour market. The governing statutes of the universities make it possible here for important directional decisions of university management are made by a majority which is not legitimised by the self-administering bodies of the university.

The terms “dual university”, “corporate university” and “open university” symbolise a university organisation strongly orientated on the educational interests of trade and industry, i. e. the requirements of the employment market. The study offers of these institutions are closely linked to the basic and further training requirements of corporate enterprises and in many cases constitute an academisation of what used to be vocational training. The guarantee of the needs-orientated qualification of the graduates is seen as lying within the narrow confines of on-the-job training accompanied by a course of complementary university study. The “Open University” programme is supposed to have a structuring effect on the university landscape and improve and regulate the intake to university education from the corporate labour market. Universities are no longer to encapsulate themselves as their own learning space, they are to provide flexible, demand-orientated qualification offers for lifelong-learning employees.

One vital instrument for the implementation of university education orientated purely on the labour market is the “(German) Qualification Framework”. To be more precise, we have to talk about a system of qualification frameworks which has established itself throughout Europe, if not indeed the world. A qualification framework describes the knowledge and abilities evidence of which should be given by a particular certificate (e. g. vocational training or a course of study). The descriptions are not filled up here by the place, time and contents of what was learnt but more with the results which should indicate what a person with this qualification is capable of doing. General expressions of these abilities serve as descriptors for the level of qualification in a ranking of all available qualifications in an area or even a nation. By restricting this to a description of the actual ability of qualified persons, a comparison of the qualifications profiles across the frontiers of areas or nations is supposed to be possible. The result promotes the mobility of employees which was previously inhibited by the peculiarities of the national, regional and area-specific education systems.

The “German Qualification Framework (DQR)” is being established above all by employers and trade unions as a centralised national framework. It is intended to arrange all labour-market relevant qualifications in Germany in proper order and produce mobility in the European labour market via the “European Qualification Framework (EQR)”. Where our issue is concerned, it is of significance that the existing qualification framework for German University Degrees (QR DH) “disappears” to a great extent in the DQR. This means that the difference between a university degree and vocational training is to step back or even be overtaken in favor of mutual comparability and recognition. If we wanted to use the mere ability to find a job (employability) as the basis of comparison, this could make perfectly good sense. Ultimately, the corresponding tasks in the working environment are fulfilled to an equal extent by vocationally trained or academically educated persons, but I fear this does not go far enough.

5. What gets lost?

As the above-mentioned “learning results” as the virtues of scientific university education are not necessarily covered by a concept of employability, we are running the risk of losing or at least changing essential quality objectives of scientific education if we simply allow the current tendencies to “run wild” without reflection. This includes the notion of independent science, which is not only linked with the outline conditions of research organisation. Independence, and thereby incorruptibility in scientific judgement, is also a constituent component of a scientific, explorative attitude which has to distinguish the scientist. This bearing is acquired when a person can be educated in an explorative context, guided if possible by role models who live this independence in everything they do. A university which detaches its basal education from the concept of explorative learning on bachelor level and only schedules research at master level or completely during the doctorate phase restricts the university education of the large majority of its graduates to the purposes of vocational training. The research activities themselves are also removed from, and therefore changed by, the task of education if they have to be distinguished primarily by their direct usefulness for the providers of external funding. The close connection of vocational training and university education takes its toll too in that many final papers are produced as solutions to practical, everyday problems. They are often not published in full or in part with reference to commercial interests. The public accessibility of scientific research results is, however, a fundamental principle of science which also differentiates it from other development tasks which may under certain circumstances be conducted using scientific methods with exclusion of the general public.

Science in line with the efficiency criteria of industrial production methods is not entirely feasible. Research must involve risk, failure, fresh starts and aberration. A university education which no longer sees and establishes itself as a form of education which is different from other means of professional qualification loses out on the mandate of promoting researcher personalities for independent science.

Our society, as well as our trade and industry, needs personalities of this kind in order to structure and preserve the living conditions of the world of science and technology by means of responsible science, however. In essence, studying should therefore mean explorative learning with all of the possibilities for diversions and delays.

The objectives of the Weizsäcker University Plan of 1970 maintain their validity and we have good reason to regard the reform approaches of that time as an incentive and yardstick. Studying would then fulfill the purpose of employability, but it would also convey the value of independence in science, which is something we desperately need.

Many thanks for your patience.

Moderator: Thank you very much. Please join me now in welcoming Professor Jörg Hacker, President of the National Academy of Science Leopoldina and thereby Germany’s highest ranking political advisor in scientific matters. Before he took on this position in 2010, he was President of the Robert Koch Institute from 2008 to 2010. He studied Biology in Halle an der Saale before working for many years as a microbiologist in Würzburg. Welcome, we are looking forward to your lecture on the independence of science.

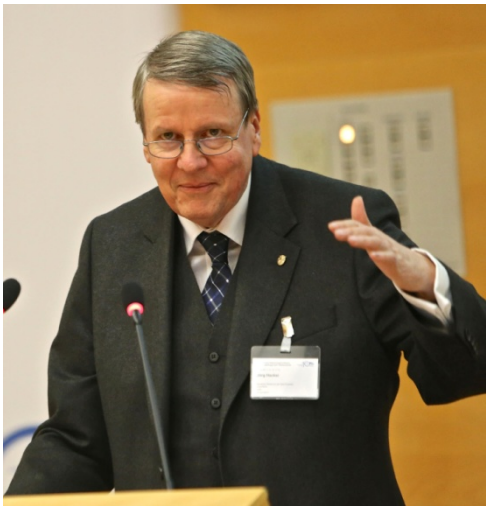
References:

[1] Weizsäcker/Dohmen/Jüchter u.a., Baukasten gegen Systemzwänge. Der Weizsäcker-Hochschulplan, München 1970. The literal and indirect quotes contained in this text were all taken from this edition.

The Role of the Academy in the Scientific Landscape

Professor Dr. Jörg Hacker,

German Academy of Natural Scientists, Leopoldina – National Academy of Sciences, Halle (Saale)



Ladies and Gentlemen,

Thank you for the invitation to discuss the independence of science at this conference in the context of Leopoldina's role in the scientific landscape of Germany. First, however, I would like to congratulate the Federal Institute for Risk Assessment on its tenth anniversary. I wish you and your staff all the best for the next ten years.

Allow me to give you a brief introduction to the German Academy of Natural Scientists, Leopoldina. It is a new and an old institution at the same time. It is old because it was founded in 1652 and has existed without interruption ever since. This makes it the oldest continuously existing academy in the world. Leopoldina is new because it was named the National Academy of Sciences in 2008. It has approximately 1,500 members from 30 countries, including 30 Nobel Prize winners. Leopoldina was named the National Academy in order to give Germany a voice in the international academic context, but also to position the academy more strongly as a national advice centre on important scientific issues for politics and the public. In my presentation, I would like to focus on this scientific consultancy for politics and the public.

I would like to begin, however, by addressing the significance of the Leopoldina, its independence, and the safeguarding of this independence. Independent advice on urgent social issues is important. The need for this is steadily increasing because progress in science and knowledge means that we are continually confronted with questions which ultimately need to be the subject of broad public discussions and which require recommendations on action.

What qualifies the Leopoldina to provide this kind of advice? Firstly, the expertise of outstanding scientists in all areas, from life science and natural science to the humanities. In addition, the Leopoldina continuously affirms its autonomy and selects new members based purely on their scientific excellence. It is independent of economic and political influences with respect to its statutes, election of members, events and organisation. Incidentally, the Leopoldina was granted freedom from censorship back in the 17th century; its reputation

stems partly from this fact. We are particularly proud of this and feel bound to maintain this autonomy.

In principle, the role of the Leopoldina and other academies today can be defined by four characteristics: internationality, trans-disciplinarity across the boundaries of many subjects, scientific excellence and, finally, precisely the independence to which I referred a moment ago. There are some institutions which pop up at certain times and later lose their relevance, but I believe that the academies represent organisations which are well suited to today's knowledge society and advice requirements, because they have always been committed to scientific excellence and independence. In Germany, we fulfill our role as the National Academy of Sciences in close cooperation with the Union of German Academies of Science and Humanities and the German National Academy of Science and Engineering, *acatech*. In addition, we work together with other agents in the German science system, particularly the German Research Foundation, with which we have collaborated on a series of events and statements. The Leopoldina as an academy always needs to maintain a focus on the structures of the science system from a bird's eye perspective. From our independent role, we try to cultivate dialogue with players in science, politics and civil society. In my opinion, it is important that we are involved in social dialogue.

Since 2008, we have published 14 opinions on various topics, some of which were the subjects of intense discussion. I would like to single out a few topics and then delve further into two examples. The topics include the energy policy turnaround and energy research which, together with climate change, touch on a significant global problem. An additional topic relates to ethical and legal aspects of biotechnology and medicine. Examples are pre-implantation diagnostics and a law that was introduced in this area. We also deal with issues for the long-term prosperity of our welfare state, for example with regard to the demographic development. Four weeks ago at the Federal Press Conference, we presented the study "Future with Children" together with the Berlin-Brandenburg Academy in which we analyse the demographic situation. At the same time, however, we provide information on how we can increase the relatively low reproduction rate in the current situation, particularly by supporting women in the workplace, and which tools are important for this. This statement was also the subject of intense discussion.

I would like to focus on two statements in particular: the first example relates to the energy policy turnaround, the second to the dual use problem. You will remember that the Federal Chancellor set up an ethical commission to shed light on energy research and energy policy following the reactor disaster in Fukushima. I had the opportunity to work in this commission. It was soon obvious to all of its members that the challenge in the coming years is about far more than achieving the greatest possible reduction in the operating life of power plants or about a technology which is generally no longer accepted by broad sections of the population in Germany. It is important to use energy in a responsible manner, to produce it sustainably, and to investigate new forms of energy generation in terms of their suitability for use. In principle, I am talking about the big energy policy turnaround, which goes further than simply shutting down power stations.

One specific question in this context is: should plants which are suitable for use in biogas facilities play a greater role in the energy policy turnaround? The Leopoldina published a statement in June this year. After weighing up all of the arguments, it became clear that the

use of biomass as an energy source in Germany should focus primarily on waste that is accumulated by and from biomass in production processes. This is the only way to ensure that there will be no conflict between the use of plants as an energy source on the one hand, and as food on the other. We defined a series of boundary conditions and caused quite a stir in politics, trade and industry and the public in general that can still be felt today. In the past number of months, the scientists who worked on the opinion on the topic of bioenergy took part in many public podium events and background discussions with politicians, in particular with association representatives who want to begin a dialogue with us, and with other players in this area. There were hearings in government committees and many interviews in the press, on the radio and on television. The number of articles on this subject in the daily and weekly newspapers increased substantially. I think it is important to assess the possibilities realistically. The energy policy turnaround should not be wishful thinking; rather, it must be based on realistic facts. Therefore, we also addressed other renewable energy sources as well as efficiency problems in the handling of fossil fuels.

As a second example of the Leopoldina's work, I would like to speak about risk assessment, a topic that is of key importance to the BfR. Recently, a conference on dealing with safety-relevant research results took place in the German Federal Committee on Education, Research and Technology Assessment. Particular attention was paid to the problem of the dual use of research results. "Dual use" means that certain research results can be used for different purposes. On the one hand, they can be used for the advancement of basic research and technologies. However, they can also be misused, for example for the development of biological weapons. In this respect, it is not surprising that many questions on the freedom and independence of science were posed following the incidents involving the genetic modification of the bird flu viruses with which we were occupied approximately nine months ago. I am referring to experiments by two work groups in Holland and in the US state of Wisconsin. They modified the bird flu virus in such a way that it could be more easily transferred from one animal to another in animal experiments than without this genetic modification. The bird flu virus is highly pathogenic in humans: there have been 600 documented cases in humans to date, approximately 60 per cent of which were ultimately fatal.

The research groups who investigated this issue of better transferability did this in light of the fact that transfer between humans had not yet been described, or only to a limited extent. The National Science Advisory Board for Biosecurity in America was called into action by these experiments, which were reported on publicly. This board urged the authors to at least reconsider publication to avoid the potential risk of misuse of the information. Many scientists saw this as an encroachment on the freedom of science, especially as the publication was called into question here. After a long discussion, the work was eventually published in a revised form in the magazines *Nature* and *Science*. The question, of course, remains relevant: how do we handle research results that could have a dual use? How do we handle the risks associated with scientific decisions? As an academy, we dealt with this problem at the beginning of this year. You can find a statement on this on our homepage, as well as a reference to a code of conduct regarding the dual use problem from the German Research Foundation (DFG) that was adopted in 2008. This statement from the DFG outlines briefly but succinctly that it is often necessary to first conduct an analysis of an experiment before this experiment is carried out. It is necessary to detail the risk potential and, if possible, make it public. Furthermore, it is necessary to include information on this procedure in the training

of scientists. We believe that this code of conduct is still correct, even though it only relates to pathogenic microorganisms. We think that focus must be extended to other technologies, and I would like to mention material science and information technology as two examples. In 2010, the Max Planck Institute also dealt with this issue and performed an analysis in which the different spheres of ethics and law were compared. The InterAcademy Council, an international association of academies, also recently made a statement on the decision in the case of the flu viruses. In our opinion, the safety of the public must come first when risks are being weighed up in these situations. This is the top priority; everything else is of secondary importance. Other priorities, such as the independence and freedom of science, can only be followed in the context of safety of the general public.

Freedom of science is inconceivable without scientists accepting responsibility for their actions. The freedom of science is protected by Article 5, Paragraph 3 of the German constitution. However, there are also conflicting articles, such as Article 1 on the sanctity of human dignity, or Article 2 on physical integrity. When considering an individual case, different perspectives need to be brought together. To ensure the independence of science-based consultation on such issues, it is very important that the consultant provides advice in a transparent manner and without predefined outcomes. In addition, advice should be presented in a clear and understandable manner in order to bring the statement and its key points to the attention of the public and politicians. Different publications and event formats are necessary for this purpose.

I singled out these two examples because they had particular relevance in a national context. However, knowledge-based political and public advice takes place on an international scale, of course. The Leopoldina's duties include establishing this internationality, not only to be heard internationally, but also to allow voices from other countries to be heard in Germany. At the Leopoldina, we see freedom to practise science as a universal right. Scientists worldwide need freedom in the context of responsibility. We are involved, for example, in the International Human Rights Network of Academies and Scholarly Societies. The Leopoldina founded a so-called "Human Rights Committee" which deals with human rights and bioethical issues in science. In the past few weeks, for instance, doctors and life scientists in particular campaigned to give medical personnel from Syria the possibility to continue pursuing their career under the difficult conditions of the civil war. For this group in particular, which has very difficult tasks to fulfill, it is important to ensure the protection of fundamental human rights. In this context, we organised medical aid for seriously injured Syrian helpers in cooperation with a number of university clinics in Germany. Last week, doctors at the University Clinic of Tübingen started the treatment of a Syrian first aider who was seriously injured and lost a hand while trying to bring medicine for civilians into the city of Ranqus. We consider these practical requirements in an international context to be an important way to protect science, and also scientists, and to at least draw public attention to the severe impediments to their work.

To conclude, I would like to discuss a recent example of international cooperation in risk assessment. It concerns the assessment of the risk that scientists are faced with when they use their expertise for the purpose of providing policy and public advice. This risk, meaning the potential damage that could occur as a result of the science-based advice, is particularly high when it comes to protecting the public from potential dangers. Last week, the Leopoldina in cooperation with the French Académie des Sciences published a short

statement on the science-based communication of risks on the occasion of the conviction of Italian scientists in L'Aquila. As you know, on 22 October 2012, the court there sentenced seven members of the Italian National Commission for the Forecast and Prevention of Major Risks to several years in prison. The sentence triggered a global debate on legal aspects of the responsibility of scientists who provide advice to state institutions. Scientists need to participate actively and as objectively as possible in this debate. The presidents of the American National Academy of Sciences and the Royal Society in London very quickly published statements expressing their strong support for the scientists. In my opinion, this was correct in principle. The Leopoldina and the French academy attempted to approach the case in a different manner: they referred specifically to a work group set up by the National Academy in Italy. This academy asked an independent expert commission of geologists and lawyers to perform a legal investigation and an evaluation of the scientific and legal aspects of the case. We will need to wait and see how this decision is viewed by our colleagues in Italy.

Essentially, a key motivation for scientific research is to better protect people from dangers posed by natural disasters. Scientific prediction methods play an increasingly important role in the case of events outside our control, such as tornadoes, earthquakes and volcanic eruptions. Scientists and representatives of state institutions must work closely together in order to responsibly inform the public of possible dangers on the basis of reliable data. Scientific predictions on dangers, and therefore on the risks to people who may be affected, estimate the probabilities of future events and are therefore always subject to uncertainty. In this context, Mr. Gigerenzer, a scientist from the Max Planck Institute in Berlin, is fond of quoting Benjamin Franklin, who said: 'Nothing is certain except death and taxes'. He said this 200 years ago. Today, we still have to deal with uncertainties, which have to be declared as such by science. Scientists have the obligation to communicate this important information as understandably as possible. Government decision makers and concerned citizens expect clear statements. Fundamentally, this is the fine line on which we find ourselves and on which we have to tread. This does not mean that scientists active in policy and public advice should withdraw from these duties; rather, they need to reflect clearly on the risks of their involvement.

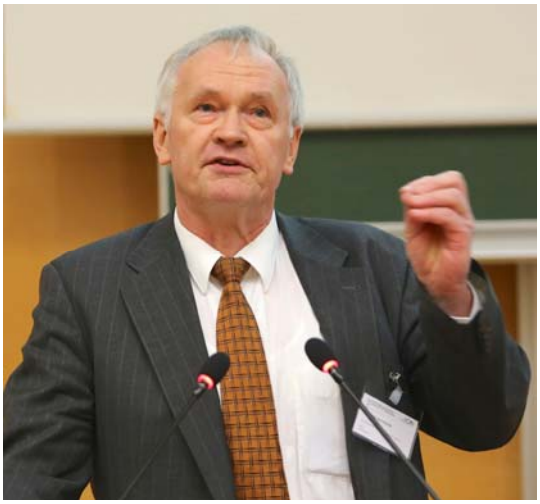
I hope that my presentation on the role of the National Academy of Sciences has made it clear to you that the independence of science in the Leopoldina's understanding of itself represents an important foundation for all its activities. This has been the case since the beginning – remember freedom from censorship – and we feel bound to this ideal. This applies also and in particular to science-based policy and public advice on a national and international scale. We are aware that this ideal needs to be constantly redefined and continually called for in concrete terms. The Leopoldina can only provide independent policy and public advice both nationally and internationally, if it is committed to the freedom of science hand-in-hand with responsibility as its guiding organisational and working principle. The members and staff of the Leopoldina know that this poses a significant challenge, and they know that we need to expect critical questions on whether this challenge is met in reality. This is necessary and correct. I hope that my presentation has inspired you to follow the Leopoldina's work in the future. Thank you for your attention.

Moderator: Thank you very much for the insight into the Leopoldina's work. We come now to the next presentation. Allow me to introduce Professor Manfred Hennecke, the second chemist today. He studied at the Clausthal University and qualified as a lecturer in physical chemistry. He has been President of the Federal Institute for Materials Research and Testing since 2002.

The Independence of Scientific Institutions – An Estimation

Professor Dr. Manfred Hennecke,

President of the Federal Institute for Materials Research and Testing, Berlin



Ladies and Gentlemen,

My sincere congratulations to the Federal Institute for Risk Assessment on ten years of successful work. I am not going to talk about the general science system today but instead focus on the institutes of departmental research in Germany. Departmental research covers about 45 federal institutions with research tasks. The BfR and BAM Federal Institute for Materials Research and Testing belong to this group.

I would like to begin with a practical example and mark out the various estimation options where the independence of science is concerned. Let us assume a ministry needs advice so it appoints a committee of experts and sets up an agency. This all involves costs, by the way. It does not use an existing departmental research institution with the relevant skills and competence. How can this state of affairs be assessed? It is completely clear that the ministry wants to use the entire scientific system for political consultancy, which means mobilising the best people, and there is definitely absolutely nothing wrong with that. We were sitting together in a group recently where this state of affairs was assessed in a completely different light: the ministry selects scientists who are acceptable to it because it wants to avoid the presumably objective and uncomfortable response of its own departmental research institution. This example is taken from real life and I do not wish to comment any further on it.

I can cover the next point fairly quickly, because we have heard quite a lot about it already. Why do we need independence? For scientific policy consulting and for research itself, of course, but – and this is of particular relevance in departmental research – also for a number of technical and administrative services on a scientific basis. What do we have to be independent from? We've already heard about this too. We have to be independent from non-scientific influences in a political, administrative, financial and ideological respect, as well as from interest groups and personal preferences. Why do we need this independence? We want the findings and results that we deliver, be it in politics or as services, to be based exclusively on factual scientific knowledge, i. e. we want them to be objective.

Departmental research institutions are subordinate federal government authorities known as governmental agencies in the English-speaking world. It can certainly be regarded as rational

to consider the needs of the superior authority in a decision, but it is not scientific. Independence is a great asset in political consulting. The Berlin-Brandenburg Academy of Sciences and Humanities prepared guidelines on political consulting four years ago. Independence stands in first place here and is picked up on repeatedly, such as in connection with the impartiality of the consultant scientists and with regard to the question as to whether money is earned through consulting or not. These guidelines were commented on with restraint in the press; all of these demands are a matter of course, after all. Although this is true, the guidelines have to be repeated from time to time in the same way that a church minister repeats the Ten Commandments several times a year. Independence is not by any means only important in research, however. Independence and neutrality are required elsewhere too, such as where an aspect like safety is produced among competitors. This is also done in Germany by non-scientific organisations such as the TÜV technical inspection association.

Let me move on now to departmental research. To give you an idea of what goes on here, I would like to give you a brief overview of its technical scope. It extends from occupational safety through pharmaceuticals, railways, radioactive protection, nuclear energy, weather forecasting, road traffic, consumer protection and nature conservation to civil and military defence. The latter is a special case, because you cannot talk about dual use if you are sitting in a national defence research institute. The handling of weapons and explosives is also a topic of departmental research. This may sound military, but it is civilian. Ultimately, all big topics are covered: energy, environment, mobility, health, nutrition.

I have presented this wide spectrum of topics in order to ask the question as to whether independence or the threat of independence may also depend on the subject to a small degree. The idea behind this is as follows: if there were an area in which no one was interested and where everything ran without any problems, the scientists there would not have any problems with independence either. If they work in the field of nuclear energy, or consumer and environmental protection or medicine or protection against dangerous diseases, however, they are under a lot of pressure from various interest groups. If you look at the wide range of departmental research, you will establish that only a few of its topics are the subject of controversial political discussion, thus attracting the special attention of the media. These include by way of example the use of nuclear energy, the transport of fuel elements, genetic technology, pig flu, waste treatment, the contamination of food and large-scale transport projects.

Next to these, there are also a number of fields in which there is no public interest of this kind. Weather forecasting is also an example of departmental research. Would we presume that independence is in jeopardy in this area? We get annoyed by the weather, but we do not behead the weather man. Radio-controlled clocks are another example. Every one of us benefits from the fact that the time is given with great precision via a long wave transmitter and here too, we certainly do not presume that independence is being threatened. GPS, the calibration system, the Blue Angel environment mark – all of these and many others are harmless. Independence is therefore of particular importance where the field in question is political and currently controversial. Consequently, non-scientific influences have to be prevented here in order to ensure independence.

Let us touch on another field now: the forms of technical services. Which scientific-technical services are provided by research institutes? This includes licensing, authorisations, approvals, analysis and testing, the transfer of standards, samples, reference materials, collections and databases. Expert opinions and reports, especially on accidents and damage claims, are part of it along with the provision of general advice to the public. When drawing up this list, I considered whether it would be possible to conduct a ranking of these services in which we would have to pay special attention to independence and where it is particularly threatened by the way in which the task is perceived. The result is: I cannot. With tests, for example, it could be assumed that they are not very susceptible to a bias, because there is usually a rule or standard by which the tests are conducted; the scientist receives a sample, takes it into the lab, makes a measurement and writes down the result. Where could a non-scientist exercise influence here? It is in this area in particular, however, that I have had the most trouble with politics in my five-year period in office.

The BAM shares responsibility for the transport of hazardous goods in Germany, for instance. There are many regulations intended to ensure that ships do not sink, planes do not crash and railway tank wagons do not leak while transporting hazardous goods. If you test a sample to establish whether it can be transported without danger – this also applies to used fuel elements, by the way – and the sample passes the test, then this is okay from the point of view of hazardous goods transport, but woe betide anyone who hits on the idea of doing something with the sample that is not part of the regulations on the transport of hazardous goods. This is precisely what a scientific institution does though, because our people are curious and they have to be too. It is important to look to the left and right. That's why we occasionally conduct unscheduled tests and publish the results. If someone doesn't like the result though, you are in for a lot of bother.

Our usual procedure is that science prepares the decision but that the decision itself has to be made by politics. Above all else, politics has to make an assessment but unfortunately, my experience has been that this does not always work. Politics sometimes wants to pass over the responsibility for a decision to science, even though we have actually only mapped out the consequences of possible decisions in our expert opinion without anticipating the decision itself. I can give you a nice example of this: several years ago in the Münsterland region, some electricity pylons fell down and the area around Ahaus was without power for several days. Roughly 20,000 to 30,000 people were affected. Nothing bad happened, because the hospitals had emergency power generators and as far as I know there were no personal injuries, but there was a lot of excitement nevertheless. The BAM examined the defective electricity pylons, initially to clarify who was to blame. The result was that nobody was to blame. The pylons had been built in line with the rules of technology and no one had performed shoddy work or violated the valid rules. A weather situation had occurred which exceeded the assumed maximum capacity the engineers had used as a basis 40 years previously. And what were the consequences? From our point of view there weren't any. If we had proposed that all electricity pylons in Germany be upgraded to withstand loads of this kind, it would have been a 20 billion euro decision, because that's what the improvement would have cost.

Our opinion wasn't wanted at all, because the political pressure to take action grew and led to some hefty discussions. Please pardon my cynicism, but I presume what was behind this pressure to take action was the attention-seeking of local politicians. What I mean by that is

that statements made on the basis of objective test activities are not disputed as such, but it is expected that instructions for action will follow. These instructions normally contain assessments which can give occasion for dispute, but it is not the task of science to issue the instructions; its task is to deliver the facts.

You all know different forms of scientific policy consultancy. The first domain of departmental research is the oral and written advice given to ministers and their authorities and occasionally to courts as well. Staff must be permanently available for this purpose as the task cannot be performed by the ad-hoc appointment of external experts. It also includes the membership of staff in political consulting committees and academies too, of course, as well as involvement in national and international regulation and standardisation. It should not be forgotten that considerable sections of the economy are not fully regulated by the state. I come from an institution of chemistry and technology where unlike food law, most of what we do is not state regulated. Everyone is happy that there is relatively little regulation in this area, but standardisation plays a major role. Standardisation tends to be more about finding a consensus – the establishment of rules by the interest groups involved – but this does not mean that it is free of conflict. Here too, there are huge possibilities to exercise influence, which is why the independence of the public researchers involved in standardisation is of such particular importance. Researchers often do not like standardisation. It is not very spectacular and it is run by aging gentlemen like me. Standardisation is nevertheless a lubricant for the economy. Many rules are made which relieve politics and its state regulation authorities. I was delighted to hear the state secretary's statement here today in which he called on us all to advise politics even if the advice is not expressly requested. It goes without saying that scientists also speak out through publications and lectures and I believe that this is part of the involvement of science in the general discourse.

How can independence be secured? Institutionally, of course: the Federal Institute for Risk Assessment is one of the few departmental research institutions without specialised ministerial supervision and provides a good example of this. The legal form for this is significant, at least in Germany. A certain amount of independence can be secured through the legal form, in particular independence from state bodies, if not necessarily from the other sources. It goes without saying that external advice and observation by scientific advisory boards and curators also belong to the institutional forms of securing independence. Many departmental research institutions did not have observation of this kind for a long time, but this has changed in the meantime. The scientific council also places great value on this.

An attempt can also be made to achieve independence individually and I would like to mention civil service law and university law in this regard. University law ensures that all German university lecturers are not subject to technical supervision. They do not have a supervisor, they do not have to have specialist subjects dictated to them and they are accountable to no one, at least not where research is concerned. Mention of civil service law will come as a surprise to many, but if we dig up the old comments on civil service law we can read that the strict form and legal structure of civil service law also served the purpose of bolstering German civil servants and making them independent of any unreasonable demands of their superiors and of external influences. This is often forgotten. At any rate it conceals the right intention of ensuring independence. In addition to this, organisational measures can be initiated, such as rotation in the assumption of tasks, the introduction of the four eyes principle and the establishment of rules and regulations. Many departmental

research institutes have established rules of this kind for political consulting. The aforementioned guidelines of the Berlin-Brandenburg Academy of Sciences and Humanities also contain rules of this kind.

The guarantee of resources is certainly also a way of promoting independence. Unlike countries such as the USA, foundation financing is not common in Germany. I know the *Stiftung Warentest* foundation quite well and you would think it was a foundation that uses the revenue from the foundation capital to finance the good work that it does. It is indeed a foundation, but the state did not put much money into it. The connection between external funding and independence is controversial. You have to know that in Germany, most external funding does not come from industry but from the state and this is even the case with the Fraunhofer Society. Numerous institutes believe that they would not be able to fulfill their mandate without external funding. Many, including us at the BAM, have an external funding code which limits funding by industry in particular. It does not work without an external funding code, but if it is dealt with in a reasonable manner, independence can be ensured despite external funding. This applies in similar fashion to an institution's own income from certain services provided to others for consulting and the like. It can help to secure independence because the institute does not then have to rely quite so much on every budget negotiation. Generally speaking therefore, widening the financial basis is a reasonable method.

Much has been said today about the topics of transparency and cooperation, so I will move on to my next point: I consider scientific quality to be the essential way of securing independence. More than through institutional, individual and organisational rules and regulations, independence can be secured by delivering scientific quality, because this makes you invulnerable in a way. I believe we all know that discussion of the topics and results with the scientific community is the best form of quality assurance. There is certainly nothing better anywhere in the world. Moreover, excellent research also produces global prestige, not only for the individual scientist but also for the institution. I am convinced that a highly respected institution is much less likely to be the victim of dishonest means and methods than a less respected one. It is also important for independence that a scientist's personal reputation enables personal career alternatives. A scientist who has the option of leaving his or her institution at any time does not have to put up with everything, especially not attacks on his or her scientific independence. It should not be underestimated either that a lack of career alternatives makes people dependent, even civil servants. Acceptance in professional circles also prevents results from being distorted or ignored. If results are to be found somewhere in international literature, they can hardly be eliminated. And finally, so I hope at least, the professional world will stand up for its members if need be when there is an attack on their independence. This applies in particular to the academies, but also to all others. I do not really know of any examples where this has not been the case, even if they have not always been successful.

An understanding and noble rulership can of course ensure that their institution is independent, be it a university or a federal agency. Karl Marx has already been quoted here today on the subject "Securing of independence by the higher classes". I will take the liberty now of illustrating this idea with a quatrain by Heinrich Heine: "Your mayor ye must trust in blindly; he guards the town and watches kindly, with anxious care, o'er old and young; your business is to hold your tongue". That was about 150 years ago and I believe the rulership

has become considerably more noble and understanding in the meantime than they were then.

I am also convinced that it is essential for services and for political consulting that we closely interlock these ranges of tasks with scientific research. Then, and only then, will their quality be assured to a high degree. This was not always a matter of course for departmental research. I also believe though that this has been achieved to a great extent today; this not only produces quality but also independence. It is of elementary importance not only for the individual scientist but also for each institution to regard themselves as a part of their respective scientific system in each respective scientific community. It must be possible to reproduce all results all over the world, no matter in which form, and hold them up to scientific criticism. This means that they must be measured without restriction in line with the valid scientific standards. If this is guaranteed, it will still not be possible to avoid all impositions that combine to restrict independence, but it will be possible to tolerate them with composure.

Panel discussion I: How Independent Can Science Be?

Participants:

Prof. Dr. Anne Glover, Chief Scientific Advisor to the European Commission, Brussels

Dr. Catherine Geslain-Lanéelle, Director of the European Food Safety Authority (EFSA)

Prof. Dr. Jörg Hacker, Deutsche Akademie der Naturforscher, Leopoldina – German National Academy of Sciences, Halle (Saale)

Prof. Dr. Dr. Andreas Hensel, President of the Federal Institute for Risk Assessment (BfR)

Prof. Dr. Manfred Hennecke, President of the Federal Institute for Materials Research and Testing (BAM), Berlin

Prof. Dr, Walter Krämer, Head of the Institute for Economic and Social Statistics, TU Dortmund University

Dr. Roger Pielke Jr., Centre for Science and Technology Policy Research, USA

Moderation: Dr. Patrick Illinger, Journalist

Moderator: Professor Glover, as I was listening to you I had the impression that you neglected to mention some of the failures associated with one hundred years of scientific innovation, such as the Seveso disaster or chlorofluorocarbons and their negative impact on the ozone layer. I also learned that the world could be such a nice place, if people simply were not so stupid as to take risks. Can you comment on that?

Prof. Glover: The aim of my speech was to provide some balance. We always talk about the negative things and often lose sight of the positive aspects. Even chlorofluorocarbons fulfilled an urgent human need, albeit with unexpected consequences for the ozone layer in particular. So science has, along with politicians, decision makers and the public, provided solutions. I merely wanted to highlight the fact that we cannot live in a risk-free world and we must, therefore, accept risks. This means we need institutions such as the BfR and the European Commission. They help us to assess risks and manage them. In the case of chlorofluorocarbons, we were not particularly careless; we just had to continuously gather knowledge. So we should not apportion blame, but rather have processes in place which ensure we can react to problems immediately. We should also be capable of predicting whether or not a problem may arise; we should have the right structures in place to minimise the damage.

Moderator: It seems to me that you assume people who reject nuclear energy or GMOs do so purely out of fear. But there can be other reasons why people oppose these things. Should we not also consider this?

Prof. Glover: Yes, absolutely. In fact, when I was Chief Scientific Advisor for Scotland, my country pursued a policy which strongly opposed the use of nuclear energy. However, our discussions in Scotland did not focus exclusively on the dangers of nuclear energy, but rather on the fact that we had over 40 per cent of Europe's renewable energy sources available to us. It would be almost criminal not to invest in this technology and bring it to the market. Because of this, the politicians decided against nuclear energy. We do not simply reject a technology because we do not like it, but because we have other priorities such as costs, social effects, IT or ethics. We must accept scientific findings, but in some cases there are other reasons why we decide not to make use of them. That is perfectly reasonable.

Moderator: Dr. Pielke, should public opinion not be part of scientific knowledge? Or, in other words, can science change public opinion?

Prof. Pielke: I think it is extremely important to engage the public in scientific issues. It is important to legitimise the authority of the scientific community. On the other hand, I do not think the public can contribute much to the technical ideas proposed by scientists. I like Daniel Patrick Moynihan's comment to Stephen Chu: we all have the right to our own opinion, but not to our own facts. One of my favourite commentators is Walter Lippman, who wrote for the New York Times. At the start of the 20th century, he stated that the role of democracy was not to make everyone think the same, but rather to encourage people with different opinions to work together. Many of our current debates are held with the aim of persuading everyone to believe this fact or that fact. From a historical perspective, political action occurs not because everyone thinks the same, but because creative politics causes interests to align.

Moderator: Ms. Geslain-Lanéelle, why do you accept conflicts of interest at all?

Dr. Geslain-Lanéelle: We do not accept conflicts of interest. Of course, we must be aware of the interests of the experts we are working with. But, if an interest exists, it doesn't necessarily mean that a conflict of interests is also present.

Moderator: Let me re-phrase the question. Would it not be better for the EFSA to ban its experts from any industry involvement?

Dr. Geslain-Lanéelle: In an organisation such as EFSA, there can be slightly different views among various people from different cultures and countries regarding what a conflict of interest actually is. It is important that we clearly state our definition of a conflict of interest. Furthermore, we must make sure that we apply our rules correctly. We reject the purist approach because we may end up with a perfect vision, but with no scientific experts. We do not want that. We want experts with a variety of interests.

Moderator: It is interesting that you cannot find any experts who are not involved in the food industry.

Dr. Geslain-Lanéelle: Well, we do not work with scientific experts who work in the industry. We work with people from universities, public research institutions and national food safety organisations. I should also add that I think it is important that scientists continue to be involved in society. When scientists do not understand the questions being posed by society, then our messages may become insignificant. And we do not want that, of course.

Moderator: But wouldn't it create a bad impression in society if the experts who decide on food safety have links to industry?

Dr. Geslain-Lanéelle: It is quite obvious that our principles do not lead to privileges or gifts for the industry – 80 per cent of health claims submitted by the industry have been rejected on the basis of EFSA assessments.

Moderator: Professor Krämer, is it really the case that anyone who does not share or express your opinion on the economy and the euro is dependent? And you yourself are one of the independent ones? Is that accurate?

Prof. Krämer: Oh, no. Industry representatives and bank representatives represent industry and the banks. That is quite legal.

Moderator: I am talking about independent economists.

Prof. Krämer: Very well. I have praised the German Council of Economic Experts. As I have already mentioned, I consider their report to be the best thing written on this issue in Germany last year. It may not get the attention it deserves, but it is good. I have great respect for these people and I bow down to them. They do their job perfectly; it is just that no one listens to them.

Moderator: After palaeoanthropology, economics seems to be the most divided science there is. When a bone is found, there can be uproar regarding its interpretation. That is my impression, at least.

Prof. Krämer: I strongly disagree. 99.9 per cent of economists agree on the vast majority of issues. I can understand why the media likes to create a different impression, as it would be too boring otherwise. That is why they always dig out the remaining 0.1 per cent so they can put out another counter-article. Nevertheless, there is a very strong majority opinion on the

vast majority of issues, whether it is student fees, the euro crisis, the freezing of rental prices or other debates.

Moderator: I could hardly wait for the media to be criticised. Let us say that public opinion does need to be adjusted slightly; well, economics itself could provide the impetus for that. Professor Hacker, can someone who is against genetic engineering be a member of the Leopoldina?

Prof. Hacker: Yes.

Moderator: But that probably does not happen. Or does it?

Prof. Hacker: We do not ask. However, I can certainly imagine that there are humanists and social scientists who are critical of genetic engineering. Life scientists also have varied opinions on this subject. Research into methods of modifying plants is part of basic research, for example. One other issue concerns the extent to which seeds should be modified and the economic interests which play a role in this area. I do not think the Leopoldina has a unified opinion on such controversial issues.

Moderator: It is always assumed that academic basic research is completely independent. Is this really the case? Is basic research not also partially dictated by third-party funds or fashion trends? There are certainly scientific issues which are in vogue. Ten years ago there was nanotechnology, a couple of years ago it was gender research in the social sciences. Does that not lead to a certain amount of dependence and to a sudden increase in new research proposals for funding organisations?

Prof. Hacker: Third-party funds are of course frequently allocated for certain issues, partly due to the respective government funding policy. We have already spoken today about how certain fields are the focus of research and part of the scientific mainstream. That will always be the case, but alternative positions should also have a chance.

Moderator: So how do you view the non-industrial influence on the allocation of funds for certain movements or trends? What about when the Research Ministry suddenly “discovers” a topic?

Prof. Hacker: Naturally, new trends or methodical approaches are constantly being established in science. The DFG awards 2.7 billion euros per year as Germany’s biggest funding organisation for basic research. They follow established processes which typically make judgements based on scientific excellence and scientific criteria. This is carried out by selected peers in the relevant bodies of the DFG. It is a similar process at the Max Planck Society; topics are sought, institutes are re-structured and re-developed. But new topics often have difficulty establishing themselves. An interdisciplinary approach, for example, is nothing new when chemists and life scientists work together. When chemists and social scientists work together and define projects, however, it can be unusual at first. Taking the scientific landscape as a whole, I do not think independence is in danger, even if there are individual exceptions.

Moderator: Professor Hennecke, if you were King of Germany, would you distribute assignments currently carried out by departmental research institutions in a completely different way? For example, one could imagine you allocating them not to the ministries, but rather to the Leopoldina, or somewhere else entirely.

Prof. Hennecke: If I had the authority to make this decision, I would view this landscape, a landscape which has grown over time, with a critical eye. Some of the institutions are over 150 years old. Others, such as the BfR, are ten years old. Some are born out of a current political crisis; some come from a long-term observation of a particular need. I do not believe that any of the different forms of scientific institutions in Germany has a competitive advantage when it comes to how efficiently they complete their assignments. There are departmental research institutions which could just as well be part of the Helmholtz Association. The allocation of assignments should be solely a question of practicality.

Moderator: Professor Hensel, how do you protect independence when dealing with industry contacts?

Prof. Hensel: I consider the one-sided demonisation of industry inherent in this question to be completely misplaced. First of all, science has nothing to do with who is giving the money. It defines itself using scientific criteria; these criteria can be described. Besides, we do accept science in many branches of industry. No, I believe we must define why independence in science is important. Because we do have a goal in mind, and that is to spread expert opinions in a transparent and comprehensible way. It is a question of whether we, as Mr. Grunwald said in his presentation, are able to break down the knowledge acquisition process and its findings into smaller parts which laypeople can understand. This would achieve more than a purely formal call for independence and financial disclosure. Of course, the issue of payment also touches on a social phenomenon; I would be interested in a comparison with America in this respect. Unfortunately, the news that a study in the health or food sector has been paid for by industry comes with a negative connotation in Germany. This has a lot to do with consumer perceptions. Many members of the public think that "big bad industry", with all its financial resources, has come up with something that the layperson can no longer control. With this loss of control comes a negative, hostile attitude. I do not want to hide the fact that some NGOs have business models which seize upon this public perception. They believe that the public must be protected from the evil state, evil industry or the economy. Ms. Glover touched on this phenomenon. People often only perceive what they expect to, and they use this selective perception to strengthen their own arguments.

Moderator: We will look into that further tomorrow. But now I wanted to give the audience a chance to ask questions.

Audience: My question to Professor Krämer and Dr. Pielke is: what sort of role do open-access journals which allow open access to scientific findings play in scientific independence? Do they lead to an increase in demand?

Prof. Krämer: At the moment, authors have to pay a lot to be published in an open-access journal. Just last week I submitted a publication; it is costing me 3,000 euros to publish it. If this obstacle were removed, open access could make it easier to spread scientific findings.

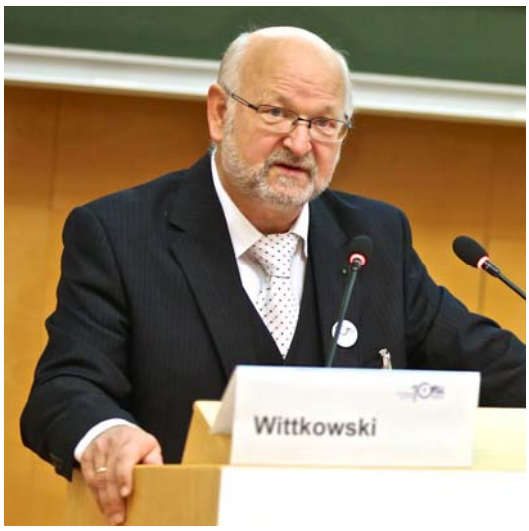
Prof. Glover: The European Commission is aiming for an “open access” policy. Horizon 2020, the EU’s next funding initiative, will encourage recipients to publish in open-access journals. I think that is a good approach.

Moderator: Ladies and Gentlemen, I would like to thank those of you on the panel for your contributions. To the attendees, thank you for listening.

Elements of Independent Policy Consulting

Professor Reiner Wittkowski,

Vice-President of the Federal Institute for Risk Assessment, Berlin



Ladies and Gentlemen,

Welcome to the second day of our event. Today we will be discussing how we secure the independence that is rightly demanded of institutions like the BfR. We all take our own independence and impartiality for granted. Yesterday we discussed how this independence can be achieved, which criteria need to be met, and how we can credibly convey our own independence. I think we made a good job of it. Allow me to briefly summarise what was said yesterday. I would like to begin with a quote from Max Weber, who said in 1919 that "whenever the man of science introduces his personal value judgment, a full understanding of the facts ceases". This fits in well with what Mr. Grunwald told us yesterday: that science is not the keeper of truth but follows a dynamic process that serves the acquisition of knowledge in each individual case.

What we also heard yesterday is that policy consulting is something that happens not just here at the BfR in Germany but also on European and global level. Only last year, we had the painful experience of learning that food, chemical and product safety all have a global dimension. We listened to a presentation by the Director General of the European Food Safety Authority, EFSA; it is clear that projects or core themes are handled not only at EFSA but sometimes also lead-managed by the national agencies, who then act in unison and have to use the existing network to the good of the consumer and the decision-makers. The guidelines of the Berlin-Brandenburg Academy of Sciences and Humanities outlines three central elements of independence: freedom of choice of method, freedom of the information basis, and – something that is very important – freedom in the interpretation of results. This is fundamentally different from opinion leadership, a prerogative of interpretation enjoyed by scientists who believe that they are ultimately the only people who can interpret the data that they themselves have generated. I think this is an extremely important issue. This is why policymakers need scientific expertise; a view also expressed yesterday by both the State Secretary and the Minister.

In particular, the legislative is increasingly becoming an important source of demand and an addressee for expertise. Government and parliaments are ever more frequently confronted with complex issues in the formulation of new legislation. In this process, the criteria of good

science must be transparency and disclosure, impartiality and autonomy. As Mr. Grunwald said, this is not about autocracy or autonomy in defining the issues. This is in line with the principle of complex decision-making addressed by Mr. Riesenhuber, a phenomenon driven by the fact that our knowledge doubles every four years.

This was not only the motor behind the creation of the BfR in Germany; the system of health consumer protection in Europe was also restructured as a result of the BSE crisis. The BfR was founded ten years ago as an independent public-law institution in the portfolio of the Federal Ministry of Food, Agriculture and Consumer Protection. The basic idea was to separate risk assessment and risk communication from risk management. The goal was to ensure qualified scientific assessment free from political, economic and societal influences. In this respect, I refer to the presentation by Mr. Riesenhuber: This is primarily about "orientational knowledge". It is about providing scientific expertise and supplying information on which to base decisions as the result of a meta-analysis, not necessarily about basic research.

If we are taking stock and assessing the work of the BfR, then it is certainly a good idea to look at the reasons behind the decision to set up the BfR as outlined in the "Wedel" opinion of 2001. This opinion calls for the explicit normalisation of the independence of the BfR in the establishment statutes and for this independence to be secured by means of clear organisational separation vis-à-vis the politically cultivated structures of risk management. The opinion goes on to say that the scientific institute should enjoy the highest level of scientific authority among the political powers-that-be, in expert circles and in the public at large, adding that the institute should use this generally recognised expertise to provide objective and preventive advice to the political decision-makers and to draw the attention of the administrative authorities to problems in a timely manner. As an organisation with undisputed specialist authority, the scientific institute can issue opinions and expert reports that help to resolve scientific disputes in the area of food safety. In this process, the institute basically decides at its own discretion whether, how and at what point in time it expresses a scientific opinion. This is also important: within the context of its policy advice activities, the scientific institute is expected to inform those responsible for risk management if its scientific assessment indicates risks to food safety. The right of the BfR to take up issues on its own authority is already firmly established.

This means the BfR plays the role of a "tracker dog" wherever there are potential risks; it assesses and communicates these risks and incorporates them into the advice it gives. If necessary, the scientific body should also be able to communicate directly with the public. Whether and in what way it publishes its findings is something that needs to be decided within the context of its independence on a case-to-case basis. In making this decision, it will weigh up the information needs of consumers as well as the general social and political impacts and the interests of private third parties while taking due account of data protection issues. So much on the recommendations; this was the legal basis that was laid out, not only for the restructuring of consumer health protection but also in the law of establishment for the BfR – where it is definitively stated that the BfR is independent in its research and in its scientific assessment and advisory activities. Even the German Chancellor could not prohibit us from doing or communicating anything. And, in her defence, we have to say that she has never attempted to do so.

With the new remit came the question of how we could do justice to the task of ensuring independent advice of the highest scientific standard, generating and providing specialised expertise, and regaining the consumer trust that had been lost during the BSE crisis. In an extremely time-consuming internal discourse, we talked about who our "clients" are, what our remit is, how we should fulfill this remit, and how to ensure the credibility of our communication in the public arena. We identified three key pillars, namely science, independence and transparency. I would like to elaborate using a few examples.

Let us begin with science: who "does" science, and which scientist is suitable for the purpose of providing an advisory service? No one would want to be advised or treated by a heart surgeon who has not practiced his trade in a decade. This means we need to ensure that the advice is provided by scientists who are themselves actively involved in research. Scientific expertise is generated within the framework of a scientific discourse conducted not just within the BfR but with the entire scientific community. Scientists who want to be recognised in this community need to be able to "hold their own" based on their own expertise, their own research and their own assessment work. The BfR is supported by an external Scientific Advisory Board and has built up a system of committees to advise the BfR in order to obtain and discuss external expertise so that we can review our own assessments. These scientific committees ultimately also serve to provide a form of external quality assurance for our scientific activities.

Let me now turn to independence. It is not enough for it to be stated in the law if it is not put into action. Neither it is sufficient for us to give an assurance that we are independent; what we need to do is to define criteria that guarantee this independence. To ensure that our assessments are interdisciplinary assessments, we have grouped experts with the same or similar areas of expertise into organisational units. All our assignments are handled by the people who possess the optimum level of expertise in the field in question. Regardless of which opinion is concerned or which statutory remit we are fulfilling, all experts who have something to say on the matter are heard. To this end, all our assignments are first collected in a clearing office. This office reports directly to the management and decides who should be involved. In other words, we adopt an approach based on "more than one pair of eyes" and on a commitment to participation. This interdisciplinary cooperation is based on defined processes that are subject to regular internal and external review. Certification helps us in this regard, and we are fully ISO certified.

There were also discussions about who we are actually there for. Most employees were initially of the opinion that our primary task is to serve the consumer. Ultimately, however, this is only indirectly the case, as we mainly provide information to the multipliers – In other words, the political decision-makers, the press, the scientific institutes, scientific societies or professional associations. We do not want to advise any individuals, neither do we want to advise individual politicians or individual companies.

At the same time, however, it goes without saying that we are not in an ivory tower. We are part of this society. Yesterday Mr. Riesenhuber criticised the fact that there are far too few scientists in the parliaments. This means we need to enter into dialogue with all those who profit from or are affected by our work, whether in a positive or negative sense. It also means that we talk to associations, parliamentary parties, parliamentary committees, NGOs and consumer associations, but not to individuals.

Germany's Federal Civil Service Act and public service regulations apply to all scientists and personnel at the BfR; this prevents corruption and permits investigation of secondary employment. At this point, I would like to emphasise that all assessments and the entire assessment process of the BfR are handled by BfR employees. Even though we draw on the expertise of committees, these committees are not part of the actual assessment process at the BfR. This is certainly one of the differences between the BfR and EFSA, as EFSA is a non-scientific organisation and is therefore dependent on the expertise of the EFSA panels. It goes without saying that we do not have any funding from industry or other stakeholders; our money comes from the public budget. When we acquire third-party funds for our research, then the money comes either from government ministries, from the DFG German Research Foundation or from the European Union. I believe this is an extremely important element in communicating independence to the outside world in a credible way. Of course there are independent scientists at universities that finance some of their research based on industry funding. But when doubts are expressed regarding the independence of an institution because it receives research funding from industry, then it's generally difficult to counter this accusation. That is why I believe that this is where we have to draw a clear line.

Standardisation and transparency are important to us, particularly against the backdrop of the European idea and the global world we live in. We primarily advise ministries on legal procedures in the fields of pesticides, chemicals, biocides, genetically modified organisms and novel food. We make this advice public in the form of reports and upload it to the Internet. When disclosing information of this kind, however, we have to ensure appropriate protection of intellectual property. We cannot bend the law when approval documents for chemicals or pesticides protect the rights of the applicants. Apart from such cases, however, our entire output is available to the public, as is the statement of reasons for our action, and a list of aspects that it may not have been possible to assess with definitive clarity because there are gaps in our knowledge or leeway for interpretation. People can read which criteria we employ for assessment purposes, how we handle scientific information, how we take account of scientific publications, and how we under certain circumstances arrive at the decision not to take a specific publication into consideration because it does not meet scientific quality criteria. Moreover, we have also developed various event formats – from expert discussions and symposiums to consumer and stakeholder conferences all the way through to the BfR forums. These events address topics that are discussed in the public arena and on which expert circles also have little or no information. Examples include the assessment of multiple residues in the case of pesticides, nanotechnology or the major issue of natural ingredients with toxicological potential. Even though most of these events do not succeed in achieving a consensus, they render all the expressed viewpoints transparent, which means that everyone can get an idea of what we know and, above all, what we still do not know.

Scientific advice on policy cannot and should not be a substitute for political decisions and a process of general discourse within society; but it can pave the way, facilitate and act as a critical companion to these decisions and discourse. The key factor is that policymakers are advised in a public and transparent manner. If this is not the case, then we lose trust. This is why we create this transparency, and I believe this is also why the majority of the addressees for our information trust the BfR. Scientific controversies and uncertainties must be presented in an easy-to-understand way. This also includes the transparent portrayal of scientific dissention and the lack of scientific expertise or knowledge. Providing all this is part of how we understand the work we do.

Ten years ago, we already attempted to establish a scientific reference function in the field of risk assessment. This entails close cooperation between national and European food authorities, as is also outlined in the EU's general food law. We need to merge knowledge, exploit best practice experience from the member states and EFSA to the benefit of consumers, and employ harmonised methods. We must work on standardised procedures that permit comparability and enable us to also integrate national experts in the core fields of European scientific expertise. As you know, there are extremely small EU member states that do not possess the resources of countries like France, Austria, the UK or Germany. In order to take some of the strain off EFSA in this area, we should think about the possibility of a kind of peer review system that incorporates national groups of experts. However, this is an idea about which discussions are still ongoing.

You know that some people have regularly called our independence into question. In May 2012 the "Testbiotech" magazine published a report that raised doubts over the independence of the BfR because members of the GMO committee worked in industry or are or were parties to patents. The response in the media was unfortunately highly undifferentiated; many of the articles that were written were factually incorrect. This led to a situation in which not only the BfR but also members of the committees were personally slandered. This prompted a question from the "Bündnis 90/Die Grünen" party in the Bundestag parliament; the question was not exclusively about the BfR but also mentioned other institutions in the portfolio of the federal government with assessment or approval remits. As in the case of EFSA, this question in Germany's national parliament focused on GMOs and pesticides as well as the respective committees. Well, we answered the questions, and the government gave a response that was picked up on by the "Report" news magazine programme in the ARD television station. We were not entirely satisfied with the report, as the programme deliberately portrayed certain interrelationships in a false light. I am adamant in saying this, because the programme's editorial team was aware of the true facts of the matter. I said earlier that both the committees and the BfR are independent. The report, however, described the former as supervisory bodies of the BfR. If this were the case, then lobbyism really would play a role. But this is anything but the truth. In this case as well, we fulfilled our obligation to create transparency and decided to communicate the independence of the BfR in the public arena.

We occasionally put this transparency to the test within the context of our quality assurance system: are there new developments or perhaps new requirements for the BfR that we need to take into account? The example of Fukushima illustrates that this kind of mindset cannot necessarily always be taken for granted: over one and a half years after the nuclear disaster in Fukushima, doubts are being voiced over the neutrality of four members of a Japanese government commission that was responsible for the reactor safety standards. This body, whose job was to define the safety standards, was only set up in 2012 with the aim of making the nuclear power regulatory authorities more independent. Prior to this, the relevant experts had been attached to a ministry that supported the nuclear power industry. In the attempt to create greater transparency, it was decided to disclose financial activities when creating this commission. It transpired that members of the commission had received money from the nuclear power industry. Although this was legal under Japanese law, it resulted in a major loss of trust at the very time the commission was being set up.

Mr. Hacker mentioned another example: one month ago, six scientists and a representative of the authorities who were members of a committee were given long prison sentences because they were said to played down the risk of earthquakes in the town of L'Aquila in the Abruzzo region of Italy. Although they measured light earth tremors prior to the earthquake disaster, they came to the conclusion there was no increased risk. In doing this, the experts acted in keeping with the scientific realisation that it is impossible to predict earthquakes. But the public prosecutor's office insisted that the scientists had downplayed the threat, saying that the assessment by the experts was criminally deficient as well as useless and contradictory. The argument of the defence in this court case is worthy of note. They argued that, if the experts were found guilty, no scientists would in future make any pronouncements on the phenomenon of earthquakes if they had to fear imprisonment for a prediction that is by its very nature speculative. Thank you very much.

Moderator: Thank you, Professor Wittkowski, for your introduction to day two. Please join me in welcoming the next speaker, Dr. Thilo Bode. He studied Sociology and Economics, wrote his PhD thesis on direct investment in the developing countries, and also supervised projects for the development of water and energy supply in the Third World. Dr. Bode has been Managing Director of the nonprofit "foodwatch" association for ten years, an organisation that promotes consumer protection by providing advice and information for consumers. Welcome.

I. Positions of the Stakeholders

How Independent Can Science Be?

Dr. Thilo Bode,

Managing Director of foodwatch e. V., Berlin

Ladies and Gentlemen,

In view of the short time at my disposal, I would like to address the question of whether independent science must not also be communicated independently. The insights I would like to talk about today stem from our experience in the political arena. There is often no question at all regarding the independence of the scientists themselves. Yet scientific findings are no longer communicated independently but coloured by agencies and bodies that have their own interests. This applies universally, whether it be government authorities, stakeholders or even NGOs. Even if your message is directed to associations or organisations, there can still be a problem if the public at large picks up on this portrayal of events or information. I would like to use three examples to briefly describe this phenomenon: the traffic light system for nutritional information on food packagings, the maximum levels for radioactivity in food, and the dioxin contamination of food products during the 2010/2011 dioxin incident.

You are all well aware of the debate over the food traffic light. In this respect, I would like to mention the quote by the German Minister for Food Agriculture and Consumer Protection, Ilse Aigner; she said there was no scientific basis for the traffic light, and this quote made the rounds in the media in the same or a similar form. It is well known that foodwatch supports the traffic light, but what we need to understand is that the traffic light as such cannot be either scientific or unscientific. Irrespective of whether we think it is a good idea or not, the way we assess it depends on our underlying view of the consumer. If we believe that labels of this kind should be used to steer and influence consumer decisions based on general policy objectives, then the traffic light is an effective tool. If, on the other hand, we believe that the traffic light is based on a paternalistic picture of the consumer, then it is something to be rejected. The public debate should naturally be based on the right consumer model, and we can naturally investigate whether or not the traffic light really does influence behaviour. And investigations of this kind have in fact been conducted in the UK and Australia, but not so much in Germany. In the final analysis, however, we are talking about a political decision. This is something we need to be clear about.

The second example concerns the maximum levels for radioactivity in food, mainly with regard to caesium. As you know, the long-term impacts of nuclear incidents are primarily related to food, where the radioactive effects persist for an extremely long period of time; in contrast to other toxins, there are no threshold levels for radiation with caesium – because any radioactive contamination with caesium is always dangerous. Based on the assumption of a certain maximum threshold concentration, a statistical decision is implicitly made on the number of diseased people and the number of fatalities. We believe that the maximum admissible levels in Europe are far too high, and we have submitted a report on this issue entitled "Kalkulierter Strahlentod" ("Calculated Fatalities from Radiation"). Although we are possibly prepared for a nuclear accident in technical terms, we are not prepared when it comes to precautionary measures to protect food. A quote from the German government states that the maximum admissible concentrations do justice to the basic principle of radiation protection to minimise a radioactive burden to the "greatest extent possible". This absurd wording shows that the minimisation requirement is not consistently applied, but that it wants to give the appearance that this is the case. The scientists agree that there are no safe maximum admissible limits for the radioactive contamination of food. If maximum values are defined, however, then this is a decision about life and death.

In this connection, it is interesting to note that the maximum values in Japan were reduced by 60 to 80 per cent a year after the reactor accident in Fukushima. The stipulation in the EU is currently as follows: the Japanese limit values apply to Japanese imports, while the remainder are subject to the 80 per cent higher limit values of the EU. In practice, therefore, the independent communication of scientific findings is not all it is made out to be. The population has not been given the right information. From our point of view one thing is clear: if we draw on the services of independent science and request advice, then this also includes absolutely independent communication in the media. I realise that this is extremely difficult. We heard earlier that the media pick out specific aspects, but that does not release us from the obligation to take all necessary pains to communicate the correct information.

For my last example, I refer to a quote from your institute on the dioxin crisis in 2010/2011. Professor Hensel said the following: "Even if eggs or pork with concentrations in the range of the highest measured values have been consumed over a longer period of time in the last few months, we do not anticipate any risk to health." We at foodwatch believe this is an unacceptable risk. We are of the opinion that part of the population consumes more than the tolerable daily intake through the regular consumption of food alone. This applies in particular to children or infants. As even the tiniest amounts of dioxin can impair the function of human cells in this section of the population, any additional burden is to be assessed critically. The statement of Mr. Hensel has important effects in terms of court rulings and the investigation of violations of the feed laws – of which there are unfortunately far too many.

My conclusion is that the communication of scientific findings by political institutions must naturally on the one hand underline the limits and assumptions of scientific knowledge but that it must also present the starting hypotheses in a transparent way. It goes without saying that the extent of risk that a society is willing to tolerate is a political not a scientific decision. This is something we need to be clear about, and there must be a political debate on this. We do, however, have particularly strict requirements in the area of health protection, at least on paper. The precautionary principle is not only rooted in the general EU regulation but is also part of European primary law, as laid out in the Lisbon Treaty. This means there is a

quasi-constitutional requirement that has to be taken in account in the process of communication. Risk communication that downplays the risks, which portrays scientific facts without reference to the precautionary principle, makes it more difficult to assert health protection in legal practice. It therefore also undermines the implementation of the laws governing food products. This is particularly the case with regard to the legislation governing animal feed. Thank you.

Discussion:

Question: I have a comment on your statement regarding the limit values for radioactive exposure: there is of course the normal background level which, if you will, provides a "meaningful limit value".

Dr. Bode: Yes, this is naturally the case. But we must understand that radioactive caesium does not occur in nature. The caesium burden is the result of nuclear accidents and atmospheric atom bomb testing in the 1950s. It has to be systematically minimised in the approval of foods, for example. The threshold levels in the EU are irresponsibly high for commercial reasons.

Moderator: But there is still such a thing as national radiation that we confronted with. If I were to give this glass of water to the world's best chemist using the most sensitive measuring techniques, he or she would probably find the tiniest traces of arsenic. Would you then argue that this should not be allowed, or would you overlook the findings because the amounts are so small?

Dr. Bode: Our drinking water laws are excellent. If the sample meets the legal criteria, then there is no reason to complain.

Moderator: Thank you. Ladies and Gentlemen, please welcome Dr. Holger Brackemann. After being awarded a PhD in Chemistry, he worked for Germany's Federal Environment Agency before joining the Stiftung Warentest consumer organisation in 2003, where he has been in charge of testing since 2008. What I did not know is that, in this connection, he also deals with the topic of corporate social responsibility. Welcome, Dr. Brackemann.

How Independent Can Science Be?

Dr. Horst Brackemann,

Stiftung Warentest, Berlin

Ladies and Gentlemen,

When the BfR organises a two-day conference on the issue of independence in science, then one thing is for certain: the answer is not straightforward! When attempting to find an answer, it can be helpful to think outside of the box, and to take a look at another field. I am thinking of judges, for example, who must hold their office in an independent and unbiased way. When it comes to making a judgement, they cannot be biased. But how can bias be determined? In court, concern regarding bias is enough for a judge to be voted out. It does not matter if the actual bias is proven – how could that even be done? Instead, rational, objective facts which cast doubt on the judge's impartiality must be presented. So there must be reasonable doubt that the judge is not performing his duties in an impartial manner. A mere feeling or allegation is not enough. On the other hand, proof of bias, which is rarely available, is also not required.

There are clear parallels in this process to the way Stiftung Warentest has maintained its independence for almost five decades now. Many, many consumers – 70 to 75 per cent according to studies – have a high or very high amount of trust in our work. One key reason for these good results is the fact that our independence is not disputed. No one accuses us of bias.

Even if our organisation cannot necessarily be considered part of the scientific community in the traditional sense, we can still make the claim that our investigations are carried out using scientific methods. This principle is also laid down in our statutes and in case of doubt we must be able to defend it in court. So how do we avoid appearing biased in our day to day work? This question is also significant because we have a lot of contact with suppliers. In our opinion, this is both necessary and favourable. Our principle for all these contacts is as follows: transparency yes, influence no.

I would like to explain this principle using five procedures which are relevant not only for us, but for scientific work as a whole. The first issue in this context is independence when choosing topics. For us, the question of topic relevance marks the beginning of scientific freedom. We discuss the projects we want to investigate in an advisory council. All stakeholder groups are represented there. Professor Wittkowski of the BfR is also a member. In this respect, we are transparent. However, our statutes stipulate that relatively high obstacles must be overcome if the advisory council wants to object to an investigation – and rightly so.

Another important point is independence in choosing investigation methods. Answering new questions frequently requires the use of new methods. In our tests, this means that we do not only resort to standardised procedures. We are also transparent in that we put this process up for discussion with our group of experts. These experts advise us, but they do not make the final decision regarding which procedure is used. Otherwise, independence would not be guaranteed.

The third point concerns the neutrality of those who carry out the actual testing, i. e. the test institutes. Here, independence from suppliers is particularly important to us. Although there are undoubtedly some excellent test institutes in industry employing excellent scientists, we would never have a study carried out in such a laboratory. It would clearly appear biased. Therefore, we get our contractors to state in detail that they are not dependent, economically or otherwise, on the supplying companies.

The fourth point has already been touched upon today: the independence of the evaluation process. Science always involves the interpretation and evaluation of results, and independence in this context means the freedom to develop and apply our own approaches to evaluation. Of course, we also regularly seek advice from experts on this point. I would like to take this opportunity to thank the BfR for the wide-ranging support they have given us over the years. But even here we are ultimately the ones who decide how to conduct the actual evaluation. We make this decision independently of the suppliers of the products we study, often going beyond what the legal standards require. That is one reason why we sometimes attract criticism.

Finally, economic independence is extremely crucial for our work. Our work is financed predominantly by consumers. A small proportion comes from the federal budget, but no money whatsoever comes from those whose products we investigate.

From our point of view, the question being addressed at this conference can be summarised as follows: we live from and with our open discussions with all stakeholders. However, we retain our independence in two critical ways. We always decide what we do and how we do it, and we finance it independently of those who are affected. We could formulate the topic of this conference a different way and instead ask how dependent science can be. I think it is difficult to find an absolute answer. However, from the point of view of Stiftung Warentest and its 50 years of experience, I would like to try and give a relative answer. The greater the anticipated acceptance for its results, the less dependent science can be allowed to be. Thank you for listening.

Discussion:

Question: To what extent are suppliers in a position to alter products before we carry out our tests so that better test results will be achieved? Can you tell us anything about this?

Dr. Brackemann: That is indeed a problem we were faced with time and again with various product groups, with both food products and washing and cleaning products. These are products whose quality can be changed via the choice of raw materials, which can cause the product to either be cheaper or more expensive. We now buy our products at retail, just like

you. And we do it with the product groups mentioned above before the suppliers know about the test. That distinguishes us from other testers.

Moderator: So how do the manufacturers know that such a test could be coming up?

Dr. Brackemann: Our statutes require us to discuss planned studies with our advisory council in advance. All stakeholder groups are represented there – the suppliers, consumer organisations and neutral experts. Unfortunately, this transparency has also been clearly exploited in the past. To answer your question, a few years ago we started presenting only very general plans at the advisory council. If we want to investigate orange juice, for example, then we talk about juice in general; the fact that it is orange juice is only announced after we have bought the juice, when manipulation is no longer possible. I would also like to emphasise that we do of course look closely at the products after the results are published. This way we can determine whether the quality is the same as it was during the test.

Question: Do you need to change anything about this process?

Dr. Brackemann: No, but you all know the media business. Sometimes certain issues arise for no particular topical reason. Even the current discussion about manipulating tested products concerns incidents that took place a long time ago. We already changed our approach four or five years ago. The stakeholders are involved, but only at a stage when it is no longer possible to influence the tested items. A classic example concerns investigations into services. If we were to test banking advice and told them in advance which questions we were taking into the branch with us, then the investigation would be a waste of time. That is why the consultation does not take place until the field phase is completed, in other words when we have already determined the results. Then we talk about how the results are to be interpreted. As I mentioned earlier, we apply more or less the same process across a whole range of products nowadays: food, washing and cleaning products, and cosmetics. First we buy the products, then we talk to the experts. We put the investigation processes we wish to use up for discussion, listen to any criticism before publication and react to it when we consider it to be justified. We do, however, reserve the right to ignore criticism if we do not think it is valid.

Question: I am from the plastics industry and would like to comment on the issue of “risk assessment and risk communication”. I can confirm what you said about your working groups. During the actual work on a project, you really integrate the various stakeholders. What is sometimes a rude awakening for us is the subsequent test report, the communication of the results. Our discussions in the groups are very factual in the test magazine, the result is naturally accompanied by sometimes very cutting and incisive remarks. That does not always seem to fit.

Moderator: How do you respond to criticism following publication?

Dr. Brackemann: We had an interesting event on this subject a while ago in this very room. Dr. Bode just addressed this issue. We are not a specialised scientific body. And that is not at all what we want to be. Unlike the BfR, our publications are aimed at the consumer, at the general public. That means we must achieve two goals. The first is a high level of expertise in our tests, and the second is journalistic quality. This includes being incisive and getting to

the point. This is both correct and intentional, but it must always be justified and based on our expertise.

Moderator: Thank you very much. Please join me now in welcoming Jutta Jaksche. She is a nutritional science and food quality officer at the Federation of German Consumer Organisations.

How Independent Can Science Be?

Jutta Jaksche,

Federation of German Consumer Organisations (vzbz), Berlin

Ladies and Gentlemen,

My presentation will deal with the question of how science communicates with society and how it handles questions from society. It should be clear to all of us that we can no longer afford to communicate only in one direction. I would like to elaborate on this in relation to a few aspects using the BfR as an example. Firstly, we need to consider the requirements for independent communication. The first requirement is political independence; this also means institutional independence. In the context of the BSE crisis in the past, we saw all too clearly how closely intertwined science and administration were. With the creation of two different institutions, the BfR and the Federal Institute of Consumer Protection and Food Safety (BVL), consequences were drawn from the negative effects of this overly close relationship. Today, we can see that these institutions have indeed become more independent and objective. This can be considered a great success.

The second requirement is that the scientists themselves are capable of arguing independently, that they can submit an independent expert opinion. For example, the BfR works with 200 external experts in the context of committees, although the majority of its opinions are compiled by in-house employees. Professor Wittkowski outlined exactly how this work is carried out by external experts and the role that they play. In its comparative report from 2011, the European Food Safety Authority (EFSA) assessed the BfR positively in terms of its formal and scientific independence. However, we are still not satisfied. We would like the BfR to provide even more understandable information on risks to consumers. It should be clear what risks are associated with the various courses of action. It is our opinion that the public must be able to discern whether the measures to be taken are really adequate. If the BfR comes to a certain scientific assessment, the consumers and we as a consumer protection organisation want to be able to understand whether the BVL is adequately translating the proposed measures into political action.

The third important requirement is that scientific issues must be formulated in such a way that they actually offer an answer to consumers' questions. This means that not only is a risk assessment necessary, but also, in some cases, a health assessment. The BfR would

probably argue that this is not its responsibility. We contend that the interaction between the responsible authorities must be improved with respect to communication.

I would like to use a brief example to explain the topic that was addressed by the EFSA representative yesterday: the example of “health claims”. We all know that health-related advertising claims are reviewed by EFSA. In future, only those statements that can be scientifically confirmed and have a verifiable cause and effect relationship will be permitted. From our point of view, this cause and effect relationship of ingredients is not sufficient with regard to the consumer. The risk in the health market is also that many other foodstuffs are fortified with a particular ingredient. By focusing on a specific snapshot, a false sense of security is created for the consumer. Our wish for the future is therefore that a risk assessment is very closely coupled with health assessments.

More detailed knowledge of everyday consumer issues is necessary for this. We need to know what concerns consumers have. For example, how is a potential vitamin deficiency viewed as compared to a vitamin overdose? Which conclusions can the consumer draw from this for his or her own behaviour, and how do the relevant authorities help the consumer in this endeavour?

The important preconditions for independent communication include transparency with respect to the risk assessment, which means the disclosure of the underlying assumptions. This also raises the question of how a risk is communicated. For example, with regard to the dioxin cases in the very recent past, what is to be made of the statement that there is no risk to health? Consumers know from previous dioxin incidents that dioxin is not good. They are bound to ask themselves whether this statement is simply intended to put their minds at rest. Therefore, do we not need additional consumer information to ensure that consumers can properly interpret this kind of statement?

The issue of trust was already addressed yesterday. The BSE crisis showed that independence and credibility go hand in hand. We all know that experts often fail to come to a consensus. Ask three scientists and you get four opinions. Individual opinions are often prematurely made public. This means that we need to assist consumers in dealing with this plurality of knowledge. We are therefore of the view that a reliable point of reference such as the BfR or, in some cases, the Max Rubner Institute or the German Nutrition Society is required.

Indeed, the BfR is a point of reference for us. Our expectation of such a point of reference is that it provides the necessary overview, that it presents meta investigations and not individual opinions because, particularly in the area of nutrition, consumers are “herded” from one trend to another and, naturally, this leads to a great deal of confusion. For this reason, standards for communication must be established. In addition, the bases for assessment must be made public in order to make comparison possible. This is very important.

However, what if the BfR reaches a different risk assessment to another institution? This possibility can certainly not be ruled out. Our view is that, in such an event, the BfR should publish a scientifically validated opinion available and defend it, even if it contradicts other opinions. The assessment of children’s toys is an excellent example in this connection.

A culture of transparency also includes active dialogue with all involved, particularly when dealing with a lack of knowledge. Consumers are very often unsure because the impression is given that the problem is obvious, but this supposed certainty later turns out to be false. I refer for example to the BSE cases, the EHEC outbreak or acrylamide. I am sure some of you would argue that an admission of a lack of knowledge from an institution could be politically explosive. This type of communication is often equated with a lack of competence in solving a problem. However, it is our opinion that conceding a lack of knowledge is ultimately an expression of scientific confidence and independence, provided that a culture of transparency and active dialogue with the involved parties exists.

Another suggestion in this context is the establishment of an early warning system which addresses not our knowledge but our lack of knowledge. Often, draw conclusions about complex usage conditions based on idealised study conditions and assume that we reflect reality in this way. Of course, this method is highly uncertain. Admitting a lack of knowledge is the prerequisite for initiating and carrying out appropriate research. This is why we suggest a stronger assumption of a lack of knowledge in the process of communication.

To conclude, I would like to give a brief outline of the instruments which we believe could improve consumer communication. We certainly need to strengthen consumer research. Today, consumers need to deal with a wide variety of issues, including digital media, nutrition, finances and much more. It would make sense to introduce a school subject called "general consumer education". In this way, consumers could learn how to assess the way they respond to risks in a more informed manner. The interaction between risk assessment and information in the public sphere could undoubtedly be improved from our point of view. This also applies to cooperation between the government and the federal states. The dialogue between science and the public must be intensified at all levels. We are happy to act as a point of contact for measures like these. Thank you.

Moderator: Thank you, Ladies and Gentlemen, please welcome Professor Matthias Horst. He is Director-General of the German Federation of Food Law and Food Science, and of the the Federation of German Food and Drink Industries. Professor Horst is a jurist. He was also a member of the Management Board of EFSA from July 2002 to 2012 and is now an honorary professor in Bonn. Welcome.

How Independent Can Science Be?

Professor Dr. Matthias Horst,

German Federation of Food Law and Food Science (BLL), Berlin

Ladies and Gentlemen,

What does the independence of science have to do with the food industry? Firstly, the food company and no one else is responsible for food safety. Companies need to follow not only the valid food legislation, but also the current developments in science. The basis for this is a state-of-the-art risk analysis; science is responsible for risk assessment and risk communication. It is crucially important for the food industry that high-quality risk assessments are performed by independent institutions and independent scientists working in these institutions. There is no doubt about this. In Germany, the BfR meets this requirement very well and, on a European level, the European Food Safety Authority (EFSA) has established a good reputation for itself in the past ten years, despite all the difficulties.

However, it is also very important for the food industry that attention is paid to science. This is often a problem in the event of a crisis. Crises are often used as weapons in political battles; science has a hard time being heard in these situations. Take the example of dioxin in 2010/2011. From the beginning, the BfR stated that, although it was unforgivable that dioxin had got into animal feed, there would be no negative health effects on individuals. It took weeks for this message to reach consumers. It is not acceptable that political risk managers can ignore the assessment of the BfR or EFSA because they are prioritising other interests. On the contrary, this information must be heard and communicated by the political powers-that-be.

The separation of risk assessment and risk management is very important. This issue has also been addressed several times today. When the two were separated ten years ago, many were sceptical, but I think this idea has really proven its worth. It relaxed the situation and curbed the politicisation of science with which we had often been confronted in the past, particularly during the BSE crisis.

If we want independent risk assessment, then we also need to accept inconvenient results. Of course, industry was not exactly overjoyed by EFSA's rigid stance on "health claims", but it ultimately had to accept it. Conversely, one should also accept it when EFSA or the BfR comes to the conclusion that genetically modified organisms (GMOs) do not cause any

health problems. This assessment should not immediately be used to slander those who reached it.

This brings me to a very important point: these days, more and more often, attempts are made to attack science and personally attack the scientists involved when people do not agree with the results. The imagined scenario is always the same: people accuse science of being “bought” by industry. I can assure you that this is a childish idea.

Nevertheless, many people demand a much stricter separation of science and politics. Professor Grunwald said yesterday that science cannot be self-sufficient, but it must be autonomous in its assessments. I think this is the right demarcation. Cooperation and interaction between industry and science is of course necessary, because industry must know the results of science assessments in order to take the required action. I think that the BfR has found the right path with its communication policy and the BfR committees which also include representatives of industry. These committees are independent of the BfR and, by the same token, the BfR must also be independent with regard to what the committee comes up with or puts on paper.

I would like to say a few words about EFSA. The scientific panels of EFSA are made up of external scientists who are not on the EFSA payroll; none of these external scientists is employed in industry. Legally, this would certainly be possible, but EFSA decided against it. Despite a highly complicated selection procedure, EFSA continually faces the accusation that industry influences the selection of the scientists. As a former member of the selection board, I can assure you that this is not true. The selection committee only checks whether the selection procedure has been adhered to. Nobody has ever tried to push through the appointment of a specific scientist. And it is not possible anyway.

One important safeguard are the extensive “Declarations of Interest”; the scientists must disclose all relationships with industry. An additional corrective is the fact that up to 21 scientists work together on the EFSA panels. All decisions reached are made collectively.

The very general issue of how to define a “conflict of interest” remains. I believe that we should avoid too much hysteria on this issue. For example, the EFSA board decided that an expert who comes from an industrial company in the food supply chain and is not a consumer cannot even become vice-chairperson. We need to be careful that these criteria do not scare off good scientists. We must remain realistic and should not labour under the assumption that science can be 100 per cent independent. This kind of total independence simply does not exist.

It is important that science and institutions such as the BfR and EFSA receive the necessary political support and enjoy a sufficient degree of freedom. If we continue to allow anyone who makes a scientific statement to become a target for personal attacks, we will not be able to progress. In the future, all responsible parties in politics, science and socially relevant institutions will need to deal with this issue to order to ensure a better and more relaxed relationship. Thank you.

Discussion:

Question: If I understand you correctly, you demand that scientific assessments must be accepted. But we cannot demand acceptance of our assessments. With our assessment, we are always in competition with other parties who may have a different view of things. We must always be prepared to present our arguments in controversial debates.

Prof. Horst: That is correct, but your institution ultimately belongs to a ministry. You can therefore demand from your ministry that it incorporates the work you conduct and publish in its policies, that it supports your work and does not contradict your findings. It goes without saying that you cannot demand acceptance from other scientists or society as a whole.

Moderator: In this connection, we could also talk about the extent to which mutual independence should allow the policymakers to decide not to follow the scientific assessment.

Prof. Horst: Yes, but in this case the policymakers should clearly state that they have decided against the scientific assessment and why they have done so.

Moderator: Ladies and Gentlemen, please welcome Dr. Gerd Romanowski. He is managing Director of the German Chemical Industry Association (VCI). He studied chemistry and has been working in various areas of the VCI since 1993, including science and research, as Managing Director of the VCI, as Head of the Science, Technology and Environment department, and as Managing Director of the German Chemical Industry Fund.

How Independent Can Science Be?

Dr. Gerd Romanowski,

German Chemical Industry Association (VCI), Frankfurt

Ladies and Gentlemen,

Thank you for the invitation and the opportunity to provide an opinion on how independent science can be from the point of view of industry. I would like to single out a particular aspect which is important to us: the legally prescribed scientific tests which industry must carry out to assess the safety of its own products. A conflict of aims exists here, at least superficially: on the one hand, a completely justified demand is placed on industry to take responsibility for the safety of its products and to conduct and finance the studies, scientific tests and analyses necessary for this purpose. This is an important element of the European chemicals regulation REACH, for example, but also of the approval procedures for genetically modified organisms (GMOs).

On the other hand, some of those who demand that industry take this responsibility do not trust the results of the tests commissioned by industry – because they were not conducted by independent scientists, but rather by industry or by scientists acting on behalf of industry. This raises the question of how independent science, scientists and scientific institutes can be. Putting aside the independence of the BfR, this question can be asked of many other scientific institutes and scientists. This is not an easy question and it can have many different answers. I think that the issue is not so much independence in these studies and tests, but rather the issue of quality, adherence to certain scientifically recognised standards, and verification that these standards are adhered to.

An incident which took place just a few weeks ago and which attracted a lot of intention – and involved the BfR – demonstrates how important this question of good and bad science is. A group led by the French scientist Séralini published the results of a study in which rats were fed a certain genetically modified type of maize. The scientists drew the conclusion from these tests that this type of maize and the herbicide used during cultivation resulted in a higher susceptibility to cancer among the rats. They concluded that the type of maize and the herbicide used were carcinogenic and therefore damaging to health. This news was quickly picked up by the media and promptly led to the demand for an immediate ban on the type of maize in question and preferably all genetically modified plants. Weeks later, after careful examination, the Federal Institute for Risk Assessment came to the conclusion that the study had shortcomings in its design and in the statistical evaluation, and that the authors' conclusions were not plausible.

The European Food Safety Authority EFSA came to the same conclusion. This news did not achieve nearly the same prominence in the media; it was mostly published in the less read science sections of the newspapers. This example shows that the main issue is not whether a scientist is independent or not. Mr. Séralini was certainly independent to some extent, although he is said to have worked on behalf of organisations which are opposed to genetic engineering a number of times in the past. Regardless of this, he would undoubtedly have been able to publish a scientifically correct study in accordance with the current quality standards, albeit possibly with a different result to the one he would have been hoping for. Therefore, it is not so much the supposed independence that is important, but rather the quality of the scientific study and the compliance with generally valid scientific standards.

The example described simply concerns bad science, the supposed results of which were then published without verification, accepted and "stylised" without question by the press. There are, however, recognised, scientifically validated procedures and standards in place for such investigations, according to which studies evaluating the safety and risks of chemicals or GMOs must be conducted. At least for legally prescribed risk assessment, for example in chemicals legislation or GMO approval, there are international, widely recognised, scientifically validated test methods with which industrial companies, the scientists involved, and the responsible authorities are obliged to comply based on corresponding regulations.

In the area of chemicals safety, these are generally standardised OECD test methods, the so-called OECD Test Guidelines and Standards. After these have been developed and validated by the OECD, they are used by the EU for the safety assessment of chemicals in accordance with the REACH regulation. These types of scientific procedures also exist for safety assessments in the context of official approvals for genetically modified plant varieties. They are defined, for example, in the “Guidance Documents” of EFSA and define binding guidelines on how the tests on safety are to be carried out. In addition, GLP (good laboratory practice) represents a quality assurance system which covers the procedure followed in tests and defines precisely how and under which conditions a scientific study needs to be planned, conducted, monitored, evaluated and documented in order to meet the requirements of the generally recognised scientific standard. It also governs the recording, archiving and reporting of the tests. Compliance with GLP is also legally required for studies carried out by industry within the framework of risk assessment. As Mr. Wittkowski mentioned earlier in his presentation, there are also certifications according to different ISO standards or service standards which are correspondingly documented and verifiable.

An additional safety net is that studies conducted for a safety assessment and their evaluation are reviewed by independent authorities, such as the BfR in Germany or EFSA on European level. It is extremely important that the submission of a safety assessment by industry is not the final step and that a check by the authorities takes place: are the studies valid, do they comply with prescribed standards, are the conclusions correct? And is the necessary transparency guaranteed?

In the context of REACH, this transparency is achieved, for example, by the European Chemicals Agency ECHA in Helsinki: it publishes the main information on the conducted studies, on risk assessment, on dangerous properties and on risk management for each substance on the Internet. There is also a range of public consultations, for example on the evaluation of the registration dossier, on the approval procedure for certain chemicals of

concern, or on restriction measures for specific substances in specific products. This transparency and the associated possibilities for participation and discussion are designed to achieve broad acceptance of decisions based on risk assessments.

With this abundance of issues, assessments on the safety of substances and products, as well as the decisions based on these assessments, can only be effective and accurate when procedures with clear, comprehensible criteria and quality standards are applied and accepted by all involved. The industrial companies and the scientists employed by them, as well as the scientists commissioned by industry, are legally bound to comply with these requirements. The same applies to authorities, who are obliged to maintain neutrality and objectivity in their review of studies submitted by industry. Problems occur when results and decisions based on these results are called into question by studies which do not satisfy scientific quality standards, but which are widely published by the media and attract a great deal of publicity, like the example described earlier.

In this situation, it is important that there are authorities that are perceived as credible due to their scientific work and their objective information and communication processes. In Germany, the Federal Institute for Risk Assessment fulfills this role in an exemplary manner, in my opinion. It would be desirable if the quality criteria that apply to legally stipulated tests and studies also applied to other studies on the safety of products and substances. Of course, this cannot be achieved by regulations where tests are carried out by independent scientists who are permitted to publish their work freely. However, a commitment from scientific magazines or their publishers to only publish those studies on safety which satisfy legal quality standards could be one possibility. Another quality assurance mechanism is the consistent use of the peer review procedure, which is common practice with scientific publications. Good and reputable scientific magazines always subject submitted publications to review by at least one and generally two or more established scientists. An article is only published or accepted after a positive review. It is all the more important that this good scientific practice be followed when it comes to issues of safety and health. In addition, the media, Mr. Illinger, should actually only include those scientific publications in their reporting which have at least passed this type of quality assurance procedure. Perhaps it is time to talk about a commitment to responsible reporting from newspapers, publications and publishers in order to avoid causing concern among the public. Thank you for your attention.

Discussion:

Moderator: Thank you, Mr. Romanowski. I think that the Séralini study is the wrong example. You described the situation as if the results of this study were published first and then retracted later in the science sections of the media. I can tell you from my own observations that our scientific editors were involved from the beginning and expressed criticism. The study was so bad that renowned scientists whom we questioned on the issue called the quality of the study into question. Even the stakeholder organisations, that are normally happy to accept such results, stayed rather quiet. I wonder therefore why you chose this example.

Dr. Romanowski: It is simply a topical example that shows the way things should not be.

Moderator: I disagree. I thought the media's handling of the study was appropriate.

Question: Let us assume that all quality assurance measures are complied with. Nevertheless, some publications or clinical studies are not published because they do not arrive at the expected results. Are there mechanisms to prevent this?

Moderator: You mean scientific studies which are deliberately withheld by companies?

Question: Correct, withheld because they do not support the market.

Moderator: This is an important question of principle. You are talking about free science, but industrial research or the researchers working in this area do not always have the freedom to publish what they wish.

Dr. Romanowski: I can only speak for our sector of industry, the chemicals industry. The main set of rules for chemicals safety is the European chemicals regulation, REACH: this stipulates that all available and existing information on dangerous properties of chemicals and on risks must be named and described in the registration dossier. That is a legal obligation.

Moderator: Do you have to announce these studies before they are conducted?

Dr. Romanowski: For certain chemicals, there are test requirements for which a test proposal is initially when the registration dossier is submitted. This is because these tests involve animal experiments. The European Chemicals Agency ECHA then decides whether this animal experiment needs to be carried out or whether it can perhaps be avoided because it has already been carried out by someone else. Suggestions are made by industry for these kinds of extensive studies; the ECHA then decides who carries out the tests, under which conditions and in which form. In principle, industry needs to include all existing and available data and facts in a registration dossier for a chemical.

Moderator: This is the case with REACH, but not with the entire chemicals industry.

Dr. Romanowski: It relates to the entire field of chemicals safety. Of course, additional sets of rules are in place for cosmetics, for food additives, for pharmaceuticals. I cannot make a statement on all of these areas, but no data can be withheld for REACH, for the assessment of chemicals.

Question: I am the head of the Chemical Safety Department at the BfR. In our department, we assess plant protection products, biocides and chemicals in line with REACH. We often hear the suggestion from NGOs and from certain parties in the Bundestag parliament that we should set up a fund to finance such studies to which all industrial companies should contribute. A study would then no longer be financed by the respective company but rather by this fund, in order to guarantee the necessary independence. Particularly in the area of plant protection products, these kinds of studies are associated with very high costs. There is also the issue of patent protection. Not all studies are open and public, even though our assessments are of course accessible.

Dr. Romanowski: This is a familiar question which has been a subject of discussion for some time, but it is not realistic. The problem is that the chemicals which we deal with under REACH have often already been on the market for decades. Many, many tests, studies and safety assessments on them already exist and we do not wish to discard all of them. They involved very high costs and high numbers of animal experiments. These studies were commissioned by individual companies which produced or still produce the substances. I think that REACH represents a good mechanism for making this knowledge, which was gained over a long period of time, accessible and usable for assessment by authorities. There is not really a better way. This fund might be an option for chemicals which will be brought to market in the future, but I believe that the idea of retrospective application is unrealistic.

Moderator: But the chemicals industry continues to develop new substances …

Dr. Romanowski: Yes, but the number of new substances coming on to the market is very low. Most of them are new formulas or new preparations using the known range of substances. There are actually very few completely new chemical substances, apart from medicines. However, medicines are subject to a special approval procedure to investigate their effectiveness and side effects.

Statement: I want to make a statement on the moderator's comments on the reporting of the Séralini study. What was said is true for your own newspaper, the Süddeutsche Zeitung. I recall your colleague's report, which deals with the major criticism of this study. Nevertheless, the first report came from France. There, a journalist signed a confidentiality agreement containing a severe penalty for breaking the agreement. On the basis of this, he agreed not to get a second opinion and to reproduce the study without criticism. This report served as a point of reference for German television and many other media. I think that science journalism needs to take a critical look at itself in this regard. I also think that you would not allow your editors to accept an exclusive contribution but have to commit to not consulting other experts for their opinion on the research.

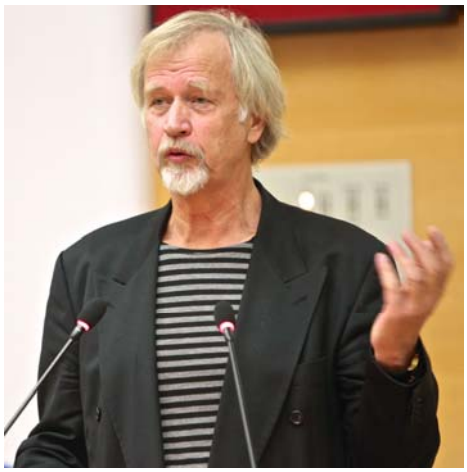
Moderator: I was not aware of that. If that is the case, the issue in this situation was not a failure of science journalism, but a journalistic fall from grace. That is not journalism. There is only one commitment that we make with this type of report: adherence to the embargo period. For example, we get technical magazines a week earlier, we can read the complete studies, on the condition that we do not report on them until the publication date of the technical magazine. But no journalist agrees to a content-related obligation.

Thank you very much. The next statement is from Dr. Wolfgang Wodarg of Transparency International Deutschland. He is a physician and health scientist, and was a member of the German Bundestag parliament for the Social Democrats from 1994 until 2009. He is also an honorary member of the Parliamentary Assembly of the Council of Europe and a co-founder and member of the Board of Trustees of the nonprofit ISM Institute for Modern Solidarity. Welcome.

How Independent Can Science Be?

Dr. Wolfgang Wodarg,

Transparency International Deutschland e. V., Berlin



Ladies and Gentlemen,

Regarding the issue of independence in science, I take a different view to the others so far. Of course science is not independent. Because society has entrusted science with a role and it should strive to fulfill this role. To do this, it uses certain methods, which we have already heard plenty about. In this way, it creates knowledge that improves all our lives. We can call upon it even if we do not understand the details because, through its processes, science provides useable knowledge, and that is something we can all agree on. It is similar to the financial system. Ideally, it enables us to trust money. Sometimes it fails and that trust disappears. The same thing can happen with science.

Science, as a knowledge producing sub-system, is naturally linked to other systems in many different ways. That's why it's not independent. It is important, therefore, to understand this connection with other systems in society, such as politics or industry. What sort of interactions exists, how do the communication processes work, which conflicts arise that must be resolved by communication, how transparent are they and what are the consequences of mistakes?

We make the assumption that science corrects itself, that it is capable of further extending the breadth of its knowledge on certain issues. This self-correction is a key characteristic which, unfortunately, has often failed in the past. It is clear that the role of science has often been restricted due to bias, influences from other systems and other fields of interest. For example, we see that negative results are held back from publication because the sponsor requested it. Or negative results are interpreted in such a way that they appear positive. In bigger studies or in reviews, positive results are three times more likely to be published than negative results. This type of process is not new. In Greece, for example, only the letters of thanks written by those saved from the shipwreck were made public, not the list of those who drowned.

So there are many different influences on which science is dependent and it is important to know what they are. Because of this, we must create transparency and talk about it. The most important questions to a scientist are therefore: why was the investigation started, what was investigated, what was found out and what does it mean? This approach to communicating with scientists, whether as a politician or a colleague, is actually quite simple,

but is not always a given. The relevance of questions posed by science is often not considered at all and, because of this, investigations are frequently carried out which are irrelevant or have totally different, non-scientific purposes.

In many cases, the study is not designed properly. Furthermore, access to the results of the study and the details are sometimes not given. There may also be errors in the results report. Chalmers points out that 85 per cent of clinical studies bring no new scientific knowledge. That is a huge waste of resources which does not get us anywhere.

There are service providers, for example, who advertise that they can deliver a scientific paper with the results the sponsor wants. The alteration of the critical standard value for cholesterol shows which economic interests can be at play in such a move. Since the standard value was reduced from 240 to 200 milligrams of cholesterol per decilitre, the proportion of patients to whom the industry can sell lipid-lowering drugs has increased by 86 per cent. I myself took part in the European Council investigation into bias at the WHO concerning swine flu. How come a completely normal flu was built up to be a pandemic and who play a role in this? The unnecessary purchase of Tamiflu and vaccines cost the public coffers 18 billion euros – a shameful story, in which official institutes in Germany also came put with egg on their face. In hindsight, we cannot even say for sure if we were conned, or whether completely false data was used as the basis for these extremely costly wrong decisions.

Futurology institutes remind us that, in the various fields that influence our society, there are many imponderables where we have to quickly fall back on reliable scientific research. If science fails as the compass for politics, then we will quickly find ourselves in trouble. It is important here to understand the different questions posed by each target group. A company, an investor or a politician will want to know the risk attached to their decision. The public has a different point of view. They do not decide, they ask if they are in danger. These different types of questions are very important when considering risk assessments.

Transparency International has set itself the goal of fighting corruption. We define corruption as the abuse of trusted power for private gain. As far as science is concerned, we must first of all ask the question: what has been entrusted to science? The answer will tell us if we can talk about corrupt science or not. Corruption or no corruption – it sounds very pithy when we put it like that. I find it better to speak of conflicts of interest, to call these interests by their proper names, and to analyse which interests have ultimately gained the upper hand. An institution's primary interests are based on its remit; its secondary interests are of a financial nature, or concern career interests, reputation, number of publications and whatever else might play a role. What we need is the transparency to be able to judge whether the entrusted role is being fulfilled. Without transparency, there is ultimately only hope. That is of course not enough.

Science has often led us astray in the past. Let me remind you of an embarrassing entry in the minutes of the Standing Conference of the German Ministers of Education and Cultural Affairs. The ministers are considering how they can prevent the punishment of higher education institutions when they serve as scientific institutions for industry. The conflicts involved in the independence of universities from third-party funding are indeed very complex; we are currently investigating this subject in a working group which is proving very

popular, even among sceptical students. I hope that the issue of independence of science will be discussed more thoroughly throughout Germany.

Such a discussion would also be desirable on a European level. A semantic analysis of research framework programmes from recent years analysed how frequently the words “competitive”, “business” and “economy” occur compared to “democracy”, “civil society” or “human rights” and other similar terms. The economic aspects of research funding are currently paramount on European level. For the European Union, science is something that will make it more economically competitive. That means science is an economic instrument. The EU’s primary interest lies not in the search for truth, but rather in becoming more competitive on an economic level compared to other economic areas in the world. This is an issue that needs to be discussed, also on European level.

A vehicle’s brakes must be good enough for it to come to a stop in time, even when travelling at high speed. No matter how powerful the engine may be, if it does not fulfill this safety requirement, then it is – simply put – a bad car. Unfortunately, the economy often only has short-term interests and considers research into risks to be distracting. For this reason, we demand that it becomes compulsory to publish all commended clinical studies. Such a process would be perfectly possible if, for example, all studies authorised by the German Ethics Committee had to be recorded in a publicly accessible register. The European Medical Agency (EMA) has just had to do this because the European Parliament’s budget committee demanded that access to drug licensing studies be improved. Even the EMA has held back studies on the pretext that economic interests of companies were involved, something which, on closer inspection, proved to be untenable.

We also demand access to all data, including the unpublished raw data and the study protocols for the regulatory authorities. The American regulatory authority FDA already does this, and much more rigidly and drastically than here in Europe. In the case of Tamiflu, for example, the EMA referred inquiries to the company involved; the company in turn is waiting until the patent has expired, and will maybe then cough up the data. Science plays no part in any of this. Our research system is in great danger because we have little public interest in knowledge without bias. For that, we need to spend more. We cannot simply leave this field to those who want to exploit it for their own gains. Thank you for listening.

Discussion:

Moderator: Thank you very much, Mr. Wodarg. I found it very helpful that you grasped this hot potato. I also noticed that you used a lot of examples from the pharmaceutical industry. Is the situation there transferrable to other sectors?

Dr. Wodarg: The reason I chose these examples is that the health sector is the sector in which I have observed events most closely. Some of the experts in our new working group will also be looking at other areas. Agrobiology is another sector where there are problems. I also know that there has been considerable bias in energy research. And as concerns the financial industry, there was a secret agreement between the Humboldt University and Deutsche Bank, for example.

Question: Are your accusations also directed at this institute?

Dr. Wodarg: I cannot say anything about the modus operandi of the BfR without first carrying out a thorough investigation.

Moderator: Thank you.

Panel Discussion II: How Independent Can Science Be?

Participants:

Dr. Thilo Bode, Managing Director of foodwatch e. V., Berlin

Dr. Holger Brackemann, Stiftung Warentest, Berlin

Prof. Dr. Matthias Horst, German Federation of Food Law and Food Science (BLL), Berlin

Jutta Jaksche, Federation of German Consumer Organisations (vzbv), Berlin

Dr. Gerd Romanowski, German Chemical Industry Association (VCI), Frankfurt

Prof. Dr. Reiner Wittkowski, Vice-President of the Federal Institute for Risk Assessment (BfR)

Dr. Wolfgang Wodarg, Transparency International Deutschland e. V., Berlin

Moderation: Dr. Patrick Illinger

Moderator: The term "moderator" has two different meanings. It is not only used to describe someone who presents the programme of an event but is also used in a technical context. In a nuclear power plant, the moderator is the material between the fuel rods that prevents a nuclear power plant from turning into an atom bomb. Let me say to those of you taking part in this discussion – I hope you are the fuel rods today.

My first question is for you, Dr. Bode. I had a colleague I held in extremely high regard who regularly asked his editor: what are we missing at the moment? The key factor was not what was going on at the time, or what his colleagues were writing about, but what they were missing at that particular moment in time. Organisations like yours focus strongly on individual issues, be it dioxin, BSE or an oil platform in Mexico. Do you not run the risk of failing to see other issues?

Dr. Bode: Let me first say something about the stakeholder statements that have been made today. In our opinion, there is no such thing as independent, seemingly neutral, objective risk communication. This is an extremely important point. This morning, for example, Mr. Horst said it was good that they said there was no danger during the dioxin crisis. This is of course wrong. It all depends on the assumed preconditions and the value assumptions. It may be the case that we can have terrific debates about threats and risks, but we must always ensure that the basis for any assessment is transparent. Regrettably, this was not sufficiently the case in the dioxin communications of the BfR. The dioxin incident can be assessed totally differently and just as validly. This was not a case in which we were dealing with an objectively neutral state of affairs.

As to your question: we naturally make a political decision, and we take the risk that we will be accused of not addressing the key issue. We are just as much an interest-representing body as Professor Horst's BLL, the only difference being that we represent not commercial interests but what we see as being the public good. We offer our findings to society as a kind of information service, and a decision is then made by the politicians. And we naturally accept this decision.

Moderator: Mr. Brackemann, does Stiftung Warentest sometimes have the feeling that it is losing what used to its generally accepted role of promoting consumer safety when compared to other consumer magazines?

Dr. Brackemann: No, absolutely not. Our aim is to inform the consumer about the differences between products by providing information that is underpinned by a valid scientific foundation. If we report on substances, for example, then we need robust information on the potential hazards of these substances before we can draw up an assessment. We can talk long and hard about the risk assessment per se, and this is an extremely complex process, and often one with many gaps. Based purely on the principle of precaution, we award better ratings to products that refrain from using certain hazardous substances than to products that do not. Nevertheless, we need a scientific basis for our assessments, and this is something that is missing in some of the other test magazines.

Moderator: That is a view from the inside. What interests me is how you respond to the fact that your end consumer, the public, is not at all interested in this scientific basis? Some people trust foodwatch and Greenpeace more than they trust a federal agency or other bodies. Do you sometimes feel unfairly treated by the public?

Dr. Brackemann: No, the majority of the population is not only familiar with us but also trusts us and the work we do. I have provided the figures today that support this. We have to repeatedly earn this trust anew, of course. At the same time, however, we are in a position to occasionally publish a report that runs counter to perceived consumer expectations. Let me give you an example: One oft-discussed buzzword is taste, the sensory properties of organically produced foods. Many people believe they can taste the difference compared to conventionally grown foods. And, of course, we are not talking about contaminant levels here. Using the established technical and scientific methods, we performed comparative tests and found no differences in the majority of products. We naturally have the confidence to publish these findings, and I believe that in this way we succeed in influencing the public debate on such topics.

Moderator: Professor Wittkowski, how do you deal with this role of referee?

Prof. Wittkowski: We would be ill advised to define our role as that of a referee. We are requested or commissioned to submit a risk estimation, in other words to assess the probability with which damage will occur. It is not about taking action when someone has the impression that a test report in the Ökotest magazine has arrived at an incorrect assessment. And we did not evaluate the Séralini study because we were of a different opinion than the authors but because we would have to rethink our entire assessment system if the study proved to be scientifically valid. This is why it is important to assess the validity of this study based on scientific criteria, and to evaluate whether or not it is accurate, based on the way in which it was conducted.

Moderator: Ms. Jaksche, do you not despair of the often contradictory and frequently extremely emotional behaviour of the consumer? On the one hand, they eat junk food; on the other hand they are up in arms every time the media report on contamination in food products. In your presentation, you portrayed the consumer as someone who needs all this scientific information in order to react appropriately to the prevailing lack of knowledge. But it seems as if this is something the consumer is incapable of doing and unwilling to do.

Jutta Jaksche: Consumers are not a homogeneous group, and we feel a commitment to cater to the diversity of consumer interests. On the one hand, some people need detailed information as a basis for everyday decisions. At the same time, others are served better by fast support directly in the marketplace. We will always have a mix of different instruments for consumer information. It is still the case, however, that even interested and committed consumers find it difficult to obtain the information they need in the market itself. That is why we want to persuade the policymakers to make these instruments available.

Moderator: Yes, but is your work not sometimes driven by the sudden outbreak of highly emotional debate?

Jutta Jaksche: We naturally also have to take a stance on issues that do not appear to be particularly relevant from our perspective. But if the consumer sees problems, we are under an obligation to provide an answer. It is not appropriate to devalue consumers as not being responsible enough due to their purchasing habits. We try to determine why consumers act as they do, and to find out what motivates them. Buying products from a discount outlet may well be a highly rational decision from the consumer's point of view, for example. The cheaper supermarkets often sell quality food products at lower prices with more or less the same quality as brand name products. This is also a form of transparency to which consumers react. We want to make things easier for consumers and pick up on the products and services that they actually want. It's not right to say that one consumer is less responsible than another because of the products he or she buys or where they shop. The market offers a huge range of purchasing opportunities, and it is important that consumers can obtain information to help them make informed purchase decisions.

Moderator: Dr. Bode, is this also how you see it?

Dr. Bode: I fully agree with Ms. Jaksche. As economic players, consumers behave quite rationally, as all they can do is exercise their individual rights. We need to protect their

individual rights and their interests, but we cannot impose any collective obligations on them. Issues relating to livestock management, climate protection and so on must be resolved by political means.

Moderator: Let me formulate the question in a different way. The proportion of their income that households spend on food and nutrition has fallen massively in recent years. The main expectation in Germany is that food must be cheap. But then there is a scandal, and everyone gets upset about industry and inadequate food monitoring.

Dr. Bode: It is understandable that consumers get upset, because they cannot do anything to protect themselves against risks. In contrast to the situation with other everyday goods, they cannot see the risks of food products, and they are not in a position to assess the quality of these products. That is why we describe food products as "confidence goods", where transparency has to be ensured in the market by the intervention of the state. By the way, the relative decline in food prices is also connected to rising incomes. The quality criteria for food products must be defined by the state so that consumers know they are buying quality. This is extremely important.

Moderator: So it is not that consumer pressure for cheap food products possibly results in inferior products being brought on to the market? The two are not connected?

Dr. Bode: It goes without saying that a cheap piece of meat must be just as safe as an expensive one. You also expect a Polo to be as safe as a BMW despite the difference in price. It is disastrous if inadequate quality standards trigger a downward price spiral. This must not happen. It is too important to ensure that the consumer can clearly recognise differences in quality. After egg labelling was introduced, for example, sales of battery-laid eggs fell significantly. But there will always be consumers for whom quality is totally irrelevant.

Jutta Jaksche: If I could add something: we found out in a consumer research study that there is a lack of dependable guide labels. Take animal welfare, for example. 20 per cent of consumers want products from livestock management systems that are geared towards a higher standard of animal welfare; yet such products account for only around two per cent of the food products on sale. It is often argued that consumers interested in a higher standard of animal welfare can choose to buy organic products. Our response is that, no, this is an area in which we need to accommodate consumers for whom this benchmark is too high. Unfortunately, the policymakers have not been able to arrive at legal regulations that ensure greater credibility. The idea of an official animal welfare label is still rejected at EU level. If this idea had been pushed through by the EU, then the accusation of competition distortion would also no longer be valid. The suggestion was also turned down flat at national level. The German Animal Welfare Association is now going ahead with a two-tier label. The aim is also to implement the findings of the European "Animal Welfare" project in practice. In our opinion, the official bodies have failed to respond appropriately, because they do not listen to what consumers want.

Moderator: Professor Horst, I was surprised when you said that it is perfectly acceptable if someone who is on the payroll of a company in the food industry also plays a key role at EFSA. Are you not looking at the issue through the eyes of the companies? Or is there a lack of understanding on your part that this sends the wrong signal to the public at large?

Prof. Horst: It is sometimes very useful to have an inside view of things, and I have seen how EFSA works from the inside for more than ten years. I am by no means trying to promote the idea that the members of the scientific panel should come from industry; and neither is this the case. But it is only natural that some of the experts from universities or other institutions have links to industry. A reluctance to engage in this area is the totally wrong strategy, as this negates the situation within society.

Moderator: But what about experts with industrial consulting contracts?

Prof. Horst: All I know is that the proposals for members of this panel are reviewed on the basis of extremely strict criteria. I know of one case where someone who had had past job-related contact with additive producers applied for the panel and was rejected for this very reason. I can give you a further example: an EFSA member bought a house in the south of France with a garden and 100 vines. He listed these vines in his "Declaration of Interest", because it might have been thought that he had connections with the wine-growing industry or wine-growing federations. These things should not be taken to an extreme where the criteria dissuade experts from wanting to work on these panels in the first place.

Moderator: So what is the basis for reports in the media about an expert who has a consulting contract with the Kraft company and holds an influential post at EFSA. This does not exactly sound like small fry.

Prof. Horst: I am not aware of this case. I am only defending myself against personal attacks just because I was on the board as a lobbyist for ten years, although the involvement of associations is stipulated in the regulations. I made huge efforts on behalf of the independence of EFSA, also its independence from the political powers-that-be. In this connection, allow me to remind everyone that, five years ago, the then Minister Seehofer tried to thwart EFSA by officially proposing the creation of a Supervisory Board attached to the Council. This would have meant that scientists were dependent on the Council, and that would have been the end of EFSA.

Moderator: I am not talking about you but about employees of EFSA. You say there is no de facto influence. But what is also important is the impression of outside observers. You are familiar with the public reaction in Germany, for example, when politicians are given low-interest loans by friends.

Prof. Horst: But it can't be the case that a scientist loses credibility if he or she has contacts with industry in any shape or form.

Moderator: I would not go that far. I am talking about contacts where someone who is already paid from the public purse earns some cash on the side by acting as a consultant. This creates the impression of dependence.

Prof. Horst: Who is responsible for value added? Not you, not me, but all the things that are created or produced here in Germany, in industrial companies, for example, or in the service sector. Much of what you are demanding can only be implemented using tax revenues that are directly or indirectly generated by industry. That is why I totally reject the notion that everything connected with industry is criminalised and criticised as profit-driven.

Moderator: Mr. Romanowski, as the second representative of industry on the panel, you said before that science is only good science if it is free and can publish its findings freely. But the problem faced by scientists in the companies is precisely that they are not free to publish their findings. How do you resolve this contradiction?

Dr. Romanowski: I did not talk about freedom to publish and free science but above all about compliance with quality standards, at least in scientific investigations looking into the safety of products and potential associated health risks.

Moderator: Nevertheless, I would like to ask whether you agree that science should be able to publish its findings freely to ensure that it is autonomous?

Dr. Romanowski: Yes, I agree in principle.

Moderator: How do you respond to the fact that it is sometimes or even often the case that studies carried out by industry never find their way into the public arena because they did not supply the desired results?

Dr. Romanowski: In the case of the chemical industry, the law clearly states which data and studies a company must submit if it wants to produce or import a chemical substance. The annexes to the REACH regulations clearly stipulate the toxicological endpoints of the studies. ECHA receives not only the evaluations of these studies but also the original data. Based on these materials, ECHA compiles an excerpt – this is what the law says – and publishes it on the Internet so that it is accessible to everyone. Industry cannot bypass these requirements or withhold information. I am not sure what you are trying to imply.

Moderator: I personally know people whose job is to support the pharmaceutical industry when a study is in danger of not arriving at the desired result. Is this not the same in the chemical industry?

Dr. Romanowski: Certainly not to my knowledge.

Moderator: Mr. Wodarg, help me to understand this. Is there a difference between industrial research and publicly funded research?

Dr. Wodarg: The findings that science produces for industry are assets expressed in the form of patents underpinned by the confidentiality of data that belong to a particular company. This is not knowledge that belongs to society. Industry itself attaches great importance to being able to depend on the research it commissions. In other words, it has an interest in good research, but this is not the kind of knowledge that is useful for society as a whole. Industry has economic utilisation and its own interests in mind when it commissions research findings.

Moderator: In your statement, you mentioned the case of Roche and Tamiflu. You represent the chemical industry, Dr. Romanowski. Are things completely different than in the pharmaceutical industry?

Dr. Romanowski: What kind of research does the chemical industry engage in? On the one hand, the research has the legitimate goal of developing new products and processes that will be successful in the market. This research is conducted in the companies' own interest, with the aim of remaining competitive, opening up new markets, launching new products and generating profit. This form of research is company-funded. If the research is particularly high-risk, there is a small contribution of public funds. The Federal Ministry of Education and Research has programmes in place for this purpose. Wherever this research is supported with public funds, there is an obligation to publish. But it goes without saying that research geared towards securing patents or intellectual property is not freely accessible.

Dr. Wodarg: You are describing economic commodities.

Dr. Romanowski: Yes, companies who fund expensive research to optimise their products or develop new products naturally have to protect themselves against other companies immediately copying these products and bringing them on to the market at zero cost. The cost of research has to be recouped. This is a normal process. The chemical industry is a highly innovative sector and spends a huge amount of money on research – just under nine billion euros a year in Germany alone, of which by the way only a few ten million are public funds. The remainder is financed by the companies' own revenues with the aim of sustaining competitiveness on the world markets. Then there is the kind of research you are talking about which focuses on the safety of a company's own products.

Moderator: Efficacy also plays a role in the pharmaceutical industry.

Dr. Romanowski: This applies to every product. No one is going to bring a medicine that does not work on to the market.

Moderator: If it generates 6.3 million in sales, then that is perhaps an incentive.

Dr. Romanowski: All I can say for the chemical industry is that research into product development is designed to achieve better products or better techniques, and to therefore help to maintain or increase a company's competitiveness.

Question: I am head of the Safety in the Food Chain Department here at the BfR. I would be grateful for a clear statement on the topic of "non-published studies". Let me use the example of food or feed additives. Everyone in this segment is well aware that the effect of a substance depends on the starting point of the animal or human in question as well as on the hygienic conditions. This means it is possible to positively influence the study findings by selecting suitable starting conditions. We find there is often a lack of any description of the starting point and the study conditions.

Dr. Wodarg: In order to assess such a study, the first thing you have to do is to assume that it has been conducted by someone who wants to bring a product or service on to the market, in other words by someone who wants to earn money from it. There are regulatory authorities who decide on eligibility for approval; the company knows which requirements it has to meet for approval and the mistakes it should avoid to ensure that the approval is not put at risk. This naturally has effects. On the one side are the policymakers, who want to stay in power. They are interested in ensuring that a newly developed product does not cause any

damage for which they could well be blamed by the electorate. That is why they create institutes like the BfR. The BfR is not independent but acts as a service provider for the political powers-that-be.

All research establishments, whether in industry or politics, operate on the basis of scientific criteria. They cannot afford to work unscientifically, because their findings would lack the necessary scientific quality. Nevertheless, the publication of study results is in the interest of the client in question. If we want society as a whole to function properly with industry, politics and all the other things that are part of it, then all these subsystems always need to be able to rely on the common medium of "knowledge" when they communicate with each other about science. This is the basis of what we are talking about here.

Dr. Romanowski: With regard to food additives, the basic rule is: everything is prohibited unless it is approved by the authorities in accordance with the legal regulations. If you want to use a chemical additive in a food product, you have to demonstrate to the competent authority – EFSA in the case of Europe – what effect this substance has, what the reason is for adding this substance to a food product, and whether its use in food is safe. To this end, the producer has to provide a data set as defined in the corresponding regulation on food additives and forward studies and measuring data to the authority. The authority then assesses whether this forms a sufficient basis for the approval of this substance. All the legal regulations are therefore fulfilled, and nothing is withheld. So I do not understand the question.

Question: I know all about the approval procedures. I am talking about the studies that are carried out but not submitted and not published because they did not supply the desired result. But science is still interested in these studies and in the question of why they did not supply the desired result. This is the question I would like you to address.

Dr. Romanowski: But how do you know that such studies exist if they have not been published? That is pure conjecture. I do not know which cases you are referring to.

Statement (from the audience): I work in the approval of pesticides, and I have a certain insight into the assessment process in this field. We are often surprised by the fact that studies are submitted to us years or sometimes decades after they have been carried out. This would not be allowed if the studies had to be published immediately after they are conducted. It is the same with pesticides that all the documents have to be submitted to obtain approval. I am not necessarily saying it is intentional. Sometimes the studies might not have been needed at the time but were carried out anyway, and are then only made public when someone actually asks about them or when we request them. Not all studies are legally required at all times. But some studies are conducted in the early phases. Perhaps companies sometimes fear a product might result in problems under certain conditions and simply decide not to submit the data at the time. We are certainly aware of cases like this.

Moderator: Professor Hensel, what is your opinion of this?
Prof. Hensel: This exclusive focus on industry is not particularly helpful. As a scientist, I myself have conducted studies that I have not published. You imply that there is always a specific motivation behind the decision not to publish a study. You may be right, but I do not think Mr. Romanowski is the right person to defend this practice. Mr. Wodarg has adequately

described the motives that can result in study data being withheld. It certainly happens that we are told "off the record" about study results that existed at the time of the approval decision but were not submitted. This is something that is difficult to verify, however.

Dr. Romanowski: But the deciding factor is what is legally stipulated and required. The companies have to meet these requirements. And everyone stands by this. That people break the law is a generally known phenomenon in society. Murder is also forbidden, but hundreds of people are still murdered in Germany every year. Of course the companies have to present all the necessary data if they want an approval. If we want to impose stricter rules, then the legislative needs to change the laws or demand more studies. But we have to have legal predictability about what companies have to submit. We cannot just base things on speculation.

Dr. Wodarg: When we talk about science, we talk about trust. Trust has something to do with the possibility of monitoring. If both sides know that the other side could be monitored at any time, then there is no need for monitoring. We must think about how to organise the structures so that the process is less complex. Whether or not we are an efficient society depends on whether we succeed in creating this trust.

Prof. Wittkowski: There is naturally a legal framework that has to be complied with, that is clear. The job of the BfR is to assess the details that have undergone scientific validation, in the form of publications for example, and to determine the status of knowledge in the field in question. We cannot assess studies we do not know about or that have not been submitted. The main point, however, is that we are regularly faced with the accusation that approval studies are funded by industry and that it is therefore impossible to exclude the possibility of bias. In mid-September 2012 we held a conference here about crisis management and crisis prevention at which Mr. Poudelet from DG Sanco was also present. We also talked about trust and independence. This prompted the suggestion that we might spend EU funds on a pilot study designed to repeat the studies that played a role in the approval of a chemical substance, for example, or a pesticide – to establish whether the study data can be reproduced. This would build trust in the entire system, also in industrial research, which is a key element in the whole process. I think this is an excellent suggestion.

Dr. Romanowski: This is an excellent idea that we should certainly pick up on.

Jutta Jaksche: I would like to add a few words on the subject of approval. We say that the submitted documentation must be scientifically tenable in order to legitimise the approval. But what about the political mandate of the approval committee? The committee has established an approval procedure based on certain rules, but there are also cases where substances or products are approved during this process, which violate EU rules. One simple example is transglutaminase, an additive that can cold-bond pieces of meat together; it is used in the production of reconstituted meat, but this can ultimately result in the consumer being misled. This point is not criticised in the approval procedure. I could mention other examples, such as the multiple residues in pesticides. Processes are lacking to monitor whether the system is still geared towards the interests of the consumer.

Moderator: Dr. Bode, would you like to address both points, the independence of studies and dealing with conflicts of interest?

Dr. Bode: If a substance is approved, it does not mean by a long stretch that everything is then proper and correct. REACH represents major progress in the assessment of chemicals, but the chemical industry fought it for many years. It was quite a battle before the precautionary principle and the reversal of the burden of proof were applied to chemicals; and implementation still presents a major problem when it comes to additives and foods. There are, for example, additives that are strongly suspected of triggering ADHD; the only condition for their approval is a reference to this effect on the packaging. If the precautionary principle was applied, then these substances would have to be banned.

The main problem, however, is the communication of risks. As Mr. Wodarg said, everything is based on political value judgements. There is no such thing as the purely objective truth. This also applies to the communication of dioxin contamination. So the BfR cannot simply say there is not any danger. Your statement is based on the consideration that the intake of dioxin through eggs is below the admissible daily tolerable limit of two pictograms per kilogram of bodyweight. But we also need to communicate that there are sections of the population who already exceed the admissible maximum intake for dioxin and in the case of whom it can be assumed that any additional dioxin burden is extremely dangerous. Your communication has a significant influence on the legal prosecution of offences in the feed sector. If you communicate the message that there is no risk, then no one will be convicted either.

Dr. Romanowski: Dr. Bode's claim that the chemical industry fought the introduction of REACH is incorrect. We never objected to REACH, only to the way in which it was to be implemented in practice. Some of our suggestions for improvements were taken into account, others weren't. On the whole, however, we are very happy with REACH and are working to implement it.

Dr. Brackemann: Many products have already been tested by the producers. If these tests are repeated by an independent institution, the results are not automatically identical. But I think this kind of monitoring function is extremely important. I would like to say a few words about product safety. All the time, we have been talking about legal procedures and the requirements for submitted studies. But I do not think this goes far enough. The independence of science also means independence in the choice of topic. We have recently seen quite a few examples of cases where certain endpoints or contaminant concentrations were not legally regulated. There always needs to be someone who keeps an eye on these parameters so that we can decide on new rules and updated regulations.

Prof. Wittkowski: Dr. Bode, that is the third time you have mentioned the communication of the BfR on the dioxin case in 2010/2011. I do not think we can accept your statement as it stands. In your presentation, you correctly quoted BfR President Professor Hensel, who was referring to a worst-case scenario and said that there was no acute health risk or added risk to the consumer under these conditions. All the employees of this institute and all the scientists who dealt with this issue came to the same conclusion. It is important to know that, at the end of the 1980s, when dioxin assessment began, the limit values were deliberately set extremely low at the level of the background presence in order to be able to minimise this substance in the environment. And we have succeeded in doing so. The legal measures, such as the installation of filter systems in incineration plants, refuse incineration plants through to crematoriums resulted in a reduction of background presence as well as the body

burden among the population to practically 20 per cent. We should not forget this. If you were right and Professor Hensel wrong, then you should really advise people against eating organically produced eggs – as they tend to have a higher dioxin content due to the fact that they absorb this background presence from the environment.

Dr. Bode: You are quite right about organic eggs. We have often pointed out the higher burden, and this has also made us unpopular with the people who market organic eggs. But the assessment of the dioxin crisis is not about who is right and who is wrong. It is about the underlying assessment criteria. If we assume that there is already a section of the population that is exposed to a dioxin burden exceeding the valid limit values, then you cannot send the message that there is no health risk when we are talking about toxins with a long-term bioaccumulative effect. I think that is extremely reckless. There is no such thing as objective scientific truth in the assessment of risks.

Prof. Wittkowski: In its most recent opinion, the BfR stated what has also previously been the case: the aim is to achieve the greatest possible minimisation. The dioxin incident two years ago was basically due to criminal activity. In other words, there was a criminal offence.

Dr. Bode: That still is not clear.

Prof. Wittkowski: A legally applicable limit value was exceeded. For this reason alone, these food products may not be sold for consumption. All this basically has little to do with the overall problem of dioxin; the strategy of limit value minimisation has been a complete success, not just scientifically but also politically. The dioxin case is a model example of precautionary consumer protection.

Dr. Bode: Your communication practice is certainly not a model example of precautionary consumer protection.

Prof. Hensel: This is an interesting debate, Dr. Bode, and I am happy to continue. We will gladly offer you a forum for your ideas. There is also another aspect that I think is of interest. You talked about the concept of precaution and said that our risk communication plays things down because it outlines scientific facts without taking the precautionary idea into consideration. You went on to say that this makes it more difficult to implement effective health protection. This point of view calls our entire institute into question. Because precaution is not a scientific dimension – but the response of policymakers to dealing with the lack of knowledge. There is no precautionary principle in science. How would you react as a politician or an NGO if you are presented with an assessment that already takes account of the precautionary principle? A scientific assessment incorporating this kind of pre-judgement would leave the policymakers no leeway at all to decide on political measures. In principle, I think the objection you raise is a legitimate political demand, but it has nothing to do with the scientific evaluation of factual information.
You also introduced the concept of "safety", meaning safety as an acceptable risk. You're right in saying that acceptability is always a societal category. It's not about the actual risk but about a successful construction and representation of the risk. I admit that describing a risk in such a way that people are or at least feel safe is a complicated matter for us as scientists. But it's nevertheless part of our mandate, that's why we are an assessment authority. But we perform this task within the context of scientific boundaries. In other words, we don't talk

about the precautionary principle, we don't say we don't want to take any risks, but we specify the safety corridors. This is a scientific way of proceeding.

Dr. Bode: Mr. Hensel, the application of the precautionary principle naturally influences the evidentiary process as it reverses the burden of proof. You cannot dispute that this obviously has something to do with science and above all with the communication of scientific findings.

Prof. Hensel: This debate has been going on for a long time. The precautionary principle was introduced for political reasons, because it was thought there would be situations in which we would have to deal with hazards that had not yet been scientifically verified. So this precautionary idea was introduced by the policymakers, under extremely strict conditions. We apply it where there is also a significant lack of knowledge among scientists. But its application remains a political decision. There is no precautionary principle in science.

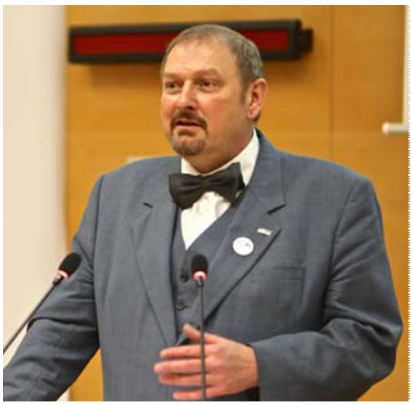
Dr. Bode: The precautionary principle is a political decision that influences the scientific evidentiary process. This is a topic I would be happy to discuss.

Moderator: I would like to thank the panel for the discussion, the attendees for coming to listen to the discussion, and the organisers for the smooth running of the event. Thank you very much.

Final Remarks

Professor Dr. Dr. Andreas Hensel,

President of the Federal Institute for Risk Assessment (BfR), Berlin



Ladies and Gentlemen**,**

The President does not always have the last word, but I do today. May I say that it was a special privilege and an intellectual pleasure to engage in debate with you. During the last one and a half days I have gained many new insights that have given me food for thought. And for this I would like to thank all the speakers, whose contributions ensured that this has been a stimulating conference.

The appeal of the event was that it allowed the presentation of the various points of view: we have heard that there are many different ways of explaining things, and this gave rise to stimulating discussion. Open debate is part and parcel of frankness and transparency. This means that criticism is also voiced, above all with regard to concepts and definitions. Lao Tzu said that chaos begins where the terminology is incorrect. This is why it was important to address the aspects that determine the independence of science. I found the question of whether science is autonomous or autarchic, and the principle of the better argument, very interesting. In the last discussion, we also learned how important it is to take the context of the proposed arguments into consideration. I found it extremely stimulating to hear all these arguments.

I am delighted that such a diverse range of speakers accepted our invitation. It is not every day that we have the opportunity to welcome the Interim President of the German Bundestag to our institute. Then we heard the different perspectives of the international speakers: Mr. Pielke, for example, who addressed the desire of the politicians for less complexity, or Ms. Glover, the scientific advisor to Mr. Barroso, who asked whether politicians should not be at least as transparent in their actions as science. I would like to broaden the scope of this request: it should apply to everyone who is active in our field. Even if you work in industry or in an NGO, you need to accept that people ask about your mandate. The BfR is in a comfortable position in this respect, as our remit is defined by law.

Our opinions are not always universally popular in industry. Sometimes it costs money to implement our recommendations, and this is difficult to communicate within the federations and associations. Ms. Geslain-Lanéelle supplied excellent examples of this, and Mr. Krämer told us that the same debate over the credibility of decision-makers is also being conducted in other sectors. Mr. Hacker reminded us that we have many tools at our disposal, including instruments like the academies. And the final presentation by Professor Hennecke showed

us that we can take highly specific measures to secure independence and achieve transparency. According to Mr. Grunwald, one of the most important measures is to make every scientific step along the way traceable and logical. This applies equally to industry.

I think it was important that we engaged in controversial debate, and I would like to thank you all for your contributions.