



**Excerpt from the**

**Proposal for Support of a Professorship**

**“Science and Technology for Peace and Security”**

**at Technische Universität Darmstadt (TUD)**

(to be funded for a 5-years-starting period)

March 9th, 2007

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## **Professorship “Science and Technology for Peace and Security” at Technische Universität Darmstadt (TUD)**

### **1. Scientific objectives, political urgencies, and institutional needs**

It is well known that scientific progress has always been characterised by ambivalences, among which the civil-military ambivalence is of utmost societal and political concern. We are convinced that dealing with these concerns has to start with academic education and research, thus creating awareness for the underlying fundamental problems and setting the developmental course for dual use technologies. These findings will then serve as policy advice within the societal discourse. To enable this kind of input from academia there is a need for scientific institutions working at the interface of science, policy, and the public. The best approach to organise independent advice for the public arena and simultaneously to ensure sustainable impact within the academic system of education and research is the establishment of dedicated university chairs.

One of the most challenging problems national and international policies and also science faces refers to the existence and emergence of weapons of mass destruction (WMD). More specifically, natural science based peace and security research should contribute to the stabilisation or reform of international regimes dealing with these issues. In this respect, besides striving to positively influence the dynamics of science and emerging technologies one also has to try to limit the negative impacts of existing modern technology. This should be part of a strategy of preventive arms control taking into account scientific-technological dynamics and aiming at new and more effective ways of non-proliferation and disarmament.

In recent years, the role of European initiatives in striving to reduce the threat of WMD has increased (e.g. in the frame of G8 activities). At the same time, the linkage of this threat to risks associated with scientific-technological progress and existing know-how in related fields has become more obvious. This emphasizes the need for contributions from European research centers to analyze the impacts of science and technology, to give

policy advice, to raise public awareness, and to find ways to use science and technology for curbing the threats. In this regard, Germany is of special relevance not only because of its high technological standing but also - and particularly - due to its internationally binding commitments to renounce all possession of weapons of mass destruction, as well as research carried out with the intent of developing and producing such weapons. Its present and future role in mediating between the “haves” and the “have-nots” could well be reflected and strengthened by appropriate research.

In Germany a small but dedicated research community working in this field has developed over the last two decades. However, it had not obtained a sufficient stability, while in other countries, especially in the US, dedicated university chairs have been established. The situation in Germany has been considerably improved by the recent installation of the Carl-Friedrich-von-Weizsäcker professorship at University of Hamburg. This has been achieved due to the engagement of the German Foundation for Peace Research (DSF). Already since 2004, DSF has continuously expressed its strong interest for a second dedicated chair located at the Technische Universität Darmstadt (TUD)<sup>1</sup>. However, DSF also said that due to lacking financial resources this could only be achieved in terms of a joint effort of several funding organisations.

This project is based on the underlying conviction that natural science based peace research and teaching must be institutionalized in a sustainable manner at universities. Only in this way can truly independent research be carried out, can a new generation of young scientists be introduced to the field, can awareness be raised by teaching multipliers, and can the huge multidisciplinary potentials at the universities be activated. In this manner, the most honest approach to the broader public and to decision makers is possible. Although scientific input and policy advice on a short term scale will of course be provided, the intended fundamental strategy research based on facts of natural sciences aims for a long term impact which makes a difference to the work of think tanks close to the government or of other policy advisers.

With this proposal, TUD is applying for funds enabling the establishment of such a professorship which will fully be taken over by TUD after 5 years. According to the

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<sup>1</sup> Darmstadt University of Technology

introductory analysis given above it should be entitled “Science and Technology for Peace and Security”.

## **2. Project description and outline of scientific profiles**

After assessing global urgencies, TUD envisages the establishment of a dedicated chair “Science and Technology for Peace and Security”. The expectations upon the professorship is manifold: Strengthen existing activities and stimulate new activities at TUD; train a new generation of natural scientists to provide policy relevant expertise; evoke awareness of the underlying scientific-technological ambivalences within the younger scientific generation and among colleagues; help to improve public understanding and to provide policy advice. The professor to be nominated will have duties in research and teaching. Further – specifically for this project - he/she is expected to invest efforts in public outreach. (For details we refer to sections 4 and 6.)

Obviously, a clearly defined scientific profile is required for the professorship. For this purpose we identify topics which ensure that the outcomes of the work will have a significant impact on the most urgent WMD issues. Two potential profiles are considered to be most relevant and attractive. These two profiles, a physics and a biology oriented profile, could build on and profit from presently well established activities at TUD. Both would sufficiently differ from the Hamburg professorship already funded by DSF.

### **Physics profile:**

A physics oriented profile could focus on the impact of nuclear weapon usable materials to study their various production paths (reactors, neutron sources, enrichment and reprocessing technologies), disposal options (from immobilisation to special reactor use) and strategies to avoid civilian usage. The concept of proliferation resistance of nuclear technologies as an intrinsic, technology based measure for curbing the nuclear threat could be revitalized and studied in its details (research reactors, accelerators, enrichment technologies, fusion...) This requires the investigation of options for an adequate shaping of nuclear technologies that are involved. In turn, emerging nuclear technologies and

energy systems might also be taken into consideration. With this approach, which tries to clarify where and to what extent proliferation resistant shaping of nuclear technologies is possible, TUD believes to meet the core of the non-proliferation problem. As many cases show, e.g. the current debate on the Iranian nuclear program, there is an urgent need for innovative strategies dealing with the deficiencies of NPT, Article IV, which could not be solved with improved safeguards alone.

While the Hamburg professorship is concentrating on the verification of clandestine production activities, the Darmstadt approach would focus on the technologies involved which should be shaped in such a way that dual use potentials become minimized. Proliferation resistant shaping of nuclear technologies represents an important aspect of preventive arms control and thereby contributes to a kind of technical innovation which satisfies an urgent global need.

There will be a link to the brand new multidisciplinary TUD energy center which deals with shaping energy technologies and an energy system for a sustainable future. The professorship might contribute to questions concerning the overall assessment of nuclear technologies, including safety and environmental aspects as well as security aspects of resource usage.

Supported by the professorship, other important promising scientific aspects of peace and security research activities associated with this physics oriented focus could be undertaken as well. These could include the study of measures of preventive arms control related to emerging high technology of military interest (e.g. nano technology) or so called non-lethal weapons. Such activities will profit from existing research experience at TUD.

**Biology or biochemistry profile:**

A biology/biochemistry oriented profile could study, for instance, the potential impact of the explosive developments in science and technology on both the biological and chemical weapons (CBW) control regimes. In a corresponding research programme these biotechnological developments could be monitored and analyzed on a scientific basis as

to their relevance for the CBW regimes. In depth studies could include investigating the ongoing revolution in pharmacology (drug discovery and delivery), weapon related aspects of systems biology and synthetic biology, and the role of biochemical bioregulators as a new form of weaponry. Moreover, the potential misuse of nanoparticles should be studied (e.g. increasing the feasibility of delivery of agents over the nasal and respiratory tracts). Part of these activities deal with what has been called biochemical agents (agents that are chemical in nature but are produced by and affect the function of biological systems) and would thus profit from collaboration with colleagues in both chemistry and biochemistry.

The central issue addressed in all these topics is a better understanding of the risks of a new dynamics which might lead to an actual use of bioweapons (improved drug delivery, new tools for dissemination of biochemical agents) having serious significance for biochemical arms control. The close monitoring of developments in biotechnology, combined with risk-benefit assessments of these advances as they occur, can make a significant contribution to preventive arms control in the area of biological weapons potential. This approach, combined with considerations of adequate verification measures, could have a relevant impact on an improved BWC regime provided that the proposed strengthening of the BWC could get more international support.

These activities are decidedly different from the orientation of activities in Hamburg (confidence building measures, export controls, biosecurity, role of scientists in BW programs). Monitoring the accelerating pace of developments in science and technology and assessing their relevance for the CBW control regimes as well as how they may shape science and technology in general are not issues of focus in Hamburg. In addition, the Darmstadt professorship has the unique opportunity for working closely with the newly established center of radiation biology at the university to study the effects of radiation on biological systems at both the molecular and the systems level.

### **Interdisciplinarity:**

The subjects under consideration obviously require a problem-oriented interdisciplinary approach. In either area, based on the scientific work, the objective is to yield relevant

information and to provide practical advice for political action to counter nuclear proliferation or biochemical warfare, respectively. Both the disciplinary and transdisciplinary work to be carried out can well be based on the experiences and achievements of the Interdisciplinary Research Group in Science, Technology and Security (IANUS) of TUD. This character of the proposed professorship fits perfectly into the institutional strategy of TUD currently under development.

Both profiles discussed above and the overall research approach are built upon specific strengths of TUD, in particular its techno-scientific expertise and its tradition in “holistic” research which aims to tackle “scientific and societal problems in all its aspects”. This interdisciplinary concepts of shaping science and technology and preventive arms control underlines the specifics of the Darmstadt professorship as compared to the Hamburg one, while the envisioned Darmstadt profiles are truly complementary to the current Hamburg research foci.

To ensure from the very beginning the interdisciplinary character of the proposed professorship, a second affiliation with the social science faculty (FB 2 of TUD) is intended and essential. The choice between a physics and a biology/biochemistry oriented focus is deliberately not made before hand but should be kept open according to the spectrum of applicants for the professorship.

### **3. Background and previous TUD accomplishments**

For more than 15 years, research at TUD in the field of natural science-based peace research has been carried out. More specifically, in 1988 Volkswagen-Stiftung launched the foundation of IANUS by giving funding for a 5-years starting period. In 1993 IANUS got the status of a central unit of TUD. The IANUS approach and work fits well into the interdisciplinary TUD tradition and even strengthens it. Over the years, the disciplinary background of its members (professors, post-docs, PhD-students, candidates) comprised physics, biology, mathematics, computer science, economy, philosophy, social ethics, political science, and engineering.



Since its establishment, IANUS has been following a problem-oriented interdisciplinary approach: Starting from the perception of problems in real life (on societal or global strata) research efforts aim at appropriate scientific procedures irrespective of disciplinary limits or traditions. This leads to suitable scientific descriptions and definitions of research tasks which are to be worked on in a continuous interdisciplinary dialogue making use of disciplinary tools. Scientific contributions to problem resolution necessitate permanent reflection on the underlying challenges and the retranslation of scientific results into real life.

Over the years, IANUS research areas have covered issues of non-proliferation, arms control and disarmament of weapons of mass destruction, in particular nuclear and biological weapons and their delivery systems. These subjects have been scrutinized from a double perspective: first, from the underlying ambivalences in science and technology and, second, from the requirement to improve the efficiency of international regimes. In combining these two perspectives projects focussed on verification methods, monitoring of the scientific-technological progress, and even shaping of science and technology in specific fields have been carried out.<sup>2</sup> In a natural way the latter activities have lead to broaden the scope of the scientific work by including a more comprehensive assessment of modern biotechnology and advanced nuclear technologies. Consequently, IANUS has started to formulate appropriate concepts guiding its work, in particular “preventive arms control” and “prospective technology assessment”.

IANUS research, which could only partially be subsidized by TUD itself, has been significantly co-funded over the years by grants of many institutions and foundations, e.g. Volkswagen Foundation, Berghof Foundation for Conflict Studies, German Foundation for Peace Research (DSF), German Ministry of Science and Education (BMBF), German Ministry for the Environment and Reactor Safety (BMU), Swiss Council of Science and Technology, MacArthur Foundation, Nuclear Age Peace Foundation, Ploughshares Fund.

A few specific IANUS projects from the most recent years may be mentioned:

- The feasibility of converting nuclear research reactors from using highly enriched uranium (HEU) to low enriched uranium (LEU) has been studied. To this end, reactor burn-up and neutron transport calculations have been carried out. Within the context of the design of new and the conversion of existing research reactors, specific design proposals have been put forward by IANUS.
- Disposal options for plutonium from military and civilian sources have been investigated. In particular, neutronics calculations on the use of Inert Matrix Fuels (IMF) as an alternative for uranium-plutonium mixed oxide fuels (MOX) in nuclear power reactors have been carried out. The project should provide a contribution to technical choices reducing proliferation risks.
- Advanced nuclear systems have been examined with respect to proliferation risks as well as other most relevant aspects such as safety and environmental impacts. This has been carried out in the framework of the TUD endeavour towards prospective technology assessment.
- The coordination of the International Network of Engineers and Scientists (INESAP), founded and hosted by IANUS, is located in Darmstadt. INESAP, which operates at the interface between science, policy and civil society and which has NGO status at the UN, is mainly concerned with the strengthening of arms control, disarmament and non-proliferation of nuclear, (chemical) and biological weapons and their delivery systems.
- Most recently, the independent Group of Scientific Experts on the detection of clandestine nuclear-weapons-usable materials production (iGSE), funded by the MacArthur Foundation, has been launched by IANUS, INESAP and ZNF (Zentrum für Naturwissenschaft und Friedensforschung, Hamburg). The goal of iGSE is to facilitate progress in verification methodologies and new measurement technologies with respect to unreported production of plutonium and HEU.
- New developments concerning the dual use dilemma of modern biological and neuroscience research have been studied with respect to the pharmacological aspect of bioregulators for drug discovery. Means for biochemical arms control have been proposed addressing present and future threats of biological weapons and the

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<sup>2</sup> During a couple of years, also mathematical modelling of conflicts was pursued. These activities not only dealt with questions of arms control but also with environmental issues like e. g. in the context of the

necessity to introduce monitoring and verification measures for strengthening the biological weapons convention.

- In the context of human stem cell research conflicts between hopes due to therapeutic chances on the one side and fears for moral norms of life on the other have been considered. These conflicts also refer to cultural differences between societies oriented along utilitarian values and others oriented according to categorical normative principles.

All of these projects have profited from intensive and regular group discussions and have been embedded in TUD-internal and/or highly stimulating national and international co-operations.

In all of these activities it has been a major goal of IANUS to combine scientific work with public and political outreach. In particular, the above mentioned specific projects have led to policy advice. Moreover there have been a number of commissioned studies to give advice to ministries of the federal government, institutions of the German parliament (parliament committees, office of technology assessment) and its members, to national and international NGOs, and to other national and international institutions. These research activities led also to appearances at disarmament and arms control bodies of the UN and to professional briefings of media representatives. In recognition of this in 2000 IANUS was awarded the Göttingen Peace Prize for its "innovative achievements in the field of interdisciplinary and practice-oriented peace research".

IANUS has always taken efforts to disseminate its results to the broader academic public. To this aim, IANUS has edited a dedicated book series entitled "Darmstädter interdisziplinäre Beiträge" (Darmstadt interdisciplinary contributions) with the Agenda publisher, Münster. In this year, a new series entitled "Wissenschaftsgestaltung – Technikgestaltung" (shaping science – shaping technology) will be started in cooperation with the well renowned Sigma publisher, Berlin.

Based on these (and other) projects, and despite the lack of a professorship dedicated to the field, a number of science graduates have completed their thesis research within

IANUS. This has been possible since repeatedly faculty members (physics, biology, mathematics) have been acting as corresponding IANUS members. Thereby, invaluable feed back effects broadening the awareness of the faculties could be evoked. Former IANUS members and graduates have received important positions in the arms control scene (ZNF Hamburg, PRIF Frankfurt, ACDIS Urbana-Champaign, S&GS Princeton) and other relevant fields at the science-policy interface.

Over many years, IANUS has been active in interdisciplinary courses on aspects of natural science and peace research as well as on the ambivalence of scientific-technological progress in specific fields. In 2003, IANUS bundled its teaching activities by initiating elements of an interdisciplinary teaching focus (lectures, seminars) on “Sustainable Shaping of Science and Technology”. This program, which contains a number of components of scientific peace and security research, is part of the interdisciplinary curriculum offered to students of all TUD faculties. From the winter term 2007/2008 on, this IANUS program will serve as a module of the master of political science program “International Studies/Peace and Conflict Research” (IS/PCR) initiated by TUD, the University of Frankfurt and the Peace Research Institute Frankfurt (PRIF), which are both closely linked with TUD by official cooperation agreements on the central level.

A regular IANUS colloquium offers a forum for invited national and international speakers from academic and political provenance. For instance, IANUS has cooperated over many years with the Press and Culture Division of the US Consulate General in Frankfurt, to organize IANUS colloquia at regular intervals with distinguished American scholars in the fields of international relations and policy. These scholars include members of academia, think tanks, and individuals who are advisors to government in the US. They visit Germany through a special programme initiated and supported by the Amerikahaus of Frankfurt.

#### **4. Tasks in research and teaching, embedding at TUD**

The professorship, which can be built upon the above mentioned accomplishments, is meant to play a significant role in the realization of the TUD institutional strategy which is formulated as tangible vision: TUD feels strongly committed to a “clear mission of combining engineering, natural science and social science for the sake of being able to approach scientific and societal problems in their entirety”, which is summarized by the motto “Knowledge and engineering for sustainable prosperity”. This implies a reorganisation in terms of a “grid structure” which includes interdisciplinary study programs, graduate schools and research centers.

Within this frame the professorship “Science and Technology for Peace and Security” will stabilize and up-grade previous IANUS work, enhance its visibility and impact, enrich disciplinary work, and – last but not least – spur on other interdisciplinary activities. The teaching capacity, which will be available at different disciplinary and interdisciplinary levels, will provide a new momentum to TUD. In the following, some envisaged institutional possibilities for research, teaching and embedding will be outlined.

##### **Research:**

The full affiliation to a natural science faculty will ensure qualification projects (bachelor, master and Ph.D. theses) with pronounced disciplinary parts. At the same time, the supervision of candidates from other disciplines working in the field of science oriented peace and security research will be efficiently supported. The second affiliation to the social science faculty (FB 2) will significantly improve the possibilities of interdisciplinary research and qualification projects, corresponding to the transdisciplinary profile of the professorship.

However, these two affiliations do not suffice. TUD envisages an interdisciplinary research center, by which a third, interdisciplinary, affiliation will be established. The research center, being an institutional element in the grid structure, will host the activities going beyond disciplinary approaches. IANUS will serve as one basic unit of the center

which will operate as a condensation kernel for other related endeavours of TUD. The professorship “Science and Technology for Peace and Security” will be integrated in the center and will play an important and leading role in establishing and shaping it. One far reaching scenario could be the establishment of a center “Shaping of Science and Technology” which would be meant to emphasize problem oriented interdisciplinary activities at TUD and to bundle efforts related to the broader topic of technology assessment including the new professorship. Bundling the problem oriented interdisciplinary efforts and anticipating the professorship, TUD has just installed a commission of the academic senate having the task of searching for improved structures of its interdisciplinary units including IANUS.

Depending on the profile of the professorship TUD will encourage significant co-operation with other centers currently under construction, e. g. the “energy center” or the “center for radiation biology”, to elaborate on relevant joint subjects.

### **Teaching:**

The professorship will have teaching duties in both faculties with which affiliations exist. In the natural science faculty a module “science based peace research” will be integrated in the master studies program. The integration of such a module is considered as a significant enrichment for the corresponding natural science faculty since, in this way, not only students but also staff scientists will broaden their view and understanding of natural science in its societal context. This module will integrate elements from the policy science oriented master study program IS/PCR of FB 2 (TUD), University of Frankfurt, and PRIF.

In turn, the natural science oriented module of IS/PCR will be put on a firm base by defining a formal responsibility given to a dedicated chair. Thereby, the already agreed cooperation within IS/PCR between IANUS and the Institute of Political Sciences (Prof. K. D. Wolf) will be extended and opens the door for more mutual exchange of teaching with FB 2.

Such expectations are promising because of positive experience gained with the interdisciplinary teaching focus “Sustainable Shaping of Science and Technology” coordinated by IANUS which has already been mentioned. Most recently, TUD has upgraded its existing interdisciplinary teaching foci by bundling these activities within a “Center for Interdisciplinary Studies Program” (CISP). This is of importance for the teaching activities of the professorship and will clearly enhance its visibility. Furthermore, the participation of the professorship in interdisciplinary teaching courses will have a multiplier effect on students of virtually all disciplines.

TUD envisages a compulsory educational component for all TUD post-graduates. This has to include knowledge and awareness of ambivalences in the scientific-technological progress and the responsibility in science and technology. One important element of this would be science based peace research.

An attractive option might be a contribution of the professorship to new interdisciplinary study programs and graduate schools of TUD, an example of which is the planned Ph.D. research and study program “energy engineer”. A further reaching vision, which cannot yet be substantiated in more detail, might be the development of a more comprehensive interdisciplinary course with an increased outreach to TUD as a whole. A prerequisite would be that more than just one professorship would be affiliated with the above mentioned interdisciplinary research center.

## **5. Embedding in science oriented peace research in Germany and the international scene**

To some extent natural science oriented peace research activities already do exist in Germany. These activities are bundled within the association FONAS (“Research Association in Science, Disarmament and International Security”), which hosts more than 60 scientific members and serves as an interlink for the existing research groups at German universities and research institutions (IANUS, ZNF Hamburg, IFSH Hamburg, PRIF Frankfurt, FZ Jülich, Uni Dortmund, and Uni Kiel). One overarching topic of cooperation within FONAS is the development of a concept of preventive arms control,

which is of highest interest for the proposed professorship. Since the chair of FONAS is currently located in Darmstadt, optimal conditions for coordination and cooperation with the professorship will be guaranteed.

In case of a physics profile of the professorship it is important to note that also the German Physical Society (DPG) has devoted a section of its activities to the field of disarmament with regular meetings at the spring conference of DPG. One speaker of this working group "Physics and Disarmament" is also affiliated at TUD. This provides optimal conditions for outreach into the scientific community.

The intended profiles of the Darmstadt professorship appear complementary to the current research topics of the recently installed Carl-Friedrich-von-Weizsäcker professorship at the University of Hamburg and the ZNF. Therefore, cooperation between the Darmstadt and Hamburg professorships is highly desirable. This is promising since the Hamburg chair, Prof. Dr. Martin Kalinowski, is still an associate IANUS member. Even more, cooperation has already started via the joint iGSE project mentioned above. Certainly, in case of a physics profile of the applied professorship it would be highly desirable if the candidate would join iGSE activities.

Of specific importance is the regional cooperation. Based on the already existing strategic cooperation contract with the University of Frankfurt and the cooperation contract with PRIF the joint master program IS/PCR is under preparation. Prof. K. D. Wolf (FB 2) plays a leading role in this program and serves as head of one of the PRIF research groups as well as a council member of IANUS. Moreover, there are numerous contacts and exchanges on a personal level including mutual support for Ph.D. projects among PRIF and IANUS members. This is considered to be a good starting point for more extensive cooperation. The future will show where and to which extent scientific overlap between PRIF and the TUD professorship will lead to a more institutionalised cooperation.

International cooperation will be essential for the success of the applied professorship. It would be premature to make a definite statement since such cooperations will depend on the chosen subject and the nominated chair. However, this field has already been



prepared by IANUS activities which may briefly be summarized as follows: In addition to project oriented cooperation with a number of high ranking international research groups (e.g. in Argonne, Bradford, and Princeton) there is exchange and dissemination of policy relevant results mediated by the diverse international networks of scientists (e.g. INESAP or Pugwash) and dedicated international efforts of scientists (e.g. iGSE or the BioWeapons Prevention Project).

## **6. Expected outcomes**

Although the expected outcomes have partially been addressed in previous sections, we will summarize, emphasize and substantiate the essential points here. When talking about outcomes we have to distinguish between those on a more scientific/academic level which can be “measured” somewhat more easily and those with respect to public and political impact which can merely be named in terms of visions.

Outcomes on the scientific/academic level:

- Policy relevant results of scientific projects dealing with the urgent WMD problematic
- Establishment of teaching modules on a firm base (e.g. integration of a module “science based peace research” into physics/biology master studies program; offering modules or courses in IS/PCR or other interdisciplinary activities)
- Qualification theses (bachelor, master, Ph.D.) relevant for policy
- Policy relevant publications, studies, and policy papers
- Training of young natural scientists to provide policy expertise
- Sensitising students of other disciplines having participated in courses (multiplying effect)
- Fundraising for policy relevant research projects
- New project activities involving other TUD colleagues (scientific outreach within TUD)
- National cooperation projects (e. g. with FONAS, ZNF, scientific societies such as DPG or the Association for General and Applied Microbiology (VAAM), peace research institutes)

- International cooperation projects (e.g. with universities, national laboratories, international institutions, and international NGOs like INESAP)

All the above mentioned outcomes can easily be measured and even quantified in an obvious way. In addition, desired (but not easily measurable) feed back effects upon the cultures of disciplines are to be expected.

Outcomes on the public/policy arena:

Based upon the successful IANUS experience we can formulate a vision by extrapolation.

- Decision makers of governments and parliaments take up policy recommendations
- Participation in governmental commissions and testimonies in parliamentary committees
- NGOs use results in shaping their strategies
- International bodies and diplomats use results and take up recommendations
- Participation in and organisation of national or international panel discussions and public events
- Visibility in media
- Dissemination of results to the broader educated public (e.g. by book publications)
- Raise public awareness for the existing and anticipated dangers in the field of nuclear and biological WMD, its connections to scientific and technological developments, and for possible innovative steps towards solutions

The two aspects, the academic and the policy outcomes, cannot be regarded as being disconnected; they rather mutually imply each other. The overall intended outcome is, in summary, the stabilisation and strengthening of the independent scientific community dealing with science based arms control research. The place of the chair at a university will guarantee both necessary impacts, that upon the academia and that upon the public/policy arena.