



IANUS

Science, Technology, Peace

2016/2017

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Dear Reader,

as you open the first issue of our annual magazine, you recognize in

the IANUS logo a two-faced Athena – goddess of wisdom and of war – the striking emblem of the Technische Universität Darmstadt. IANUS is a

Wissenschaftliche Einrichtung or research platform at this university, founded in 1988, internationally known for *Naturwissenschaftliche Friedensforschung*, that is, science and engineering-based peace research.

The two faces of Janus behold future and past, beginning and end, war and peace. Accordingly, IANUS considers the ambivalent role of science and technology as engines of change: It investigates how technology can intensify social conflict – as well as its capacity to support cooperative problem-solving.

By promoting the latter, IANUS provides an added dimension to conceptions of sustainability, responsible research and innovation, and technology assessment. Sustainable development aims for peaceful living conditions. Responsible research is dedicated to public values, including peace. Technology assessment needs to consider not just benefits and risks but whether they are distributed fairly and do not foster divisions. How does IANUS pursue this agenda? The following pages provide some glimpses. (And how important is this for society? See the news item on page 9.)

Alfred Nordmann and the IANUS team

Nuclear Condition(s):

Politics, Technology, Philosophy

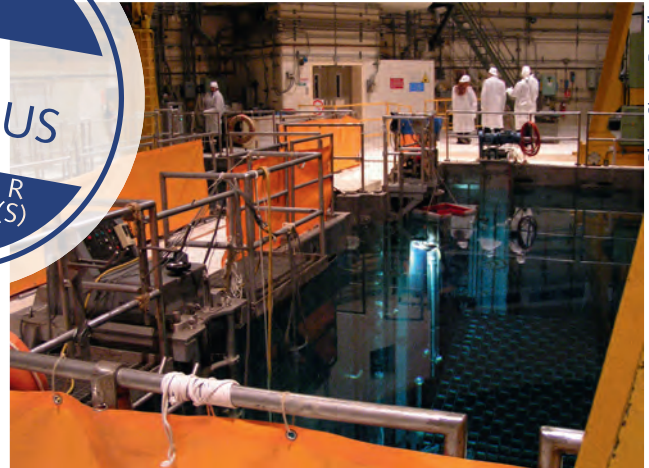
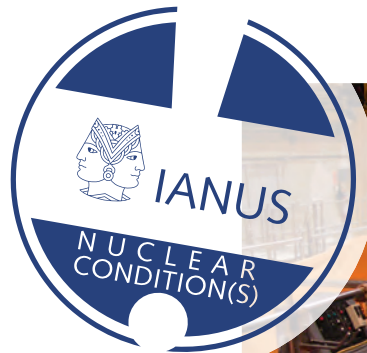
In recent years, IANUS established a reputation especially for its scientific and technical competence regarding reactor design – how to design in a way that respects the political value of the non-proliferation of nuclear weapons and fissile materials. Currently, IANUS builds on this reputation with a new, yet related question. An international and multidisciplinary working group builds scientific competence regarding safety and security and the expanded responsibility of engineers in the “second nuclear age”.

The working group (see page 7) aims to seize the moment at a time when the future of the Non-Proliferation Treaty is deliberated, when humanitarian approaches are brought to the question of nuclear arms, when Cold War certainties have been confounded, when many nations seek new alignments of nuclear energy and nuclear arms. At this moment, the challenge to understand the proliferation discourse comes with the opportunity to rethink notions of nuclear safety and security.

In the second nuclear age strategies and policies have changed from the time of the Cold War. Attention is focused on possibilities and capacities rather than stockpiles and arsenals. Once the sharp distinction between nuclear weapon states and the rest of the world has been erased, the category of technical competence and trustworthiness comes into play. Strategic security issues and the logic of deterrence are giving way to problems

of safety-engineering regarding the whereabouts of fissile material, the physical integrity of civilian plants and military arsenals.

In 2016/2017 we seek to develop longer-term funding perspectives and to this end will host an international conference in the summer of 2017. At the same time, we hope to involve scientists and engineers at TU Darmstadt in discussions of the changing configuration of safety and security with the expanded role for safety engineering and the promotion of a *Sicherheitskultur*.



Spent Fuel Pool

Photo: Simone Rameller

Conflict Minerals

The 2017/18 IANUS Working Group

Green technology, renewable energy, resource efficiency – these are the catchwords of the day as we seek to sever our reliance on fossil fuels. But with the energy transition comes the dependency on new materials. They don't pose the problems of fossil fuels, but pose problems of their own. In 2017/2018 a multidisciplinary working group will explore these questions. It will amplify and extend scientific competence at TU Darmstadt through an international network of researchers.

The *Energiewende* entails significant changes in the use of resources. While steel, wood and concrete still make up the bulk of used materials, the technologies to produce energy from wind, geothermal sources, solar radiation, or the tides utilize numerous other substances in varying quantity. In many of the materials needed, rare earth elements are a vital component. This dependence presents numerous economic, political and ethical challenges. Often the working conditions in the mines are problematic, some of the deposits are subject to violent conflict which serve to acquire funds to arm militants. With only a few countries exporting these materials, geopolitical constellations become more complicated, advanced technological systems become more vulnerable. At the same time, there is a lack of compelling design concepts for recovering and recycling conflict minerals.

By delegating many of the risks associated with these minerals to poorer countries with fewer protections, we make ourselves dependent on particularly these countries. Whether mutual dependency promotes conflict or peaceful cooperation is an open question – how green technologies are developed may have a lot to do with this.



First Annual IANUS Lecture Taking Responsibility for Problem-Solving Opportunities: Towards a Positive Technology Ethic

Once a year, a distinguished scholar is invited to reflect on a cross-cutting IANUS theme. Philosopher Don Howard from the University of Notre Dame spoke in Darmstadt on February 11, 2016. Discussants were Manfred Hampe (TU Darmstadt) and Wolfgang Liebert (BOKU Vienna).



PREVIEW

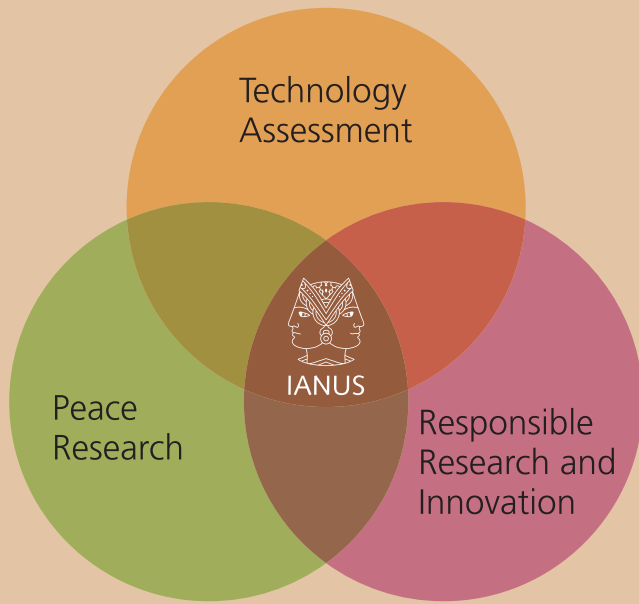
Second Annual IANUS Lecture “Time and Space for Safety and Security” (tentative title)

Dr. Leon Hempel
TU Berlin, Center for Technology
and Society (ZTG)

Thursday, February 9th, 2017,
6 p.m., ULB Vortragssaal
Magdalenenstrasse 8
in cooperation with FiF – Forum
interdisziplinäre Forschung

People usually expect from technology ethics that it draws limits. In contrast, positive ethics explores alternative pathways and helps engineers discover the most beneficial technical options.

For example, rather than say “no” to autonomous vehicles, a positive engineering ethic helps shape the legal and ethical framework in which these vehicles can operate. A positive technology ethic is unafraid even to engage with DARPA in the field of military ethics.



IANUS research activities are located at the intersection of Responsible Research and Innovation (RRI), Technology Assessment (TA) and *Friedens- und Konfliktforschung*, that is Peace Research and Conflict Studies. IANUS has built highly specific competence in these fields. Research topics like *Nuclear Condition(s)* or *Conflict Minerals* enter this conceptual arena, gain definition from it and can thus be advanced in a focused and distinctive manner.

Focus in this issue (first in a series of three) Technology Assessment

Technology assessment (TA) used to react to technological innovations and stepped into action only when these were ready to enter the marketplace. All it could do was raise concerns and investigate side effects – after the fact. In recent years, technological projects and visionary research proposals have become subject of TA. Still, a similar approach was chosen: TA researchers would imagine how these technologies might enter the marketplace. They would then raise concerns about their implications and explore possible side effects.

To overcome these limitations, IANUS researchers Wolfgang Liebert and Jan C. Schmidt introduced Prospective TA. By reflecting on technology at an early stage of the innovation process, prospective TA seeks out diverging pathways and prompts deliberate decisions by researchers and developers. These decisions can and should be informed by political or ethical values. Still, it is an important feature of Prospective TA that it relies on imagined trajectories and consequences – with emphasis, however, on the professional judgement of the researchers themselves who actively participate in Prospective TA.

Prospective TA perfectly captured the work of IANUS – with scientists and engineers engaged in better designs for nuclear non-proliferation. A further IANUS contribution emerged from Alfred Nordmann’s critiques of speculative ethics and “consequentialist” TA. He proposed Forensic TA that is now being discussed with Armin Grunwald (ITAS, Karlsruhe) as part of so-called Hermeneutic TA. Rather than focus on imagined consequences, this form of TA considers the research programs themselves, how they conceive societal problems as well as their solutions.

528. PARIS — Galerie des Machines C. L. C.

*An image of technological promise?
Paris, Exposition Universelle de 1889*



Who is IANUS?

What is and what does IANUS? These questions can't be answered without speaking about the people who cooperate on the IANUS platform, who provide and expand its scientific and technical expertise.

By definition, IANUS welcomes anyone's ideas, suggestions or initiatives – for technological development to strengthen social bonds, to reduce the potential for conflict and work towards peaceful living conditions, taking “peace” to be one of the core values of responsible research and innovation. IANUS thus encourages and supports the cooperation of researchers in any technological field where safety and security are discussed, where risks and benefits are often distributed unevenly, or where one needs to rely on scarce resource.

As IANUS begins to build competence in a variety of fields, each of these involves researchers from Darmstadt and far beyond. In addition, there is a growing number of Darmstadt researchers that stands by to add experience, advice, and expertise.

Contributors to the Nuclear Condition(s) project include Christopher Daase (Frankfurt), John Downer (Bristol), Jean-Pierre Dupuy (Stanford), Christoph Engemann (Lüneburg), Matthias Englert (Öko-Institut Darmstadt), Friederike Frieß (Darmstadt/Wien), Anne Harrington (Cardiff), Leon Hempel (Berlin, Darmstadt), Don Howard (Notre Dame), Moritz Kütt (Darmstadt/Princeton), Wolfgang Liebert (BOKU Wien), Sonja Schmid (Virginia Tech), Christina Schües (Lübeck), Birgit Stammberger (Lübeck), Jens Steffek (Darmstadt), Martin Ziegler (KAIST Daejeon), Casper Sylvest (Syddansk Universiteit Odense) and Rens van Munster (DIIS, Copenhagen). By relating the Nuclear Condition(s) question of safety and security to other fields, IANUS will involve more scientistst and engineers from the TU Darmstadt, especially in the field of cybersecurity.

The core team for the project on Conflict Minerals consists of Oliver Gutfleisch, Judith Kreuter, Markus Lederer and Liselotte Schebek (all at TU Darmstadt) with a group of international colleagues joining in at the first workshop in the Spring of 2017.

In different contexts, these researchers from the TU Darmstadt contribute to IANUS discussions and initiatives: Nico Blüthgen, Barbara Drossel, Vanessa Geuen, Christoph Hubig, Britta Hufeisen, Christoph Merkelbach, Jochen Monstadt, Florian Müller-Plathe, Nina Janich, Tanja Paulitz, Ahmad-Reza Sadeghi, Jan C. Schmidt (h_da Darmstadt) and several others.

Aside from producing visibility for relevant concerns, IANUS will identify in the coming years Research Affiliates who advance these concerns and build a body of work through IANUS-related publications.

News

Essential Expertise

German parliamentarians are worried that they might lose essential expertise since the future of science-based peace research in Germany is uncertain. As reasons for their concern they cite attrition through retirement, lacking career prospects for young researchers, and the lack of long-term institutional funding. This refers to IANUS in Darmstadt and the very few other sites in Germany where science-based peace-research complements the perspectives of history, political science, or philosophy. Based on the resolution that was passed on Oct. 20, parliament now deliberates what steps it can take to maintain this expertise. In the meantime, IANUS seeks to respond to the challenge that comes with a generational change and a new model for building scientific competence.

S.Net Conference Bergen

IANUS members and associates attended this year's S.NET Conference of the Society for New and Emerging Technologies. Dedicated to the theme of "The Co-Production of Emerging Bodies, Politics and Technologies" it took place in Bergen, from October 12th to 14th, 2016. IANUS contributed the panel "Handle with Care: Making the World Safe for Technology". Leon Hempel, Alfred Nordmann, Annette Ripper, and Christina Schües discussed safety, security and vulnerability in the second nuclear age and our current technological condition.

Two Prizes for IANUS Collaborator Moritz Kütt

We congratulate Moritz Kütt for the TU Darmstadt's 2015 Athene prize for interdisciplinary teaching, awarded on occasion of his seminar "Mess-elektronik hacken". Also, he received the Leonard M. Rieser Award of the Bulletin of the Atomic Scientist for his article "Arms control lessons from the Volkswagen scandal".

IANUS-related Teaching

Winter Term 2016/2017

FriedensZeiten – ZukunftsGeschichte

Alfred Nordmann and Christina Schües

Leben in Kriegs- und Krisenzeiten

Autonomous Student Union Lecture Series

Summer Term 2017

Einführung in das Technology Assessment

Dirk Scheer

Konfliktmineralien

Global Challenges Lecture Series

UCS Summer Symposium 2017

The Summer Symposium 2017 of the *Union of Concerned Scientists*, UCS, will take place in Darmstadt with IANUS acting as local organizer from July 24th to 31st.

The aim of UCS and its 98.000 worldwide members is to apply science to understand the world's pressing problems and to develop effective solutions to them:

www.ucsusa.org

2. November
Marcus Müller
Germanistik, Digitale Linguistik

16. November
Anne Schwob
Hochschulgruppe Nachhaltigkeit

30. November
Mario Kupnik
Elektrotechnik, Mess- und Sensortechnik

21. Dezember
Alexandra Karentzos
Mode und Ästhetik

11. Januar
Stefan Katzenbeisser
Informatik, Security Engineering

25. Januar
Reiner Anderl
Datenverarbeitung in der Konstruktion

8. Februar
Eugen Kogon
Politikwissenschaft

cum tempore auch an einer technischen Universität nehmen wir uns die Zeit für das große Ganze unserer Forschung.

vier Viertelstunden eine Viertelstunde zum Anstoß, zwei zur Diskussion, das vierte Viertel optional zum Austausch.

im Quartier nachbarschaftlich unter dem Vorzeichen von Frieden, Nachhaltigkeit, Sicherheit.

von wegen „postakademisch“ es geht um Herausforderungen an verantwortliche, kritische Forschung.

bei einem Viertele Lehrenden, Mitarbeiter, Studierende sind eingeladen auf ein Gläschen Wein, Apfelsaft, Mineralwasser.

DAS AKADEMISCHE VIERTEL

mittwochs 13 Uhr c. t.
Magdalenenstraße 8
drei plus eine Viertelstunden
im Vortragssaal der ULB
S1|20 Untergeschoss

Gastgeber:
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mail@ianus.tu-darmstadt.de

Forum Interdisziplinäre Forschung (FiF)
FiF@tu-darmstadt.de

Rückblicke und Archiv
www.ianus.tu-darmstadt.de/akademisches_viertel/



In cooperation with the
Forum interdisziplinäre Forschung (FiF):

Das Akademische Viertel

During the past nine semesters – number 10 coming up in the Spring Term 2017 – IANUS and the TU Darmstadt's *Forum for interdisciplinary Research* (FiF) have hosted the Akademische Viertel. Every other Wednesday, a faculty member initiates a discussion by reporting on one of the ways in which questions of responsibility arise in the course of their research. Colleagues, students, university employees join in during the informal setting of a conversation that never exceeds 45 minutes.

If this is the typical format, there are subtle departures from the rule. For the third time, a long deceased researcher makes an appearance at our discussions. The first one was Darmstadt-native Georg Christoph Lichtenberg, a philosophically minded 18th century physicist, now famous especially for his aphorisms (he was actually born in nearb Ober-Ramstadt). One of his texts raised troubling questions about the ways in which researchers distort and fail to recognize their objects. In the following term we encountered Martin Wagenschein, a former TU Darmstadt faculty member with a lasting influence on science education. In order to understand a theory, he argued, one needs to retrace its origin and development. Next up is Eugen Kogon, a social and political theorist who unflinchingly demonstrated the industrial scale and technological dimension of the Holocaust – with strong views about the responsibility of engineers.

For summaries of all discussions of the past four years, see the IANUS website: www.ianus.tu-darmstadt.de

Support for Integrative Research Proposals

From Ethics Screening to Responsible Research

In recent years more and more funding agencies require sustained engagement with social and ethical dimensions of research. This marks a departure from the familiar mode of ethical screening whereby researchers merely indicate in a list whether or not their project involves animals, human subjects, personal data, military applications, and the like. Now, they need to demonstrate that public values are integrated into the research process.

Since IANUS contributes to the policy debates about this shift from ethical screening to responsible research and innovation, it can also advise and assist research consortia regarding topics and tools for the integration of societal values. During the process of drafting research applications, IANUS can develop suggestions on how to find a suitable format that recognizes problem areas beyond the customary one of “ethics”. Once funding has been obtained, IANUS may prove to be a valuable cooperation partner that provides relevant content. IANUS also seeks to extend the scope and further the significance of responsible research and innovation by incorporating questions of conflict and cooperation.

Value Integration

Responsible Research and Innovation (RRI) calls for an integrative approach: societal values – as stipulated, for example, in the EU Charter of Fundamental Rights, or the UN Millennium Objectives – should enter into the research process and orient further development. One innovation model is the iterative design cycle according to which a desired technical achievement results from the step-wise optimization of system behaviors. In this model, the intermediate evaluation of system behavior draws on technical criteria as well as economic or legal considerations. Here, the idea of sustainability can enter in but also the promotion of peaceful conditions of life. Ideally, societal actors should be involved in the process of design and development.

Building Competence across Technological Fields

After *nuclear condition(s)* and *conflict minerals* what might be the theme of the next IANUS working group?

- **KRITIS – Social and Political Vulnerabilities of Critical Infrastructures**
- **Cyber-War and Peace**
- **Security Issues for Citizen Science, Maker Spaces, and 3D-Printing**
- **Safety Cultures and Security Conflicts in Robotics, Automation, Industry 4.0**
- **Dual Use as a Technical Challenge for Autonomous Vehicles**
- **Technology and the Politics of Climate Change**

Calendar

November 2, 2016 to February 8, 2017

Das Akademische Viertel

in cooperation with the Forum interdisziplinäre Forschung (FiF)
www.ianus.tu-darmstadt.de/akademisches_viertel/

February 7 to 9, 2017

IANUS Thematic Week

February 7, 2017, from 6 p.m.

Opening Night

February 8, 2017, 2 p.m. to 5 p.m.

IANUS Open House and Discussion of Future Topics

February 9, 2017, 10:30 a.m. to 5:30 p.m.

Workshop "Safety and Security across the Disciplines"

February 9, 2017, 6 p.m.

Annual IANUS Lecture: Leon Hempel

May 2017

Nuclear Condition(s) International Conference

July 24 to 31, 2017

UCS Summer Symposium

IMPRINT

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IANUS

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TECHNISCHE
UNIVERSITÄT
DARMSTADT