Session U2

TA and Ethics for Value-driven Technologies: Educational Aspects (Part 2)

Chairs: Jan Kaźmierczak (Silesian University of Technology), Elena A. Gavrilina and Alexandra A. Kazakova (Bauman Moscow State Technical University)

The session addresses the conceptual, methodological and organizational challenges of integrating TA principles into educational systems. Educational institutions are regarded as space of (re)production of values and attitudes, sociocultural meanings and epistemological optics for technical practices, while being constrained by the structural limitations of globalizing markets and growing specialization.

We invite educationalists and all those interested in disseminating the value-driven approach to technologies to share their visions and experience in the field of technical and non-technical education, within a wider comparative perspective on educational systems, including pre-university training and life-long learning.

About Educational Needs of Technology Assessment

Authors: Bartłomiej Gładysz (Warsaw University of Technology) and Jan Kaźmierczak (Silesian University of Technology)

In this paper the authors try to present and analyze their thoughts as well as some results of their earlier researches, focused on surveying needs and possibilities of educating stakeholders of processes concerned with social impacts of new (innovative) products and technologies which appear in contemporary world (Technology Assessment - TA). After short introducing some general problems TA, a brief literature review is presented dedicated on state-of-art in the areas of educating students of technical universities as well as engineers still active on the labor market in Technology Assessment and Ethics. Next part of the paper was intended as presenting a structure of educational process as well as some possibilities of using modern methods and tool of teaching in the discussed field of education. A subjective review of practical examples focused on the considered “educational stream” in Poland as well as abroad is next presented. In the third part of the paper planned research are briefly introduced which will be based on previously discussed considerations as well as on some initial results. A set of teaching needs in Poland will be defined as well as a list of stakeholders who participate in educational processes. The country-wise perspective is assumed to be taken into consideration in the discussed context. Finally, some conclusions are formulated which are intended - among others - to enlarge the considered area of educational challenges on other technological trends and their consequences which are appearing in contemporary world, like Industry 4.0, Internet of Things or Smart Cities.

Technological History as a Tool for the Development of Competence in Judging Current Technologies

Author: Kurt Möser (Karlsruhe Institute of Technology)

Technology Assessment studies, though often referring to specific historic fields of technology, do not generally include systematic results and / or methods of the academic History of Technology. On the other hand, the academic History of Technology seems to be reluctant to explore the relevance

of their research fields for Technology Assessment and for the communication of its results. In the paper I, as a historian of technology, propose to bind these two academic fields closer together. And I suggest to communicate the results of historic approaches to technology into a broader public, with the aim to foster a higher competence in judging complex questions of technologies today.

In order to do this, two historic cases are studies where technologies were embedded in political and social contexts, and which were subject to past public debates. From these two examples lessons learned will be discussed for judging the various and manifold contexts of these historic technologies and to outline the framework for their success or failure.

The first contextualized study: the failed diffusion of the electric car around 1905 in the contexts of technology, competition with other diving systems, economy, user expectations, and cultural valuation.

The second contextualized study: the survival of animal power for traction and the relevance of this alleged „obsolete“ mobility in widely different social and technological contexts.

Starting from these two case studies, I will propose a more general approach to using experiences of the past to frame and assess contemporary technologies. My aim is to develop procedures to communicate historical experiences into a broader public and to encourage competence to judge current technologies which are controversially discussed. With an eye on teaching, I would like to foster interest of a broader public for the History of Technology and to recognize the fascinating potential for understanding our technologically shaped world.

Relevance of the interdisciplinary course on Technology Assessment for energy universities

Authors: Nina Malinovskaya and Pavel Malinovskii (National Research University)

The objectives of social and humanitarian education, explicitly or implicitly, are defined by the tasks formulated in 1987 by the UN Commission on environment and development, the concept of "Sustainable development" (SD) appeared and its definition was given. A comprehensive approach to these issues remains unchanged.

Technological progress is now forcing decisions to take into account the complex interrelationships between different types of technology. Social, cognitive and information technologies play an increasingly important role alongside traditional technologies that use natural forces and resources.

How can we assess these complex technological relationships if energy University graduates do not have training in key social and humanitarian disciplines, while at the same time mastering the methods of interdisciplinary analysis of problems?

In September 2015, UN member States adopted the SD agenda until 2030. Starting from the distinction of substantial and procedural values, it is possible to notice that the 17 goals of the UN belong to the substantial values. Let us cite as an example Goal 7: "Achieve universal access to affordable, reliable, sustainable and modern energy for all" and related Goal 13: "Take urgent action to combat climate change and its impacts". Basic professional education forms competencies for the promotion of substantive values.

Procedural values are stated in UN documents related to the concept of "good Governance" (GG). Three institutions can be reformed to promote good governance: the state, the private sector and civil society. Whatever the social position of the holders of technical University diplomas in the TA

situation, the level of their competence in the field of substantive goals will, by definition, be satisfactory. However, their social, moral, civil position is determined by many factors that go beyond the impact of social Sciences and Humanities.

At all levels of higher education in the Russian Federation philosophy is now the main humanitarian discipline. At the same time, it tolerates changes in the curriculum easier than any other science.

Department of philosophy in MPEI, for ten years, constantly updates the contents and extends the themes of the courses which are relevant to the principles of the GG. [See table.]. It remains to collect in a single interdisciplinary course TA socio-humanitarian aspects of this social practice. This is now the mission and meaning of our teaching.

Principle	**Educational discipline**
Participation	Culture of speech. Business communication
Consensus orientation	Business ethics
Strategic vision	Communication and strategic management. Philosophy. Political science
Responsiveness	Ethics. Psychology
Effectiveness and efficiency	Professional ethics
Accountability	Logic and theory of argumentation
Transparency	The philosophy of computer science
Equity	Ethics. Jurisprudence. Sociology
Rule of Law	Jurisprudence. Sociology. Business ethics and etiquette

Technical education in Russia: A request for TA and Value-oriented Approaches

Author: Andrey Andreev (Moscow Power Engineering Institute)

The Russian tradition of technical education from the time of the Enlightenment invariably includes the humanitarian component and the study of certain social sciences. The composition of this part of the educational program has changed, but its purpose has always been understood unequivocally: to extend the cultural horizon and at the same time form an understanding of the social responsibility of future engineers. The existing model of humanitarian education in the Russian higher school of technical profile was formed in the early 1990s and in many respects reflects the realities of that time when the most significant factor was the deideologization of social and humanitarian disciplines, and the problems of NBIC convergence and, moreover, its social consequences and ethical aspects were practically not discussed even by narrow specialists.

Currently, the humanitarian component of technical education includes:

1) The obligatory part (two disciplines stipulated by federal standards – philosophy and history of Russia);
2) The variable part, which educational institutions define independently.

It is in this variable that one somewhere can find training courses giving some insights into the social aspects of technology and TA (for example, in Moscow Power Energetics Institute “The Foundations of the Philosophy of Technical Knowledge” and “Professional Ethics”).

In general, the humanities and social sciences in Russia's technical universities from competencies corresponding to the main international humanitarian initiatives, in particular, with the goals of the "sustainable development" agenda declared by the UN and the general principles of "good governance". These are, in particular, elements of a strategic vision, an understanding of the essence of global problems, communication skills and a number of others. However, this model does not sufficiently reflect the practical needs and problems associated with the modern stage of interaction between social processes and technologies, when, as we see it, social and technological development develops into their merger and society begins to develop as an integrated socio-technical sys-tem.

This process is practically not reflected at all. However, in current socio-historical context, the state of humanitarian education causes a certain dissatisfaction. In any case, we are aware of a number of initiatives for its correction. However, not quite a clear understanding of the goal makes these attempts somewhat chaotic. As we believe, a wide popularization of the developments in the field of TA and value-driven technologies could give them a certain common meaning. In order to move the business off the ground are needed high-profile international initiatives comparable in scale to the movement for sustainable development. But there is a question: to what extent it is possible in the conditions of the sanctions regime that impede constructive communication between Russia and the intellectual circles of other European countries.

Teaching the teachers for value-driven technologies. How can TA lectures support future engineers to design technical innovations dealing with societal challenges?

Authors: Mahshid Sotoudeh, Walter Peissl, André Gazsó, Michael Ornetzeder and Doris Allhutter (Institute of Technology Assessment)

Technology Assessment (TA) supports democratic governance processes in science, technology and innovation by providing a comprehensive insight into the knowledge of expected opportunities and potentially negative consequences of new technologies. This kind of reflexive knowledge may qualify engineers to:

- better understand the complex interactions of technology and society from different perspectives,
- take part in research and technology development in a responsible way, **identify values** that promote or inhibit technical innovations and
- design **value-driven technologies** as technical innovations dealing with societal challenges such as demographic change, climate change, overconsumption of resources, consequences of digitization and automation etc. – hence, contributing to socially acceptable, best possible technical innovations.

TA's main tasks are understanding the relationship between society and technology and giving science-based advice to political decision-makers. With this in mind, TA aims at developing innovative research approaches and methods which, on the one hand, provide a timely and balanced decision-making basis for knowledge-based policy advice, making different values and interest transparent and, on the other hand, promote public and scientific debate and interaction. TA offers a broad range of interdisciplinary methods for investigating technology and its potential effects, focusing on socio-technical implications and matters of political concern. Experts, stakeholders, political decision-makers and the public are often involved in the process of knowledge generation.

University lectures on TA can take advantage from knowledge and experiences of TA researchers. In 2017, the Institute of Technology Assessment at the Austrian Academy of Sciences (ITA) organized a summer school for lecturers at the Technical University in Vienna.

Target groups of the TA Summer School:

The TA-Summer School aimed at the diversity of all disciplines at the TU Wien. Scientific staff who were going to teach TA in their courses were invited to apply for the Summer School.

Goals and contents of the Summer School

The Summer School provided initial theoretical and practical insights into the role and use of TA and the way it can be taught at the TU Wien. The summer school aimed at providing a space for the exchange of knowledge between TA researchers/practitioners and teachers of the TU Wien and at developing approaches to give students of different disciplines an understanding of TA goals and methods.

The contributions included among others: Basic insights into the field of TA and practical examples; problem definition and research design in TA; methods for technology assessment; participants played an active role in small group work. ITA researchers encouraged them to rely also on their own expertise and work experience on ethical issues for engineering to design TA units for their courses.

The 4th European Technology Assessment Conference in Bratislava is an opportunity to exchange our experience at international level and discuss the possibility of standard courses for interdisciplinary TA Summer schools for lectures at technical universities.