Royal and Cross Cultural

Report of the "Workshop on Philosophy and Engineering 2008" at The Royal Academy of Engineering

London, November 10 - 12, 2008

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The cross cultural mission of the international "Workshop on Philosophy and Engineering" 2008 (WPE-2008) was to encourage reflection on engineering, engineers, and technology by philosophers and engineers alike. To bring engineers and philosophers together was a successful push against the dispersing forces of (academic) specialism and professionalisation.

WPE was held at The Royal Academy of Engineering in London from November 10 - 12, 2008. The idea of WPE emerged at the Engineering Systems Division of MIT in 2006 by the Philosophy and Engineering Planning group headed by Taft Broome (now at Howard University, Washington). This WPE was the second one, following a successful meeting at the Technical University of Delft in 2007. There were nearly 90 participants in the workshop from across Europe, the US, China, India, Sri Lanka, Brazil, Chile, Iraq, etc. Nearly all of those attending played an active part, with 46 contributed and peer-reviewed papers, 8 posters, 4 keynote speakers and a series of "tutorials" in which work by established researchers was introduced to participants working in different areas.

Opening the workshop, Billy V. Koen (University of Texas) gave the talk "Towards a Philosophy of Engineering: An Engineer's Perspective". Koen set out his view of the nature of engineering, a necessary precursor, he argued, for establishing a philosophy of engineering. According to Koen, the engineering method consists in "the use of heuristics to cause the best change in an uncertain situation within the available resources." Koen, winner of several American teaching-based awards, also offered in his colourful presentation an engineer's perspective on the nature of philosophy and how this relates specifically to the philosophy of engineering. His statement that "everything is heuristic" underlined the – in this case indispensable – heuristic character of the approach, when engineers learning philosophy and vice versa.

1 Maintenance as morality

Jerome Ravetz (University of Oxford) as the second keynote speaker at the workshop spoke on "Maintenance as Morality". Ravetz, sociologist of science and co-inventor of "Post-normal Science", addressed the essential importance of maintenance to engineering, which is necessary to ensure that engineered products function as intended, in a safe way. Looking at the fundamental role of engineering, technology and technical infrastructure in modern societies, these efforts can not be overestimated. In the style of antique ethics Ravetz spoke about maintenance as a vital element of our everyday life and raised it to the class of a modern virtue. However, the role and criticality of maintenance contrasts with the relatively low status of maintenance activity and the people who carry it out.

Deborah G. Johnson of the University of Virginia and president of the "International Society for Ethics and Information Technology" gave a talk titled "An STS-informed account of Engineering Ethics" and set out a case for using the tools and concepts developed within science and technology studies to better understand the ethical responsibility of engineers. By this means, a better appreciation of the relationship between engineers and society can be established. Carl Mitcham (Colorado School of Mines and author of *Thinking Through Technology: The Path between Engineering and Philosophy*) set out his views on "The Philosophical Weakness of Engineering as a Profession". Mitcham argued that unlike philosophically strong professions such as medicine and law, engineering does not have an established set of goals embedded in the way that it is taught and practised. His provocative argument was that engineering was more like business in this respect, a conclusion that provoked lively debate.

These keynote lectures were complemented by contributed talks on a wide range of highly stimulating topics. The kinds of issues

that proved most fruitful in generating philosophical discussion included the approach and methods of systems engineering, philosophical and ethical questions arising out of (software) engineering, engineering education for the current era, and the nature of philosophy of engineering. The contributed papers encouraged lively debate both in the lecture halls and throughout the breaks.

From Germany there were two contributions. Albrecht Fritzsche (University of Stuttgart, Institute of Philosophy) talked about "The Dynamics of Practical Wisdom in IT Professions" and Oliver Parodi from the Research Centre Karlsruhe, Institute of Technology Assessment and Systems Analysis, presented "Hydraulic Engineering Reflected in the Humanities". Parodi provided a philosophical insight into engineering and demonstrated several close links between the practice of hydraulic engineering (in the last 50 years) and the occidental cultural roots. He highlighted the future of hydraulic engineering also. Based on some lacks of today's hydraulic engineering in Germany he offered four suggestions for a future practice: a reasonable hydraulic engineering, a more hermeneutical one, a culture-sensitive hydraulic engineering, with always perceptible buildings and technological constructions.

2 Toward an epistemology of engineering

Another talk hitting the concern of WPE-2008 at the very heart was the one of Antonio Dias de Figueiredo. Figueiredo (Faculty of Science and Technology of the University of Coimbra, Portugal) leads the auditory "Toward an Epistemology of Engineering". At first he introduced "four dimensions of engineering": engineering as basic science, social and business activity, design, and as practical realisation. According to these dimensions engineers can be seen – and see themselves, which was empirically ascertained – as thinkers, social and business experts, designers, and integrators and/or doers. Further, his talk analysed the epistemology of engineering in light of the four key questions of the philosophy of knowledge: the ontological, the epistemological, the methodological, and the axiological questions. For the case of engineering, the ontological question inquires about *what*

reality can engineering know (1), the epistemological question looks into *what is engineering knowledge* (2), the methodological question asks *how can engineering knowledge be built* (3), and the axiological question (which includes the ethical), inquires about *the worth and value of engineering knowledge* (4). In all of these philosophical (epistemological) dimensions, the engineers construct their knowledge along the whole continuum of the realist or phenomenological principle (1), the deterministic or teleological principle (2), the principal of analytical modelling or complexity (3), of intrinsic rigour and value exclusion or extrinsic relevance and value inclusion (4) – depending on the belonging to the four engineer's dimensions (thinker, social expert, designer, doer).

Numerous other speeches rich in content where given, e. g. the one of Joel Moses, Former Director of the Engineering Systems Division at MIT. In "Toward an Ontology for Systems-related Terms in Engineering and Computer Science" he underlined the necessity to clarify the meaning and use of important terms such as form, function, efficiency, uncertainty, complexity across the narrow boundaries of each engineering practise.

WPE-2008 introduced tutorials for participants, an opportunity to hear from experts in various fields about their work and how it relates to the philosophy of engineering. Tutorial topics covered US and UK approaches to innovative engineering education, the application of metaphysics to practical engineering, learning about consciousness through the engineering of intelligent systems, peace engineering, feminism and engineering, and the nature of sociotechnical systems.

Aarne Vesilind came up with the term "peace engineering" to describe many engineering activities that can contribute to human well-being. In his tutorial, he focused not on engineering but on engineers. In an emotional and impressive way he gave a couple of examples of (famous) peace engineers, who feel highly responsible for their work and the humanistic justification of it. They vouch for their work by their persons and even sometimes by their life. Vesilind projected the ethical problem of dual use of engineering products and technology onto the person. Beyond technical standards, rules and ethical codes he addressed

engineering practise as a personal undertaking and a question of virtues.

3 Emerging subjects

As the philosophy of engineering is an emerging subject, the given tutorials were invaluable opportunities to share work that has been carried out by individuals and research groups worldwide. Another substantial element of the workshop the breaks were. There really happened cross cultural interchange. People with different academic background, engineers, sociologists, philosophers, etc. from all over the world joined and neared. And just the academic hybrids, the philosophising engineers and the engineering philosophers felt home at this WPE. The different (geographic and academic) cultural roots of the participants lay open at the talks and the poster session. American pathos, Indian myths, German structuredness, British humour and elegance, etc. shined through the scientific and philosophic concern of WPE-2008. This cross cultural bouquet of flowers was very stimulating.

The location was very suitable for the concern of WPE: London as a cosmopolitan city and (historical) stronghold of philosophy and engineering, The Royal Academy of Engineering in the heart of London at the river Thames in-between The Royal Society and the British Academy. Just the free time at this busy workshop was too short to get deeper into the royal ambience – except for a vespertine reception at the red and fleecy floors of The Royal Society.

To look on WPE-2008 with German eyes you can say, that WPE was a push to bring together what even in Germany is discussed in different academic threads: philosophy of technology, engineering ethics, sociological technology studies, STS, theory of engineering (in particular "Allgemeine Technologie"), technology assessment (TA), and engineering practise. It was obvious that the German (academic) threads are at the world's level and can give significant inputs and contribute to the concern of WPE. To bring these threads together pays off even in Germany.

Plans are now being formed for the WPE-2010. This year the topics of WPE will be included in the biennial conference of the Society for Philosophy and Technology: "Converging Technologies, Changing Societies" which will take place at the University of Twente, the Netherlands, in July (http://www.utwente.nl/ceptes/spt2009).

WPE-2008 was a success in bringing together philosophers and engineers in academia. The challenge for the next conference is to include more practising engineers to give their perspective on the reality of engineering methods and to discuss with philosophers those aspects of their work that they find philosophically interesting. The aim of WPE is to ensure that the exploration of philosophy and engineering maintains a focus on the real-world application of engineering and the philosophical issues that it gives rise to. Therefore, the concern of WPE can be stimulated by the discussions about technology assessment and vice versa stimulate the TA debates. Surely it would be an honourable and remunerative effort to bring WPE 2010 or 2011 to Germany – and perhaps give it a focus on TA.

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Welt der Technik – technische Welt?
Bericht von der internationalen Tagung „Technologies of Globalization"

Darmstadt, 30. - 31. Oktober 2008

Von Suzana Alpsancar, Ulf Blanke und Frauke Nowak, TU Darmstadt

Um weltweite Herausforderungen von Technologien interdisziplinär zu identifizieren und zu diskutieren, führte die Tagung „Technologies of Globalization" am 30. und 31. Oktober 2008 in Darmstadt Wissenschaftler und Vertreter der Industrie aus unterschiedlichen Forschungs- und Wirtschaftsbereichen zusammen. Auf der englischsprachigen Tagung, die vom DFG-Graduiertenkolleg „Topologie der Technik" (TU Darmstadt) ausgerichtet wurde, trafen über hundert Teilnehmer aus zwölf Nationen zusammen. Knapp vierzig Beiträge und fünf Plenarvorträge beleuchteten aus unterschiedlichen Perspekti-