

International systems stability, culture and advanced technology

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Global systems of information, commerce, politics, finance and natural resources have had both negative and positive consequences for international stability. As I sit down to write this editorial, the largest banks in the USA and UK have been fined a combined total of almost US\$ 6 billion dollars for systematically rigging foreign exchange and Libor rates. This behaviour, supported by advanced technologies, has partially contributed to the current international instability in the global financial system. The crisis rumbles on (now it is 7 years old), still threatening to bring down the economies of entire countries, and enforcing new kinds of colonialism, hegemony and creating shifts the implications of which will take decades to truly understand. But it is not just world finance that is unstable. The failures of international political systems have led to the staggering rise in inequality both between and within societies, raising fears of more instability to come. To coin a phrase: society can no longer afford the rich.

Whilst humanity can identify an elusive Higgs boson or measure the amount of dark matter in a distant galaxy, here on Earth stable and equitable international systems remain far more elusive. The big problems we face as a species are systemic and shared, but we still do not have much of a handle on key issues of international stability and complexity, uncertainty and positive transformation. We need to engineer something systemically new.

Few multidisciplinary academic and practice-based communities exist having set as their agenda an attempt to

understand these problems from a systems engineering perspective. One such community is the International Federation of Automation and Control Technical Committee for Technology, Culture and International Stability (TC 9-5). It belongs to an almost unique group of technical committees situated within IFAC called “CC 9—Social Effects” currently chaired by Professor Françoise Lamnabhi-Lagarrigue of the Systems and Signals Laboratory at CNRS in France. These groups seek to understand and address social effects associated with the proliferation of automation and control systems and sciences. The TC 9-5 committee comprises members from a wide range of disciplines who share a common interest in the problem of international stability, especially in relation to technology advancement and considerations of ethics and culture.

TC 9-5 is one of the oldest communities in IFAC, originating during the cold war period of the early 1980 s when problems of international stability had, as their backdrop, the security concerns associated with nuclear proliferation. Thirty years later the scope of the committee is much wider, reflecting the growing complexity of the challenges and opportunities faced by our species. It is almost unique in the variety and range of members interests and includes both academics and practitioners who regularly participate in its events and publications.

This second TC 9-5 special issue of *Artificial Intelligence and Society* comprises a collection of invited, peer-reviewed papers from our membership. We are glad to report that since our last AIS issue the committee has had a significant growth in activity from new, up-and-coming researchers. We have therefore launched a new AIS “student forum” organised by young TC 9-5 researchers Amy Stapleton of the University of Lille and Natalia Kobza of the European Network for Students of Industrial

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Engineering Management (ESTIEM) who are assistant editors for this publication. The forum sets out emerging and still forming perspectives and experiences. The forum creates a space for new voices to be heard. Young researchers interested in the topics covered by AIS are invited to submit their papers to the forum as an open call.

Now to the individual articles of this issue.

The first contribution comes from Professor Peter Groumpos of Patras Science Park in Greece and presents a “Knowledge Triangle” model of regional development which combines both modern thinking around innovation and inspirations from Greek philosophy. It is proposed that the K-Triangle, which expands former contributions (such as those associated with the so-called Lisbon strategy), can drive sustainable growth in less developed regions.

The next two papers focus upon ethical themes in science and engineering in relation to control and automation. The first is a contribution by Professor Alan Cottey from Scientists for Global Responsibility in which he introduces “openness”, an important systems concept which implies that we must embrace “otherness”. Niels Bohr, at the beginning of the nuclear age, promoted an open world, and this is extended beyond Bohr’s concerns with security to the wider notion of stability.

The theme of openness is continued in Dr. Marion Hersh’s paper in which otherness is explored and narrative ethics proposed as a means of addressing ethical issues in automation and control technology development. Understanding the “other” is important for engineers who design technologies and services whose users are not engineers, i.e. are “others” and different from them in ways which might include gender, race and physical or mental ability, for example. Although ethical behaviour is an individual responsibility, social and institutional dynamics make it easier to behave ethically in a community which values, supports and actively encourages ethical behaviour. Dr. Hersh sets out a new seven-step methodology for using narrative ethics and she uses two case studies to illustrate its application.

In the twenty-first century sophisticated inter-networked systems of information sharing pose considerable risks to society generally and the organisations in which they are deployed in particular. The problem of managing technology development risk has been traditionally framed in purely technical terms, which makes sense for small, well-understood, embedded systems, but not for the open, highly interconnected, interdependent and diverse systems of today. Risk associated with these systems must be viewed from multiple perspectives at once, and the most important perspective identified and placed to the fore. Drawing from socio-technical systems and information systems theory John Organ lead-author’s a contribution which reframes and contextualises technical risk management in new terms.

The paper from Dr. Norbert Jesse, the CEO of a high technology firm in Germany is on an industry perspective. Local communities in Germany are under great pressure to improve and modernise their services. German society places stress on a federated political structure and the principle of subsidiarity. How can social networking technologies be leveraged so as to benefit local, federated, subsidiary communities and the competence of the citizens activated to improve living conditions in these neighbourhoods? Technical requirements for an Open Government and the “SAGA” standard of the Federal German Government are discussed. The author introduces a new, SAGA-compliant, framework for the implementation of web applications for eGovernment in Germany and, potentially, elsewhere where affordable, open standard platforms are required to support e-Governance goals.

The next two papers have been included in this volume by the Editor of the Journal. Karnaukhova and Polyanskaya bring to the discussion the role of communication and reputation as essential components for the positioning of an organisation in a globalising world. Kuzheleva-Sagan and Suchkova argue that as risk is becoming a central issue of social relationships today, it is important to find effective ways of generating users’ trust in the Internet services. This paper brings trust in design as another perspective of social sustainability.

The Student Forum opens with a paper by Mihaela Mecea of Babes-Bolyai University, Cluj-Napoca in Romania. She reflects upon the global context in which networks of cultural interaction and exchange expand across scientific and engineering professional domains and how this has created demand for *culturally sensitive* education. Her paper analyses university organisation and governance when it is exposed to multiculturalism. She stresses the advantages of studying in such an institution given the intensifying demand for such skills. The contribution concludes that multiculturalism in higher education presents advantages for graduates in engineering who must seek work in labour market shaped and transformed by cultural permeations.

The second paper is a combined perspective from France, Kosovo and Romania which reflects upon the systemic stabilising influence of the European Erasmus educational exchange programme in the European area. The paper sets out student experiences in two European Erasmus programmes: the “MITRA” Masters programme on Intercultural Mediation (Identities, Mobilities and Conflict) and the Entrepreneurship and Management Training in Science, Technology, Engineering and Mathematics (EM2-STEM) programme. The article compares and contrasts experiences and reflects upon the extent to which such programmes play a role in the development of important intercultural communication and cooperation

skills of participants. The authors also investigate whether the Erasmus Programme has shaped or transformed participating students' views of international stability.

The special issue closes with a contribution from the European Network of Students of Industrial Engineering Management (ESTIEM) in conjunction with Dr. Dietrich Brandt, a senior member of TC 9-5 and former chairperson of IFAC technical committee TC 9-2 for the Social Impact of Technology and leading thinker in the human-centred systems tradition. This paper, lead authored by three young engineering management researchers from Poland, Netherlands and Austria, asks the profound question: can engineers learn leadership? They contend that education in Europe today does not sufficiently take into account complex problems, tendencies of *chaos* and uncontrollable human behaviour, and the lack of mutual *trust* in commercial transactions. They argue that universities have generally failed to create *leaders* and have instead focussed on educating future managers. ESTIEM is one of the few student-run European communities to offer educational programmes in parallel to their own home university courses. Their programmes include new leadership academies offered to engineers. These are based on *Experiential Learning* methods in which students learn and practice working in teams with shared and rotating leadership. Given the failure of many European universities to develop strong leadership programmes, ESTIEM offerings are re-envisioned as a series of university-equivalent ESTIEM courses culminating in a Europe-wide “ESTIEM University”. This envisioned student-driven virtual institution could help shape a new leadership generation in Europe. This final paper fittingly sounds a bell of real hope for international leadership and oversight in a society defined by the proliferation of technological developments which seem, at times, to destabilise rather than solidify and embed living, healthy systems in human shared experience. European students themselves are now advocating new universities! If these academies are not developed by established institutions it is not unlikely that students will

build them themselves. ESTIEM are already on this road. Maybe the next generation will engineer the systems previous generations have failed to envisage and implement.

Closing remarks and acknowledgements

The subjects covered in this special issue are merely indicative of the range of interests of my colleagues in IFAC and the TC 9-5 technical committee in particular which comprises almost 80 members from over 20 countries. I have not included important developments in end-of-life management and recycling, cost-oriented automation, mechatronics management and education, microfinance, telemedicine and virtual hospitals, robotics, service-engineering, energy-systems, social networks or important work on the role of control and automation technology in the recovery of post-conflict regions. Neither does this special issue touch on geographical information systems, technology driven transformation in less developed regions, global forecasting. Econometrics or important theoretical work in mathematics. Perhaps these are topics for future special issues. However, I trust that the selection that is included demonstrates the breadth and depth of research on technology, culture and international stability currently underway in the field.

A sincere thank you goes to the reviewers for their speedy turnaround of the papers, to the senior editorial team at AI and Society for their guidance and support and, especially, to the authors for their inspiring work.

I am also deeply grateful for the support of the technical committee itself, and especially the two vice-chairpersons who work so hard to promote technology, culture and international stability research and practice: Professor Peter Kopacek (Head of Institute of Handling Devices and Robotic at the Technical University of Vienna) and Dr. Marion Hersh (Head of the TC 9-5 Working Group on Ethics, University of Glasgow) who has contributed a paper to this special issue.