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Editorial

NeTWork WORKSHOP

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After WW2 technologies emerged, that had the potential of being very beneficial. However, the nature, the scale and the conditions of these processes meant that negative effects, especially of disasters, were no longer confined to the premises of the industry or the workforce but could affect large sections of the population. The emergence of this notion came on top of already growing concerns about general environmental effects of industry such as air pollution (smog).

Decision makers and the public therefore wanted to know about the potential effects, but at the time had little expertise of their own. Thus “industry” was asked what could be expected. Industry reacted (as usual) on the defence, supporting claims that nothing bad could happen by expert reports. Experts usually were in favour of the technology they were discussing, not so much because the industry paid them but because they chose to work in their profession because they found the activity appealing. This unfortunately led to a bias that later got designated as experts not being trusted and turned them into a party of their own, often considered as being opposed to the threatened public.

This position became aggravated because politicians and public wanted more and more detailed information which could only be given by these experts, deepening the abyss between them.

Then social scientists stepped in trying to understand the dichotomy between “experts” (meaning technical) and the public and to maybe do something about it. In the beginning they were driven by the belief that certain technologies (such as nuclear) were a blessing for society and thus the “irrational” resistance of the public should be understood and overcome.

In this process the very meaning of risk became part of the issue. Was risk a “physical” phenomenon that, given enough effort, could objectively be assessed or was it an inherently socio-political entity that escaped rationality.

Many psychometric type studies were devoted to this issue. These really only revealed that potential disasters frighten people (experts and populus alike) and therefore insurance type risk evaluation is not the way people make their risk decisions. Subsequent attempts to teach the people to think like insurance persons all failed. Finally policy makers accepted that politics has its own rationality not necessarily explained by insurance type rationales alone.

The present situation is that it is recognised as essential to have people involved. Standard procedures of democratic public decision making, however, prove to be insufficient to handle especially local and regional concerns. The distance between institutions and people is increasing because of globalization of the institutional processes, which threatens the heart of democracy: What used to be a dichotomy between experts and public now also develops as a distance between politicians (who are supposed to represent the people) and the people.

A possible way out is first to recognise that we are all the general public and we are only experts in a very small field. Secondly, that there is no such thing as an irrational public. Lastly, that the heart of democracy and a stable society is the recognition that ultimately it is the people who decide.

The questions therefore should not be what is the meaning of risk, but how can the concept of risk be used meaningfully in society, to reach acceptable solutions to the complicated issues that society faces.

This book is meant to contribute some ideas and models to actually do this. The book is a product of NeTWork, an international, interdisciplinary study group with the objective to advance the study and intellectual

penetration of social and scientific problems posed by the diffusion of modern technologies in all domains of work life. Over the past nineteen years NeTWork, partially supported by the Werner Reimers Foundation (Bad Homburg, Germany) and the Maison des Sciences de l'Homme (Paris), has held annual workshops relating to the overall theme of new technologies and work. These have covered a wide range of topics that included human error, training, distributed decision making and management.

While the original activities of NeTWork began with a wide coverage of sub-themes, more recent preoccupations focused more specifically on a theme of great scientific and social significance:

The safety of high technology systems and the role of human contribution to either breakdowns or the maintenance of hazardous systems.

The past few years have seen a succession of major disasters afflicting a wide range of complex technologies: nuclear power plants, chemical installations, spacecraft, roll-on-roll-off ferries, commercial and military air craft, off-shore oil and gas platforms, telecommunication systems, computerized stock exchanges, hazardous goods transport and modern railway networks.

At a purely surface level, these accidents varied widely in their specific causes and consequences. At a more fundamental level, however, they shared a number of important features:

- They occurred within well-defended systems that were proof against single failure, either human or mechanical.
- They arose from the adverse conjunction of several distinct causal events. Moreover, a large proportion of these multiple root causes were present within the system long before the accidents occurred.
- Human rather than technical failures played a dominant role in all of these accidents.

A point has been reached in the development of technology where the greatest dangers stem from the insidious accumulation of latent or delayed action, i.e. human failures occurring primarily within the organizational, design and managerial sectors. The availability of cheap computing power has effected radical changes in the relationship between advanced technological systems and the people who control them:

- Systems have become automated. In many new technologies, operators exercise remote supervisory control rather than direct, hands-on, manipulation of the process.
- This control is centralized in the hands of a few individuals.
- Systems have become larger, more complex and more dangerous: greater amounts of hazardous material are concentrated in single sites (chemical and nuclear power plants); there are more potential victims (advanced transport systems).
- Elaborate 'defences-in-depth' make systems more opaque to the people who control them.
- Flexible working conditions make it imperative that operators continuously explore the boundaries of their workspace in order to optimize various aspects of their performance. Yet the presence of automation and engineered safety systems obscures the boundaries between safe and unsafe operation.

We can trace four ages of safety concern. The first was the technical age in which the main focus was upon operational and engineering methods for combating hazards. Then came the human error age in which remedial efforts were directed at reducing both the occurrence and the consequences on unsafe acts committed by those at the immediate human-system interface. But over the past decade we have moved into a third age, the socio-technical age. In this, the present age, we recognize that the major residual safety problems do not belong exclusively to either the technical or the human domains. Rather, they emerge, from as yet little understood interactions between the technical, social and organizational aspects of the system. For the most part, the search for safer systems in this third age has concentrated upon identifying retrospectively those organizational features that contributed to major accidents such as Bhopal, Challenger, the 'Herald of Free Enterprise', Piper Alpha, King's Cross, Clapham Junction and Tchernobyl. These case study analyses have yielded valuable insights into the organizational pathways by which fallible high-level decisions turn into the unsafe acts of those at the 'sharp end' of the system.

In highly regulated systems safety problems may also occur because of factors external to the organization such as regulation problems and dysfunctional relations between organizations, which seem to herald an

overlapping fourth age, the inter-organizational age, in which efforts are also concentrated on the improvement of inter-organizational interactions.

Yet it is clear that investigations limited to accident-prone systems are not sufficient to identify those organizational characteristics which distinguish safe from unsafe systems. In order to meet the challenges of the socio-technical age and of the inter-organizational age, we need to seek out and describe the characteristics of high-reliability systems and their interactions. That is, organizations, operating in hazardous environments, that succeed in achieving a high degree of relative safety. In short: we need to define system health as well as system morbidity.

The themes of annual workshops are planned and evaluated by a small 'core group' whose membership varies slightly according to the respective sub-theme to be treated. Two or three "godfathers" further detail a chosen sub-theme and propose a list of prospective participants. The choice of invitees is made internationally on the basis of their active research involvement with respect to the sub-theme or corresponding practice experience. Thus more than 190 persons from 21 countries participated in the NeTWork workshops between 1983 and 2001.

All contributions to a given workshop are distributed to all participants several weeks in advance in order to facilitate their thorough reading before the workshop itself. Only short statements are possible for each contributor summarizing the main points of his/her paper contribution in order to maximize thorough discussion and proposals for the improvement of each contribution. The workshop's "godfathers" usually serve as editors for the preparation of the publication which is usually developed from each meeting. So far 13 publications have appeared from these NeTWork activities. Three more are in preparation. The model of this international and interdisciplinary exchange has meanwhile been adopted by various other institutions. The administration of NeTWork activities is managed by staff of the Berlin University of Technology: Prof. Bernhard Wilpert (Speaker) and Dr. Babette Fahlbruch (previously: Prof. Antonio Ruiz Quintanilla and Matthias Freitag, Workshop Coordinators). The Maison des Sciences de’l Homme continues to support the workshop administratively and materially.

Today, the participants in NeTWork form an international, interdisciplinary network of professionals which world-wide seeks its equal in terms of its unique and productive mix: philosophers, historians, engineers, management experts, sociologists, psychologists, physiologists, economists, ergonomists united in a common concern for the improvement of safety and reliability of complex modern socio-technical systems.

Twenty years of successful theme oriented cooperation of a large international, interdisciplinary group consisting of internationally reputed as well as young promising scholars and experienced practitioners is in itself a remarkable achievement. This was only possible on the basis of the unbureaucratic support from two enlightened institutions devoted to the furthering of national and international cooperation among human sciences: the Werner Reimers Foundation and the Maison des Sciences de l'Homme.

The book in front of you is the result of discussions on Risk Coherence. It is a collection of loosely connected exploratory essays on the fuzzy but important subject of risk coherence coming from many different knowledge domains. It is not a tightly integrated, single author book. As a result the various sections have different styles. Some parts are analytic and others descriptive. Some subjects are treated by various contributors although from a different perspective and a symmetrical and holistic coverage was not the purpose of the book. It gives the reader material to reflect.

The book deals mainly with risk of sudden, accidental, harmful events in technologically sophisticated, multi-party enterprises, not long term, chronic, health risks from pollution, or common slip & fall events.