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Technology Assessment - A Challenge to Knowledge Organization?

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The increasing technicalization of knowledge calls for a school of thought in technology assessment which occupies itself with the cognitive foundations of knowledge technology and the consequences and effects of the technicalization of knowledge. The present contribution hopes to stimulate ISKO into taking an interest in this problem field. (Author)

1. Technology Assessment

According to *K.A. Detzer* (3), the concept Technology Assessment was coined in 1965 by the then chairman of the Science and Research Committee of the US House of Representatives, congressman *E.Daddario*. Quite generally the aim of Technology Assessment may - varying with the given approach and the task at hand - be defined as the control, monitoring or containment of technological innovation, based on the early recognition and/or prognostication of possible technical effects and consequences (e.g. risk or effect prognoses). A central concept in this connection is that of safety, understood not only in a purely technical sense, but also as social and 'orientational' safety. A more precise definition of the tasks and methods of technology assessment must be left to the given research field and/or the concrete task at hand and can be arrived at only in that context.

Today there exist at least three schools of thought in technology assessment, each resulting from the background of their given adherents. First of all there is an engineering approach, immanent to technology and championed by technicians themselves. This approach is characterized on the one hand by high technological competence, but, on the other hand, also by strict confinement within the limits of technology. Its aim is to recognize technical effects and possibly to change them in order to minimize technical risks and strengthen positive effects - in short: to improve technology and thus to ensure technical safety. The fixing of limit values e.g. for noise or pollutant emissions and their monitoring by measuring techniques may be regarded as concrete examples of this approach.

2. Knowledge Technology and Knowledge Organization.

A characteristic feature, and probably not the least important one, of the concepts of an 'information society' or even an 'information age' (13) is the fact that modern technology (computer, communication and media technologies) is being applied to process knowledge (in the widest sense). As a result, in his dealings with knowledge (knowledge acquisition, knowledge processing, etc.) man is being confronted on an ever increasing scale with technological systems (4) (6). Media, according to *G. Wersig* (14), are an organizational consequence of technology. Assuming that media influence our cultural development (and who would doubt it), such an influence must in the end also be exercised by technologies.

In its strongest form so far this technicalization of knowledge is encountered in the so-called knowledge-based ('smart') information systems, where, however, they constitute only a preliminary culmination point of a long development. Earlier forms such as computer-assisted technologies for data storage (conventional data bank systems), word processing, desktop publishing or calculation already deal in one way or another with knowledge. While the increase of human knowledge has so far promoted the genesis of technology, technology is now, in turn, increasingly influencing the generation, storage, processing, distribution and utilization of knowledge. Knowledge is being technicalized on an ever increasing scale, thus being no longer just a precondition for technology, but in equal measure its aim. Of course this technicalization did not start only with the invention of the computer or of communication technology: paper and printing likewise constituted technical rationalizations in this sense. Yet the modern, computer-based techniques mean a gigantic quantitative and qualitative leap forward. Thus e.g. *K. Haefner* notes "that we are moving more and more from the 'old', explicit representations on 'readily overseeable media' to knowledge organized implicity in technical systems" (6, p.18). Here even the amalgamation of technology and knowledge into 'cognitive-technical complexes' (*H.F. Spinner* in 13) is hinted at. Visions of e.g. virtual libraries (7) or even the AI nightmares of *H.Moravec* (11) may indicate what types of future are regarded as possible throught the technicalization of knowledge or its amalgamation with technology - but are these types of future really desirable?

According to the traditional understanding of technology, however, this technicalization of knowledge means at the same time a dehumanization of knowledge-processing processes. 'Each new machine means that man cedes to his technical machinery some action which he formerly ac-

complished with his mental-organical faculties, thus objectifying something which originally was subjective, a part of his vital initiative' (5, p. 107). But can such processes really be technicalized in analogy to the human accomplishment - does not the technicalization of knowledge processing differ in some way or other from the mechanization of manual actions? What gain will man obtain from this technicalization, or what loss will be suffer from it?

It makes sense to refer to such a technology as a knowledge technology[1]. According to *H.F. Spinner* (13) it is - in addition to a few other factors such as e.g. the increasing determination of the knowledge order by the economic order - these technical conditions which give rise to a 'change of the knowledge order' or to a 'new knowledge situation' to which technology assessment will have to pay attention. Here, the concept 'knowledge order' is not understood by *H.F. Spinner* as an ordered system or classification of knowledge, but rather as the totality of all normative rules in man's dealing with knowledge (e.g. the generation, processing or utilization of knowledge). Knowledge order as understood by Spinner is a concept of ordering policy, analogous to e.g. social or economic order.

While in the past technology assessment had to deal primarily with the *technicalization through knowledge* (engineering sciences), now the *technicalization of knowledge* itself is becoming a topic in its own right. Now if these cognitive foundations of technology are to become an object of technology assessment, an interdisciplinary - or, to use a concept coined by *J. Mittelstrass* (10): transdisciplinary - cooperation will constitute a necessary basis for any success - for the amalgamation of technology and knowledge has caused the foundations of knowledge technology to become transdisciplinary themselves.

Generally speaking it will have to be the task of technology assessment in this area to preserve (or may by create in the first place!) an understanding of the causes, meanings and effects of the technicalization of knowledge. To indicate a few problems existing here, the folloeing research topics may be mentioned here as examples, with no order of importance or even completeness being claimed here:

- What, particularly in cognitive-technological systems, is the nature of implied knowledge in comparison with traditionally processed knowledge?
- Is there knowledge that cannot, or not meaningfully, be technicalized?
- How is the knowledge implied in these systems related to the environment or to 'reality' (the question of representation)?
- What concepts of knowledge representation are pursued in such systems? How does the representational form influence the contents? Or: Is there any loss of content through a processing in conformity with the requirements of the media or of technology?
- Do possible new forms of knowledge representation also lead to new types of knowledge or new forms of insights?
- How do such systems influence or change man's acquisition of knowledge?
- How does the technicalization of knowledge influence its availability or distribution?
- What requirements do these developments impose on man, what competences does he need to deal with these systems and what consequences result from this with respect to education and advanced training?
- Do the creation and use of knowledge technology produce any fundamental social changes and if so, of what nature will these changes be?
- What dynamics of their own will knowledge technologies possibly develop?

This list of possible research topics alone illustrates the necessity of transdisciplinary cooperation between all sciences concerned with knowledge and its processing. The traditional, often one-sided orientation of technology assessment can hardly produce any useful, at least no exhaustive contributions to answering the questions raised. A central position, however, according to *H.F. Spinner*, is occupied here by the humanities, the sciences of the human mind. 'In our information age the 'human mind' as object of the humanities is made up of knowledge and more and more knowledge... The climbing of the information mountain and the illumination of the cognitive-technological complex thus become new tasks of the humanities which they, in union with all other 'sciences of knowledge' - but spear-heading them where possible by virtue of their anciennity - should increasingly pay attention to in the future, although so far they are doing so only hesitatingly.' (13, p. 6).

Before, however, these concrete questions can be tackled, a more precise definition would be required of what is to be the objective of such technology assessment as applied to knowledge technology. In other words: on what standards is an assessment - the result, after all, of an investigation - of technology to be based? A task which, just as the concrete research itself, should be an important and fundamental topic for our Society for Knowledge Organization.

3. Technology assessment as a task for ISKO. A plea

Now that *P. Jaenecke* (8) has made an attempt in this journal to define the position of Knowledge Organization, thus in the end assigning ISKO its sphere of work, I wish to suggest here, without already outlining a pertinent programm, that our Society should also pay attention to technology assessment of the kind described. Where, if not in our Society, dealing as it does, and on an interdisciplinary basis at that, with knowledge organization anyway, could one find a suitable place for investigating the effects of knowledge technology? Where, if not in this Society uniting representatives from the most varied sciences of knowledge, would one find a place to overcome *C.P. Snow's* (12) thesis of the 'two cultures'?

Leafing through the various Proceedings volumes produced by our Society so far one will readily note that, while the technicalization of knowledge occupies a broad space, the consequences of this process have so far remained largely unconsidered (or at least unmentioned). Should not precisely ISKO take the lead here? How can a Society which is devoted to knowledge organization and thus, today, necessarily also to its technicalization operate meaningfully without picturing *in advance* the consequences of this technicalization? For only the thinking-out *in advance* of possible consequences and effects lets options originate and leaves corresponding action possibilities open.

The first task of such an understanding would be the development of standards for evaluating the technicalization of knowledge from the point of view of its various consequences and effects, its possible gains and losses. Only such an evaluation codex would permit a proper appreciation of the results of technology assessment. Thus, in a first and fundamental step one would need to achieve clarity as to the desiderable and undesiderable effects of the technicalization of knowledge. In other words: properties would need to be elaborated which a (new) knowledge order - as meant by *Spinner* - should possess. *H. Löckenhoff* has, in addition to economic and technical realizability, insisted above all on "sufficient compatibility with individual, social and cultural order of life" (9, p. 32). Such compatibility would probably have to be superordinate objective of a knowledge order. A 'new knowledge order' needs to be described and defined. The concept of 'knowledge order' alone does not yet indicate what expression of such an order is meant. Even a knowledge order influenced to a high degree by technology should undoubtedly, in its basic definition, be oriented to man's needs. Any technicalization of knowledge should adhere to this basic definition of a humane order of knowledge. The best possible organization of knowledge-technological systems will be determined by the humane requirements in dealing with them, not by e.g. elegant or rational technical solutions alone.

Besides an evaluation of the results of concrete technology assessment - which in a second step would have to tackle the problems already outlined (but also other ones) - this fundamental work would possibly also give rise to normative recommendations for the technicalization of knowledge which already at the very beginning of technicalization projects might rule out undesirable effects while at the same time helping to promote desirable ones. Man furnishes the orientation and constitutes the objective of knowledge technicalization, which can be pursued only for man, with due regard for his needs.

Trivial though it may seem, the following should be borne in mind in conclusion: any technicalization, including that of knowledge, is always brought about by man. Technology assessment is, in the end, always an investigation of human action. Unsound developments - of whatevernature - are therefore not an abstract responsibility of some machines, but one of man. And, in their actions, human beings have the possibility of choice - as long as they know and understand what they are doing!

Note

1 The customary concept 'information technology' already implies a certain dependence (varying with the context and the situation) of knowledge, but one which arises only through application in accordance with the given needs.

References

(1) Bolter, J.D.: text and technology: Reading and writing in the electronic age. Libr.Resources & Techn.Serv. 31(1987)No.1, p.12-23

(2) Bolter, J.D.: Der digitale Faust. Stuttgart: Klett-Gotta 1990.

(3) Detzer, K.A.: Technischer Fortschritt und gesellschaftliche Verantvortung. In: Zimmerli, W.Ch. (Ed.): Wider die 'Zwei Kulturen'. Berlin u.a.: Springer 1990.

(4) Gödert, W.; Kübler, H.D.: Konzepte von Wissensdarstellung und Wissensrezeption medial vermittelter Information: Plädoyer für eine kommunikationstheoretische Betrachtungsweise. In: Nachr.Dok. 44(1993)p. 149-156

(5) Guardini, Romano: Die Maschine und der Mensch. In: Die Technik und der Mensch. 2.Aufl. Mainz: Grünewald 1990. p. 93-110

(6) Haefner, K.: Der Mensch in seiner zunehmend technisch geprägten informationellen Umwelt. In: Wissensvermittlung, Medienund Gesellschaft: ein Symposium der Bertelsmann Stiftung am 23.-24. Februar 1989 in Gütersloh. Gütersloh: Bertelsmann 1989. p. 14-33

(7) Heinisch, C.: Visionen: CyberLib - die Bibliothek der virtuellen Realität. In: Cogito 9(1993)4, p. 44-48

(8) Jaenecke, P.: To what end knowledge organization? In: Knowl.Org. 21(1994)1, p. 3-11

(9) Löckenhoff, H.: Zur kreativen Bewältigung von Komplexität in der Wissensordnung. In: Gödert, W.; Jaenecke, P.; Schmitz-Esser, W. (Eds.): Kognitive Ansätze zum Ordnen und Darstellen von Wissen. Frankfurt: INDEKS-Verlag 1992. p.31-41

(10) Mittelstraß, J.: Grundlagen und Anwendungen - Über das schwierige Verhältnis zwischen Forschung, Entwicklung und Politik. In: Chemie-Ingenieur-Technik 66(1994)3, p.309-315

(11) Moravec, H. Geist ohne Körper - Visionen von der reinen Intelligenz. In: Kultur und Technik im 21. Jahrhundert. Frankfurt/Main: Campus 1993. p.81-90

(12) Snow, S.P.: The Two Cultures and the scientific revolution. New York: Cambridge University Press 1959.

(13) Spinner, H.F.: Technikfolgenforschung im Überblick. In: Der Hochschullehrer (1989)2, 9. 1-7

(14) Wersig, G.: Informationsgesellschaft und Informationskultur. Freie Universität Berlin, Arbeitsbereich Informationswissenschaft 1987.

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