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Computers - Organizations

[PS NOTE WRITTEN IN DECEMBER 2008: THE ANNOUNCED EDITING OF THIS TEXT HAS NOT BEEN POSSIBLE AND PARTICULARLY THE LATER PART OF THE TEXT IS CORRUPT AFTER TRANSLATION FROM AN EARLY MICROSOFT-WORD VERSION. IT IS BARELY LEGIBLE. IT IS INCLUDED FOR THE POSSIBLE VALUE OF THE REFERENCES. WHICH OBVIOUSLY REFLECT THE STATE-OF-THE ART AT THE TIME - YEARS 1989-1992]

Introduction

The following text is an unedited material excerpted from a previous version of the research program. It will be rewritten as soon as possible but is included here for potentially interested readers who do not eschew a text that is most difficult to read. This section of a research proposal intends to cover the issue of computer and software usage starting from the point of view of organization theory and business administration.

Some directions for IT-research

Beside software developers there are also organization theorists and practitioners at various levels, engineers, economists, etc. who have widened their experience and interest towards the issue of systems, information systems, and computers, and whose work should be considered in our research (Swanson, 1976; 1982; Mason, & Mitroff, 1973; Erlandson, 1981, close to the efforts in Nordström, 1987 and Forsgren; Nordström, 1987; Forsgren, 1988b; Turoff, & Hiltz, 1982; Stevens, 1982; Meadows, & Robinson, 1985, esp. pp.1-15, 373-438; Henderson, 1987; Ehn, 1988; Gibson, & Ludl, 1988).

In Scandinavia, however, early efforts of this kind resulted initially during the 1960's and 1970's in a sort of technical-formal business analysis that was labeled information systems analysis and information systems research, a hybrid between traditional programming and "information flows" as found in the theory of accounting (Ijiri, 1965). As mentioned earlier, it was found that they could described in terms of graph theory or topological algebra such as applied to electric circuit theory. Such an orientation was one basis for an influential school of information systems represented by Langefors and his followers (Langefors, 1973; Langefors, & Sundgren, 1975; Lundeberg, 1976; Olle, Sol, & Tully, 1983; 1982, see Lundeberg's contribution). Comparing with the developments in Scandinavia (Bansler, 1987, presents a partial summary), in the USA and in other countries similar approaches had an almost simultaneous start (Gatto, 1964; Grindley, 1966) generating in a few years a sizable amount of pertinent literature (Couger, & Knapp, 1974; Olle, et al., 1982; Olle, et al.,

1983; Olle, H.J., & Verrijn-Stuart, 1986; Olle, et al., 1988; Langefors, Verrijn-Stuart, & Bracchi, 1986; Avison, & Fitzgerald, 1988). Attempts to overview and systematize such literature, e.g. by means of various list-table taxonomies have paradoxically also grown in these last few years (Blank, et al., 1982; Lyytinen, 1987; Iivari, 1988).

A late expression of the same interest profile is represented by the label of decision support systems (Lee, Cosh, & Migliarese, 1988, presents a survey) which by now seems to have parted in two branches.

One of them is oriented towards advanced variants of conceptual modeling (Humphreys, & Berkeley, 1988) or computer aided support of software engineering, CASE, which in close connection with AI and expert systems thinking strives towards greater formalization and mathematization. This is done not only in terms of graph theory (e.g. Petri nets) but rather in terms of either intuitive ad hoc piecemeal heuristic formalizations which are basically required for running the computer tool. The reliance is then mainly upon notations inspired by symbolic logic in a technical, engineering, instrumental spirit without particular connection to the disciplinary and historical issues in mathematics and logic. It is particularly apparent in the treatment of such fundamental issues as information quality, accuracy, software quality/reliability, software maintenance, etc. In one such approach (Berztiss, 1989) it is, for instance stated that "It deals with aspects of modularization, prototyping, and software quality attributes. Info systems become increasingly integrated with other kinds of systems. Information systems technology, since it already interacts with software engineering and is beginning to interact with artificial intelligence, can provide a catalyst for increasing the relevance of software engineering to artificial intelligence. For a meaningful discussion of the transition from an information base to a knowledge base we first need to define some terms. We consider a data base to be simply a structured collection of data. In an information base the data become interpreted by the imposition of constraints, but all the data are still regarded as reliable. Now, much of our decision making cannot be based entirely on reliable data, and we must consider the admission of unreliable data into a system as a step that promotes an information base to a knowledge base (with handling of exceptions, representation of different types of unreliable data, and inference making capabilities). The essence of management of an information base is a conservative attitude to what may be admitted to it, but the essence of management of a knowledge base is a liberal attitude. Handling of unreliable data is in quite a different category from exception handling. An exception handler recognizes that something is amiss, and takes protective action. There is nothing protective in the handling of unreliable data by a knowledge system. We do not have the techniques for spotting unreliable data, classifying them, and providing them with representations. Each class of uncertainty requires its own approach. First the proper kind of logic has to be found for each particular class of uncertainty. Next an inference ingine based on this logic has to be built. Finally, since the support for any decision consists of inputs belonging to vaious classes of uncertainty, the inference engines have to be made to work in a cooperative mode" (ibid, pp. 16-18).

The other branch has taken either a practical-popular orientation of user advising and counseling at the level of administrative systems management (Martin, 1988) or as a reflective-critical orientation towards disciplinary, transdisciplinary and epistemological issues of the social sciences, but in separation from formal sciences such as mathematics, logic, econometrics, and statistics (Hirschheim, 1985; Klein, & Hirschheim, 1985; Mumford, Hirschheim, Fitzgerald, & Wood-Harper, 1985; Boland, 1987). An appreciation of these traditions requires a philosophical overview (Ivanov, 1984b). This second branch can be said to approach those systems analysts who, starting from the traditional field of business administration and having often taught

in graduate schools of business, have in the past 20 years stretched their interest to encompass the business of organizational content of information technology and associated programming. One intention of our proposed research is to bridge both empirically and (unseparably) theoretically at the level of basic research the gap between these two traditions of formal science and human or moral science (as it was called during the past century).

This bridging of the gap between programming or systems development and business administration, economic science and political science may naturally fall under the label of systems theory (Churchman, 1971). Today it might be implemented within the frame of our research program by developing the "hypertext" idea beyond na•ve empiricism (Rychlak, 1977), i.e. in its historical background (Calvino, 1988, pp.71, 112, 116-123). This leads towards some kind of explanatory "hypergames" which will expose systems analysts and decision makers at all levels to the complexities and possibilities of social systems design options. This has been suggested in the field of essay literature (Calvino, ibid., pp. 35, 71, 94-95,108, 116, 119-121) and in the context of systems design (Forsgren, 1988b; Fischer, Morch, & McCall, 1989), in one case constructing a metaphor based on the creation of nested multiboard games of chess which provide a rich set of strategic possibilities, pointing ways out of the international arms stalemate by supporting current arm negotiations (McWhinney, Greening, & Mitroff, 1988).

Our proposed research will also attempt, in the context of metaphorical approaches, to encompass aesthetical and ethical dimensions by extending the concept of games into the mythological dimension which is nowadays so exploited in information technology for computer games (Mitroff, 1983a; Mitroff, 1984).}

In Scandinavia such efforts often have been culturally and politically influenced in a more "socialistic" direction, close to issues of workers' participation and work environment (Mathiassen, Rolskov, & Vedel, 1983; Lanzara, & Mathiassen, 1985; Andersen, & Mathiassen, 1986; Mathiassen, & Nielsen, 1988; Mathiassen, & Munk-Madsen, 1989). These approaches, however, to the extent that they have related themselves to traditional science or to systems or organization theories at all (Ehn, 1988; Mathiassen, et al., 1988; Mathiassen, et al., 1989) have displayed a weak, if any, consideration for the hard historical issues about the theories of logic and mathematics. Traditional science tends to be considered in terms of an overall positivism, while the theoretical basis is sought in continental interpretations of traditions of semiotics, rhetorics, dialectics, and even aesthetics (Andersen, et al., 1986, present a bold and original approach where a kind of rhethoric-dialectics is applied to the dialogue structure of the paper itself). Lately "soft systems methodology" SSM (Checkland, 1988) has also been adduced with the addition of dialectical "hard contradictions" that were already suggested from within the SSM tradition itself (Atkinson, & Checkland, 1988), in the spirit of "Hegelian inquiring systems" (Churchman, 1971), but with a Marxistic-Maoistic twist which is rare to find outside socialistic Scandinavia. The weak anchorage to the historical debates on logic and mathematics are also reflected in the limited range of the discussion about formalization (Naur, 1982, one main basis for Mathiassen & Munk-Madsen's, op. cit. criticism of the issue). Such weakness can barely be offset by the stronger consciousness, displayed in such works, for the hard everyday's consultants' practice of computerization projects and program systems development.

One particular branch of this expansion of software interests into organizational and systems thinking deals with psychosocial aspects of problem solving and organizational psychology in the form of studies on "cognitive styles" of problem solving or "types" of decision makers, including Jungian analytical psychological approaches (Mitroff, & Kilmann, 1978; Mitroff, 1983b; Mitroff, 1983a; de Waele, 1978).

This has also been done in direct connection with the issue of information systems (McKenney, & Keen, 1974; Benbasat, & Taylor, 1978; Kerola, & Taggart, 1982; Robey, & Taggart, 1982; Fripp, 1982; Woolley, 1982, all concerning experimental problems). The same kind of interest was shown also in other organizational contexts not directly related to information or computer systems (Mintzberg, 1976; Mintzberg, 1978; Mintzberg, 1979)

Several of the above approaches, both theoretical and experimental, refer to psychology, social psychology, and social science in general, in clear connection to the issue of contacts between logic and psychology to which one arrives by pursuing in depth the disciplinary problems of logic and mathematics (Nyman, 1917; Macnamara, 1986). The organizational or, more generally, the social systems aspects of such endeavours may eventually also lead to issues of multidisciplinary or transdisciplinary research which are often desired by funding agencies without a clear evaluation of their difficulties in the social and historical context of universities (Kubie, 1970; Swanson, 1979; Granberg, 1976; Ivanov, 1984a; Knuthammar, & Pålsson, 1985, pp.52-62 & 124-127; Betz, 1971; Scott, 1984). Especially in the fashionable field of information technology there might be further the problem of what has been called "the higher capitalism, new men of power, and the academic bourgeoise" (Nisbet, 1971, chs. 5-7; Scott, 1984).

The bridge to wider issues and to a wider perspective

Another further line of development starting from the expansion of concerns of computer programming towards the "larger system" will takes us directly into what has been labeled management information systems, administrative systems, etc. Some of these concerns in the USA have been allowed to flourish at graduate schools of business while universities, at least in Scandinavia have been sometimes pressed into transforming themselves into institutes of technology or even technical institutes and vocational training schools (cf. earlier references to studies on transdisciplinary research and universities' development).

Business administration can also be seen in a narrow perspective having its own indisputable disciplinary nucleus in the theory of accounting which is several hundred years old (Littleton, 1981). The roots of accounting and auditing, however, are closely related to classical statistics as it was understood until this century (Meitzen, 1891; Sjöström, 1983; Ivanov, 1984b; Ivanov, 1986; Johannisson, 1988), and to statistical and geographical information systems as it has been noted by several authors (Dunn, 1974; Ivanov, 1972; Ivanov, 1986, p.28; Persson, 1976; Morgenstern, 1963; Nilsson, 1987). Historically and conceptually accounting can be formulated in terms of the history of ideas and in terms of systems thinking (Littleton, 1981; Churchman, & Ackoff, 1955; Churchman, 1961; Benbasat, & Dexter, 1979; Guillet de Monthoux, 1982; Johansson, 1982; Jönsson, 1982).It may be, for instance, of great interest from the point of view of basic research to understand what has been so fundamentally important in the idea of double entry accounting, to the point of it still being considered the indisputable "nucleus" of business administration or theory of information theory and "data structure" for the firm.

It is then important to note that such nucleus of accounting and auditing can either be expanded into a questionable extremely formal or mathematical understanding of economic information (Theil, 1966; Marschak, 1971; Schwartz, 1986) against which several warnings have been issued (Keynes, 1952, p. 19n; Schwartz, 1962; Ingelstam, 1970) or into the social and psychological realities (as suggested by the above mentioned) (Churchman, et al., 1955; Benbasat, et al., 1979; Boland, 1979; Mason, 1981). Such an expansion fits well with the ideas of "organizational

information systems" (Ciborra, 1985, has re-established the term today) for comprehensive research programs on information systems which have been formulated by business and organizational researchers (Mason, et al., 1973; Kling, & Scacchi, 1980; Kling, 1980; Ives, Hamilton, & Davis, 1980; Mitroff, 1981; McFarlan, 1984, esp. pp. 97ff and 109ff; Docherty, Werngren, & Widman, 1984; Cash, McFarlan, & McKenney, 1988; Ulrich, 1988).

Our own research proposal may partly be regarded as an update and a development of such earlier research programs, with the important addition of especial concerns for information technology as represented by formal science embodied in industrial computer hardware. The research should, however, ideally result also in proposals for undergraduate and graduate curricula for university education seen as a recruiting basis for future researchers who will guarantee the continuity of the proposed studies. This is analog to what has been attempted earlier on a more technical basis (Computer science curriculum, 1964; Forsythe, 1967; Information systems-curriculum recommendations of the 80's, 1982; Parnas, 1989), and where many implicit theoretical committments could be inferred from pioneering researchers' proposals for educational reference literature (Gorn, 1964; Korfhage, 1964).

The main difficulties for the research outlined in this section will probably be to ground an administrative or organizational science into something which transcends the often unconsciously presupposed utilitarian basis of J. Bentham's "moral algebra" as applied to modern cost-benefit analysis. Some attempts have nevertheless already been made to initiate a renewal of economic and organizational business science, both from polemical liberal standpoints which touch upon the issue of rationality, logic, and psychology (Hayek, 1949, ch.3; 1967; 1941), and from other more recent standpoints which are not easily classified. They are both "practical" (Hayes, & Abernathy, 1980) and theoretical, close to philosophy and ethics (Böhler, 1970; 1973; Morgenstern, 1972; Henderson, 1978; Budd, 1979; Brunsson, 1982; Brunsson, 1985; 1986; Grassman, 1985; Guillet de Monthoux, 1983; 1987; 1981,, where especially the last reference stays closest to information system problems; Etzioni, 1988; Sen, 1987; Gustafsson, 1988). Others yet dwell upon the issue of money and power in a bread historical or philosophical perspective (Simmel, 1900/1978; Desai, 1979, concentrating on Marxian economics, Daudi, 1986; Mathieu, 1985), in a psychoanalytical perspective (Borneman, 1976), or in more or less explicit Marxian terms, in less or more close contact with the issues of information technology (Emery, & Thorsrud, 1969; Quiniou, 1971; Ehn, 1988).

As we have seen, Marxian-socialistic, together with phenomenological, "ordinary language", and "speech-act" tendencies in systems development have grown on the Scandinavian scene, and have recently been summarized in the quest for "work oriented design of computer tools" (Ehn, 1988). In these contexts we have the emphasis on the conceptualization of the computer as a "tool" (Wallin, 1986), as a tool for cooperative design (Sørgaard, 1988), or as a vehicle for user oriented systems development and communication (Nissen, & Sandström, 1987; Nurminen, 1988). All this stands close in matters of concern, if not in theoretical outlook, to the qualitative-constructive proposal in the spirit of experimental idealism and dialectical-pragmatic systems theory (Churchman, 1971; Ivanov, 1972; Mitroff, 1981; Forsgren, 1988b). The conception of tool according to these latter traditions of pragmatist instrumentalism should open fruitful avenues for discussions of utilization of the computer tool or, rather, instrument (Sachs, & Broholm, 1989).

The theoretical basis for "cooperative work" should, however, be worked out since it still seems to be rather unclearly eclectic to the extent that it does not rely only on marxistic approaches. While some authors (Ehn, 1988) rely on an attempt of synthesis

among e.g. Marx, Wittgenstein and Heidegger, others (Mathiassen, et al., 1988; Mathiassen, et al., 1989) refer to the dialectical materialism of Mao Tsetung and to a transaction theory of the firm. An appreciation of these approaches would involve discussing the choice among alternative meanings of dialectics (Rychlak, 1976; Datan, & Reese, 1977; Riegel, 1979) and justifying the historical basis of the transaction concept which is now rooted in rather positivistic works (Williamson, 1970; Williamson, 1975, seemingly related to ; Marschak, & Radner, 1969), and with clear connections to the so called transaction theory of value which has been strongly criticized (Churchman, 1961, ch.13).

Finally, an interesting avenue of research has been recently opened, close to our proposed main methodological orientation toward pragmatist social systems design, in combination with European continental thinking (Ramirez, 1987; Ramirez, 1988a; Ramirez, 1988b; Richardson, & Dowling, 1985; Motloch, 1989; Katsenelinboigen, 1989, an abstract). It develops the aesthetical dimension of organizations and design as it was also suggested in the tradition of social systems theory (Churchman, 1979, ch.11), on the context of work-oriented design of computer tools (Ehn, 1988), and earlier in other contexts (Moles, 1966). Such aesthetical research efforts may apparently distantiate our proposed inquiry from the original issues of information technology to the extent that they cannot be seen as incorporating an aesthetic dimension. Aesthetics, however, in its essence and in its relationships to logic and mathematics (Schleiermacher, 1988, on the essence; Steiner, 1886/1988, on the relationships) may be very relevant to the study of formal sciences which are often guided by criteria of simplicity and elegance. This may constitute an avenue for an understanding of the sociopsychological and cultural determinants of the use of computers, including the playing and gambling behaviour (Turkle, 1984; Fine, 1956; Bergler, 1958; Halliday, & Fuller, 1974) including its wider scientific and cultural context (David, 1962; Eigen, & Winkler, 1985; Carse, 1986) and compulsive-subconscious aspects of thought which are mentioned in our section about logical aspects.

In the context of "tacit knowledge" and "knowledge acquisition" (Sandahl, 1987) aesthetics may furthermore be central for the discussion of the communicability of knowledge (Schleiermacher, 1988, in the introduction pp. 39ff) which in turn is a basic research problem in the development of computer support in the form of expert systems, appearing in the form of polemics about tacit knowledge (Göranzon, & Josefson, 1988), and hints about the role of drama (Hilton, 1987; Hilton, 1988; Hilton, & Mindus, 1988). A similar role could be envisaged even for poetry, e.g. in developing the concept of system (Erikson, 1975).

These last considerations may serve as an introduction to the section of our research proposal dealing with an overall summarizing "cultural criticism" as it is implicit in several hardly classifiable works (Norström, 1912; Gehlen, 1967; Ahlberg, 1974; 1978; Guénon, 1982; Filoramo, 1985; Poupard, 1986; Lewis, 1988, esp. pp. 80-12). In doing so, however, it is appropriate to reflect in a self-critical sense about the striving for completeness and unity which may be characterizing the proposed research. Modern writers (Musil, 1952) have questioned the oversimplified tendency to monistic thinking, in view of alternatives, and hopefully not only the better known relativism, eclecticism, skepticism, nihilism, but rather late versions of pluralism such as postmodernism that have been mentioned in the context of design of computer tools (Ehn, 1988). In the context of this research proposal we are not strange to the idea of regarding the presently fashionable hypertext idea of associative data structures, "connection machines" (Hillis, 1986) and other problematic speculative comments related to the "philosophy" of Apple Computer, Inc.(van Gigch, 1988) in the light of their historical background in literature. This leads to interpreting such idea as a kind of postmodernism or a search where even humanistic approaches to mathematics

(Zellini, 1985, as referred by Calvino, 1988, p. 69) melt down with the main ideas or the "six memos for the next millenium": lightness, quickness, exactitude, visibility, multiplicity, and consistency. It will be easily seen that at least five of these ideas fit well with being embodied in the computer idea. One important intention of the section of the research proposal which was presented here is, then, to secure the consideration of the ethical moral dimension by means of its linkage to the previously mentioned understanding of aesthetics as implicit in the criteria of elegance and simplicity of formal science and of the science of forms or design (Thackara, 1988, and the relation to formal science in Churchman, 1971,#, pp. 137ff.).

In this way, the issue turns out to be one of interpreting the current wave of computerization as a formalization of the world in aesthetical and ethical terms as they can be identified within the technological and political changes of society. This is the import of cultural criticism (Ivanov, 1986, tries to open some avenues). It is reasonable to expect that such an enterprise will not be considered as excessively original and ambitious: the AI tradition has already legitimated efforts which might be considered quite speculative, touching even upon the aeternal ultimate questions of philosophy and religion, mind, soul, etc. (Haugeland, 1981; Dennett, 1978; Brams, 1983; Hofstadter, 1979; Hofstadter, & Dennett, 1981; Doyle, 1982).

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FROM THIS POINT THE ORIGINAL TEXT OF MY DRAFT TURNS OUT TO HAVE BEEN COMPLETEY CORRUPTED AND IT IS BARELY LEGIBLE. IT IS INCLUDED ONLY WITH THE PURPOSE OF OFFERING SOME ORIENTATION ON THE POSSIBLE REFERENCES.

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tendencies in Germany (Oesterreich, & Volpert, 1986) that lie close to socialistic theory building (Leontjev, 1982; Rubinstein, 1977) and which have been well recognized in Scandinavia (Docherty, et al., 1988)
(Oesterreich, et al., 1986; Volpert, 1988)strong socialistic consciousness combined with aintenance, etc.
(Denning, et al., 1989); This closeness is indicated by the fact that the concept of cooperative negotiating interaction as developed in the latter tradition in terms of "quality" of information (Ivanov, 1972, chaps. 4-5, pp. 4.33ff.) and later summarized in other contexts (Ivanov, 1986, pp.47ff.) inspired the Marxistic original model for labor union involvement in systems development or development of negotiated information tools (Ehn, 1973). This Marxistic model, with slight modifications, was later developed into what could be called a model for constructive, interactive, dynamic, learning, negotiation systems at the work place (Ehn, & Sandberg, 1979, pp. 34-35). The very same model was later taken up in other Scandinavian Marxistic traditions (Mathiassen, 1982, p. 137). The main difference compared with the original model (Ivanov, 1972) is the emphasis on "resources" in the negotiations , to which it could be objected that the determination of resources throws us, pradoxically and recursively, into the need for an information system for that purpose according to the original model. The same model idea of quality as learning flexibility or constructivity was later incorporated in another dissertation in the pragmatist tradition #, on the essence; Steiner, 1926 that tries to open some new avenues of research , systemutv(Forsgren, 1988aLabeling something as being cultural criticism, journalistic essaism, or even philosop pp. 176-177), where the original metaphorical concept of quality was elaborated into the metaphor of constructivity and conversation, with five

related strategies for systems development.parent in the treatment of issues that have been considered ar greater depth elsewhere, such as information quality and (Ivanov, 1972) (Hester, Parnas, & Utter, 1981; Parnas, van Schouwen, & Kwan, 1988) Scandinavia such efforts often interface, schools (cf. the earlier reference {In(Böhler, 1970)gelstam, 1970 #305} or into nizational science on nthoux, 1983; (Guillet de Monthoux, 1987; Guillet de Monthoux, 1981) (Nissen, et al., 1987; Goldkuhl, & Lyytinen, 1982)on (Williamson), seemingly related to & Radner, transaction theory of value that has been severelylong time ago aesthetic use of computers, including; (Mitroff, 1984) in its relation to earlier non-computer studies (Eigen, et al., ; Carse, 1986) as well as the nscious aspects of thought thatdge (Schleiermacher, 1988, see in 1988 #282; Hilton, et al., 1988) amd music. wards monistic thinking. It is to be hoped that he natives will not be only the welland not evenple Computer Inc. sComputers and S

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