Development projects

In the context of a research program in information technology and administrative data processing one main subject for applied research will be the development of software packages of computer programs that embody de ideas of social systems science. The kernel of the applications will not be programming "virtuosism" and the development of new formalisms or new programming languages that often rather belong to the field of "rhetorical mathematics" (Davis, & Hersh, 1986, pp. 57-73). The applications will not emphasize the algorithmic thinking when considered as an intellectual component of computation, but rather modular thinking, and especially systems thinking (ibid., pp. 127-129). Programming will follow the modern trends of assemblage from available building blocks in the sense of e.g. the HYPER technique that is subordinated to the idea of system and system metaphors such as soft systems methodology, information quality, interactivity, co-constructivity and critical systems theory (Checkland, 1981; Forsgren, 1988; Ivanov, 1972; Nilsson, 1987; Ulrich, 1988), as well as system primitives such as objective, measure of performance, client, decision maker, planner, resource, environment, morphological-functional-teleological classes, etc. (Churchman, 1971, chap. 3; Churchman, 1979).

An outline of detailed work that has been done and is to be done (Forsgren, 1989; Ivanov, 1989b) centers on the use of computer support for documentation and update of systems description according to the above metaphors and primitives. The idea is the creation of an interactive computer application that keeps track of the relations between system primitives in the course of the continuous development and redevelopment (maintenance, upgrading) of a particular system intended for certain clients, etc. Instead of leaving the build up of the hyper-network to a purely associationistic (Guthrie, 1942) or connectivistic (Hillis, 1986) learning (Rychlak, 1977; 1981, offers a critical view of the debates on learning theory), the structure or skeleton of the network itself is modeled according to the concept of structure and function, or morphological-functional-teleological classes. The measure of performance in terms of the metaphorical concept of quality of information can be formally structured in terms particular data structures (Ivanov, 1972, chaps. 4-5; Ivanov, 1987) or mathematical matrixes (Ivanov, 1975, pp.46-49), while a "co-constructor" (Forsgren, 1989) can provide computer support to the above mentioned structure or skeleton of the system The co-constructor is an embryonic computer application with abilities to encourage critical co-constructive interactions about its future design. It also supports its own redesign using meta-design techniques, at the same time encouraging users (clients, decision makers, and other primitives such as actors, system activists, etc.) to participate in the process of improving such techniques. Critical coconstructive interactions take place where people with different interest are invited to critically examine the existing way of acting, and also to suggest and push for new ways of acting that better fits their interests or, rather, their ethical values.

Opportunities

One main opportunity of the ongoing research is the opportunity to test the social systems theory (Churchman, 1968; 1971; 1979) in a sense that is analog to its testing
by means of "soft systems methodology", SSM, but with the advantage of integrating both computer technology, group communication, and critical social theory in this SSM. A second opportunity is to obtain a marketable product that can be useful for use in business systems design, implementation, and maintenance of computer systems. A third opportunity is the use of the process of research itself as a vehicle for rising by means of computer technology the interest of young graduate students and instructors for social systems science. One might say that in the research project the computer is utilized as a "motorcycle" as a pretext for discussing methodological and philosophical questions with people who would spontaneously eschew such questions (Pirsig, 1974).

Expected problems

Among the practical problems that we foresee in our applied research concerning group communication there are in first place those that can be derived from the theoretical criticism of the thinking of J. Habermas (Ivanov, 1989a, to be integrated in a special work on the subject of "design and creativity", identifies some relevant literature; Thompson, & Held, 1982, esp. H. Ottemann's "Cognitive interests and self-reflection") who is considered by many to be the main modern theoretician of dialogue and communication. Such problems concern mainly the issue of power and ethics in cooperative learning communication, which has not yet been satisfactorily developed. Experiences and theories of learning (Ackoff, 1988; Argyris, Putnam, & McLain-Smith, 1985; Docherty, et al., 1988; Gustavsen, 1985; Löfberg, 1989; Oesterreich, & Volpert, 1986; Revans, 1982; Rychlak, 1977; 1981; Volpert, 1988) have not yet been incorporated in the work. The risks are that, in the worst case, this applied research leads to expensive activity with results that are not evaluable or that can be foreseen already now with the help of common sense or of available theory. If the social systems aspect is lost out of sight during the research, as it easily can in a context where young researchers become fascinated with the "erotic" glamorous aspect of "boy's toys" equipment, the consequences can be disastrous. Such a vision is already suggested in some programs for research that embody high technology and high capital investments with scenarios that would be considered by many as very challenging, offering rewarding creative opportunities (Lee, Cosh, & Migliarese, 1988, includes some relevant examples; Schwartz, 1986, represents an instructive extreme).

A problem that is related to loosing out of sight the systems dimension is the uncritical belief that applied research can start out using as building blocks available software packages as if they were neutral "atoms", and assuming that the consequences of their assemblage depends only upon the way they are interrelated. The antithesis of this position is, of course, that the "tools" themselves in such oversimplified mean-ends chains bear within themselves the presuppositions of what is bound to happen whenever they are used. If this were not so is would not have been necessary that engaged scientists and philosophers down through the last decades envisaged the need and possibility of creating new concepts of logic, mathematics or information (Churchman, 1971; Ivanov, 1972; Rosen, 1985; Rota, 1986). Also from the political left we get the concept of "dead labor" that is crystallized in capital equipment (Solomonides, & Levidow, 1985) and bears within itself the presuppositions of its use. The whole issue is also related to the dream of specialization of knowledge, and of "separability" in systems design (Churchman, 1971).

What is practice and application?

A semantic analysis

Webster's Third New International Dictionary (unabridged) informs us that empiric is one who follows an empirical method: one who relies on practical experience. An
(unfortunately) archaic meaning of empirical is relying on experience or observation alone, without proper regard for consideration of system, science, and theory; or "being or befitting a quack or charlatan" {sic!}. Empirical means also experiential, observational, factual; capable of being confirmed, verified, or disproved by observation or experiment. Empiricism is the practice of emphasizing experience especially of the senses or the practice or method of relying upon observation or induction rather than upon intuition, speculation, deduction, dialectic, or other rationalistic means in the pursuit of knowledge. Empiricism is also the theory {sic!} associated especially with the British philosophers John Locke, George Berkeley, and David Hume that all knowledge originates in experience. Cf. phenomenology, positivism, pragmatism, sensationalism.

Experience is the direct observation of, or participation in events: encountering, undergoing, or living through things in general as they take place in the course of time. It is also the state, extent, duration, or result of being engaged in a particular activity (as a profession) or in affairs generally. It is the sum total of the conscious events that make up the individual life. It may also mean something personally encountered, undergone, or lived through as: a) an event observed or participated in, b) a state of mind that forms a significant part of one's inner religious life and that is sometimes accompanied by intense emotion. Furthermore it can mean something by which one is stimulated or moved. Philosophically, experience means the act or process of perceiving or apprehending, as well as the discriminative reaction or the unconscious response of an organism to events or happenings within its environment. As a verb, experience stands for: to have experience of, meet with, suffer, undergo. It also means to learn by experience, find out, discover. Other meanings are to respond of react discriminatively to (a set of events within the environment): used of an organism. Synonyms are: undergo, sustain, suffer. Experience indicates an actual living through something and coming to know it first hand, rather than through hearsay or report. {In this sense it comes into conceptual conflict with the idea of "cooperative" mutual learning.}

To the extent that praxis is not obscurely founded on a non summarizable massive body of ideologically loaded literature it is defined by the dictionary as originating from medieval Latin, further from Sanskrit, something meaning doing, action, from the stem of prassein, to pass through, experience, practice, + sis; more at practical. Cf. action, practice. Praxis means then a) exercise or practice of an art, science, or skill; b) usual or conventional conduct: habit, custom.

Speculation, that was mentioned above as a kind of opposite to empiricism, means the faculty, act or process of intellectual examination of investigation as 1) Reasoning taking the form of prolonged and systematic analysis; 2) Reasoning or theorizing about a matter that transcends experience and does not admit of demonstration; 3) - In Hegelianism - reasoning that apprehends the unity of opposing categories, synthesizes them in a broader comprehension, and constitutes the thinking which explains objects of experience by their relation to the absolute personal reason. An (again: unfortunately) archaic meaning of the word is capacity for or exercise of the power of seeing: a) comprehending or mental vision; b) physical vision, the act of viewing, observation {sic!}.

Closely related to speculation, theory is defined as originating from words that stand for: to look at, behold, contemplate, consider. It means a belief, policy, or procedure proposed as the basis of action: principle of plan of action {sic!}. It also means the body of generalizations and principles developed in association with practice in a field of activity.
Pragmatism means an emphasis in philosophical thought on the application of ideas or the practical bearings of conceptions and beliefs. More specifically the word refers to an American movement in philosophy founded by C.S. Peirce and W. James and marked by the doctrines that the meaning of conceptions is to be sought in their practical bearings, that the function of thought is as guide to action, and that the truth is preeminently to be tested by the practical consequences of belief.

Practice as transitive verb means to exercise oneself for instruction or improvement or for the acquisition of discipline, proficiency, or dexterity. It also means to do or to perform often, customarily, or habitually: make a practice of, engage regularly. Practice further means to scheme to bring about: plan, plot; to make an effort (as to cause something: try). As an intransitive verb it means to act, to perform an act often or customarily in order to acquire proficiency or skill, to do something habitually. Synonyms: exercise, drill.

Consequences

In face of the expected problems in applied research it is justified to dwell a while, with the help of the above semantic overview, on the concept of practice and application. A paradoxical but justified question is to ask ourselves what is applied research and how do we know that we are doing really applied research and not just "doing". A preliminary analysis of the above meanings indicates that theory and practice are intimately intertwined and that a good practice must be theoretical as much as a good theory must be practical. Most, if not all of the research proposed in our program should then be termed as practical unless one takes a particular philosophical position and subscribes to the Anglo-Saxon empiricism of Locke, Berkeley and Hume. A particular emphasis on this school of philosophical thought, besides of paradoxically implying an excessive reliance on "philosophical" assumptions, also indicates an emphasis on repetitive, habitual action at the expense of the creative one. Experience means much more than doing or sheer trial and error activism, or, for that matter, political action. Participation or engagement that also mean experience may be stronger in an attitude of theorizing or speculation. Instead of just "observing" this experience implies a willingness to learn to see, learn to observe, and a readiness to test whether one really sees what is to be seen. It is one of the main purposes or our proposed research.

The positivistic and formal views of this matter (Macmurray, Ewing, & Franks, 1938, is just an example), as it may subsumed under other keywords such as action, concreteness, praxis, manual, experimental, done-manufactured, lived, etc., is not very helpful here. The marxistic concept of praxis as well as the phenomenological concept of Lebenswelt paradoxically do not display the necessary concreteness that is expected in a discussion about concreteness itself. The idea of praxis as it was supposed to get implemented in the Chinese culture revolution, with periodic exchange between manual and intellectual work, has since then fallen in disreputuation.

Obviously there is something that is not in order with this concept, as it is not so easy to understand except in trivial political terms why, in spite of all modern talk against separation of planning and performance of work, both the Bible (Syrak 38:24ff.) and the Chinese I Ching (in the first hexagram - The Creative) take the trouble to emphasize the legitimacy and value of deepening oneself in only one term of the dyad thought-action, wise man versus worker, wise saint versus hero. It is easy, however, to see that the word "application" itself presupposes that there is something that is going to be applied, and therefore it is what it says, a thing in isolation in the sense that its
nature until further motive is not to be discussed and still less be used as a subject in a conversation.

The philosophical doctrine of pragmatism may be helpful here as a background for our starting point in dialectical social systems theory, since it opposes the absolute separation of thought from action, pure from applied science, intuition or revelation from experience or experimental verification, and, finally, private interests from public concerns (Dictionary of the history of ideas: Studies of selected pivotal ideas, 1973, pp.551-553). Common features of components of various pragmatist directions have also been a pluralistic empiricism, a temporalistic view of reality and knowledge, a relativistic or rather contextualistic conception of reality and values, a probabilistic view of physical and social hypotheses (versus a mechanistic view or versus dialectical materialism), and finally a secular democratic individualism. Pragmatism also favors procedural rules for explicating meaning of philosophical and scientific concepts; it also sees thought and knowledge as evolutionary, where reality is transitional, oriented towards the future; finally it takes a broad philosophical attitude towards the conceptualization of experience.

Consequently one of the most concrete insights of industrial science in the new technological era has been the understanding that all manufacturing is a manufacturing up to specification (Churchman, 1948; Ivanov, 1972; Shewhart, 1939). A submarine that is manufactured and stands up concretely in the dockyard but sinks when navigating in troubled water is not a submarine or is not yet manufactured. Some concrete skrews that cannot be sold to a customer or cannot stand a certain mechanical load are rather abstract and "theoretical" screws, while some estranged mathematicians that pass months or centuries developing abstract mathematical theories become very "practical" and applied as soon as they turn out to have supported the development of an atomic bomb. Similarly, if a psychoanalyst or a systems analyst "talks" with his client or customer, it is just talk, even if it may affect the customer's fundamental life-decisions the next hour. But if in the meantime their conversation is channeled through a capital intensive computer communication network, and it is sound and video recorded for creating a video "product", then the equipment operators have really been doing something. May it be so because of the fact that as it has been remarked in the context of computer aided instruction "Five million dollars per hour is regarded as a modest budget for production of quality film"? (Schwartz, 1986, p. 227.)

To this it should be added that many past and ongoing applications of available computer software are of a rather doubtful concreteness. Replicability is the hallmark of experimental concreteness, but computer runs, even disregarding the ultimate consequences of the use of the results of such runs, cannot be replicated because of obsolescent and ever changing hardware and associated software.

It seems that the ultimate accepted criterium of application understood as successful application is ("international") consensus about profitability in the wide sense of the word. We are thus reminded of the lamentable fact that "verification of the theory depends as much on the cost of trying to apply it as it does on other empirical evidence" (Churchman, 1961, p.331). Those who cannot afford to set up journals and frequent recurring conferences in various corners of the world about narrow interests that appear to be politically neutral and are judged promising by big business or big state will not have the chance of publishing and getting international recognition in the English-speaking universe of consensus. The ultimate criteria of science thus have been established as being political and economical, notwithstanding the contrasting claims of
different schools of political science and economics. Does it matter what one means by
democracy or profitability?

Against the background of this sceptical image of applied research it may very well
happen that the best applied research is the "philosophical" one, granted that it is the
expression of an engaged and good philosophy. A promising vision of future applied
research in information technology for administrative data processing will then be the
critical review of software packages in use, and promising work that already has been
done on this subject (Heim, 1987) certainly deserves to be used as an inspiration in the
planning and implementation of future applied research.

Relations to other international research

These applications have a clear connection to applied research going on in other
research centers (McWhinney, Greening, & Mitroff, 1988) but there are no known
reports of so called concrete work that has advanced further than a primitive
prototypical realization of some of the above ideas, unless we relate them to the
keywords of group decision making, computer mediated communications, computer
supported cooperative work, and conflict resolution - conflict management - crisis
management.

Implications for university organization

Today it is taken for granted that the university can function as a research
department belonging to a business company. Research is supposed to foster the
competitiveness of the industry, the growth of export, and it is supposed to be applied
research or at least "directed basic research". Few would claim, however, that it is
convenient to equate science and business as little as it is convenient to equate science
with politics. It is not justified to believe that a successful career in business is an
indication of scientific proficiency as little as it is justified to conclude that a failure in
business in an indication of lack of aptitude for scientific work. Whoever happens to
insist in equating science and politics would certainly get something to think about if he
knew about certain studies of the relation between the two (Boffey, 1975; Hahn, 1971;
Ivanov, 1985, see the bibliography at the end; Nisbet, 1971; Rouse, 1987; Schick, 1969;
Schlesinger, 1968; Schmidt, 1986), or, in general, if he knew about the history of
scientific institutions (Weiss, 1982).

An unnoticed way today towards confusing science as politics is the increase
consultative role attributed by the state to universities (Ivanov, 1984; Ivanov, 1985).
Lately this seems to have been emphasized in order to avoid the costs of the promises
of democratic availability of university education for "everyone", especially those
belonging to the working class. Especially in the fashionable field of information
technology this may be paradoxically be leading further to the problem of what has been
called "the higher capitalism, new men of power, and the academic bourgeoisie" (Nisbet,
1971, chs. 5-7; Scott, 1984).

Implications for university education

One particular problem appearing in the university milieu is related to the motivation
and expectations of the students who happen to have been attracted to this institution
in view of preparing for a lucrative professional career. The social psychological climate
in the computer field is in certain respects characterized by what has been called the
"Don Juan syndrome" (Ivanov, 1986). The disregard of theoretical and ethical aspects of
the work frees a great amount of psychic energy that is thus invested in empirical and
profitable activities. Objections raised by theoreticians are easily countered by
paradoxically requesting that they, without comparable financial support, show
"empirically" what their theories are good for.
Smart operators in the form of analytically gifted Young Urban Professionals oversell glamorous high tech equipment and related consultancy. Stories that are published about successful Silicon-valley tycoons, the heirs of pioneering whiz kids, (Jobs, 1989; Lammers, 1988; Rheingold, 1985) stimulate the belief in fortunate breakthroughs without the labors of mathematical and engineering education, an analogy to rapid fortunes by means of smart speculations on the stock exchange. It is only natural that this attitude of mind will color the relation between the universities' senior research staff and graduate students, reflecting and supporting, in the context of research education, the enactment of a drama that is analogous to that of modern family relations between parents and their children: responsibility without authority, rights without obligations (Collange, 1985). This recalls the need of some kind of cultural criticism to be developed elsewhere.

The fact that certain scientific discoveries like radioactivity were obtained "by chance", however, does not mean that the discoverers were uneducated smart operators. Be as it may be, under present circumstances it is probably necessary to design applied university research with due consideration for this environment if students are going to be attracted to certain important matters in spite of their potential unprofitability (Churchman, 1982, chap. 3, mentions certain aspects of the "success of failure"). Disregarding the unfortunate (or fortunate) difficulties to evaluate results of applied research it is necessary that researchers and grant givers be clear about the legitimate impossibility to guarantee in advance the results of research that by definition is searching for unknown results. The incapacity to clarify this issue may lie at the bottom of the paradox constituted by ethically committed university or "center" researchers that are encouraged to sell part time or integral time their services as consultants only to discover that the university does not offer a genuine research environment, and conclude that they must leave the university in order to set up their own research center or consultancy bureau. A similar paradox arises for researchers employed by well funded consultant firms or agencies of the government who were supposed to be allowed to make research but find out with distress that they are not allowed to do that type of free research that the universities themselves are unable to find funding for.

The struggle for funding versus the integrity of research should certainly prompt further inquiries beyond the optimistic views presented by the few studies of the matter.

References


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