In this Issue

Arbel and Seidmann's 'Distributed accounting systems'

Information processing is more and more concerned about the issue of *distributed* information processing. The focus of our special Human Systems Management issue is precisely on this problem: there *is* an alternative to simply installing a centralized information system.

The problem is characterized by *multiple criteria*.

The concerns should be not only with *hardware capabilities*, not only with *software performance*, but also with organizational embedding, service, reliability and support network (brainware and knoware issues).

We certainly have to move beyond the 'checklist and questionnaire' procedures à la Harvard Business Review.

Professors Arbel and Seidmann come from the Tel-Aviv University (there seems to be a 'School' emerging in Tel-Aviv, dealing quite vigorously and in a no-nonsense manner with the distributed information systems – DIS). This journal is quite fortunate to be able to present the thought and achievements of the Tel-Aviv DIS people as a coherent whole.

The multicriterion problem mentioned above is approached via Saaty's *Analytic Hierarchy Process*.

The system in question is that of a network where each 'node' is a particular *workstation*. All the workstations have full 'stand-alone' capability. Such systems, based on local area networking (LAN) are becoming a pervasive feature in modern organizations.

The Analytic Hierarchy Process (AHP) is then applied to an illustrative example dealing with specific acquisition problems. This is a very detailed and sufficiently tutorial example to attract attention of analysts who need to develop support for decisions of this kind. The advantage is that both technical and 'intangible' (understand 'more important') aspects of the problem are explicitly dealt with and yet the technique goes beyond simple-minded 'checking-off' some questionnaire items, towards a true decision support system.

It is important to develop similar methodologies for human systems management. It is even more important to stop 'importing' such methodologies from the traditional OR/MS areas and start developing new approaches which would reflect the qualitatively different nature of the problems faced by human systems management. After all, the technical transfer of methodologies is exactly that: a technical transfer. Arbel and Seidmann sense the need for that: '. . . the model's basic structure has been refined to handle the specific needs of various environments regarding the evaluating of other novel information systems.'

Borovits's 'Managing the use of microcomputers'

Microcomputers are penetrating into business organizations at an accelerating rate. This is in spite of the 'older generation' fears and misplaced applications of power. In many places however, private homes of employees are often technologically more sophisticated than the places of their work. There is a number of people who have a sophisticated computer in their homes – yet, they go and face the non-computerized 'service' drudgery at work. This, of course, cannot last for too long.

Professor Borovits from Tel-Aviv University has now taken a closer look at microcomputers from the managerial/organizational vantage point. Major story he is reacting to is: microcomputer users – because of the essential incompatibility mentioned above – have to *bypass the central data processing department*, in order to realize the productivity gains inherent in the new high technology.

Is this really necessary? Are microcomputers to enter more or less spontaneously through the 'backdoor' of corporate 'decision and vision mak-

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Human Systems Management 5 (1985) 277–282

ing?' Are there no top executives and managers who would actually understand the proper role of microcomputers and welcome them, with proper accolades, through the front door? What are they managing if not the proper entry of new, more productive technologies and their interaction with humans? Legal issues? Stock splits? Corporate takeovers? Accounting tricks? How long can this last?

Professor Borovits is suggesting that perhaps a group (sort of 'welcoming committee') should be designated to assume the responsibility for introducing and monitoring the use of microcomputers. He insists that a logical choice would be *Information Systems Department (ISD).*

The decision is critical: *should we use organizationally distributed microcomputers, or should we continue relying on the central computer facility*? This decision is being faced by an increasing number of business and non-business institutions (health care, education, military, etc.). Most of our institutions choose to balk the issue: it is much easier to 'do as we always used to do'. Some institutions move ahead on distributed microcomputing: and observe – they are all winners!

There are some organizations which still (even in 1986!) try to solve their information problems by choosing this or that piece of hardware! They spend money and effort on getting in an appropriate "piece of junk" which nobody knows how to place it organizationally, nobody knows how to operate it, and managers do not know what kind of questions to ask. It is high time that, at least in more developed economies, we get away from the 'hardware fix' and stop confusing technology with hardware. Technology is a form of *organizational relationship*, it is primarily a managerial concept.

Borovits echoes this concerns: 'software selection is more important, more critical and usually more complex than hardware selection'. Of course: the *means* are useless without all the *hows* of its use. But the software itself is not the most important dimension of technology. There is something more important than the means (hardware), more important than the know-how (software): *the know-what and the know-why*, i.e., brainware. (There is even something more important than 'brainware': the organizational/social embedding of technology in productive human systems). So, why do we keep choosing computer technology on the basis of archaic criteria of ROM and RAM? Nobody really knows; it's easier.

Prof. Borovits is aware of all this and his emphasis on support is not accidental.

It is not sufficient to control the data processing resources: the utilization of these resources *must be managed*. Anybody can control, only a few can manage. Professor Borovits provides a system of pragmatic management rules for the ISDs to consider: the ISD, rather than resisting microcomputers, should apply all their existing expertise to their vigorous introduction. ISD will then end up with less direct control, but with *more influence*.

Professor Borovits did not state it explicitly, but the implication is clear: at this stage the ISD group is the most logical and natural unit to be charged with managing the swift introduction of microcomputers throughout the organization. He calls on the ISD to undertake this role and thus to reconfirm its justification within organization. The ISD would become an influential and useful agent of managing the information resources rather than simply one of maintaining the mainframe computer. Such opportunity will not come twice.

If the ISDs turn their back on microcomputers now, then they have sown the seeds of their own destruction: maintaining the mainframe is not enough. Especially not in modern, competitive, forward-looking organizations. Microcomputers do not only change work of employees, but they change the very meaning of information and its use. It is time to move from data to information, from information to knowledge and – from knowledge to wisdom.

Ahituv and Ronen's 'Distrubuted CAD/CAM systems'

Computer-aided design and manufacturing systems (CAD/CAM) are fast becoming one of the most promising high technologies emerging from the variety of technological advances of the past decade. As most high technologies, CAD/CAM requires information. Can we then simply 'hook' CAD/CAM upon the existing centralized MIS systems?

Of course not.

Professor Ahituv of Tel-Aviv University (currently at the Claremont Graduate School) is one of the most vigorous proponents of DIS (Distributed

Information Systems) approach to high technologies. He is one of the first few to recognize that *new* approaches to creation, delivery, use and evaluation of information are necessary if systems like CAD/CAM are to function properly. His co-author is Boaz Ronen from ELTA (Electronics Industries Ltd), who brings in a practical view of DIS.

First code word is integration: all CAD/CAM work stations must be interconnected – must function as a *system*. For the reasons of integration we have seen CAD/CAM evolve into CAE (Computer-aided engineering). But, ultimately, we have to deal with the main issue of high technology characterized by the acronym CIS (*Computer Integrated Systems*), coined probably at Arthur D. Little, Inc.

How far should the integration proceed? Should it go all the way to full centralization? Of course not. Should it then be fully decentralized? This is where the methodology of *distribution* comes in. The level of centralization/decentralization has to be *decided*: decided *by managers* and executives; certainly not by MIS technicians, programmers or system technologists.

Ahituv and Ronen do a fair amount of pioneering work in order to frame the decisions involved in the managerial/organizational language.

One concept should be clear: distribution *is* about information, responsibility and control; distribution is *not* about the spatial distribution of pieces of hardware. Deployment of hardware units at different locations has very little to do with DIS (actually, you can have DIS even with hardware centralization): hardware is just not the dominant focus of managerial decision making. Not anymore.

The authors define distribution as 'delegating responsibility to the end user'. This is a perceptive reading of a strong, all-encompassing trend which is reshaping most developed economies: trend towards responsibility, self-reliance, self-help and self-management.

Ahituv and Ronen do not stop just at definitions and classifications: they present a full methodology for the managerial decision on the proper level of distribution; they use CAD/CAM as a most typical example. Their Centralization/Distribution Spectrum (C/D Spectrum) is one of such useful methodological tools.

The purpose is to help managers to recognize that distribution of information and responsibility comes naturally with most of the high technologies and represents a process to be understood, accepted and *managed*. The alternative is either haphazard 'spontaneous' decentralization or artificially enforced centralization. Neither alternative is useful, both are damaging to the organization, and both are indicative of rather unpleasant characteristics concerning managerial competence.

The C/D decision is certainly a multicriterion problem: Ahituv and Ronen list *twelve* most important and essential criteria for such decision making. (One can immediately realize the inadequacy and futility of decision making based on 'memory capacity', 'price', or 'net present value of something'. The problem involved is much too important for that).

If you 'misfit' your CAD/CAM distribution level, you misfit the high technology itself, you hamper its adoption by your organization – ultimately you create a misfit organization with a dim chance for long-term survival. That seems to be the message.

Human Systems Management is committed to continuing this line of inquiry. We shall further explore CAD/CAM systems from their managerial and organizational impacts and effects. Number of articles and special issues are in preparation and the Ahituv–Ronen paper is certainly a good beginning.

Charalambides's 'Communication and compunication'

The *systems worldview* has long been recognized as being superior to the *analytical worldview*. Yet, many organizations and companies seem to be 'stuck' in the reductionist, hierarchical and analytical worldview and are uncapable of making the desirable and necessary transition towards the systems worldview.

Leonidas C. Charalambides of Marquette University has undertaken the task of 'easing the pains' of such transition: he suggests 'compunication' (computer communication) system that would help managers think and communicate systematically although they might still be working analytically. ('Compunication' is one of those language-punishing expressions with only a small chance for

survival. Another possibility would be *telecomputing*).

It is all related to Decision Support Systems (DSS). The OR/MS versions of DSS are hopelessly inadequate, simply mimicking the rationalistic modeling of the past, ignoring the user-decision maker and his multicriterion context redolent with conflict. Almost no attention is paid to problem formulation, problem reformulation and reframing, generation of creative alternatives, and so on.

Professor Charalambides has taken an important step towards the *second generation* of DSS. This conception of DSS, referred to as Conceptualization/Communication/Creativity Support System (CSS), is of paramount interest to HSM and an integral part of human systems management. This triad, human–systems–management, is being conspicuously de-emphasized in the rationalistic OR/MS modeling.

Humans hold different worldviews and thus deal with problems in their own unique ways. In order to talk of decision support of any value, the different worldviews must be taken into account, respected and even amplified. Otherwise, decision hindrance systems (DHS) emerge and are swiftly marketed.

Each individual manager must be able to communicate his worldview to his associates and they must be capable of understanding it. A top manager is then the leading facilitator and catalyst of the communication of such worldviews among the organizational subgroups and stakeholders.

All decision makers operate within their own 'frame of reference', never out of context. Their decision making then cannot be 'supported' by canned models which emphasize content and ignore context.

The analytical and systems worldviews are two examples of the endpoints of the spectrum of worldviews. Charalambides points out that analytical thinkers pursue *growth* (survival of the biggest, achievement) while systems thinkers pursue *development* (survival of the fittest, potential). While 'biggest' talk 'scale', the 'fittest' talk 'scope'. While the 'biggest' advise: 'if it ain't broke, don't fix it', the 'fittest' adhere to: 'if it ain't broke, improve it'. Analysts pursue a single objective, relentlessly, efficiently, mindlessly; Systemists balance multiple objectives, seeking harmony and conflict dissolution.

What systems thinking managers need is organizational communication media that are fundamentally different from those generally available today.

Charalambides then discusses the differences between the CSS concept (designed for systems-oriented managers of the 'new' breed) and the DSS concept (available to the analytical managers of the past). DSS users and other self-proclaimed experts neither recognize nor tolerate any *subjective* problem structure. Their lifelong quest for the 'correct' objective structure is then part of the decision hindrance process currently under way.

Many companies are undergoing a powerful transformation towards the systems thinking worldview. Technological, managerial and organizational revolutions are fueling the transition – human systems management is emerging and the need for the appropriate methodological/technical support is becoming obvious. Now is the time to learn: how to design optimal systems rather than optimize given systems; how to dissolve problems rather than solve them or resolve them; how to generate new alternatives rather than choose among the given alternatives; how to balance multidimensionality rather than pursue unidimensionality; how to seek ideals rather than accept 'good enough'; and much more: how to become catalysts of human creativity, rather than engineers of human souls · · ·

Oliver, Nussbaumer and Grimmett's 'Appraisal of changed technologies'

One of the major characteristics of 'high' technology is that its implementation requires (and often forces) *changes* in organization, management techniques and managerial culture. In short, almost everything changes and the sooner managers realize this, the better. New philosophies of management, new organizational design methodologies, new job designs, new goals, values, performance measures, and so on, are necessary and have to be developed as soon as possible so that the current generation of business students is not condemned to studying thoughts and experiences 'of the fifties'.

Professors Oliver, Nussbaumer and Grimmett from Austin Peay State University address the issue of adapting company's performance appraisal and reward systems to the resulting organi-

zational change. Each of the basic four work designs requires different performance *criteria*, system-specific measures of performance and appropriate communication and decision-making processes.

High technologies, more than any other technologies, induce broad and often radical organizational changes – changes in the very management system of the organization. It is obvious that different performance appraisal system applies to specialized ('labor-divisioned') routine workers of Chrysler, and something entirely different must be applied to evaluate the performance of knowledge workers and problem-solvers of Nissan, or of autonomous professionals on the floor of Volvo in Kalmar.

The authors identify *four basic directions of technological change:*

(1) Jobs become more specialized, fragmented and routine (classical division of labor combined with American hierarchic supervision and administration).
(2) Jobs become more complex, technical, and non-routine (essentially a Japanese experience, highly technological, knowledge-based monitoring and problem-solving).
(3) Jobs become autonomous and entrepreneurial (intrapreneurship) with high *individual* responsibility, high personal risks and leadership rather than supervision (this applies to an increasing number of American *high-technology* companies based on task organization design, ad hoc decision making, and dismantling of hierarchy).
(4) Jobs become group oriented (essentially Swedish autonomous group experience with loose supervision, assumed professional ethics, and diffused, group responsibility).

Professor Oliver designed a questionnaire to measure the attributes present in jobs in order to classify jobs and organizations into one, or a combination, of the four designs outlined above.

There have been many recent callings for developing performance measures not only for individuals (and groups) but for individuals *in* groups. It appears that the approach presented in this article has taken several important steps in such direction. The authors provide detail description and characterization of performance appraisal for the four distinct organizational designs: hierarchic, professional, task and group. Furthermore, some examples and experiences with matching performance appraisal systems to organizational designs are discussed.

It is obvious that traditionally bound top management rarely understands the need for a unique, custom-made performance appraisal system. Therefore, many high-technology related potential gains in productivity, performance and employee satisfaction still remain mostly potential.

It is one of the tasks of Human Systems Management to help managers and management scientists to translate potentials into realities. This paper is a worthwile step in that direction.

Geurts, Hart and Caplan's 'Contingency problem solving'

The authors recognize that there are two streams of research into decision making: *decision technique oriented* (essentially prescriptive) and *empirical / behavioral* (essentially descriptive), and *both* lack the set of organizing principles which would be salient to researchers, practitioners and users. *Contingency principles*, which would recognize the variety of decision-making 'types' and circumstances, are missing.

Jac L. Geurts from the Catholic University of Nijmegen, and Stuart L. Hart and Nathan S. Caplan from the Institute for Social Research at the University of Michigan, have attempted to provide just such organizing framework. Obviously, problem complexity, time pressure, stress, organizational expectations, perceived riskiness, etc., are factors which must be taken into account. There is no single uniform decision-making approach per se. Even the same decision maker switches between different decision-making *régimes* acccording to the circumstances.

'I am myself and my circumstance' teaches Ortega y Gassett. This is a deep insight which has escaped generations of methodologists of decision making. There are even some who even today sweep the richness and variety of human decision making under the uniform rug of 'maximizing a utility function'.

The authors classify the approaches according to the (1) *phases* of the decision *process* (recognition, formulation, options generation, evaluation, selection, implementation), (2) *state of knowledge*

(certainty, risk, uncertainty, ambiguity, and (3) organizational *setting* of the decision problem (individual, group, collectivity).

Geurts, Hart and Caplan have, consciously and voluntarily, chosen to ignore the 'single versus multiple objectives' decision classification. This is causing some problems because this particular typology is of course the most fundamental: when facing a single objectives, the problem is that of *measurement and search* only; when facing multiple objectives, the problem is that of decision *making*, In the first case the decision is implicit in the problem and must be simply explicated through technical measurement and search, in the second case the decision must be *made*. There can be nothing more fundamental than that and the reader can resolve the paradox by reading the paper *as if* only the decision *making* problems (i.e., the ones with multiple criteria) were assumed.

On the other hand, the typology by the 'state of knowledge' is quite controversial because such a state is of course a matter of opinion and highly subjective category. The degree of certainty, risk, uncertainty, and/or ambiguity will be perceived *differently* by *different* decision makers in *different* situations. These are all highly relative categories and the authors are first to admit it.

The authors have also treated decision making *as if* it were a sequential process of linear progression. Thus, *reformulation, restatement, reevaluation*, and plain *preferential switch* (change of mind) have all been purposefully excluded.

Still, a 'Classification of Decision Techniques' has been achieved and is presented in a table. The whole area of MCDM (representing over 3000 references) dealing with multiple criteria, has not been classified.

This classification serves as a useful beginning on the path toward the integrated framework for decision making. Some very important questions are being asked: Under what conditions should or should not an aided decision making (like DSS) be used? How is a decision about using a decision support made? Why is there insufficient emphasis on *interactive* decision making? In using *any* decision aid, the issue of human–'machine' interaction becomes dominant: what do we know about such interaction process? What do we know about decision making via generating new alternatives (not simply choosing from the 'givens')? What do we know about handling ambiguity (i.e., *fuzziness*) of human decision making? Is not the fuzziness itself situation dependent, perceived differently by different subjects under different conditions.

The authors conclude: 'It appears to us that problems facing organizations in the forseeable future can only become more perplexing and ambiguous. Further exploration of the applicability of the conceptual framework described here with an eye toward promoting effective guidance in this murky zone of human affairs strikes us as a matter of the highest priority.'

It is therefore with some justified satisfaction that HSM can point to its earlier completed special issues on *fuzziness and fuzzy sets, expert systems, artificial intelligence*, and *decision support systems*, reflecting a working awareness of the importance of exploring fuzziness and ambiguity, man-machine interaction, multiple criteria and decision support in decision *making*.