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A human resource approach to information systems development – the ISU (information systems use) design model

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Abstract: The ISU design model is an 'architecture' designed to support a human resource approach to information systems development. The model emerged in a live project for a large local government client, and its particular shape derives from four major areas of concern: (1) quality, and the strategic management of resources; (2) client-led management of information systems development; (3) IT-related labour market issues and equalization of employment opportunities; and (4) human-centred approaches to the design of technology systems. This article develops a working definition of human-centred design practice, indicates key practices in implementing the architecture, and identifies key concepts in interpreting the 'feel' of the approach. As a human-centred model, it is essentially about learning, and the article refers to three concepts of organizational learning which informed the design work.

Introduction

This article discusses a model for information systems development in large formal organizations, the Information Systems Use (ISU) design model. The model was developed for a large local government client as one part of a corporate Training and Staff Development strategy. It is therefore human-centred (rather than, say, systems-centred or technology-centred). However, if human-centred was an obvious framework in this case, the main purpose of the present paper is to suggest that, rather than this being an isolated special case, development practice for significant IT systems in user organizations generally can and ought to be based on a human-centred model. This is because:

(1) People (not systems) recognize and deliver value added (i.e. service, quality);
(2) People (users) define the expectations and required performance characteristics of systems;
(3) People (users) deliver – or don't deliver – the value of investments in IT systems.

Thus, unless a user organization has the right kinds of people in the right places with the right skills, responsibilities, authority and support, then good IT strategy, good IT systems and good use are more a matter of accident than (technical) design. On the other hand, with due attention paid to people and the organizational spaces in which they act, there is at least a chance of systematic quality in design and use. Thus, we can argue, human-centred is the way to do IT in any circumstances.

Human-centred has various meanings, and it is important to be clear what they are and how they relate to each other. In general discussion the term has a vague quality, sufficient to make many IT professionals want to distance themselves. It sounds quite different from 'software engineering' – one of the main banners that the would-be profession currently marches under. On one hand, in choosing human-centred (HC) to describe this model there was an explicit intention to distance the ISU approach from standard IT development practice and to imply some criticism. But, on the other hand, there was recognition of the need to interpret HC in a way sufficiently concrete to be the basis of a methodological design. This paper outlines the interpretation.

The approach is a design approach based on systems principles (Checkland, 1981; Open Systems Group, 1981). The ISU design model is therefore not a rigid formula but an analysis (with a certain level of generality) of a specific set of practical problems. However, the fact that a human-centred approach does not take a rigid universal recipe form does not necessarily reduce it to a woolly invocation to participate. HC can be operationally defined and participation turns out to be only one aspect of the definition.

The HC standpoint makes the model differ in several fundamental respects from conventional lifecycle models or structured development methods

(for a survey, see Avison and Fitzgerald, 1988). HC is not an extra ingredient that can be added to standard development practice in the way that user training, for example, is typically tacked on to the end of a development process. HC is an alternative framework, a different perception of what information systems (IS) development is about, within which conventional development practices will need to find (and in some cases perhaps fail to find) an appropriate place. The purpose of the present article is to present an outline of both the ISU design model and the underlying philosophy and design approach. Since the model itself is a model of design practice, these reduce to the same thing. In other words, the article proposes an alternative notion of what it is to design computer-based information systems.

Although some elements of the model have yet to be fully implemented (others have been quite widely employed outside the framework of the model) it is not an academic construct. The ISU architecture emerged from a commission for a large local government organization, to design a human resource development strategy related explicitly to the use of IT. It has been developed further through analysis of and practical involvement in other situations where people-oriented systems development is being attempted.

The model is an intermediate product in a practical development process. Rather than being planned as part of a systematic academic programme of research, it emerged during an isolated piece of consultancy work which offered unexpected opportunities to integrate a wide range of perspectives. For this reason it is not appropriate, at this stage, to try to give full references to all the relevant literature. The present phase of development (January 1991 – December 1992) has two dimensions:

(1) To further test and refine the architecture and its underlying methods, in live design situations;
(2) To map the various foci of methodological attention within the model, in terms of a range of relevant literatures which do not adequately communicate with each other.

In the present paper only a very broad gesture is made towards the literature; most of the items in the bibliography are themselves overviews or edited collections.

The absence of a systematic map of theories, methods, techniques and models is a mark of the current incomplete state of development; as it happens, the future of the present model will eventually include a literature map because the development has now shifted to a more academic context. However, it is worth pointing out in a journal such as this, many of whose readers are academics, that the model was produced for use in a given situation, and that – as an outline map of places that a given organization needs to explore in its own future development, and in terms of its own intellectual and other resources – it is broadly adequate for its purpose. Whether an organization proceeds from this point by directly drawing on the many relevant literatures, or in some other way (e.g. through action learning programmes, or by buying-in expert consultancy) is not important. What matters is that it does systematically explore and develop the ground, and maintain some intelligible map of the terrain, for its own use. Knowledge can be produced and transferred in more ways than 'the literature'.

The pattern of the remainder of this paper is as follows. First, there is an outline of the model's structure and content followed by an outline of problems that prompted and informed the development. This in turn is followed by a discussion of practical issues in the model's use and further development. Finally, some practical stumbling blocks are discussed in the conclusions section.

The structure of the model

The model has the form of an architecture of practices. A range of required activities were identified by the original research, which complement and feed each other in a variety of ways; this structure is the ISU 'architecture' (see Figure 1). The primary features of the structure are its loop form and its two levels: a strategic outer loop and a tactical/operational inner loop. Activities in the two loops tend to be populated by different sets of actors (i.e. senior management in the outer loop, together with other significant actors in the policy domain such as staff representatives and – in the original local government setting – elected Members). One of the key design issues is to identify the people who constitute the main links between levels, moving backwards and forwards between them. A particular user-side middle management role – that of 'information resource officer' is central in this.

The loops imply a sequential flow, clockwise, from the top left. Thus the strategy loop flow is as follows:

(1) Briefings for strategy actors;
(2) A statement of principles for IT/IS development;
(3) Specific strategies for information technology (IT) information systems (IS), information jobs (IJ) and information resources (IR);
(4) Design, implementation and support of key line and staff roles – information resource manager (irm) and information resource officer (iro);
(5) Systematic learning, feeding back into the next cycle.

The tactical/operational loop flow involves the following sequence:

(1) Study circles for information staff;

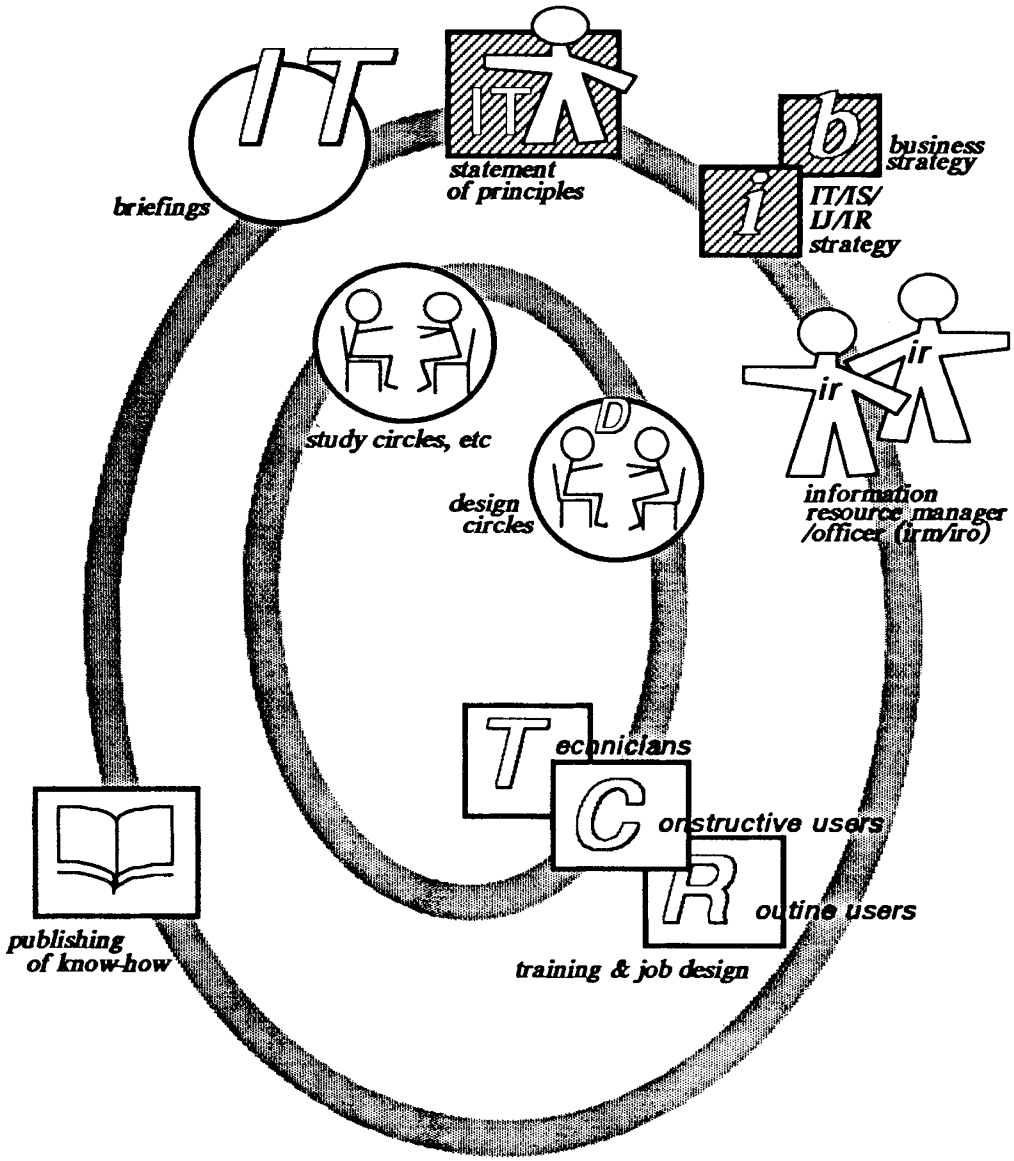

Figure 1 The ISU (Information Systems Use) design model

(2) Design circles (a participative version of design teams);
(3) Design, implementation and support of jobs and careers involving three types of user staff (constructive users, routine users and technicians), feeding back into continued operation and eventual review on the next cycle.

In principle there are numerous connections betwen the strategic and tactical/operational levels (e.g. from study circles, as a review mechanism, to revision of IT/IS/IJ/IR strategies) but they have not been included in Figure 1 for clarity. The inner loop seems roughly to cover the same range of activities as the model in Perlman (1988).

The model as a 'bootstrap' model

The flow in Figure 1 is not to be taken too literally. The above sequences are possible start-up sequences. But after the first full cycle, all activities could in principle be up and running side by side. Indeed, some of them – for example, those centring on management roles and those centred on design circles – must continue in parallel for at least as long as the organization is learning to behave in this way. That is, the structure must be viewed as synchronic (simultaneous) rather than diachronic (sequential). Thus the best way to interpret the architecture is as a structured checklist, or a map of linked domains of activity. Figure 1 is certainly not a process flowchart which is why there are no arrowheads on the loop segments.

The ISU model should not be regarded as an A-to-B, once-through process model. Because they are production-oriented, most development models are A-to-B sequences, or sequences of sequences (e.g. design followed by maintenance) with perhaps some internal iteration. Even in lifecycle models, the recycle link (e.g. new version policy) tends to be external to the logic of the other activities – a nominal reference to some other level of organizational practice, user-managerial rather than producer-technical. In contrast, the ISU design model is use-centred and, fundamentally, about learning; the inevitable consequence of this is that it really is a cycle.

One consequence of the synchronic way of reading the model is that, if necessary, a start can be made anywhere, wherever the organization happens to be at this particular time. If an IT or IS strategy exists, fine; it can be a starting point for critically assessing management roles, or the training and educational support that should be provided to design team members. On the other hand, if there is no formal statement of strategy this could be even better (given that most strategies are simply equipment shopping lists or bureaucratic purchasing-control mechanisms), because principles can then be looked at without being confused too much by low-level current practice masquerading as a strategy.

Another example is if there is no current IS design and development activity, then study circles, reviewing the experience and needs of information staff and aimed towards eventual system design (or redesign), are a good place to start. Job redesign is also a potential startpoint, depending on existing personnel practice. On the other hand, if there is a current information systems project at an early stage, then the ISU design process can be organized around that process. It could then focus on the design of design teams and their required means of support, and the integration of job and career design into project activity.

The ISU design model is not pragmatic, in the derogatory sense of 'casual' (it is highly structured and, in that sense, rigorous); but as a 'bootstrap' model it is designed to be adaptive to local conditions. The structure is there to guide systematic development from wherever the starting point happens to be. Choosing where to start – which involves identifying the present state of practice and the ruling priorities – is a decision that the model informs but does not dictate. A basic understanding that underlies the model is that models can only ever be mirrors to practice; they cannot substitute for practices. Because a model is by definition incomplete (otherwise it would be real!) it and its predictions must always be subject to evaluation and criticism; no model can ever guarantee 'the one best way'. This is true of entity models and data models; method models too, such as SSADM. In the ISU design model, recognizing the inevitable incompleteness of models, gives rise to its underlying structure – that of a learning loop, through which elements of the architecture can themselves be revised.

Pivotal practices

Although the ISU architecture is provisional, in the sense of being explicitly and continuously open to redesign, some of the elements shown in Figure 1 can be identified as pivotal practices:

(1) A statement of principles;
(2) The design, implementation and support of key managerial roles;
(3) The creation and support of study and design circles;
(4) Job design and human resource planning.

Each of these will now be discussed in more detail.

Statement of principles

A statement of principles is logically prior to a strategy. It is a looser, more discursive, less technical and more

public form of agreement between actors in the policy domain. It can be the subject of negotiations with staff, in a way that strategies can't. At one level it can be viewed as a statement about what game an organization seeks to be in, through its use of IT, and who the significant players within the organization are seen to be. A statement of principles for the ISU approach will emphasize, for example, the involvement of final end-users in design and redesign, in order to enable the development of systems that, in turn, enable the users. It will highlight the central role of final users in identifying and delivering value added opportunities (service, quality, etc) through the introduction and use of IT systems. It will locate human resource development as a central and integral aspect of an IT/IS strategy. Equalization of employment opportunities within the internal labour market of the organization, e.g. around technician roles on the user side, will be highlighted. The statement will identify general responsibilities of management and IT professionals.

At another level, a statement of principles will also offer an outline definition of the managerial and administrative style of the organization in relation to IT capital and revenue budgets; i.e. it will indicate (existing or future) practices through which aims will be pursued and strategies implemented. As indicated in Figure 1, detailed strategies are required in order to operationalize such a statement. In addition to an IT (information technology) strategy and an IS (information systems) strategy, the ISU model indicates two further levels: a strategy for developing and deploying information staff (an IJ – information jobs – strategy) and a strategy for identifying, developing and deploying information resources (IR). An IR strategy must deal with hardware, software, data and people; and of these, people is the primary category.

Key management roles – IRM/IRO

Taking their name from the top level of strategy within the ISU model, information resources (ir) management roles are identified at two levels. The ir manager (irm) is a senior management role; the ir officer (iro) is middle-level. Conceivably the functions of an irm could be distributed between a couple of close-working people within the senior management team (one with a service management background, for example, and one with personnel experience). Whether the functions constitute a full-time responsibility, or one major responsibility within a portfolio of related ones, depends on the scale of IT operations and the experience of actual post-holders. But the complex mix of responsibilities and the strategic importance of the domain tends towards full-time. An irm is responsible for developing and delivering the IR (and hence IJ, IT and IS) strategy, and in particular, for securing the resources that it requires.

At the middle-management level, in a developed IT-using organization there are likely to be a number of ir officers (iros). Iros do the legwork in support of an IR strategy and of the irm. They lead information systems projects from the user side, they match resources to needs at a tactical and operational level and they train and develop staff. The range of functions may call for a multi-experienced partnership – again, this depends on scale, and on the capability of actual individuals.

The irm and iro roles are complex and novel. They extend further, covering different ground, than an IT or IS manager or director, an experienced professional IT project leader, or a typical user-side computer liaison officer. All too often, the latter is either an amateur 'techie' (a person, often a professional, who apparently feels secure only in technically-defined situations, and therefore is unable to address real situations in participants terms) or the unfortunate victim of dumping by embarrassed user-managers, and in either case, not much use at representing and developing the user interest in the face of 'techie' imperialism. The essential difference between the conventional roles and the ISU roles is the human resource focus that is rolled into the ISU model.

In any organization the remit and occupancy of irm/iro roles will be a matter for specific design and negotiation, coupled with staff development and possibly recruitment. It is an open question whether 'hybrid managers' (BCS Task Group, 1990) will be any good in these roles. In an organization with an internal IT-contractor department, the politics of the respective management roles will need careful attention. While producer-side experience may help (*viz* the 'hybrid' career path; BCS, 1991) the essence of irm/iro roles is to develop and assert the control that users have over the effective development and use of IT and IS. Person-specifications and training support for the roles will need to be designed and reviewed. These are, emphatically, not functions for which headhunting can be expected to provide an adequate recruitment mechanism. They are, emphatically, roles that must be integrated into the management development planning of the organization.

The irm and iros are the people who will hold together an IR strategy. If they are wrong, the strategy will fall over, and the people come, logically, before the strategy. The sad fact that logic is rarely the same as history, and that an organization has to start with the roles and people that it happens to have, means that, again, the 'bootstrap' interpretation of the ISU model is central.

Study and design circles

These can be seen to be at the centre of the model. In

any approach that calls itself human-centred, some form of participative design activity would be expected; this is what design circles are. However, there can be different interpretations of what participation is for. From a system-centred position (i.e. an engineering-style design approach), end-user participation in design is a means of securing a quality design – a form of knowledge extraction process. Design teams involving final end-users, if well designed and supported (Eason, 1988; Greenbaum and Kyng, 1991), can certainly perform this function very well. Alternatively, from an implementation point of view, there may be an expectation that involving users in design will prime the user community for eventual introduction of the system. This expectation can be very poorly met by design teams, partly because of the lag involved in detail design and installation, and partly because of intrinsic differences in scale between implementation and design. This is one reason why design circles are supplemented at the tactical/operational level of the ISU design model by an explicit focus on job and career design (see below).

From a third viewpoint, that of change management and organization development, design teams may be seen as a site for developing concrete visions of the future, understanding what can be changed, how, and by whom. This last view is particularly important in the ISU model, as a strategic development model rather than simply a project management method. And this is one reason why design circles are supplemented (preferably preceded), at the tactical/operational level, by study circles.

Study circles (Green *et al*, 1989) are activities of an open-ended educational kind, in which users of technological systems may explore, with the help of facilitators, the nature of their involvement in the systems. Jobs and services or products are up for discussion, as well as technology and the human-machine interface, ergonomics, health and safety. Study circles are 'horizontal', the members are peers, and the groups are run in a way that addresses all members as equals, with relevant knowledge and experience and with significant expectations that should be identified and met by the circle.

A study circle constitutes a space donated by holders of organizational resources ('management' in a general sense, although in Scandinavia, for example, this may happen through the mediation of the State). Within the space, people implicated in technological and organizational development can explore their own interests, roles and needs – for knowledge or training, for systems tools and frameworks, for political influence, for career options, for personal meaning. Study circles are a gift from management to the participants, and do not undertake to deliver anything in particular to management. However, their members may choose to invest or risk something in the current organizational setting, as a result of being given this opportunity to step back and look. Whether they choose to do this or not is, in turn, the risk that managers take in supporting study circles. In some countries other than Britain, it's a risk that is more familiar and acceptable, and it's fundamentally connected with enabling ownership of an organization's agenda by its members.

On the basis of this kind of open-ended, educative interpretation, drawn from the practice of study circles, design teams can be re-cast as design circles. The budget and timescale pressures are the same as in conventional design teams, as is the need to deliver on an organizational timescale, within corporate objectives. But the style is different. Design circles aim to take the educative, horizontal style of study circles – preferably building on the basis of previous study circle activity within the organization – and make it work on the more difficult ground of a real-time project. The study circle principle, i.e. that everybody has relevant knowledge and that everybody needs to know what everybody knows in order to see the whole picture, is the key ingredient of design circle practice. Experience shows that it can be done, with significant benefits for design quality, and excellent time and budget performance (O'Hara and Smith, 1992). Useful insights into conventional (i.e. technical) design team practice are offered by Demarco and Lister (1987).

Job design and human resource planning

This is the final pivot of the ISU design model. It is a dimension rather than an activity, and the extent to which it is located in one or other activity of the architecture (e.g. in design circles) depends heavily on the extent to which the organization already has practices that address the requirements of job design and human resource planning. For example, if people are not used to talking about or negotiating job content (e.g. if there is no staff assessment programme) then it will be difficult for design circles to handle job, as well as system, issues. Job issues can still seem too abstract at the design stage, and significant development of job aspects may be forced to wait until the system begins to appear physically in workplaces. This implies a time lag and loss of the momentum that has been built up through participative work in the system design phase. Questions of phasing, continuity of activity and integration of job/system analysis all need to be looked at as part of the design of an ISU design structure. In each case the practical solution will depend on local circumstances and history.

A typical weakness of design circles may be that they function very well as knowledge extraction processes and information system design practices, but not as practice-design practices (i.e. work design practices). If this is so, they will also fail to achieve much by way

of committing significant actors (all members of a successful design circle become significant actors in relation to implementation) to necessary courses of action once the system becomes part of the day-to-day practice. Risks, and therefore realistic commitments, may only begin to become clear when on-the-job implications are unavoidable, for both users and their managers. To some extent this kind of difficulty can be tackled by better management of design circles. But, in principle, it calls for some other form of organization.

The scale of implementation activity is different from the scale of design (even participative design); more people are involved. Different people may come on the scene at the implementation stage (trade unions, personnel people, middle managers) and bring with them different expectations of what appropriate practice looks like. Vertical groups (i.e. involving different levels of the hierarchy) become inevitable. All of these difficulties can be addressed to some extent when designing design circles. But, in principle, some problem of time-lag/hiatus/change of style and scale, has to be anticipated by providing for a type of activity which differs from design circles. This is the role of the job- and career-design cluster of activities in the tactical/operational loop of the ISU model (Figure 1). This cluster represents far more than the usual token tacking-on of training to the end of a project, and in fact the job-centred interest is spread through the whole of the architecture.

Experience suggests that another likely weakness of design circles in a given organization will be in their contribution to management and organizational development. Horizontal organization is good for active contribution within design circles; but vertical organization is needed in order to shift resources around so that an information systems development process is able to contribute effectively to the organization. However, including higher-level managers within design circles has its difficulties and dangers. It may upset the fundamental dynamics of mutual learning and exploration.

The role of the iro as a leading member of design circles, acting as go-between and advocate for both operational and strategic levels of practice within the organization, will be crucial in finding a good practical solution for this 'vertical' problem. Nevertheless, however ably this role is performed there are limits on the ability of operational actors even to see corporate realities. Thus, in principle, design circles cannot carry the whole strategic burden of a significant IT project. Matching effort is required at a different organizational level.

In part, the separate job-design focus in the tactical loop is there in order to force project activity out of the technical mode, and to generate active higher-level managerial involvement. But clearly, if this broader management involvement appears only at the implementation stage (as implied by a literal, diachronic/flow-process reading of Figure 1) it is far too late. The extent to which higher-level processes (around service definition, management development to support design and implementation, etc) move along in parallel with the detailed project process (requirements specification, job design, etc) depends on teamwork between irm and iro, and on the irm's status and authority within the senior management team. While the human resource planning aspect of the irm/iro team's work has been highlighted, this ought to be seen also – certainly at the irm level – as an organizational development responsibility, supported and authorized as such by the senior management team. Significant IS development is far too important to be neglected as an occasion for organizational and management development. Perhaps also it is clearer now why the irm role goes so much beyond an IS director's, or that of the head of an IT contractor-department.

Key concepts

There are three essential aspects of the ISU design model that don't appear on the surface. That is, they are not explicit elements in the architecture, but lie implicit in the content of the statement of principles, the irm/iro roles, the job design activity, and the design circle practices. The three aspects can be presented via three key concepts:

(1) Constructive users;
(2) The 'techie filter';
(3) Resourceful humans.

Constructive users

The fuss about IT skill shortages is mainly around graduate-level staff. And, notwithstanding the recent discovery of hybrid managers, the fuss is mainly about techies in technical applications areas; producers of IT, within an engineering-type culture. Regarding national economic prospects, an equally serious labour issue centres on users of office systems. In this large and heterogeneous category, many are female, with low levels of formal educational qualifications, underemployed and attributed low status. If this population could be transformed into constructive users of IT, the effect on the economy would be huge; the value of office-IT investments could actually begin to be realized through effective design and use.

Later on in this paper more is said about where the 'constructive user' concept comes from, (see section on IT-related labour market issues) but here it's necessary to stress that constructive users are the most important IS development resource an organization possesses or could possess. You can always buy a

technician – a whole team of technicians – at a price. However, there's no way to 'outsource' what a constructive user knows about how IT works and fails to work in your organization. Constructive users are, potentially, designers with unique knowledge. They have far greater potential as user-designers than do IT professionals from outside the mainstream of business activity. The ISU model is consciously structured so as to create a space for constructive users and (via study circle programmes, design circles, and job- and career-design practices) to focus the attention of managers on them.

The techie filter

The ISU model is also about professional IT roles within an organization, and their desirable limits. This is necessary because of the imperialism and cultural politics that are commonly associated with a data processing (dp) department or substantial group of IT professionals within an organization. Non-technicians defer and technicians are happy to claim authority over 'technical' issues. As a result, most IT strategies and IT projects live in a nowhere land, abandoned by managers who are not as good as they should be, to those who they can plausibly cast as 'technically qualified'.

The view behind the ISU design model is that IS design is fundamentally a matter of use design rather than technology design, and therefore IS issues in a user organization are not really technical issues at all, but business and general management issues. Another understanding of 'the technology' is needed; one which will enable managers to integrate the management of IT/IS into the general management process. The model offers such an understanding in the form of the notion that 'information resources' are the total constellation of information-related apparatus, software, data and people, and that people are the central, determining, animating element.

Even if such an idea is accepted at a senior level, there needs to be a careful distinction made in everyday practice, between 'techie' ground and 'user' ground. Technicians are welcome in 'Userland', provided that they talk 'user talk'. The responsibility for seeing that this happens can only lie with users. The business of demarcating and policing user ground, and making sure that technicians observe the ground rules, is what I call 'the techie filter'.

It's essential to accept that it must be users who decide who is a techie. A business analyst, a database analyst or a 4GL consultant, may not feel like a techie and may protest at being called one; s/he may be conscious of lacking the technical skills of others – systems programmers, real-time programmers, software engineers, communications specialists, whoever. This is what the world of IT knowhow is like; somebody else always knows more – one only has to look at the hierarchical, multi-stream format of the British Computer Society's industry structure model (BCS, 1991) to see this written large. What is important, then, in harnessing IT for use, is that those who use IT and manage its use should also determine what level of 'technical' discourse is acceptable within their domain. Techies can translate it in whatever manner they prefer so long as they deliver and stand accountable in user terms.

This, however, is easier said than done as most non-IT people have an inferiority complex about IT – simply an extension of that felt by 'non-technical' techies. To empower users and user managers so that they can lay down boundaries and police them effectively is a non-trivial matter of cultural politics within an organization. It involves confidence building, perhaps some 'technical' training (hands-on, jargon-busting; whatever gives users the necessary confidence), the support and arbitration of those in authority, and a substantial and sometimes painful learning curve, especially for techies. All the activities in the ISU model are to some extent addressed to this task, and especially to supporting the users' image of themselves as designers who, in their own domain, collectively, know more than techies do. A kind of assertion training programme is called for in order to develop a working techies filter.

Irms and iros are responsible for this cultural-change programme, and for marking-out and policing the techies filter. This can be carried out in the explicit contractual form of IT project contracts or service-level agreements, and also in live interactions between users and techies within design, implementation and operating practices. Selection, job definition, training and personal development of irms/iros are clearly important issues here.

The techies filter can be looked at in various ways. Figure 2 shows one of them. It pictures the techies domain as being outside both the strategic and the tactical, providing service inputs to both according to openings offered by the (client-led, business-led) planning, design and operating process. When they cross into the strategic or tactical/operational domain, techies cross as listeners, learners, technicians and providers of support, not gurus or leaders – unless they have other, non-IT/IS credentials. An alternative interpretation would show IS development as a stream of activities in time, with the techies filter as a contractual boundary running laterally through the flow. At some stages of development the boundary moves further into the main stream; at others it recedes to the margin. But technical activity is never the main stream. Managing the advance and retreat of the boundary is an important responsibility of iros, in their project-manager role.

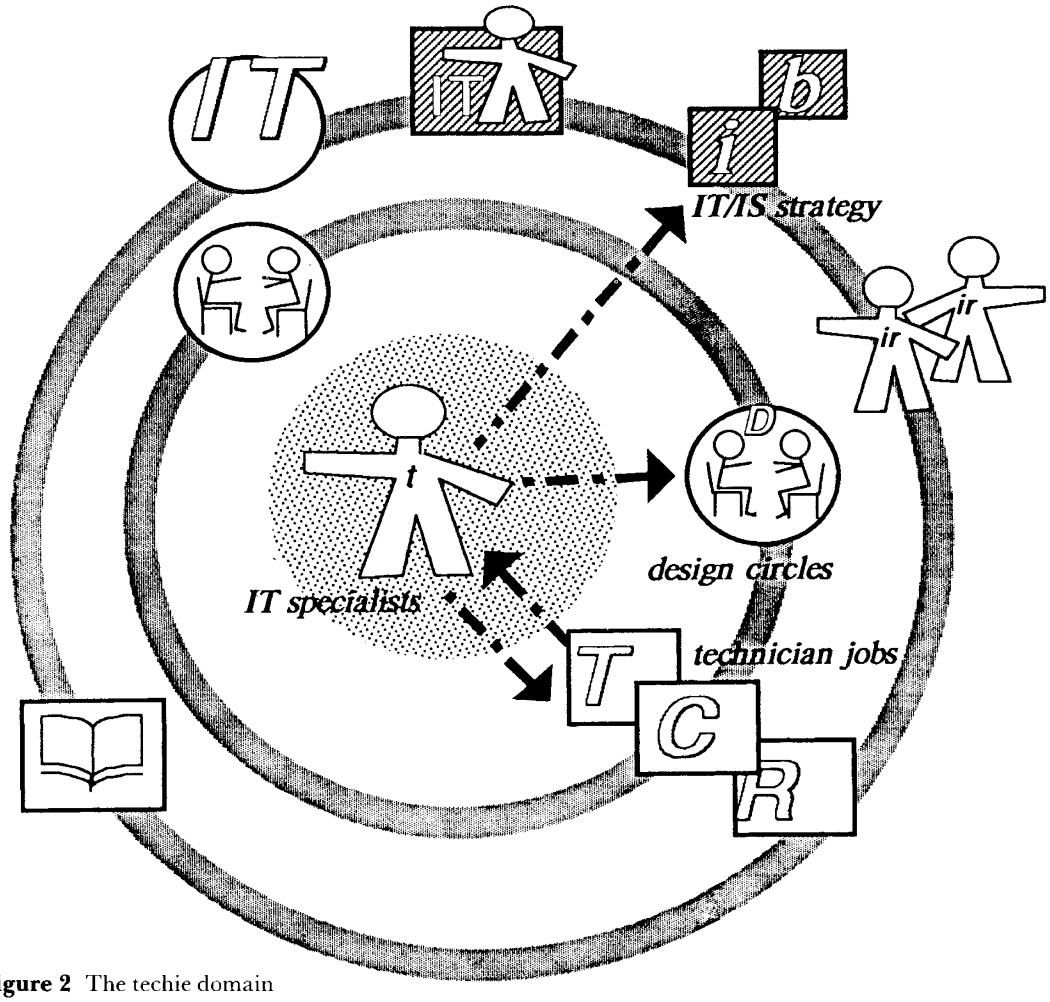

Figure 2 The techie domain

Resourceful humans

The ISU design model gets its particular character from a convergence of human resource interests with information/technology interests. It needs to be understood, however, that human resources really are different than any other kind. They are not there simply to be used. They are also ends in themselves. People matter, in a way that computers, software and data don't.

In order for it to matter to management, the difference need not be recognized in these philosophical terms, because human resources differ in another way too – they are the source of the value in all other resources. People recognize (that is, constitute) value; they add to it, they transform it into other forms. People – not capital, land, shelter or anything else – are the fundamental economic category.

Thus, for either value-added or social reasons, it's necessary to recognize the crucial difference between human resources and resourceful humans. Resourceful humans can do things. They know who and where they are, they know what they're about; they know what they need in order to be able to do it. The ISU model is built on an understanding that these are the kinds of people on which economic success, in any terms, is built. This implies that IT systems and IT systems investment should be carefully directed so that they support the emergence of resourceful humans within organizations.

What is being emphasized here is slightly different from what is addressed under 'constructive users' above. There, concern is with the design of design and use practices, so that constructive use is enabled, supported in principle. What is being stressed in this section is that unless managers are able to take the risk of working with real people, who are actually present in their work, and unless the process of IT

development and use helps people to accept and develop the real extent of their own power over and responsibility for their own conditions of existence at work – empowering, as distinct from enabling – then the process will not be able to contribute to the success of an organization in the way that something as expensive and difficult as IT development should do.

This is not an easy task, and there seems to be evidence that straightforward participative design practice doesn't deliver especially well against this rather demanding standard, as distinct from the more modest standard of knowledge extraction. Something more than participation is required to fully develop a human-centred development process.

Practice

In explaining the ISU design model, the most essential and most difficult thing is the particular kind of practice that the model implies.

The model comes from frames and is designed to support a particular form of managerial and organizational practice. It also directs attention to specific practical content. The content can be outlined in terms of:

(1) Four underlying areas of concern (which can be seen as inputs to the architecture) leading via the architecture to the identification and pursuit of
(2) three organizational missions ('outputs' from the architecture).

Figure 3 identifies the four main practical inputs to the model.

The form of the model derives mainly from a concern with learning (the model as a 'bootstrap' model) and has three aspects:

(1) Understood as educational development and training, learning provides a basic representational and conceptual structure for the model – the two-level loop;
(2) Understood as progressive, systematic and explicit refinement of understanding, learning provides a methodological model of how to design and implement an organizational system – a 'soft systems' approach;
(3) Understood as acquisition of increased options in action, learning provides a keynote to the operative style, and some further methodological guidelines – managers becoming more capable through action learning, and human resources becoming empowered as resourceful humans through personal and organizational development practices.

Inputs and outputs will first be discussed followed later by a discussion on the three aspects of learning.

'Quality' and the strategic management of resources

In the original context, the public sector client was in the throes of dramatic changes in service definitions, delivery standards and management methods. Thus quality and the ability to strategically manage resources were central issues in the design brief. An approach to IT-related training and development issues had to offer a way of addressing these corporate crises. The particular (local government) form of this challenge was specific, but it is becoming increasingly a matter of concern at top management level in a range of organizations, whether it is possible to direct IT investment positively and effectively through channnels which contribute significantly to key business concerns – quality, flexibility, value added (Earl, 1989; Dale and Plunkett, 1990).

We took the view that quality is essentially a people issue – a matter of enabling maximum contribution to the business from its human resources. We therefore located the ISU model, in corporate terms, in the intersection of two domains of strategy – human resources and information resources (see Figure 4). We set out to provide conceptual tools for visualizing and assessing the relationship between the two, and also some practical frameworks (e.g. change missions, standard practices, techniques, managerial role definitions) within which the appropriate managerial skills and allocations of responsibility could be recognized and developed. Our basic view was that an IT/IS strategy or a significant IS project is hardly worth the trouble, if it does not directly provide a locus – and some specific support, guidance and challenges – for developing the strategic capability of managers and their day-to-day awareness of strategic issues. Management education frameworks such as LGTB (1988) and BIOSS (1987) are relevant here.

Client-led management of information systems development

Again, in this area there were specific conditions in local government. Compulsory Contracting and Tendering (CCT) is a legal requirement recently imposed on some local authority services. Although data processing services are not included in this set, expectations were that future legislation would include them; in any case, local authorities were beginning to undertake fundamental reorganizations in order to give all their external and some internal activities a client-contractor format appropriate to CCT. This kind of shift will place new and difficult responsibilities on managers in IT-using departments, where previously IT development had been seen as the

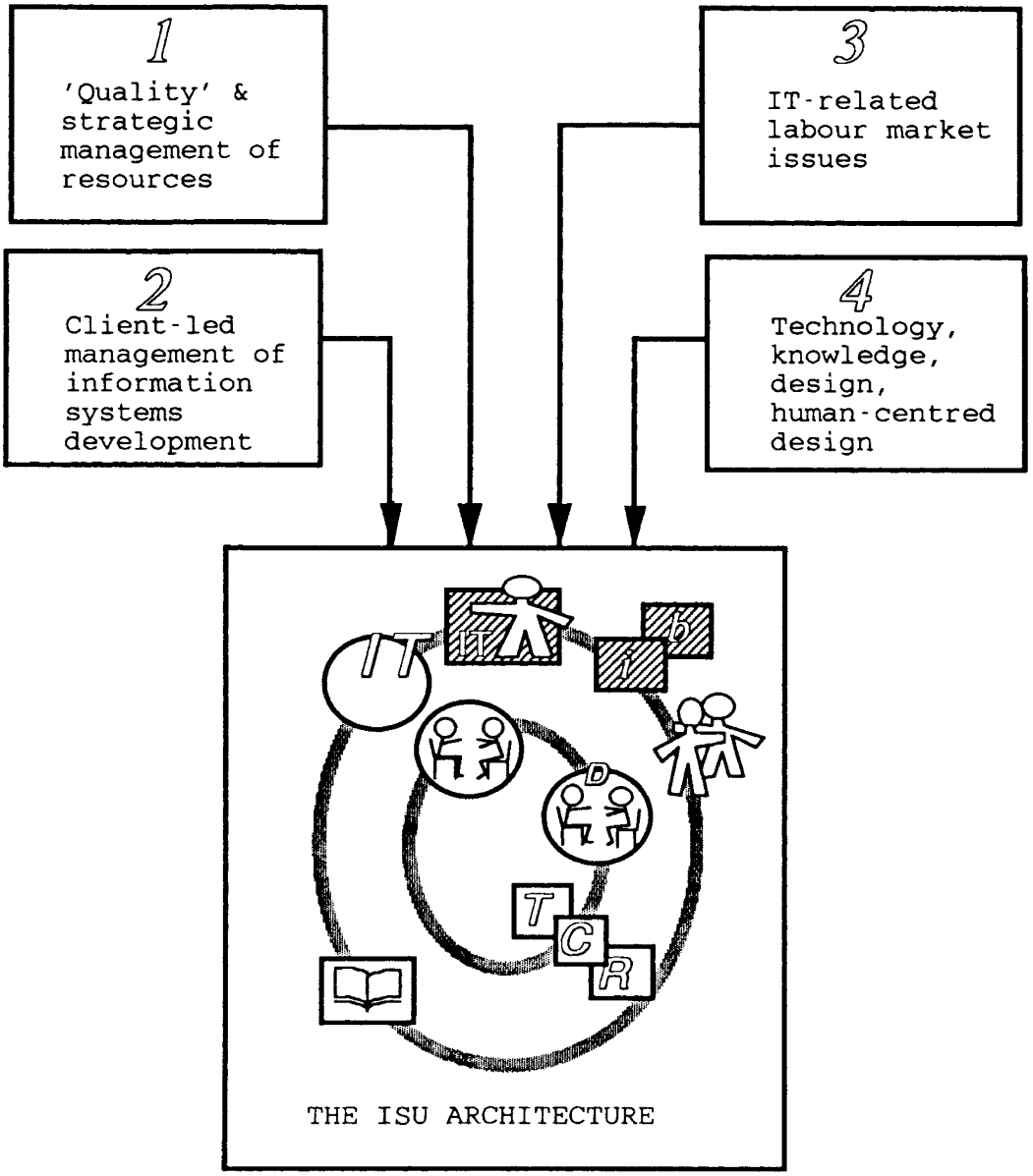

Figure 3 Inputs – the practical origins of the model

responsibility of a central service department.

Another trend contributes to the problem. Because of the typical applications backlog that accumulates around a central dp department in a large bureaucratic organization, because of the increased availability of turnkey or semi-custom systems for a range of local government applications, and because of the falling price of computing power, many departments – housing is a common example – have acquired their own systems, and with them, the responsibility of managing their purchasing, implementation and upkeep. Often user-department managers have

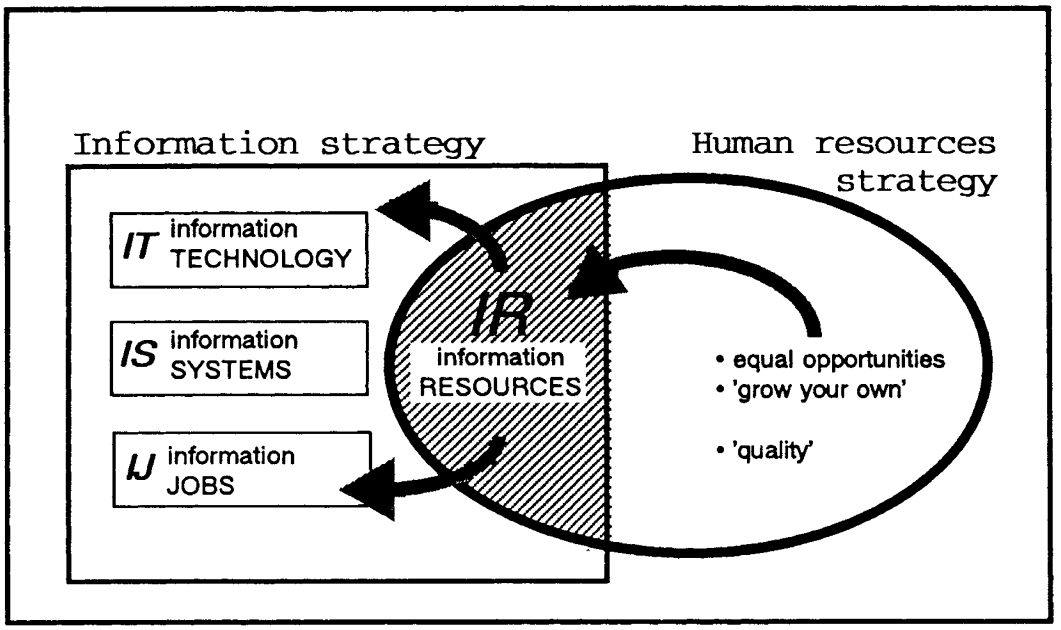

Figure 4 The ISU model within business strategy

botched this and found, among other things, that the imperialist politics of central data processing departments – which they sought to escape by going independent – have re-emerged within the in-house technical units that they have had to create. Non-IT managers end up as IT managers and, although it gives them sleepless nights sometimes, they generally let the responsibility slide down the organization to someone 'who understands' – a quasi-technician in a staff function, rather than a mainstream manager. This kind of person has often migrated into IT-related work, and is not a trained IT professional. This is an unstable and risky, but all-too-common situation.

These kinds of difficulty are not limited to the public sector. In general, an increased burden of responsibility seems to be being placed on the ability of IT-user organizations or departments to effectively oversee the IT systems lifecycle, including managing the contractual interface with IT specialists and suppliers, where previously this had been the function of an in-house department.

It was also clear that most writing about IT management, and most project management methods, relate to problems faced on the supply side – in dp departments and the IT services contractor industry rather than the use side. IS lifecycle models, for example, are producer-activity models. Their primary aim is to get the supplier from A (an opportunity to tender) to B (sign-off, payment and handover to someone else, even if it's the maintenance group within the same in-house dp establishment) with a reasonable degree of technical elegance and a minimum of litigation and post-project come-back. The fact that maintenance and system upgrades sometimes appear in IS methodologies is misleading. They formally close the loop but are outside the design process as a contractual phase in the life of a system. Closing the loop, i.e. actually using and redesigning a system in response to emergent requirements, is outside design in a real material sense. Designing for the system lifecycle, as recognized by lifecycle models, is simply designing for continued involvement of future producer-side actors, as distinct from designing the future life of the system, its use by front-of-house people.

'User involvement' in this context is a less meaningful term than it seems; it generally translates as 'effective data extraction'. This often gets confused with the other important issue for IT contractors – client involvement, which is aimed at clarifying the mutual contractual obligations of contractor and client in order to steer a project to completion. 'User-involved' development methods may be significant in delivering IT systems (though in their bureaucratic extremes – as in SSADM – development methods may end up as an old organizational problem disguised as an administrative solution). However, they do not address the basic reality of IT/IS systems for users.

Users live with a system forever, and a conceptual framework that goes from A to B, rather than round and round, simply doesn't map their problem.

An IT-based system starts out for its users as an alien entity, created, in its details, by alien people – techies – and posing the problem of whether it really will be workable, cost effective, adequate, secure, upgradeable, compatible, etc. Techies are always moving the technology goalposts, suppliers are always moving the cost/power goalposts, increased penetration of IT continually increases an organization's exposure to risks of disruption. Thus, for users, an IT system is always a problem. Hopefully, the significance of the problem declines over a system's lifetime as the organization learns. But clearly, systematic opportunities, expectations and structures for learning are what users need in an approach to IT/IS development.

It was necessary to build these into the ISU model. It was particularly relevant to identify roles for different types of user-side managers in relation to IT/IS strategy and practice (i.e. at board or senior-team level, and at project or 'legwork' level) and to begin to map the job-description and training requirements that would be called for in supporting these roles, together with a typical person-specification for the job. There has recently emerged a focus on 'hybrid managers', but it was felt the analysis of user-oriented issues requires a broader concept, which places at the centre the human resource management issue. At the same time there was a need to promote the idea that client-led management of IS development and operations is a good way to go, but that there are substantial role and skill issues to be clarified and resolved in a given organization, if the outcome is to be successful. All these concerns were instrumental in producing the irm/iro focus within the model.

IT-related labour market issues

A further stream of concern came from local government policy work on employment issues. A previous study of equal opportunity issues in IT-related office work labour markets (Hales, 1988) underlined the potentially significant strategic role of local authorities as employers, in breaking down the stratification that is characteristic of IT labour markets. With a local rather than a national- or international-focused approach to labour issues, we arrived at a different emphasis than the usual (graduate level, engineering-focused) skills shortage debate.

From this standpoint, three important issues are:

(1) The possibility and desirability of developing intermediate work roles – 'para-professional' or technician level – within a strongly stratified system of labour markets, as alternatives to (overqualified, mobile, expensive) graduate labour;
(2) The scope, at a local level, for equalizing and exploiting employment opportunities around IT, for women and for people with few formal qualifications who are trapped beneath the glass ceiling of the professional/non-professional occupational boundary;
(3) The opportunities that might be developed by employers in internal labour markets (i.e. within large IT-using office organizations) via training, job design, career development and human resource planning, as distinct from externally by state agencies via public training.

The ISU design model was intended to address these issues, through its inclusion of job design as an intrinsic feature of systems design and development. In the original research context, the equal-opportunities labour market view emerged from a local government, employment-opportunity focus. However, the implications are certainly more general than this. The implied debate is, on one hand, about the social responsibilities of employing organizations (an issue raised by 'Japanese' management methods; Pascale and Athos, 1981) and on the other, about the effectiveness of investment ploughed into human resource development under conditions of financial stringency, compared with investment in the fixed capital base.

In the ISU design model, the central focus of the labour market interest is the notion of 'constructive users'. The term was coined by the End-User subgroup of the Training Agency's national lead body for the IT 'sector', the ITILB. While the producer subgroup was concerned with standards for professional training in IT (i.e. the terrain of the British Computer Society's 'Industry Structure Model', recently enhanced and reissued; BCS, 1991), the End-User subgroup had to focus on training requirements for many kinds of users across all sectors and occupational roles – managers, clerks, technicians, secretaries, librarians, designers, etc. Their approach was to define constructive use as applying to uses in which an understanding and competence in some aspect(s) of IT are essential to success, as distinct from those where the presence of IT is incidental; and to develop a general method for deriving training standards for particular types of constructive users. The method – Functional Analysis Contextualized In Tasks (FACIT; see Carroll *et al*, 1989) – uses focus-group techniques and is, in principle, adaptable into a job design method.

'Constructive end-user' is better than 'user' because it clearly refers to the (often female) actual users of keyboards and screens and not their bosses, who are often the surrogate in methods that claim to involve

'the user' but actually pivot around set-piece bargaining between (generally male) contractor-salesmen and client-side managers. In the ISU model 'constructive user' is used in a slightly narrower sense than by the ITILB; it refers to constructive end-users who actually, right now, understand how IT makes their job tick and might be deployed more effectively. In this sense, there are few constructive users in any organization today, though there may be many routine users.

The ISU model was built around a view that constructive users are the most important IT development resource an organization possesses, or could possess. However, there are no jobs titled 'constructive user'; there are no job advertisements for them, no training courses. The mainstream skills debate looks right over their heads. In focussing on the constructive user issue, the ISU model goes beyond the narrow dp and engineering recruitment debate, to the organization-wide problem of getting the right IT in the right places to support creative IT-using staff in adding value and delivering product. Getting the right staff at every level – and especially the front-line user level – is crucial in creating a designer-subject able to drive both IS development and the integration of information systems constructively into practice.

The problem of identifying constructive users, supporting them, and developing their practical relationship with IT professionals in an organizational context, gives rise to the map of labour shown in Figure 5. In practical terms, some leading problems – addressed within the ISU approach – are:

(1) How to identify existing constructive users, help them move up the learning curve and enable them to be effective partners in the design/strategy process;
(2) How to design IT-user jobs and systems – together – to promote constructive use;
(3) How to design and implement structures that support routine users and promote their development into constructive users.

Technology, knowledge, design and human centred design

The final determinant of the approach that resulted in the ISU model was a perspective on technology and design that differs considerably from that underlying conventional systems design, in its epistemological and sociological terms of reference. The perspective stands at the convergence of several strands of theory and practice; it is an example of the multi-metaphor approach identified by Morgan (1986).

First, a systems approach to knowledge. This determined not only the general method of analysis (a soft systems method) but also a subject-centred and

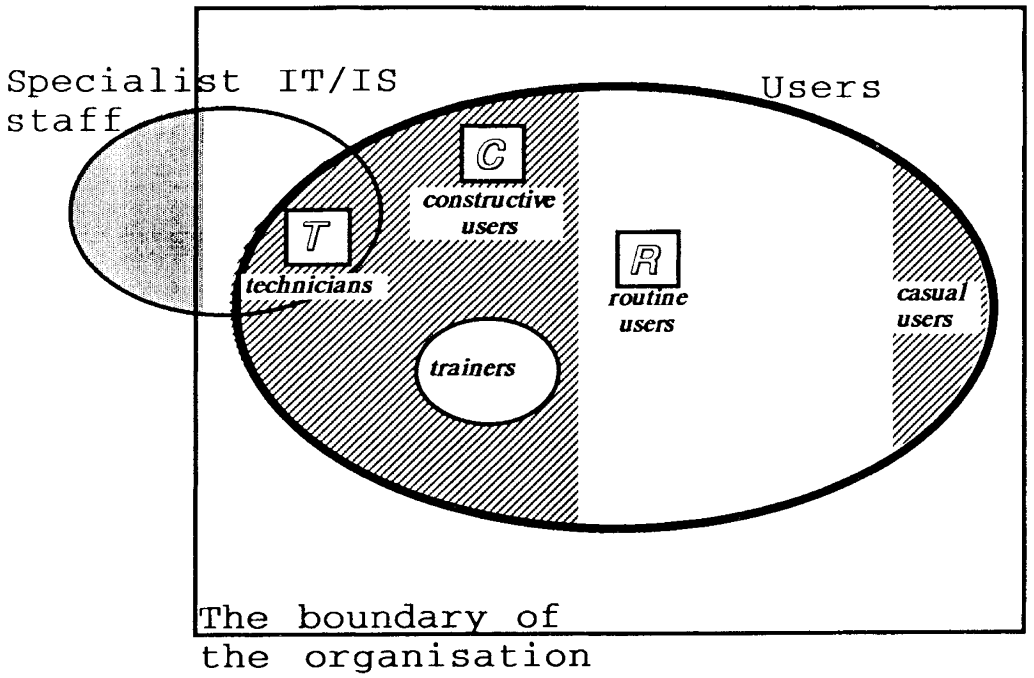

Figure 5 A labour map

self-reflexive (whole system) view of how valid knowledges are produced (Hales, 1978). This differs from the knowledge extraction view that is implicit in conventional design methods.

Second, a view of technology which sees technologies as historical structures of practice (praxis, social activity systems) rather than rule-bound constellations of things, and therefore also sees systems design as properly being about the design of use-practices within a specific cultural and economic setting (Habermas, 1972).

Third, a theoretical model of practice derived from labour process theory, but augmented by cultural theory so that subjective (identity, knowledge, representation, etc) as well as objective structures in work practices (time, space, data, money) are brought into focus as objects of design (Hales, 1980).

And finally, a tradition of human centred alternative design, established in the 1970s by labour movement activists as a practical form of materialist economics, in opposition to the 'inevitable' logic of conventional managerial economics (Wainwright and Elliott, 1982; Rosenbrock, 1989). This tradition recognizes forms of design knowledge – tacit knowledge, final-user service-delivery knowledge – that are inseparable from the users of technological systems. It both posits and promotes final users as designers in a developed sense, challenging the prerogatives of professionals. This tradition is strongly manufacturing and skilled-manual-male oriented, but there is a gender-aware strand of British work that focuses on the development of office information systems (Green *et al*, 1989; Green and Owen, 1991, Hales, 1988; Hales and O'Hara, 1992).

These influences were coded in a set of five design principles that were brought to bear on the design of the ISU model:

(1) Designing a technology system is designing user jobs; acknowledge this and adapt the techniques and practices to reflect this;
(2) Designing a system lifecycle is designing careers, labour markets and training regimes; address these too;
(3) Although the product (an IT system) is important and visible, recognize that the process – the design and implementation process – is expensive, difficult, takes time and causes disruption; therefore design the process so that it delivers benefits directly (organizational development, staff development, cultural change, equal opportunities awareness and opportunities) rather than waiting for the product eventually to be installed. Deliver something from day one and keep the process alive through the dead time of detail design;
(4) To produce adequate, really useful knowledge of a complex whole system object (e.g. as the basis for a requirements specification), it's necessary to produce a whole subject of a kind that probably doesn't currently exist, cutting across functional, hierarchical and cultural lines; small-p political organizing is a central aspect of the design role. This is also a path towards successful implementation;
(5) Living labour rather than apparatus is the key to value added. People, not systems, deliver service; thus the design agenda includes tacit knowledge, implicit skills, vision, languages, self image, subcultures, personal and group identity, systematic opportunities for creativity, 'what's in it for me' etc.

Three organizational missions (outputs)

The ISU architecture is a map of a system of practices required to support a practical solution to a set of problems. To turn it from a map to a plan, within a specific organization, an architecture needs to be translated into a set of change programmes or missions, according to prevailing priorities and circumstances within the organization. In the original case, this mapping fell out in the form of three mission statements which were then used to generate specific goals and performance indicators for the change programme. Each mission (see Figure 6) highlights a subset of activities within the architecture:

(1) Developing management practice: this highlights the statement of principles, IR and IJ as an integrating framework for IT/IS strategy, selection and training for irm/iro roles; issues in strategic management, change management and an enabling, bottom-up style; quality management, managing service level agreements, project management; 'publishing' of organizational learning;
(2) Developing information-worker staff: this highlights human resource management practices, constructive users, hybrid users; job design, career design, career crossover schemes, training for routine users; study circles; 'publishing' of organizational learning;
(3) Developing participative design practices: this highlights design circles and the techie filter; technician roles; project management and various strategies at the project level such as prototyping and choice of software development environment; 'publishing' of organizational learning.

Experience in participative design projects (Hales, 1991; Hales and O'Hara, 1992; O'Hara, and Smith, 1991) suggests that this kind of distinction between strands is important. A project that succeeds well in the third mission area – participative design – and delivers a robust design, to budget and on time, may

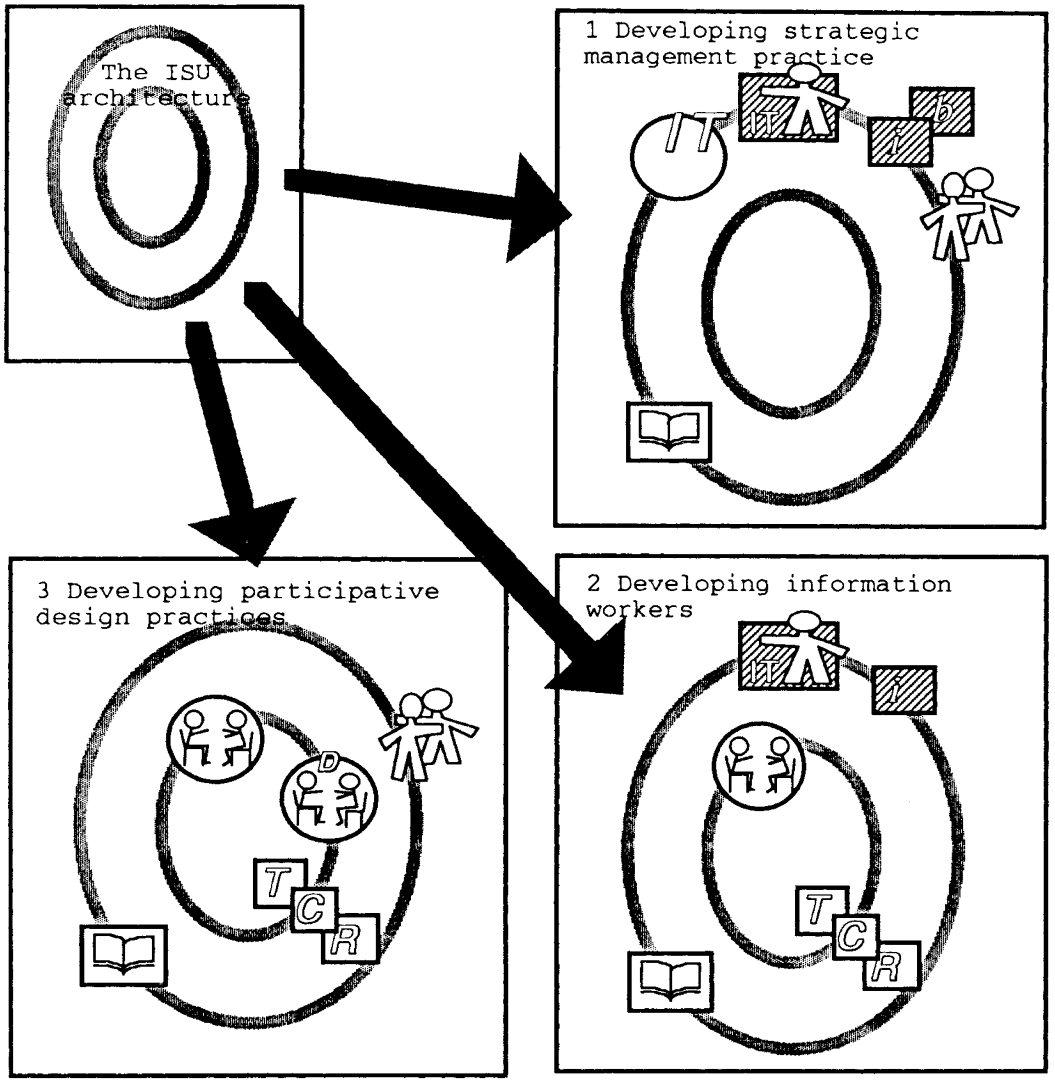

Figure 6 Outputs – three missions for organizational development

still fail to shift sufficient organizational practice in the other two domains: information work and strategic management. As a result, a good system may lose potential through inadequate implementation and poor vision. Apart from resulting in a loss of value and misdirection of strategic effort, a successful participative design project that fails in this way also fails in human centred terms, because the human benefits – job satisfaction, career opportunity, enhancement of skills, and all the benefits delivered to customers and clients – lie overwhelmingly in (constructive) use rather than design. Some of the relevant techniques and structures are discussed by Eason (1988).

Success – and some early success at that – in the first (management) mission is essential if a system is to be strategically located and if the system development project itself is to serve as an effective focus for staff and organization development and be a motivating element within the organization. Success in the second (information-jobs-and-careers) mission is essential if the value of the system is to be realized in constructive use. Although it should not be left until so late, this second mission is the one that should steadily move

into the limelight as a project moves from design towards implementation. It's still a design mission, but involves a different scale and mix of actors and an explicit shift in design focus from system to practice. As a shift, at a certain stage of a project, this will, in principle, be more noticeable in early projects, as an organization is learning to operate across the full range of this type of strategy (i.e. all three mission areas). Ultimately, in a mature IS-using organization, both jobs and system would be recognized and addressed as objects of design from the outset.

The particular definition of a set of missions, together with their associated goals, targets and performance measures, will vary between cases. But, it is likely, that a three-way split of the above general kind will be a relatively robust feature of this type of strategy. Critical factors in the success of such a strategy include formal recognition at appropriate levels, that there are several distinct but interdependent missions involved in a human centred strategy, and acceptance of accountability and responsibility for all of them and their targets, by specific managers. If the participative mission is the only one recognized, and therefore the only one that delivers, then – achievement though this is – it will not be successful.

Learning

The two-level loop structure

Understood as educational development and training, the place of learning in the system lifecycle is represented in Figure 7. This simple diagram has two loops – labelled the strategic and the tactical/operational – to provide for double-loop learning. Training (activity in support of explicit skill development) appears as an input mainly on the implementing side of the loops; educational facilitation (activity in support of recognition, negotiation and commitment) appears mainly on the reviewing side.

It is well known that training is neglected in relation to IT. In contrast, educational facilitation ('educatio - to bring out') is rarely commented on, yet clearly has a significant role in situations where the shaping of new knowledges and new commitments is at stake. The ISU model assumes this kind of situation, since otherwise the strategic level would not be worth calling by that name. IT development within an organization must be a knowledging process as well as a delivering process. Conventional IS design methods – SSADM, Yourdon, etc. – support delivering; the ISU model contains delivering within it (e.g. as part of the structure of design circle activity), and is also designed to support knowledging.

Figure 7 also suggests how the structure of the ISU architecture relates to the simple learning structure. They have the two-loop structure in common; and at each place in the learning model there is an equivalent centre of activity in the ISU model, fulfilling a general set of functions but having a particular shape determined by the organizational setting of the design project. Each centre of activity represents a cluster of practices. There are, in principle, many connections between them, other than the simple 'cyclic flow' connection shown. In particular, connections both ways, between the strategic and tactical/operational levels, are important. Many of these will, in practice, be secured by the movement of the irm and (especially) the iro between different activities and roles. Some of the connections (e.g. reviews, formal publication, inputs to policy, staff development practices) can be systematized as routines; others (e.g. informal publishing of outcomes of development work) will be *ad hoc*.

A soft-systems approach

Understood as progressive, systematic and explicit refinement of understanding, learning is at the centre of the soft systems approach which underlies the development and use of the ISU architecture. In the original investigation, interviews and group sessions with managers and staff were used to develop maps of content (e.g. the constructive user diagram, Figure 5) and of function (e.g. the learning process diagram Figure 7). The research also yielded a map, in the form of a structured list of objectives and critical success factors, of actual and required organizational behaviour. General perspectives and knowledge from outside the organization, in the form of analyses of the four areas of concern outlined earlier in this paper, were also written into the content map, the function map and the behaviour map.

The content and function maps were used to generate the ISU architecture; the behaviour map was used to test the coverage of the architecture, and to generate from the architecture a set of performance indicators for the implemented system and the implementation process. The 'system' here refers to a required system of practices, for which the ISU model constitutes an outline plan. The plan is operationalized through a change programme. The programme, in the original case, had three component missions.

Figure 8 shows the overall relationship between products and stages of the design and implementation process. In principle, this is cyclical and iterative rather than once-through.

The ISU architecture can be seen as a fairly general one, given the generality of the underlying processes and the widespread nature of the problems it was designed to address. However, no case will exactly match the original, so that in another case the same

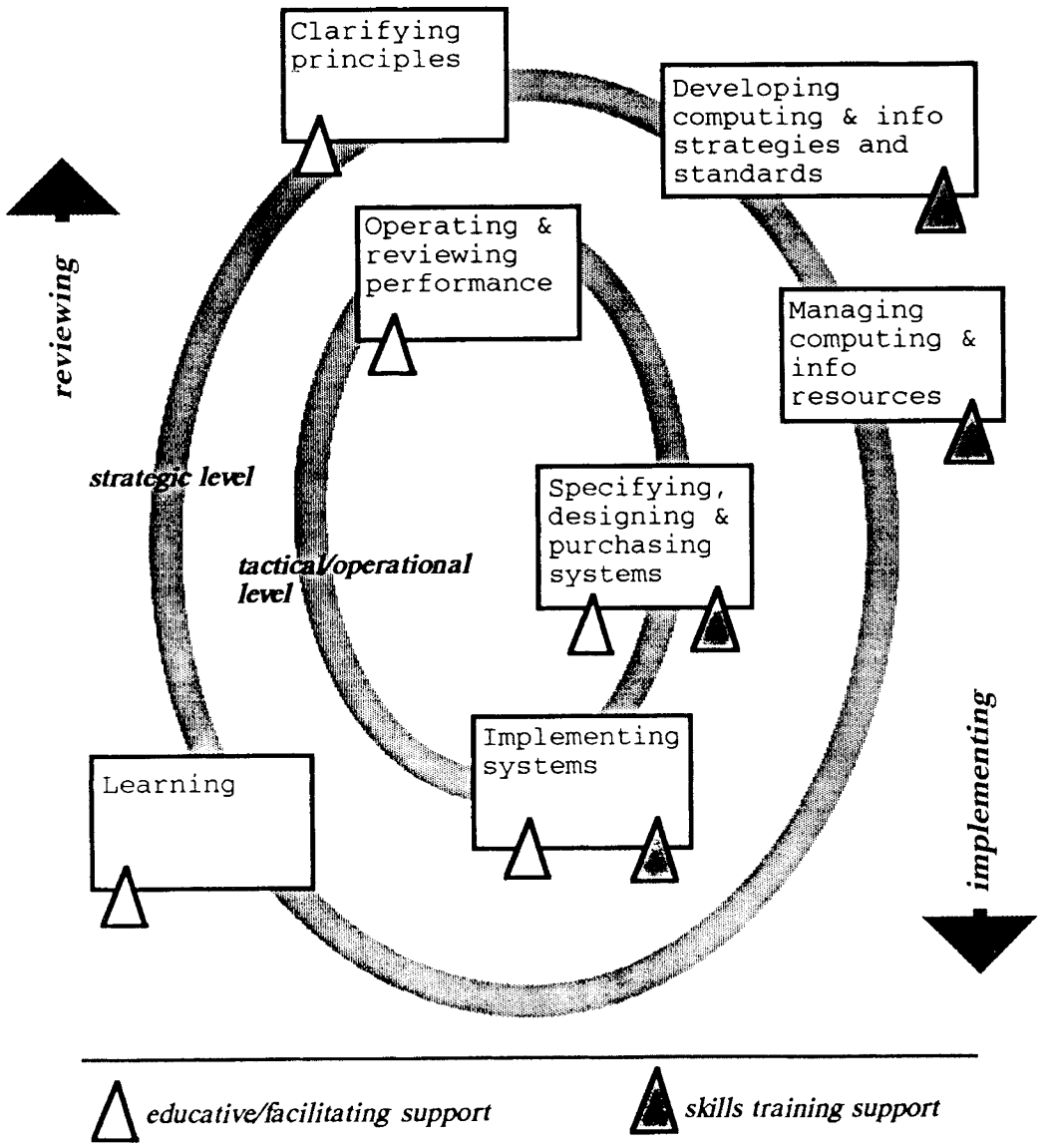

Figure 7 Learning support within the development process

kind of investigation, mapping and architectural design will need to be carried out. With the ISU architecture as a guide this need not take as long or be as difficult as would otherwise be the case. The particular detail of component activities – the design of a study circle programme for example, the content of a statement of principles, or the planned expansion of a design circle programme into a quality circle programme (or *vice versa*) – will depend on local needs and conditions; but the general form of the ISU architecture should be fairly robust.

In the original case, the detail of the architecture was documented in a draft ISU handbook for the organization. Such a handbook, and its periodic revision, constitutes an initial and continuing focus of the publishing activity in the outer loop.

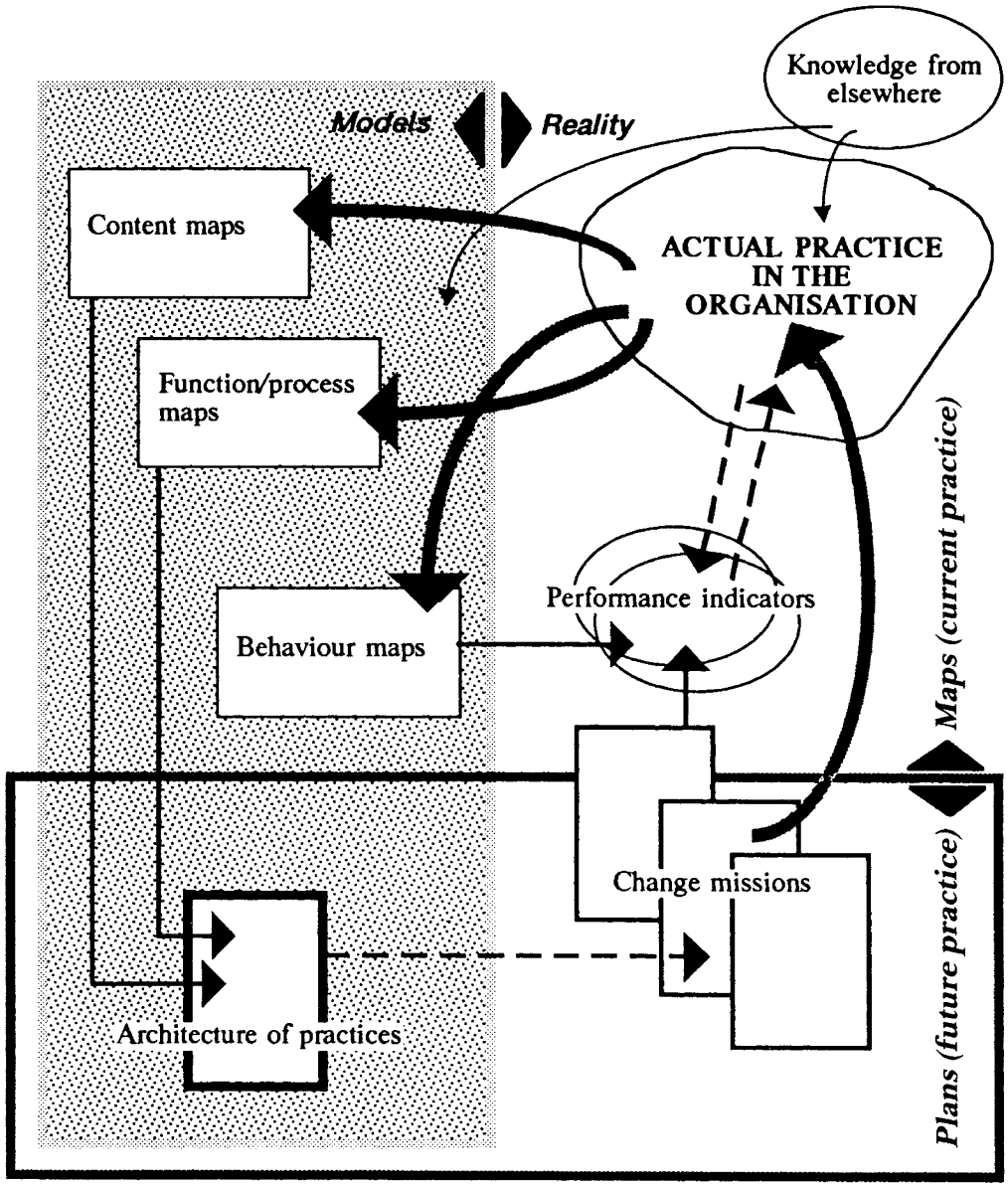

Figure 8 A soft systems modelling process

Problem management, change management and empowering

The final perspective on learning which influenced the approach comes from psychological 'helping and facilitating theory' (Heron, 1989 and especially, Egan, 1990). If learning is seen as something that can be deduced from the fact that an increased range of options appears in the practice of the subject, then a practice-centred model of IT development needs to be able to address the question of how analysis moves over into practical action. The crucial moment in this

process is when analysis – intellectual ownership of a problem – passes over into commitment to changed practices: emotional ownership of a problem situation.

In principle, the locus for this movement lies in the 'educational facilitation' phases of Figure 7. The skills required to realize the movement, however, are rare and hard to document. Deep within the ISU model is a concern to help managers become more capable and able to commit themselves to effective change action, and to help staff to become more active and resourceful (Moss Kanter, 1983, 1989). Through the whole approach there is a defining emphasis on enabling and empowering, so that the strategic focus on human resources becomes transformed into a practical focus on empowering people as resourceful humans, via personal and organizational development.

'Action learning' is central to the practical interpretation of the ISU design model (Revans, 1982; Pedler, 1983). Action learning is about theory being developed in the same place as practice, not elsewhere. Knowledge extraction (developing a significant knowledge through user involvement, then translating it into another location where design professionals operate on it) is only an incidental focus in the model. Centrally, it is about the production of 'really useful knowledge', which by definition is owned by, and can directly enter into and inform the practice from which it emerged (Hales, 1980). Knowledging does not end with the completion of design – no architecture and no formal system can contain all relevant detail – and the production of new knowledges will continue to be relevant throughout implementation and use. So, an action learning style of development and implementation is fundamental to the practice of the ISU approach.

Conclusions – some obstacles to the full use of the model

This article has described an architecture of practices which, together, would support a human resource approach to the development of information systems. To date, the architecture has not been fully implemented. In the original case, the ISU architecture was part of a package, a proposed training and staff development strategy. The whole proposal ran aground on the organization's inability to frame a strategic-level initiative, and to operate a knowledging as distinct from a delivering style of managerial practice at senior level. Consultants will recognize the situation: where a client wants the researcher-designer to conjure a problem away by delivering a solution, rather than provide guidance, models and challenges that will enable those responsible to manage the problem better.

The management development mission within the ISU domain of the training strategy was linked to a broader mission in the overall proposal and it was – ironically but unexpectedly – a failure of strategic-level management capability that undermined the project. The deepest difficult lay in securing emotional as distinct from intellectual ownership of the proposed strategy; finding influential advocates willing to identify themselves with the strategy's success, and with the risks involved. The fact that this is a common difficulty does not make it any less significant.

Given the innovative range of the proposals and their wide potential impact, the order of difficulty would have been less if the original work had been pitched at a departmental rather than corporate level, where pilot development might have had a lower political profile and smaller range of actors. Nevertheless, in principle the difficulty remains even at departmental level, and other cases including a successful participative design project (Hales and O'Hara, 1992) show that weaknesses in risk taking and change management in an organization's culture constitute deep obstacles to implementing a model like ISU. This serves to underline the importance of the management development mission within the model.

Failure to identify and deliver the information-jobs-and-careers mission is likely to be an equally serious danger in many settings. Many organizations have poor practice in the human resources domain, and simply to espouse a human centred statement of principles will not improve matters. Again, risk taking and change management, involving the ability to take emotional as well as intellectual ownership of a problem situation, are central.

Relevant skills within an organization are likely to be in short supply. As a 'design' approach, the ISU approach relies heavily on modelling; that is, the explicit formulation of descriptions of a situation, which serve as guides to practice and become objects of explicit critical re-evaluation in the light of their use. There are distinct analytical skills involved and also skills in managing this kind of process. The fact that these are widely recognized in the literature of soft-systems and change-management practice does not necessarily mean that modelling will be an easy style to introduce into a given organization's management culture. A good indicator at the outset would be whether the organization has previously taken significant steps towards accepting and using performance indicators; and particularly, whether managers and staff are able to see these as useful and negotiable guides to improved practice, rather than simply sticks with which to beat failed managers.

If an organization fails to register the two other missions of a human centred approach, it is left with the obvious one (or perhaps, the one that is most acceptable because it is least challenging in an admittedly serious situation) – namely, participative design of technological systems. In this situation,

human centred development practice degenerates into mere knowledge extraction, and user involvement in design shrinks to address the more limited challenges of a robust system architecture and appropriate human-computer interfaces. Usability becomes the keynote, rather than the whole question of use and usefulness. In the absence of specific initiatives in organizational learning, management development, staff development and job and career design, the fundamental cycle-structure of the ISU model collapses, staff motivation lapses after the early active design phases are complete, and full benefits are neither identified nor achieved.

While improvements in knowledge extraction may be the state of the art in some areas of methodology, in terms of the legitimate aspirations of the ISU design model, to succeed in this alone would be a failure.

Note: The ISU model was previously referred to as the IRD (information resource development) model (Hales and Simpson, 1991).

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