

User involvement in the systems design process—a practical guide for users

LEELA DAMODARAN

HUSAT Research Institute, Loughborough University, Leicestershire LE11 1RG, UK;
e-mail: l.damodaran@lboro.ac.uk

Abstract. Increasingly users find themselves ‘involved’ in IT design projects. This occurs because the organizational culture of the parent organization purports to promote participation, or because structured design methods are being used which require users to play a part. In either case users who find themselves required to participate in IT projects are frequently unclear about what this requires. In most organizations surprisingly little briefing on the users’ role in design projects is provided. Users are therefore confused about their brief and concerned about their lack of expertise in computing. Although research reports on participatory design (PD) projects abound, little coherent guidance for the key stakeholders representing users’ interests is available. The contents of this paper go some way towards filling the gap. Clear differentiation is made in the paper between the roles of the different players involved. Detailed guidance is provided for meeting the varied requirements of the different roles. For example, the roles of ‘top’ management and ‘middle’ management in supporting user involvement are explored, their special responsibilities specified and required actions listed. The need for an infrastructure to support user involvement and how to create one is discussed. Guidance is provided on, for example, the representation process and the factors to consider in selecting user representatives. The role of user representatives is particularly problematical and therefore receives particularly close attention. Finally guidance is given regarding the common pitfalls in Quality Assurance procedures and especially how to avoid the procedures becoming a meaningless ‘rubber-stamping’ exercise. The guidance presented is grounded in the extensive experience of the author in participative design processes in a wide variety of contexts including the footwear industry, a major UK government department and a telecommunications and broadcasting company.

1. Introduction

The field of participatory design (PD) is represented by a vast literature which now spans several decades, a number of different academic disciplines and traditions and which has an increasingly multi-national flavour.

The concept of PD is imbued with commitment to the ideal of democracy in work organizations and to the notion that the workforce should be active participants in all

decisions which affect their daily working lives. The term ‘user involvement’ is sometimes used as a synonym for participatory design in a technological context. Some practitioners however, suggest it represents a lesser goal. For example, Muller and Kuhn (1993) write ‘Much of the Scandinavian work retains an explicit commitment to workplace democracy in the context of technological growth and business development—that is, direct and effective worker participation (not mere ‘involvement’) in design activities and decisions, within a trade union context’. In similar vein Clement and Van Den Besselaar (1993) comment that ‘It (user participation) cannot be restricted simply to the design of information systems but inevitably brings in wider elements of working life’. The author of this paper takes the view that effective user involvement in system design does indeed ‘inevitably bring in wider elements of working life’. This phenomenon occurs because many decisions, apparently focused upon purely technical issues are in fact socio-technical in nature. Thus, for example, decisions about dialogue design may be concerned with specifying the sequences for data entry. The outcome of such a decision has profound implications for job design, the nature of which will depend upon the degree of discretion left to the user in performing the data entry tasks. The informed user involved in such a decision is thus in a position to influence highly significant aspects of working life.

For user influence to be a reality with any real power however, requires a great many preconditions and requirements to be met. In other words, empowering the user is very demanding and complex and can only be achieved by carefully structuring the organizational context.

The author’s experience of PD and user-centred design in contexts as diverse as, for example, a footwear manufacturing company (Damodaran 1977a and Damodaran *et al.* 1977b) a major government department (Damodaran 1991, Harker 1993) and a ‘high-tech’ telecommunications and

broadcasting company (Damodaran 1994) suggests that a highly integrated strategic approach is essential to the success of the participative process. Further there is ample evidence (Damodaran 1992) to suggest that users need to be well-informed and to have real understanding of the principles underlying the processes in which their active involvement is sought. Mechanistic following of prescribed procedures without an understanding of the intended goals of the whole process is likely to prove futile at best and probably expensive and wasteful as well. Thus the strategy for PD must include the infrastructure (resources and capability) to promote learning and understanding by all of the participants. The strategy must also include the clear allocation of responsibilities to key stakeholders and clarity regarding the respective roles of the different players.

The need for appropriate formal bureaucracy is supported by other investigators. Clement and Van Den Besselaar (1993) note 'While the relationships within the group may be relatively informal and flexible, protecting it from the outside may require formal contracts and bureaucratic structures, such as steering committees and advisory panels. Resources such as time, space, relief workers, and access to technology will need to be negotiated, with some control over these residing within the project group itself'.

Given the plethora of reports on PD projects it may be thought that any further guidance on how to conduct the PD process would be superfluous. An examination of recent literature reveals that this is not the case. There are frequent references to the significance of the organizational context in PD, but rather less consideration is given to address the question of how to tailor the context to support user-centred processes. *Ad hoc* advice is not in short supply. Clement and Van Den Besselaar (1993) draw from their study of PD projects a number of lessons for future projects. They report that, since PD is a complex process which is highly dependent on specific organization contexts, there can be no 'programmatic solutions'. They proceed to comment that 'Considerable improvisation informed by a holistic understanding of local conditions will always be necessary. Initiators should expect the process to involve juggling many items and balancing competing demands'. The initiator is then advised to establish an animator or group of animators; to achieve greater bureaucracy; and to seek the support and involvement of middle and top managers. The specific observations and general guidance offered are undoubtedly valid and are congruent with the author's experience. However they only address the initiator of a PD process—just one of many stakeholders in the process. Similarly Bjercknes (1993) offers advice, again sound, which assumes only two categories of participants; users and system experts. These examples of fragmented advice appear to typify the published literature. Apart from well-established and valuable techniques incorporated in the ETHICS approach (Mumford 1983) there is a dearth of

guidance to support the multiplicity of user roles which feature in participative processes. This paper makes a contribution towards filling the gap.

The guidance presented here was formulated in response to the need to support users in large IT projects in UK government departments (where often there are structured design methods which require users to play a part). The contents were however informed by the author's experience of user-centred design in the widely differing contexts referred to earlier. As simply involving users does not guarantee their influence in the IT development process, the practical steps required to achieve user influence in IT design, development and implementation are described in detail in sections 3 and 4.

2. Basic issues of user involvement

2.1. Context of user involvement

For nearly two decades many information technology (IT) systems have failed to deliver the benefits expected by the users. Inadequate involvement of users in the design process is cited as a major factor contributing to this shortfall between expectation and reality.

All approaches to system design involve users in the design process. The difference between the various approaches lies in the degree to which users are able to influence the system design (e.g., with SSADM, Learmouth and Burchett, Structured Data Analysis, etc, users are involved as providers of information to the project team). In these methodologies users make a substantial contribution to the project but often do not influence key decisions. The danger remains, therefore, that the eventual IT development will fail to reflect adequately real human and organizational needs. Disenchantment and two decades of experience of IT failing to deliver the expected rewards have led to increasing attempts to involve users in a more influential role. Forms of involvement can be broadly characterized as falling somewhere on the continuum represented in figure 1.

2.2. Benefits of user involvement

Findings from a variety of studies (e.g. Robey and Farrow 1982) show that effective involvement in system design yields the following benefits:

1. Improved quality of the system arising from more accurate user requirements.
2. Avoiding costly system features that the user did not want or cannot use.
3. Improved levels of acceptance of the system.

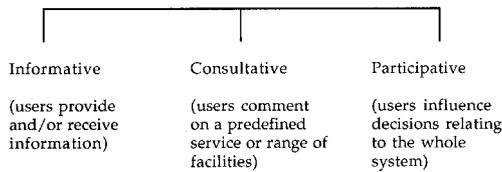


Figure 1. Forms of user involvement.

4. Greater understanding of the system by the user resulting in more effective use.
5. Increased participation in decision-making in the organization.

Much of the emphasis on user involvement stems from a concern to avoid ill-effects on users during implementation and subsequently in the normal operation.

The major premise of most, if not all, of the social design approaches (e.g., Checkland's 'soft system methodology', 'human activity method', ETHICS, 'Sociotechnical design' and 'quality of working life' approaches) is that without effective user involvement in all stages of planning and design the organization is simply storing up problems for the future. When the problems emerge post-implementation they are likely to be serious and more intractable because system changes become more expensive as the design progresses and 'hardens'. Thus there is ample cost justification for addressing human and organizational issues earlier rather than later in any form of planned change.

2.3. Some of the pitfalls of user involvement

The evidence for the effectiveness of user involvement is both equivocal and contradictory (Hirschheim 1983). It is not sufficient just to have participation, what is needed is effective participation. The users should be able to influence design, not merely 'rubber stamp' it.

It would appear both from the literature and from the author's experience that to participate in organizational decision making is insufficient by itself to achieve successful IT systems. The quality and experience of the participation are crucial determinants of the eventual performance of IT. Hirschheim (1983) observed in his study that the term participation had a variety of meanings across the organizations sampled. He found that the term was used to describe everything from merely informing the workforce about a proposed IT project to genuine user-led design. A similar finding was made by Levie and Moore (1984) in an international study of workers and new technology, where despite legislation (e.g. in Scandinavia) the practice of involvement was far from the ideal that one would like to see in effective participation.

For user involvement to be successful from the users' perspective requires the users to be identified closely with both the process and the outcomes. There should be explicit

opportunity to influence the design process, and this should be observed in the resulting design decisions for the system. Bjorn-Andersen and Hedberg (1977:734–735) succinctly describe the process as follows:

'One frequent-heard argument for users' participation in designing is that involvement enables people to develop realistic expectations, and that it reduces resistance to change. This argument has often a manipulative flavour and appears to pay more attention to users' feelings of influence than to their actual ability to influence. The effects of such insincere pretences of democracy are questionable and may well counteract their purposes of facilitating change.'

If users are to exert effective influence on the system design process then they must participate in the development of the mechanisms which define the design decision process (Hedberg 1975). At present users who are involved in the system design process may find themselves in one of two equally invidious positions: that of a 'hostage', or that of 'propagandist'.

2.3.1. *The 'ho stage' role:* This role was identified by Hedberg (1975) and is readily observed in many user representatives participating in the design process. Here user involvement is effectively blocked by the professional design team. Instead the potential users operate in a way that promotes 'social comfort' and mutual esteem but limits real communication. No effective communication or problem-solving takes place partly because no-one wishes to disturb the peace and partly because users feel too ill-informed to contribute to IT decisions.

Inadequate and inappropriate training may promote the hostage phenomenon since it can leave the user representatives feeling confused and inadequate as members of an IT project. In these circumstances they are likely to take away the notion that there is something mysterious about computers and this belief may reinforce their feeling of being in a process they do not understand and cannot control, which in turn encourages them to adopt the hostage role. The hostage role is particularly damaging because it fails to deliver any of the benefits of user involvement while sustaining the delusion that users are represented in the design team.

2.3.2. *The 'propagan dist' role:* Hedberg (1975) labels this as the 'indoctrination alternative'. In this role any potential disruption to design from user involvement, as perceived by the designers, is handled by exposing the user representatives to training in systems design methods. On emerging from such training, the representatives often no longer represent their original group's perspective, but begin to adopt the designers' view of the design process. This change in perspective can lead the

indoctrinated ‘user representative’ to communicate more with system analysis and less with other users. Over time there appears to be a tendency for such indoctrinated ‘representatives’ to perceive user problems and issues from an IT perspective. This is reinforced by the observation that many such representatives subsequently pursue careers as system designers. In such a role user ‘representatives’ fail to safeguard the needs of the constituency they were intended to represent.

2.4. *Need for a ‘user involvement infrastructure’*

Since administrative or clerical procedures have always been subject to change it is important to appreciate the reasons why the experience of change involving IT is different in its nature from previous change processes. Conventionally most clerical systems, for example, were changed in increments by those involved in the works—albeit with guidance or direction from Organization and Methods (O & M) experts or other specialists. With IT systems the responsibility for developing the new system is in the hands of a group of IT specialists. This specialization has arisen because of the complexity and sophistication of the technology and not because it is an efficient, effective or desirable way to bring about change. Whilst specialized IT staff possess the necessary skills to construct the system architecture and develop the software they do not usually possess the knowledge and experience of the current and future users. IT staff attempt to acquire some of the required knowledge through analysing the current system and interviewing users. This is often only partially successful because users are generally placed in a purely reactive, information-providing role with the disadvantages outlined above. For users to apply *their* knowledge and expertise to IT development requires considerable resources to be invested in organizing and supporting a network of users with assigned roles and responsibilities, consultative procedures and user education. This paper describes and provides guidance on how to set up such a ‘user involvement infrastructure’, which is essentially a structure of communications mechanisms and services necessary to support the user involvement process.

3. Elements of the infrastructure

There are many different mechanisms for involving users in the decision-making process. Some of the most common include:

- Membership of steering/advisory committees.
- Membership of design teams.
- Membership of problem-solving groups.
- Consultation with individuals or groups.

- Prototypes/simulations.
- Quality assurance procedures.

Some project control methods such as ‘PROMPT’ or ‘PRINCE’ (which are used widely in the British Government Civil Service and elsewhere) suggest specific mechanisms to ensure users are represented in IT development projects. Since with large IT developments, it will be neither appropriate nor practicable to involve all users in all decisions relating to the IT development typically some form of representation process is set in place.

3.1. *Making user representation work*

Some of the most serious limitations with user involvement arise from shortcomings of the representative structures put in place. Critical areas include:

- Selection of representatives.
- Support from other users (at all levels in the organization).
- Training all users.

3.1.1. *Selection of representatives:* The issue of who should represent the user population on committees, project teams, during consultation, in system trials, etc., is a crucial one. The aim should be to ensure that those appointed are genuinely representative of the user population and possess the necessary personal attributes. Relevant factors to consider are listed in figure 2 but should not be regarded as exhaustive.

To ensure appropriate selection of representatives it is important to appreciate why the various types of future user need to be represented. For example, ‘first level’ users or ‘end users’, who will interact directly with computer terminals to help them to perform their work, will have different interests from those users who will only utilise printed output or manage the primary users. Each type of user should influence decisions concerning design of the facilities they will use in the future.

High levels of user competence and experience need to be brought to bear in the decision-making process. Often the most suitably skilled and experienced people cannot be spared from day-to-day operations to become representatives. Where this applies their experience must at least be available to user representatives as a necessary part of the consultative process.

The demands of the user representative’s role are explored further in section 3 while section 4 examines the specific responsibilities of the user representative.

3.1.2. *Support from other users:* Even with the required attributes, the user representative can only succeed with the support of all users throughout the organizational hierarchy.

Attributes to Represent:	
Location	e.g., inner city/rural headquarters/regional geographical area
Grade/function	e.g., junior, intermediate, senior clerical/managerial
Specialism Audit etc.	e.g., Accounts, Child Benefit;
Work experiences:	duration range of duties diversity
User 'type' or category: first/second/third level users	
Personal Attributes:	
Interpersonal skills	
Communication skills	
Ability to acquire technical knowledge in diverse areas	
Ability to sustain a sense of mission	
Perseverance	
Patience	

Figure 2. Attributes desirable for user representatives.

Too often the user representative is expected to shoulder the responsibilities of representing the user population without the benefit of an appropriate infrastructure and resources—particularly time and relevant skills. In addition the user representative often has to operate without the clear declaration from senior management that the representative is charged with doing this important job and that all other members of the user population are charged to assist him/her.

A multiplicity of user roles exists in the user organization and these must be integrated into a user infrastructure which supports the user representative. Characteristics of the varied roles are examined in section 4.

3.1.3. Training all users: For reasons already discussed it is essential to involve users in a variety of decisions associated with the IT development.

To enable users to be effective in a decision-making role requires that they be given relevant learning opportunities before being faced with decisions. Demonstrations of similar systems, visits to sites using a similar system, and discussion sessions provide some examples of useful learning opportunities which need to be provided.

Users also need to learn about the varied issues which will be under consideration at different stages of the development process. Strategic issues for example require senior management to be aware of human and organizational aspects of proposals, as well as the economic and 'business' aspects. Job design is particularly important to consider early in the design process. At a later stage detailed dialogue design requires knowledge of basic principles in human factors such as the preference of occasional users for a menu-driven system with many prompts, while frequent users may well prefer a fast command-driven system. End-user decisions concerned with

siting of VDUs, training schedules or the design of user manuals require yet different expertise. Where project management and formal design methodologies (e.g. PROMPT and SSADM) are to be applied, users need training in the relevant techniques in order to utilise available procedures to maximum advantage. Thus it is evident that users with different roles will have different learning needs. Training will need to be tailored accordingly and this is discussed again at appropriate points in the paper.

4. User roles

4.1. Users as 'owners' of IT

Users are the future owners of IT developments. It is the users and not the system providers who will be committed to using the system, managing it, paying the operating costs, maintaining it and living with the impact on job design and work organization. Users therefore have good reason to ensure that the outcomes of IT developments are acceptable and desirable. To achieve positive outcomes requires the users to exert considerable control and influence throughout the development process. This section addresses the varied user roles required in that process.

4.2. Diversity of user roles

Every prospective user of a planned IT development has a role to play in the development process. This section indicates the variety of roles to be fulfilled by users at different grades in the user organization.

Users in management grades will need to be involved in creating, maintaining and setting conditions in which user representatives and end-users can fulfil their responsibilities in the IT development process. Some users will be formally appointed as user representatives to represent the users' interests on project steering committees, and in project teams. End-users will be involved intermittently in a variety of ways to provide information, assess proposals, evaluate products of the project team, etc.

The specific responsibilities associated with these varied roles are examined in section 5.

4.3. Resource pool of user expertise

The all-pervasive nature of IT means that widespread effects are felt even with modest IT systems. Expertise in any organizational function is likely to be relevant at some stage of the planned development. Every future user therefore needs to be regarded as a potential source of relevant expertise to the development process. To reflect

this reality it is useful to develop the concept of a resource pool which comprises the varied skills and knowledge of *all* the job holders in the user organization. The notion of a resource pool fosters recognition of the differentiated areas of user knowledge which exists. Such recognition will encourage application of *appropriate* skills to the IT development process and mitigate against assigning people on the purely pragmatic basis of availability. Recognition of the existence of such a resource pool establishes all users as being members of a network of differentiated user roles. If this network is to achieve the goal of user influence in the IT development process, then it has to have a formalized infrastructure and essential resources. To appoint user representatives without establishing an infrastructure to support them is to pay lip-service to the notion of user influence and to miss the opportunity for effective influence. Each grade in the organization has a role to fulfil and the rest of this section addresses these varied roles.

4.4. 'Top management' role

4.4.1. *Promoting positive attitudes to IT:* As in all areas of organizational life the attitude of top management to IT will permeate the whole organization. It is crucial for effective user involvement in IT that a positive and proactive view of the user role is reflected throughout the organization. This demands energy and resources to be devoted to IT-related activities on a continuous basis.

The first step in fostering a positive approach to IT requires top management itself to develop a clear vision of what is required of it and how it should proceed. To achieve this requires an exploration of the human and organizational implications of IT and especially an awareness of the pitfalls.

Seminar and workshop sessions offer appropriate media for learning about the need for user involvement, the penalties of neglecting it and the available experience in how to achieve it. The expertise to present these sessions may be available in-house or may require consultant support. Gaining clarity of purpose and definition of its own role in the IT development should be the objective of these explorations by top management. It is only with a whole-hearted, keen and informed interest in the IT development that users can ensure desirable and effective outcomes are achieved. It is for top management to make this clear by example. Too often the only material step taken by top management in the early stages of an IT development is to appoint user representatives and to regard this as the sole and sufficient action required of them. This tempting abdication of responsibility has to be strenuously resisted. Representatives can only succeed to the extent that the users' role, responsibilities and authority are appropriately constituted, supported and guided through all the stages of development and implementation.

Equipped with a vision of where top management is going and what needs to be done to get there makes it possible to proceed to formulate goals, establish policy, write terms of reference for the role and mobilize the rest of the user population in a coherent and effective user involvement programme.

4.4.2. *Starting the user involvement process:* An early first step will need to be the selection of a number of key individuals at different levels in the hierarchy to agree collaboratively an infrastructure and a division of labour which will permit all parties to pursue the shared objective of effective user involvement. Again a seminar or workshop forum which provides relevant knowledge and an environment in which to explore the implications of user involvement is appropriate.

A series of seminars/workshops is likely to be needed unless the IT development is small-scale. Important objectives of these events will be to achieve a sense of mission, to define terms of reference for key users throughout the hierarchy and to formulate an agreed *modus operandi*.

It will also be important to ensure that the terms of reference for the system providers oblige them to heed user concerns, and to ensure evaluation criteria are established to provide a yardstick by which to assess acceptability of the products delivered.

Early attention should be given to selecting and training user representatives. The need to provide them with the necessary resources to conduct careful investigations of the existing system and establish criteria for assessing products also merits attention at an early stage.

4.4.3. *Empowering the users:* Using IT effectively requires users to understand what it can offer and to recognize its limitations. It can be very difficult to predict the impact of IT from examining design proposals, flow charts or data flow diagrams. More dynamic ways of experiencing and exploring some of the technical possibilities are offered by pilots, simulations and prototyping. All these tools offer a vehicle for users to identify and then to specify their requirements to system providers. Use of such techniques should be demanded by top management as a vehicle for user involvement in the development process. The application of such techniques allows users to see the implications of different IT options and to make informal judgements on the suitability of specific system proposals. These techniques help to empower all levels of users to play a part in influencing the IT development.

4.4.4. *Summary of top management role:* What is required?

For users to influence IT developments effectively top

management needs to do the following:

- Create a user infrastructure which delineates clearly the roles of all users (from end-users to top management users), the communication mechanisms and the services required to support the user involvement process.
- Formulate terms of reference for key users throughout the organizational hierarchy.
- Ensure that the terms of reference for system providers place due emphasis on investigating user issues in the early stages of the development life-cycle and on the user role in the Quality Assurance process.
- Select appropriate user representatives at different levels throughout the user organization to fulfil a variety of functions.
- Ensure user representatives gain familiarity with PROMPT and SSADM where these methodologies are in use.
- Ensure that the user requirement is based upon a thorough analysis of the existing system and an extrapolation of future needs.
- Formulate user acceptability criteria from the data collected in investigations of the current system.
- Ensure there is informed use of pilot trials, simulation exercises or prototyping techniques to promote user understanding of technical options and their relative merits.

How to provide it?

Top management levels in the user organization must recognize that they have a crucial and on-going role in IT developments. In particular, their role requires them to take the following actions:

- Explore and develop understanding of the strategic significance of user influence in IT developments, through the media of seminars and workshops aimed at formulating the role of top management, the terms of reference and the responsibilities associated with IT developments.
- Provide a workshop forum for representatives throughout the hierarchy to develop collaboratively an infrastructure and a division of labour, which will permit all parties to pursue the shared objective of effective user involvement.
- Create an infrastructure which enables various user representatives to identify and to fulfil their responsibilities by providing opportunities for training, communications, consultation and exploration of IT options.
- Ensure visibility of top management commitment to user involvement by allocating adequate resources (staff, finance and time) to the user involvement process.

4.5. 'Middle management' role

Managers in the intermediate (middle management) grades (grades 6 and 7 in the UK civil service for example) are uniquely placed to create awareness and interest in the opportunities and pitfalls of using IT. They are also well placed to support the day-to-day functioning of user representatives. In particular they need to motivate all end-users to appreciate the responsibilities they have to ensure positive outcomes from IT developments. To achieve this middle management must provide, on a continuing basis, IT related information and time to discuss and digest it.

4.5.1. *Promoting consultation:* Promoting consultation is a key part of the role of middle management. The user representative will need access to a wide array of expertise to fulfil his responsibilities and cannot possibly possess all the relevant skills himself. He/she therefore needs to be encouraged to consult widely. Virtually every form of expertise in the user organization is likely to be relevant at some stage in the IT development cycle. Recognition that the organization comprises a considerable pool of resources is an important concept for middle management to promote. Any notion that for the user representative to seek assistance is to admit inadequacy or failure should be strongly rejected. Effective consultation is the key to effective user influence over the impact of IT. Middle management needs to create the conditions i.e., ensure that the relevant individuals schedule the time and promote the motivation and the understanding to permit such consultation to occur.

The managerial role of these middle grades of managers requires them to create the environment within which organizational goals can be pursued. In the IT context the requirement is to provide the conditions in which user representatives and end-users can work together effectively in order to achieve the successful development of IT. This entails application of management skills relating to planning, allocating work, motivating people, training and communication.

These traditional management skills will be evident in the user's organization and are especially pertinent to the management of technological change. The IT specialists are concerned primarily with the development and delivery of the IT system and are unlikely to be able to match the user's command of traditional management skills and knowledge of the user's organization. It is therefore important that middle management apply their skills in the IT context and resist the temptation to 'leave it to the experts'.

4.5.2. *User analysis:* An especially important function to be fulfilled at this level is to ensure that adequate investigation of the current formal and informal system occurs. Such an investigation involves a systematic user analysis. This

analysis provides the basis for formulating the criteria on which to assess acceptability of the system for its users. The analysis involves collecting and analysing information about users and about the tasks they perform. Products of the analysis inform the IT design process in technical as well as human and organizational areas. Without effective user analysis, members of the design team would have to make assumptions about the characteristics of users and their work. Usually such characteristics are sufficiently complex that even 'informed' assumptions are likely to be inaccurate and they put the basic IT development at risk. It is for middle management to ensure that a sufficiently thorough user analysis has been conducted to provide valid answers to the following kinds of question:

- Who will be affected? (this will include people who do not use the system directly).
- Is it possible to identify just two or three main user categories? (based on facts such as grades of staff, possible use of system etc.).
- What are the characteristics of people in each user category? (e.g. age range, computing experience).
- What are the characteristics of the task performed by each user category? (e.g. degree of guidance, amount of human contact, sources of error).
- What do different users like and dislike about their jobs?
- How are the different users likely to react to the system? (which aspects will be seen as 'costs' and which as 'benefits' to the users?)

Collecting data in the user analysis process involves interviews with the users to provide factual information and opinions, systematically observing work situations, and collecting relevant documentation. (The skills required for these forms of data collection, analysis and synthesis will need specific training if the findings are to be worthwhile.)

The products of a thorough user analysis provide a rich database for interrogation throughout the IT development. It provides the raw material to help formulate the following key products:

- User requirements specification.
- Specification of acceptability criteria.
- Design specifications for the system, jobs, organization and training.
- Appropriate policies (e.g., for implementation and user involvement).

As each of these areas is tackled it may become apparent, for example, that more information is needed about the users in a particular sphere of activity. User analysis can therefore be seen as a recurrent task required to meet the needs of the different stages of the system design process.

The products of user analysis are valuable in helping middle managers to control the development process. For example, user acceptability criteria constitutes the yardstick for assessing the IT product from the users' perspective, whether these products are proposals, sample screen formats or the eventual system. It is important to distinguish between user *acceptability* criteria and user *acceptance* criteria. User acceptance criteria relate to the physical system (including hardware, software and documentation). Users however might well find an IT product unacceptable for reasons such as de-skilling effects on their jobs, reduced opportunities for communication or decreased job satisfaction. Such concerns associated with job design fall outside conventional acceptance test criteria but are crucial criteria of acceptability to the user. Thus to ensure IT systems are *acceptable* to users it is essential to identify from the user analysis process acceptability criteria in order to provide guidance to the designers and to evaluate products.

4.5.3. *Summary of middle management role:* What is required?

- Provide the environment in which user representatives and end-users can contribute to the successful development of IT.
- Recognize that management skills, relating to planning, allocating work, motivating people, training, communication, etc., are essential to the effective development and management of IT in the user organization.
- Resist the temptation to 'leave it to the experts'. IT experts are unlikely to have the management skills or knowledge of the users' organization outlined above which are crucial to successful implementation of IT.
- Ensure that adequate investigation of the current system occurs, covering both system analysis and user analysis.
- Formulate acceptability criteria for the planned IT development. Ensure these are included alongside the Acceptance Test Criteria.
- Give special attention to job design issues and ensure that relevant specialist knowledge is obtained.

How to provide it?

- Provide an appropriate level of education, learning opportunities and training for user representatives and all users who will be involved.
- Set up a consultative network throughout the user organization and in the project.
- Allocate time for discussion groups/problem-solving sessions related to IT user issues during normal working hours.
- Ensure that traditional management skills are applied to the IT development.

4.6. Role of user representative(s)

4.6.1. *User representatives*: have a most challenging and demanding role in most IT developments. To date very little guidance or training exists to guide and support their activities. Typically they inhabit a kind of ‘no-man’s land’ between the users they represent and the system provided.

User representatives need a high level of interpersonal skills, the ability to persevere in difficult circumstances, a strong sense of mission, and a basic understanding of the technical skills involved. In order to be successful with the mission of ensuring that users’ interests are adequately taken into account, a support infrastructure must be provided for the user representative as described in the earlier section.

The other roles described in this section provide the key elements in this infrastructure. The essential requirement is to avoid isolating the user representative in his role and to ensure that other users fully support, enhance and promote his/her functioning.

To characterize clearly this crucial role some of the positive and negative features usually associated with it are highlighted in figure 3. The guidance presented in this paper is intended to be used to enhance the positive aspects of this critical role and to minimize the negative ones by indicating the appropriate steps required to support the user representative effectively.

4.6.2. *Summary of role of user representative(s)*: What is required?

- Understanding of the significance of the role for the entire user organization.
- Ability to operate independently even in a sometimes hostile environment.
- Awareness of the need to consult widely.
- Willingness to call on expertise of others as required.
- Awareness of the need to seek support and authorisation when necessary.

Understanding of the specialized techniques and processes of IT development.

How to provide it?

- Seek training and expertise—especially in human and organizational aspects of IT (in the absence of off-the-shelf training modules it will usually be necessary to have customized training tailored to the needs of the individual).
- Perform the bridging function between the IT experts and the ‘end-user’ (next section).
- Ensure that clear terms of reference are agreed for the role.

Role of the User Representative	
Positive Aspects	Negative Aspects
Involvement on exciting, ‘leading edge’ developments	Lack of clarity in the role (terms of reference are often non-existent or ambiguous)
Offers a challenging, demanding and potentially very powerful position	Occupies a ‘no-mans land’, between users and designers - can be a lonely position to occupy
Provides opportunities to influence the nature of the user impact of IT on the whole organisation	Lack of understanding of the role on the part of others at all levels in the organisation
Involves contact throughout the organisational hierarchy	Expected to be knowledgeable in widely differing areas of expertise
Provides opportunities for learning a wide array of new skills and a broad knowledge base	Lack of power and authority
Provides considerable career advancement prospects and/or into the IT specialism	Lack of support from line management and other users
Bridges the traditional barrier between users and IT specialists	May be blamed for short comings of the system
	Can suffer from the ‘hostage syndrome’ i.e., identifying with the IT organisation rather than ‘championing’ the users’ interests
	Annual reports are likely to be written by Project Managers who will probably be ADP specialists

Figure 3. Role of the user representative.

- Ensure that resources of time and opportunity to consult with others is provided.
- Seek authority to use a wide range of resources—especially the expertise of others (both internal to the user organization and external) as the need arises.
- Join or establish a support group of other user representatives to share problems and learning.

4.7. Role of end-users

4.7.1. *Every individual*: who will be affected by the IT development should be involved in the planning of that development. This is particularly true of those who will eventually be using the planned system: the ‘end-users’.

To fulfil the role of end-users entails recognition that the IT system being developed will be *their* system. It is essential for them to be aware that their knowledge and energy are required to shape the development in accordance with their needs. Their knowledge and experience are required at different stages and for different purposes throughout the development process. The role of end-user carries the onus of responsibility for providing detailed knowledge of the user and his tasks in the user analysis

process and subsequently. It is important for end-users to appreciate that if they have knowledge and experience in a post then they are the experts on their work, whatever grade they occupy. End-users must be able to differentiate between the formal description, constraints, etc., of their work and the informal practices and attitudes, and be able to convey these to the user representative and others. It is also important for end-users to realise that however good or knowledgeable the user representative might be he/she cannot possibly know every relevant detail of all their jobs. The end-users must therefore provide such detailed information to inform the development.

Conveying relevant information successfully requires practice to formulate facts and ideas clearly. Discussions with colleagues can provide such practice. End-users need to appreciate that a considered and informed view is likely to be given attention by the project team whereas confused, vague or over-emotional comments are likely to be disregarded or dismissed as 'resistance to change'. Lack of experience and training in communication can result in important points being excluded from the decision-making process. Training in communication skills and opportunity for practice are therefore important.

In addition to providing detailed knowledge in the user analysis process, end-users may be asked to participate in Quality Assurance activities, to comment on proposals or mock-up screen formats, demonstrations, etc. When this occurs it is important for end-users to understand that the opinions they give will provide the basis for decisions which are likely to have long-lasting effects on jobs. It is therefore very important that due time and attention are devoted to considering issues on which views are sought.

4.7.2. *Summary of end-user role: What is required?*

- Recognition by end-users that the IT system will be theirs.
- Recognition that they have an opportunity and a responsibility to ensure that the IT system meets their needs.
- Recognition that they, uniquely, possess knowledge and expertise in their area of work.
- Awareness that the user representative requires support and help if he/she is to represent end-users successfully.
- Awareness that the user representative has a complex, demanding role with many conflicts to reconcile.
- Willingness to put effect into providing information, making informed comment on proposals, evaluating products, etc.
- Willingness and enthusiasm to keep abreast of progress and events related to the IT development.
- Ability to convey clearly factual information, ideas and opinions related to the IT development.

How to achieve it?

- Gain knowledge and understanding of the user role in the IT development process.
- Gain some understanding of the IT possibilities by visits to other sites, demonstrations, etc.
- Ensure time is available to contribute to user analysis, product evaluation, the QA process, job design, etc.
- Train in data discovery techniques.

5. Responsibilities of user representatives

It has already been emphasized that responsibility for ensuring user influence is exercised fully is vested in users at all levels in the user organization. Key areas of responsibility are listed below and then dealt with in more detail in subsequent sections:

- Provision of detailed knowledge.
- Highlighting strategic issues.
- Managing the user role.
- Participating in Quality Assurance.

5.1. *Provision of detailed knowledge*

Detailed knowledge is required initially in the early development phases where exploration and specification of the user needs is the first essential step towards the design and implementation of an appropriate IT system. The quality of data collection and decision-making in the early stages in a project's life cycle (initiation, specification and logical design stages in SSADM) is reflected in a key document—usually entitled the User Requirement. Responsibility for production of this document lies with the user, or, more usually, with his/her representative. The quality of an IT system is in large measure determined by the quality of the User Requirement. The significance of the User Requirement as a contractual document between system user and system provider cannot be overemphasized. To achieve influence over IT development thus necessitates production of a powerful User Requirement which adequately reflects the true complexity of the users' needs.

Prototypes, simulations and pilot studies are valuable tools for assisting the users in formulation of the User Requirement. These processes provide means of communication between users and designers. They are valuable communication media because they offer users a realistic and direct experience of proposed IT designs. Users can therefore understand proposed systems features and make meaningful interpretations of the proposals instead of facing the difficulties posed by abstract terms and representatives of data flows etc.

Production of an appropriately constituted User Requirement requires the user population to mobilize considerable resources in collecting, analysing and presenting the necessary detailed knowledge. The user analysis process outlined above in section 3 is a key part of this important stage. (Once it has been produced relevant users must police the application of the User Requirement to ensure that design proceeds in accordance with the stated needs. The Quality Assurance process provides the mechanism for this policing function and is discussed further towards the end of this paper.)

The need for detailed knowledge of the users' tasks is also required when reviewing products at the various milestones in the development process. These products will vary according to the stage in the project life-cycle. In the early stages they will include proposals, flow-charts or other representatives of the movement of data through the user organization ('data flow diagrams', 'entity life histories', for example, in SSADM terminology). At later stages the products may relate to the design of dialogues, screen formats or the design of jobs and forms of work organizations. At every stage and with every product, decisions are required which will have an impact on the user and the user organization at a later date.

Especially crucial decisions are made throughout the early stages in a project's life-cycle. For example, deciding which functions should be performed by the IT system and which by people is profoundly important for the quality of jobs which will result. The use of specialized Human Factors techniques such as Task Allocation procedures is required here. The user representative will need to ensure relevant specialist skills are available to support this activity. In some areas the availability of specialist advice will not be sufficient to inform the design decisions. It is in these areas where it will be necessary to use trials, pilots, simulations or prototypes to provide the necessary data. Expert guidance on how to plan and conduct such exercises will be essential to ensure validity of the findings and to interpret the results.

In other areas essential data may simply not have been collected and it may be necessary to initiate a data discovery process (e.g., interviewing local office staff on the nature and function of checking procedures carried out as part of normal working). In yet other instances it may be necessary to set up a small problem-solving group to identify the possible solutions to a problem and to test these options in order to determine the most desirable approach.

Provision of detailed knowledge: action points.

What?

- To provide detailed knowledge of their work situation to the development process.
- To recognize the limitations of personal knowledge and therefore undertake to consult appropriately.

- To ensure that user input is properly representative.
- To initiate a research activity where future impact is unclear (e.g. to establish a problem-solving group or work party).

How?

- Select relevant users (by user type, skills, functions, etc.).
- Provide skilled interviewers to carry out the careful systematic data collection required to ensure that thorough analysis of the current system occurs.
- Provide training in user role and in basic IT appreciation.
- Participate in appropriate activities as specified by the methodology.
- Establish continuous liaison with users not assigned to project teams—i.e. a bigger consultative network.
- Inform/educate the whole user organization in relation to planned IT developments.

5.2. *Highlighting strategic issues*

In most IT developments most users are inevitably somewhat remote from the day-to-day decision-making required in the analysis and design process. As a consequence many of the real implications of design decisions may not come to their notice until far too late to be averted. One of the most intellectually demanding responsibilities of the user representatives is to be scanning the development process constantly for ramifications of potential significance for the user population. When cause for concern is identified the user representative needs to be assured of the following:

1. The availability of a senior user, perhaps at short notice.
2. An informed and sympathetic hearing.
3. A willingness to use resources to check out the validity of the stated concern and to identify remedial action where appropriate.

Where controversial or problematical issues arise which may require compromise on the part of the designers, the senior users are likely to be required to exert their authority in support of courses of action recommended by the user representatives. A key factor in any debate about changes to the design or the requirement is the cost to the project—in resources, finance or delay. Only the user can evaluate this against the eventual impact on the user organization if the change is not made. Users will have to decide, at an appropriate level of authority, what is viable and which is preferable.

Mechanisms for promoting a healthy 'early-warning' system include regular meetings of relevant users in a

discussion forum. Availability of experts on key user issues such as job design to inform these discussions is important. Conclusions reached in the discussion sessions should be assured of a hearing by top management through appropriate lines of communication.

Highlight strategic issues: action points.

What?

User to provide an 'early-warning' system for senior user management to ensure:

- Identification of potential areas of negative impact.
- Discussion and resolution of controversial or critical concerns is promoted.
- The need for design changes is highlighted if serious negative impact on users appears likely.

How?

- Provide a resource pool of expertise on key user issues such as job design and work organization.
- Provide a forum for discussion of user issues and formulation of policy.
- Provide lines of communication to convey user concerns to top management throughout the development process.

5.3. *Managing the user role*

The 'user role' may involve just one or two representatives in a small development or whole 'user teams' in large IT applications. Whatever the scale of the system there is a need for planning and controlling the commitment of resources to the project, to the demands upon the various user groups and to the demands of the QA process. The planning process also applies to the development of appropriate skills by user representatives, by end-users needed to support them and by IT specialists. Often it is seen readily that users require an appreciation of the technology but only rarely is it recognized that IT staff require educating in the reality of existing user practices (formal and informal). Too often the IT specialists design for a theoretical and standardized situation with the result that the product does not meet the practical realities of the user situation.

A major part of the process of managing the user role has to be devoted to ensuring the availability of expertise in a number of different areas. These areas include, for example, training, education, environmental design, workplace layout, quality assurance and user analysis techniques. Some of this expertise can be provided by carefully tailored training but some will be sufficiently specialized to require the use of in-house or external consultants.

Managing the user role: action points.

What?

- Appropriate planning and control of resources to the project.
- Educate the IT specialists in the reality of existing practices (formal and informal) in the current system.
- Learn how to interpret, evaluate and comment on IT proposals from the IT design team.
- Gain necessary training/experience to participate effectively in meetings as user 'ambassador'.
- Ensure attention is paid to the ergonomics of the workplace/equipment.

How?

- Ensure that thorough analysis of the user situation is conducted by users and conveyed to IT design personnel.
- Use rapid prototyping, simulations and pilot studies to develop understanding of IT proposals.
- Conduct workshops on user role, effective communications, etc.
- Conduct workshops on ergonomics associated with screen-based systems.

5.4. *Participating in Quality Assurance*

Quality Assurance (QA) is defined as 'all those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality'.

The aim of this section is to encourage the future IT user (a) to recognize the QA process as a powerful tool for gaining influence over the design process and (b) to utilise it accordingly. For users to be able to exert appropriate influence through the QA process requires that they understand:

- What the QA process is about.
- The importance of QA to the user.
- How the user can meet his QA responsibilities.

5.4.1. *What the QA process is about:* The QA process is usually structured in a Quality Assurance programme which aims to ensure that the quality and the *appropriateness* of the system is established cumulatively as the system is developed.

Project control methods such as PROMPT include the QA process as an integral part of every stage in the development life-cycle. In such a process the user is required to carry out two vital functions in QA:

- Check that products are correct, i.e., that they properly describe the current organization or what is required by the user or proposed by the project.

- ‘Signing off’ those products, i.e., certifying that they describe what the user requires from the system.

The QA process involves Quality Reviews which ensure that the user is made aware of what is being developed to meet the specification. For the IT project development team the review process should provide essential feedback on the acceptability of its products. How to achieve this is discussed next.

The QA process requires that the project team submit the products for review and, if they meet with the users’ approval, that a written assurance is given by the user to the effect that the system is being developed as required and that the next stage of development can be embarked upon.

The QA process will vary in size according to the size and complexity of the project. Some products will need a technical review which requires skills the user is unlikely to possess and will require him to seek expert judgements. Other products can be evaluated by relevant users themselves. In small projects these reviews will form a linear progression, with the user reviewing the key product(s) at the end of each stage and seeking assurance that technical reviews have also been carried out. Without this type of major review the project should not progress to the next stage, where work and expenditure could be nugatory. A quality assurance programme of this type is the minimum required by PROMPT methodology.

In larger projects a hierarchical programme of reviews is likely to be required. This should ensure that as various component parts of large products are drafted or completed by project members they are reviewed by colleagues within the team or associated with the project. This may require IT specialists or users, or both. Products reviewed in this way form the building blocks from which larger documents can be assembled with confidence. These larger products need to be reviewed in their turn to determine whether they are comprehensive and appropriate, and to check that the separate building blocks fit together appropriately. The evidence of the earlier reviews provides the assurance that the components are technically sound and relevant.

It can therefore be seen that a critical document such as the User Requirement can be built up of several components which have individually been reviewed and ‘signed off’ previously by members of the future user population who have the practical experience of the current system. Typically the completed User Requirement will need to be reviewed and ‘signed off’ as a single entity and in large projects several different groups will have an interest in this at a high level.

The sign off at this level will establish a contract between the project and the user. It is therefore important for managers with some seniority and authority to be involved in the formal review meeting. Further, it is essential for their staff

to have spent a substantial amount of time reviewing the product to confirm that it is a valid and appropriate product from the users’ point of view. Any doubts expressed need to be taken seriously and their foundation examined carefully—despite the pressure to conclude the stage and move on to the next.

5.4.2. *Importance of QA to the user:* The preceding description of the QA process indicates that, *in theory*, users have considerable power to direct and indeed to halt the development process if they are not convinced of the appropriateness of quality of the work done. In practice this power is rarely seized by users for a variety of reasons. Some of the reasons relate to lack of seniority and authority of users compared with that of the IT project team members. For users to have a clearly defined and legitimate role in QA, as required under PROMPT methodology for example, is essential but not sufficient to ensure user influence. Without an understanding of the goals and significance of QA it is often the case that users go through the motions of reviewing products and signing them off without due reflection and consideration of the implications of their actions. The most fundamental point for users to understand is that the sign-off procedure is highly significant since it represents a binding acceptance that the product meets the users’ requirement of it. Too frequently the user feels pressurized into ‘signing-off’ because the delay while they deliberate and reflect is likely to be seen as obstructing the progress of the development. Users are often led to see their function in QA as a ‘rubber-stamping’ operation and are encouraged to sign-off in order that project schedules are not disrupted. In reality this can mean that users are facilitating, often inadvertently, the development of the wrong product or of a product with inappropriate features. As it is rare for users, especially first-time users, to appreciate the significance of QA, careful briefing is essential as part of the initial training provided to user representatives.

5.4.3. *How the user can meet his QA responsibilities:* In order to participate effectively in the QA process the user will need an understanding of the process and training in his role. As part of user training it will be important to include educational techniques which convey an understanding of:

- The power and significance of QA.
- The need for technical assurance.
- The need for the user to review and accept products (at the same time or separately from the technical review).
- The hierarchical approach which may be necessary and the importance of the sign-off at various points.
- The need to record and control this process.

With regard to contributing to the review effectively the

user needs a yardstick to measure the validity and relevance of the product, i.e. he requires evaluation criteria. Relevant criteria need to be formulated by the user based on data collected in the user analysis process. Acceptance criteria, including acceptability factors, need to be clearly specified in order that each product can be assessed and checked against them. In this way the criteria can be applied to assess acceptability of key products as the project progresses through the prescribed stages of development.

IT members of the project team can be helped greatly by worthwhile feedback from users on the products under review. The feedback is only likely to be worthwhile and of value if users have understood the products and been given adequate time and opportunity to digest and explore the contents and their implications.

Techniques for promoting understanding and discussion include demonstrations, 'walk-through', pilots, prototypes and visits to sites with comparable systems in use.

5.4.4. Participation in the QA process: action points:

What?

- Gain an understanding of the power and significance of QA for the user.
- Formulate acceptance criteria which include user acceptability factors.
- Set up a hierarchical programme of quality assurance and reviewers.

How?

- Acquire training in the QA process which emphasizes for example the significance of the 'sign-off' of key products.
- Use data from current systems surveys to generate user acceptability criteria.
- Select reviewers from appropriate levels in the hierarchy to ensure that valid assessment occurs.
- For key end-of-stage reviews ensure involvement of an appropriately senior user who is well-briefed on the work completed to date.

6. Discussion and conclusion

The paper provides a practical guide to meeting the complex demands associated with effective user involvement. The rewards of participation are high and so too are the costs of adequately resourcing and managing the process. Given the problematic nature of user involvement, fraught with difficulties and offering uncertain outcomes, it is not surprising that the subject is treated with cynicism and sometimes even derision. However, the cumulative costs of failure to involve users in IT projects on a national scale is

probably incalculable. The sense of persistent disappointment with technology can only be eroded gradually by ensuring that user issues are clearly on the agenda for all advanced technological projects. User issues cannot be on the agenda in any meaningful way without the active involvement of users in all stages of the planning and development of technical systems. In particular, user issues need to be addressed at top management level since that is where policy and strategy are decided and resource allocations are agreed (Damodaran 1994).

The requirement for the future is to develop organizational strategies which incorporate user involvement principles in all areas of corporate life. The immediate stepping stones to achieving that future goal are the application and testing of the guidance presented here and elsewhere in order to promote genuinely user-centred IT strategies.

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