MANAGING THE INTRODUCTION OF NEW TECHNOLOGY

by

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Managing the Introduction of New Technology

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Abstract

A prevailing dream of many progressive, conpetent managers is that the introduction of new technology will be a smooth and painless procedure which will result in substantial cost savings and increased efficiency, but the reality is often more like a nightmare. This paper outlines important considerations for those people charged with the responsibility of managing change in organisations.

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INTRODUCTION

This paper is about managing the introduction of new technology and it is the term "managing" which is brought into focus in an attempt to highlight the issues and responsibilities pertaining to the role of a 'manager' in handling the process of introducing technological change. This paper is not much concerned with the details of what the new technology is, sometimes referred to as the content of a problem; it is concerned rather with how the new technology is to be integrated into the operations of the organisation. The focus is on the process of management.

THE ART OF MANAGEMENT

It is accepted wisdom in most organisations that, to maximise the likelihood of achieving objectives, including change, it is necessary to plan. In fact, planning has long been regarded as a critical skill for managers; so much so that the planning and management functions are sometimes regarded as being synonymous. Recent assessments of managerial performance, however, linked with research in neurology and evaluation of the changing role of the manager in the face of environmental turbulence (to which micro-chip technology is a major contributor) have led to a marked distinction being made between the functions of planning and managing.

It is now widely suspected that the logical, rational, sequential, linear aspects of man's thinking, all the typical 'planning' activities, are controlled by the left hemisphere of the brain; whilst the right hemisphere is responsible for the mysterious or 'dark' side of man's understanding - the meaning derived from a relational or wholistic use of information. In this sense management is increasingly coming to be regarded as a right brain activity requiring synthesis rather than analysis of information. The wisdom of managers, often expressed as intuition, seems to develop out of the unconscious processes of drawing on past experiences, collecting non-verbal information and understanding relationships. The usefulness of rigorous planning is not being questioned but it is being suggested that planning by itself, without the understanding and management of organisational relationships, will not guarantee success.

SYSTEMS THINKING

There exists a great tendency for line managers, burdened with the demands of here and now operational issues, to think in a linear fashion and believe that, because a technological change makes sense to them, because the benefits can be calculated logically, because Blind Freddy could see the advantages, that the wider organisation will respond enthusiastically and incorporate the new development on the basis of its inherent rationality. Unfortunately, change is rarely this straightforward and its management requires more sophisticated thinking as the basis for action. Management involves the ability to look into the gaps between the parts of a system and understand the relationship between those parts. The manager must appreciate that changing one part of a system will necessarily change the relationship between parts and since organisations derive their effectiveness from healthy relationships between people, structure, tasks and technology - it is the management of these relationships which becomes critical when they are challenged by change.

TASK SUB-SYSTEM

Job Design

- What will people have to **do** which is different?
- How will volumes of work and time pressures change?

  Which tasks. become redundant?
- Do the new tasks make up satisfying total jobs?
- Do the jobs ensure the skills of the job holder are well used?
- Does the job holder have responsibility **for his/her** work?

Ergonomics

- Is the new equipment safe and does it provide proper levels of comfort, **i.e.,** lighting, screen glare, seating, ventilation, noise levels, etc.?

STRUCTURE SUB-SYSTEM

Hierarchy

- Will the existing number of levels still be appropriate?
- Will the problem of decision making and **communicating** tend towards centralisation or decentralisation?
- What new control systems will be required?
- What new mechanisms of co-ordination will be required?
- How will spans of control be affected?

Classification

- What will be the impact on the number of jobs?
- How will the new jobs be classified, recorded, assessed and rewarded?
- How will new responsibilities and authority levels be incorporated in formal procedures?

Physical Layout

- Will the physical layout need to change and how will this affect informal communication channels?

PEOPLE SUB-SYSTEM

- Who knows what is going on?
- Who understands the new technology?
- Will people be deskilled or reskilled?

  Will there be an increase or decrease in:

  opportunities and responsibilities,
  status and security
  job satisfaction,
  quality of work life ?

Training and/or recruitment?

- Are age patterns important?

Career paths?

- Supervision and leadership styles?

PLANNING CHANGE

When sufficient data has been generated to identify important system wide implications of a change in technology it can be useful for planning purposes to think of the change process itself as falling into three phases. It is important to remember that each phase will need to be successfully negotiated before the change is fully implemented but the infinite subtleties of reality will ensure that the problems refuse to be contained within the sequential time frame and neat categorisation of the plan.

PHASE I: UNFREEZING

Creating a felt need for change amongst those required to change.

Minimising resistance to change.

PHASE II: CHANGING

Changing people (individuals and groups); tasks; structure; technology.

PHASE III: REFREEZING

Reinforcing outcomes

Evaluating results

Making constructive modifications.

OVERCOMING RESISTANCE TO CHANGE

> 'There is nothing more difficult to arrange, more doubtful of success and more dangerous to carry through, than initiating change. The innovator makes enemies of all those who prospered under the old order, and only luke warm support is forthcoming from those who would prosper under the new. Their support is luke warm partly from fear of adversaries who have the existing laws on their side, and partly because men are-generally incredulous, never really trusting new things unless they have tested them by experience.'
>
> Niccolo Machiavelli

Any change made to people or organisations involves the potential for resistance to the change and this is a desirable state of affairs, for even though change is necessary for organisational and personal adaption to a shifting environment an organisation with no resistance to change would be no organisation at all; it would move in any direction and in response to any suggestion.

To think about organisations in this way requires a systems or wholistic perspective which encompasses the notion that 'the whole is greater than the sum of its parts' because the relationships between those parts bring a new dimension to the entity. A dimension which is not visible and must be inferred from the behaviour of the parts. This dimension is not easily quantified but it can be sensed and is sometimes referred to as the culture of the organisation.

It is the author's experience that most managers do not think wholistically nor do they act with an appreciation of the interconnectedness and interdependence of the parts of the organisation. Rather they spend their time tinkering with bits of the organisation as if it were a machine or a billiard table, with the movement of the parts governed solely by the laws of physics. They believe that if their calculations are accurate enough in regard to the force and angle of their cue shots then they can predict the outcome of their actions.

So often new technologies are introduced on the basis of such assumptions and five or ten years later the planners are still puzzling over what happened to prevent the realization of greater efficiencies, reduced costs and improved decision-making. Predictably they seek flaws in the plan, look for fallacies in their logic or blame deficiencies in machinery and people. They seem incapable or unwilling to look into the gaps between the parts of the system and derive an understanding of how the pieces fit together and how a new level of equilibrium will need to be achieved and managed when the status quo is upset by the introduction of a new factor.

This management task is a difficult one and it is most likely the intangibility of the requisite right brain skills which lead to an over reliance on rigorous planning to carry the day. It is the author's contention however that a manager who does not understand the balance of the relationships which currently give substance to his organisation - which are his organisation - will not be able to develop a plan for the introduction of a new technology which is sufficiently flexible to assist the change. It is more likely that the plan will become a symbol for the change resistors and a set of blinkers for the change initiators as they pursue its implementation.

UNDERSTANDING THE LINKS

A. The Tale of the Polyploid Horse

The anthropoligist Gregory Bateson developed this fable to illustrate potential relationship problems in changing systems.

A geneticist in the late 1980's was awarded the Nobel Prize for creating a work horse twice the size of the ordinary Clydesdale. This polyploid horse was twice as long, twice as high, twice as thick, and had four times the number of useful chromosomes of the standard horse. The expectation, of course, was that it would be able to do twice the work of an ordinary Clydesdale.

ALAS, by the time it was fully grown it was unable to stand on its four legs, for it was too heavy, being eight times the weight of a normal Clydesdale. Each morning it had to be raised to its feet by a crane and suspended in a special frame so it could take the weight off its legs.

The Polyploid had to be continuously hosed to keep it at a normal temperature for its skin and dermal fat were twice as thick as normal while its surface area was only four times that of a normal horse. Hence it didn't cool properly and without the hoses the innermost parts would begin to cook.

And then there was the enormous problem with eating. Every day it had to eat eight times what would satisfy a normal horse and had to push all that food down an oesophagus only four times the calibre of the normal horse.

The blood vessels too were reduced in relative size making circulation difficult and straining the heart.

Lessons from the fable:

Organisations (or information systems) which are functional at a particular size when allowed or encouraged to grow to twice that size often encounter acute operational difficulties. At first there are no special signs of any deep underlying problems until suddenly some critical threshold is passed and all the original systems that were functional when the organisation was smaller cease to function effectively.

As the tale of the Polyploid horse suggets, doubling the size or potential capacity may require some functions to be multiplied by two, others to be halved, some to be raised to a third power, and so on.

The problem is, we don't always know in advance which set of functions should be altered in which way. For we have no idea when changes in two or more interacting variables whose curves are discrepant will push the system across critical thresholds.

B. A Case of New Technology

The author was able to observe developments in an organisation which had computerised its information processing system some two years beforehand. The people in this organisation were experiencing many problems due to a lack of understanding of and training for the new technology; due to covert resistance from some sections of the work force and also from emerging 'polyploid horse' effects. But the symptom of malaise which first attracted the attention of the observer was a cultural event involving a presentation to a junior staff member. This practice of contributing to the purchase and presentation of a gift to an organisation member on the occasion of a marriage, promotion, departure, etc., is common in many organisations. Such rituals are often indicators of the climate or social health of an organisation and in most cases the ritual has its own protocol regarding the hierarchical position of the speech maker vis a vis the recipient; the length of service of the recipient; the value of the gift; the nature of the occasion, etc. Yet in the case being cited. there was an obvious incongruity as the second ranking officer in the organisation, flanked by other senior personnel, made an unconvincing display of admiration for the inebriated subordinate whose impending marriage was being celebrated by the gathering.

The exchange was so devoid of mutual respect as to discount egalitarianism as an explanation and as the dynamics were explored further it became apparent that they were the manifest symptoms of an underlying movement of informal power in the organisation. This shift occurred because the new technology created opportunities for some lower ranked employees to

expand their roles by gaining control over the flow of information and by exercising their initiative to the extent that they became a preferable alternative to the equipment suppliers for some maintenance tasks. Their strategic position in the new order of things made them powerful players in the day to day operations of the organisation and line managers soon learnt that they were now dependent on the co-operation of these subordinates.

Lessons from the Case:

i) A change in technology is likely to lead to a change in the patterns of influence in an organisation.

ii) When technology changes, some organisational roles will also change and there may develop a discrepancy between job descriptions, tasks actually performed and accountability.

The sad facts of the above case were that a lack of good management and the effects of bureaucratic inertia caused this organisation to suffer for several years before a restructuring took advantage of the initiative of the newly influential employees whilst also making them accountable.

The Managerial Task

The difficulty in writing about organisational relationships, as I have attempted to point out, is that by their very nature they defy explicit analysis and to try and describe them in a language comprised of a linear structure is self-defeating.* It is possible though to examine the major sub-systems of any organisation, labelled herein as Technology, Task, Structure and People, and by posing appropriate questions to generate the sort of data which might prompt the 'right brain' manager to become more conscious of the links which are likely to be severed or joined by change in the sub-systems.

TECHNOLOGY SUB-SYSTEM

The sub-system for which specialist advice is probably most readily available, but which is not always communicated in a language the user can understand. This complicates the issue of whether the new technology is the right equipment for the task.

- The right information, at the right time, in an understandable format?
- Reliability of equipment?
- Satisfactory servicing arrangements?
- Internal maintenance capacity?
- Flexibility of system?
- Life span?
- etc.

Computer technology is an extremely efficient means of handling data but when it goes wrong it also goes wrong in a very efficient manner (just like a freeway).

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* Hence the trend amongst some organisation development consultants to use techniques based on imagery and metaphor.

The point to be emphasised is that resistance to change, like conflict, can be both good and bad for an organisation. Well managed conflict helps to generate constructive alternatives for the decision-making process but, if the task of managing the conflict is avoided or handled poorly, then differences become entrenched and the co-operation which is fundamental' to organisational life becomes increasingly difficult. Likewise, resistance to change can prove functional by arresting ill-conceived changes but it can also seriously impede the efforts of management to make changes for the increased effectiveness of the organisation.

Few organisational change efforts tend to be complete failures but most encounter problems of the kind that they take much longer than expected; they have a negative impact on morale; they cost a great deal in terms of managerial time or emotional upheaval. These problems are often the result of management's failure to anticipate, recognise and deal with resistance to change.

One approach to overcoming resistance is to have organisation members participate in the design and implementation of the change. There are difficulties, however, in defining the extent of participation, particularly when the change is complex; of achieving true participation in an organisation where the management-style has not normally encouraged participation; and the possibility that the participatively designed change will be less than optimally effective. This is more particularly the case in the choice of new technology which is highly specialised and little understood. This lack of understanding, 'in turn, often triggers resistance based on a fear of the effect the change will have on existing social relationships. Consequently, the manager should be concerned to use the <u>informal</u> system, which exists in every organisation, rather than to fight against it. The informal system is not inherently resistsant to change but people will resist strongly when the change is perceived as a threat. Thus the manner in which the change is introduced becomes a vital determinant of the perceptions of those affected and hence of the intensity of resistance.

The implications for the modern manager of an understanding of the nature of resistance to change are that, when planning how to introduce a change, s/he must include the likelihood of resistance and devise a change strategy which will incorporate and, if possible, minimise, this variable.

The most common reasons for resistance to change include:

(i) A desire not to lose something of value

e.g.: Fears about a loss of status may occur when changes in information flow, reporting patterns etc., portend changes in the formal and informal pecking orders. Fears about possible job loss may also be triggered, or fears about an anticipated career path.

(ii) A misunderstanding of the change and its implications

e.g.: Communication about the change is prone to all the usual difficulties of organisational communication, plus the distorting effects of anxiety about the unknown.

(iii) A low tolerance for change

e.g.: Fear of an inability to learn new skills, largely influenced by previous experience of change and age.

Fear of 'exposure' whereby shortcomings people have learnt to cover up under the existing system may now be exposed.

(iv) Disruption of routine

e.g.: Rearrangement of the familiar physical surroundings and social interaction patterns threatens the sense of psychological security and personal identity.

(v) Lack of Appreciation of Potential Benefits

e.g.: Inability to clearly identify personal consequences; belief that the current system is perfectly adequate or belief that the change does not make sense for the organisation.

(vi) Health and Safety Concerns.

STRATEGIES FOR CHANGE

A successful change strategy will take into consideration the existence and strength of factors such as those listed above and include methods designed to minimise their resistance potential. Such methods tend to range along the democratic - authoritarian continuum of leadership styles and could include participation, communication and education, facilitation and support, negotiation, manipulation and coercion.

More recent insights into managerial options have come from the study of personal transition and some consultants suggest that the role of management in the change process would be better construed as one of helping others to 'let go' of the existing order rather than emphasising the new.

Each of these methods has advantages and disadvantages and an effective strategy is likely to involve a combination of methods, with due regard being given to existing situational factors.

The key situational factors may include:

(i) the amount and type of resistance that is anticipated

(ii) the position of the initiators vis-a-vis the resistors in terms of power, trust, authority, resources, etc.

(iii) who has the relevant data for designing the change and the needed energy for implementing it

(iv) the stakes involved (e.g. the presence or lack of a crisis, the consequences of resistance and lack of change).

The situational factors will, in part, determine the relative disadvantages of some of the change methods. For instance, a lengthy process of participation and education would be unsuitable in the event of a crisis or unchallengeable directive from above. A successful strategy would have to include consideration of the need to minimise causes of resistance and the exigencies of the situation. It would also need to be sufficiently flexible to adapt to emerging resistance since the process is often made manifest in covert ways.

In some cases there may be no obvious choice for the manager in the face of urgently required change. The question of resistance is put aside and coercive tactics are used.,-presuming the manager has sufficient power (as distinct from authority). However, as I have attempted to point out, change inevitably involves resistance at some level and the danger in ignoring it is that the inherent conflict will manifest itself in a way which hinders

the change effort and the organisation's effectiveness suffers in the long term. Hence, even though the situational factors may sometimes justify overriding resistance in the short-term, the wise manager/change agent will devise a plan which includes the possibility of resistance to change, sooner or later, in overt or covert ways.

SUMMARY

This paper has argued that management is just as much concerned with a wholistic appreciation of organisational relationships as it is with logical planning. Systems thinking is suggested as a basis for exploring the relationships likely to be affected by technological change; and the change process is described as involving the negotiation of three phases. Resistance to change is highlighted as a key variable in the planning of change and some strategy styles are discussed.

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