



*MANAGEMENT OF INNOVATION
AND NEW TECHNOLOGY
RESEARCH CENTRE*

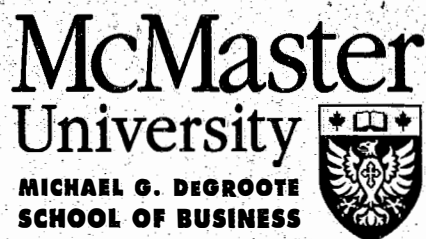
**ON THE ROAD TO THE NEW
BUSINESS PARADIGM:
HOW FAR IS TOO FAR?**

by

John W. Medcof

Management of Innovation and New Technology
Research Centre

WORKING PAPER NO. 97
January, 2000



Innis

~~Re:~~

HD

45

.W657

no.97

ON THE ROAD TO THE NEW BUSINESS PARADIGM:

HOW FAR IS TOO FAR?

John W Medcof

The Michael G DeGroote School of Business

McMaster University

Hamilton ON Canada L8S 4M4

Phone: (905) 525-9140 X27434 Fax: (905) 521-8995 E-mail: medcof@mcmaster.ca

Abstract

An analysis of the four fundamental elements of organizational function; people, environment, technology and structure; shows that the wholesale adoption of the new business paradigm is not appropriate for all organizations. Managers must consider the costs of change and the risk of creating dysfunctional incompatibilities among the four elements when making the tough decision about how far to go with the new business paradigm.

Do we really have to believe the people who keep bombarding us with the news that we now work in a new economy, the 21st century economy, that is fundamentally different from the old, and requires fundamentally different management approaches? Do we really have to bring revolutionary change to our organizations, to conform to the precepts of the "new business paradigm," as a precondition for survival? Do we really have to adopt the latest information technology, re-engineer our business processes, become lean, mean and wired, hire high tech workers, outsource, spinoff, form alliances, etc , etc , etc? Have not people at all levels of organizations scrambled to implement such initiatives, often with disappointing results?

It is the premise of this article that the initiatives of the new economy can be taken to excess. You can take your organization too far down the road to the new business paradigm, at high cost to your organization and to yourself. Yes, change is probably needed, but too much change is as bad as not enough. Managers must make tough judgment calls about how much is enough for their individual organizations. This is best shown by taking a global view of the organization rather than by looking at the parts separately. This is best shown by focussing upon the few fundamentals of organizational function, rather than by looking directly at all the complex details. The details can be worked out once the fundamentals are appreciated.

A great deal of the advice on the subject of the new business paradigm begins with the premise that more is always better. Every organization needs more and better information technology and more highly trained people, for example. It will be argued here that more is not necessarily better and that there is an optimal level of "new management" for every organization.

In fairness to those who have proffered advice based upon the "more is better" assumption, it should be said that in the context in which most of it was given, it was probably the best advice.

going (1) The early nineties was a time of great turbulence for business. Managers had to react quickly and manage by the seats of their pants, just to stay alive, let alone make money. It was primarily during this period that the concept of the new business paradigm was forged. Under fire, solutions had to be found and advanced as far as they could be taken, as far as anyone could see. Now, with the benefit of hindsight, it is possible to take stock of what has been learned and to better appreciate some of the nuances of the new business paradigm.

We will take stock by considering four very broad, but very fundamental, facets of organizational function: people, environment, technology and structure. The new business paradigm consists of a particular configuration of these facets (to be described below) that must be attained if its benefits are to be achieved. But other configurations can be more effective for many, if not most, organizations. The model presented here is intended to help managers decide upon the degree to which they should adopt the new paradigm for their firm, and what the most appropriate configuration for them is. For ease of reference, the analytic structure being used here is called the **PETS Model**, an acronym for the four fundamental facets of organizational function it embodies: **P**eople, **E**nvironment, **T**echnology and **S**tructure. To facilitate the development of the argument here, the four facets will not be discussed in the order in which they appear in the acronym. We begin with the environment, and the aspect of the new business paradigm which corresponds to it, the new economy.

Environment

An organization's environment consists of those things outside of it that have an impact, or potential impact, upon it. The government, the economy, competitors, suppliers and the culture of the society in which it operates are all part of the environment. Environments can be

classified on a dimension running from low uncertainty to high uncertainty. According to the ET. Model, and as shown in Figure 1, the level of **environmental uncertainty** depends upon two sub-dimensions, variability and complexity. **Variability** is the amount of unpredictable change in an environment. High variability gives an unpredictable environment and high uncertainty. **Complexity** is the number of different aspects of the environment which the organization must attend to in order to compete. With high complexity, an organization must pay attention to a great number of different things, this is difficult to do, and uncertainty is high (2)

lease insert Figure 1 approximately here

The New Economy

It is generally recognized that the new economy provides a business environment that has higher uncertainty than the old economy (3). It is this high uncertainty that is pushing organizations to adopt the new business paradigm, and GM is often cited as a firm striving mightily to meet the new demands. GM's environment includes, among other elements, the customers who buy its vehicles; its competitors like Ford and Toyota; its suppliers who provide the seats, tires, radios and other components that are assembled into vehicles; and the government, which passes laws about such things as safety and emissions. The higher uncertainty in GM's environment has come from higher variability and complexity. Higher variability has been brought about by such factors as Toyota's ability to bring new models to the market much more quickly than was traditionally the case, and increasing numbers of lawsuits from customers with various grievances. Higher complexity comes from the increased number

of serious competitors in the North American market. In the nineteen sixties they could be counted on the fingers of one hand. There are many more today and most are from offshore. In the fifties, the number of different car models was smaller and consumer tastes were more homogenous (everyone knew that bigger was better). There were fewer government regulations about safety and emissions. The number of precedents for consumer suits was much smaller. GM is struggling because it is having trouble adjusting to the new high uncertainty environment. It is held back by entrenched business practices which worked so well in former times of lower uncertainty. Many argue that Chrysler and Ford have been more successful in adjusting to the new economy. There are many changes that have contributed to the coming of the new economy but all of them work through increased variability and/or complexity to create greater uncertainty.

Although most industries are experiencing increased uncertainty as a result of the advent of the new economy, some industries do experience more uncertainty than others. Yes, the degree of uncertainty in the classical music recording industry is higher than it was 20 years ago, but the current level of uncertainty is not as high as that in the current rock music industry. The steel industry currently has an environment which is much less certain than it was in the fifties, but that level of uncertainty is still less than that in the consumer electronics industry today.

Any management team considering what changes to make in order to prosper in the new economy must ask itself to what degree its environment actually has changed. How uncertain has it become? The wholesale changes recommended by the strongest proponents of the new business paradigm may not be necessary for all organizations. We will now go on to consider those facets of the organization that might be changed to meet the challenge of the more uncertain environment of the new economy, beginning with organizational structure.

Structure

An organization's structure is the set of agreements which people in the organization have about who will do what jobs, and how they will do them. Structures can be classified on a low flexibility - high flexibility dimension. According to the ET Model, and as shown in Figure 2, **structural flexibility** is determined by levels of formalization and centralization. **Formalization** is the degree to which agreements among people in an organization are written down and strictly followed. In highly formal organizations, a great many agreements are written down as rules and are strictly enforced. Changes are difficult to make and the structure has low flexibility. Firms with low formalization are less hamstrung with binding rules, can change more readily, and are more flexible. **Centralization** is the degree to which power in the organization is concentrated in the hands of a few people. With high centralization, a small elite is given most of the power and other members of the organization must follow their commands. People lower down in the organization must wait for approval from above before they can take action. This slows down the decision making process and the structure has low flexibility. In organizations with low centralization, power is dispersed among many people who are empowered to make decisions in their respective realms of activity. This speeds up decision making and increases flexibility (4)

lease insert Figure 2 approximately here

The New Organization

Many writers argue that the advent of the new economy demands that organizational structures be made more flexible in order to deal with the increased uncertainty (5). This new

organizational form, which is less formalized and less centralized than traditional structures, is often called the new organization. Becoming a new organization involves moving to the right on the flexibility dimension in Figure 2. A very common piece of advice for becoming a new organization is to form workers into self-managed, cross-functional teams whose members collectively embody the expertise necessary to deal with the complex problems thrown at them by the new economy. The empowerment of these teams is a form of decentralization which gives them the authority to make decisions as demanded by their work, so they can flexibly adapt the most effective course of action. It is also recommended that formal communication channels be de-emphasized or eliminated so that everyone can talk to everyone else, as their work demands. This reduction in formalization speeds the transmission of information around the organization, allowing fast decision-making and more flexibility. There are other changes to be made in order to become a new organization, but they all contribute to lowered formalization and/or centralization to produce a more flexible organization. The quintessential new organization is flat, flexible, networked, global and diverse (6).

Most advice about adjusting to the new economy recommends that organizations adapt the new organization model completely, how else to become nimble enough to deal with the high uncertainty. However, our discussion above showed that although the level of uncertainty in the environment has generally increased with the advent of the new economy, the environments of some firms are still less uncertain than those of others. It follows that some firms need to be more nimble than others, and therefore need to acquire more of the characteristics of the new organization than others. The difficult questions for a management team are, then, "How uncertain is our environment? How nimble do we need to be in order to deal with it effectively?"

How flexible does our structure have to be if we are to be that nimble?" These questions are complicated because the answers depend upon more than environment and structure, they also depend upon technology and people

Technology

The technology of the organization includes the physical and mental tools which people use to perform their work. Physical technologies are physical objects such as computers, metal stamping presses, trucks and pencils. Mental (conceptual) technologies are abstract systems which people use to organize and carry out their work, for example, accounting systems and the Hay system for pay. According to the ET Model, and as shown in Figure 3, work technologies can be classified along a dimension running from routine to non-routine. The level of **technological routineness** depends upon variability and complexity. **Variability** is the number of novel problems which arise in the use of a technology. With high variability, a great many unexpected problems arise. For example, a computer system which goes down frequently has high variability which makes working with it more non-routine. With low variability, there are few unexpected problems so the use of the technology is more routine. **Complexity** refers to the degree to which the problems which are encountered in the use of a technology are difficult to solve. Many of the problems which arise in the launch of a space shuttle have high complexity, which means they are difficult to solve and teams of highly trained technical people must work on them for many hours, and perhaps some days, in order to solve them. Such technology is non-routine. By contrast, the typical problem with the family car can be diagnosed and repaired by a single mechanic in an hour or two. The car is less complex than the space shuttle and therefore working with it is more routine (7)

lease insert Figure 3 approximately here

The New Technology

It is generally acknowledged that, so called, new technologies have been important drivers of the new economy (8) In particular, information technologies have revolutionized how business is done Robots are replacing workers on the factory floor and manufacturers are wired to their suppliers and customers to enable fast reactions to the uncertainties created by the new economy Workers now use wireless communication to be in constant contact even though geographically separated and at no fixed address But the new technologies are more demanding in some ways than those they replace Word processors enable their users to do many things that were not possible with typewriters, but are more complex to use, require more training, and thus create less routine work than do typewriters The near-automated factory, which is efficient even with very short production runs, requires trained technical people to constantly re-set the parameters for those runs, using information technology Such technologies are non-routine compared to traditional factory floor technologies which often created mind-numbing, invariant work

Managers are urged to adopt the new information technologies in order to cope effectively with the fast-paced, uncertainty driven competition of the new economy, just as they are urged to adopt more flexible organizational structures But, as with structures, the question is, how uncertain is your particular business environment and how non-routine does your technology need to be in order to cope with it? The answers for structures and technologies are inter-related They also depend upon the people of the organization

People

The people of an organization include all those individuals who work for it as employees. According to the ET Model, and as shown in Figure 4, people can be classified along a dimension of **sophistication**. Level of sophistication is dependent upon a person's motives and cognitions. **Motives** are the internal forces that drive people to action. They can be classified into three principle categories, depending upon the human needs they are based upon. The first category, the existence motives, are concerned with maintaining the body as a physical entity. In this category are the motives for such things as food, water and oxygen. The second category, the relationship motives, are concerned with establishing and maintaining social relationships with others. These include the needs for such things as love, esteem and friendship. Finally, there are the growth motives, concerned with the need to develop and exercise one's capabilities. These include such motives as the need for self-actualization and personal achievement. The ET Model proposes that the existence motives, which we share with animals, involve a less sophisticated level of human functioning than do the growth motives. Most people are driven to some extent by all three categories of motives, so the level of sophistication of an individual is determined by the relative strengths of the categories. But level of sophistication is also influenced by cognitions. **Cognitions** are the mental processes which occur when people process information, for example, when they make decisions, solve problems or learn something new. People are said to be cognitively sophisticated when they have a high capacity for information processing. For example, some people can learn more material more quickly than others. Being able to deal with more complex information is also a sign of cognitive sophistication. For example, some people can solve complex problems more effectively than others. Finally, people

who process information without bias have a higher level of cognitive sophistication. For example, being able to assess other people without biases due to stereotyping makes one a more effective processor of information (9)

lease insert Figure 4 approximately here

The New Worker

In the new economy, business needs a new kind of worker (10). Even jobs on the factory floor and on front-line service counters require people with considerably greater capabilities than was the case a few years ago. A meagre education and/or a strong back are no longer enough. On the factory floor machines do the "manual" work and people do the thinking. They must have the training and cognitive capacity to make crucial production decisions. Today, the customer service representative is empowered to take the actions necessary to ensure a satisfied customer. This requires social skills as well as good decision making. People working in teams need the capacity to understand the complexities of group dynamics, and the social skills to act on those understandings. In all of this the worker must embrace the challenges that arise daily from the new complex work environment. The worker must be intrinsically motivated to seek out new problems, before they occur, and to take on the self-development challenges that are often a part of the solution. This is no place for people who just want to be left alone at their desks to "get some real work done." In short, according to the ET model, new workers must have high cognitive capabilities and strong growth motives if they are to meet the challenges of the workplace in the new economy. New workers must have high levels of sophistication.

But how much sophistication is enough? As discussed above, businesses vary in the levels of uncertainty of their environments, the degrees of flexibility in their structures and in the degrees of non-routineness in their technologies. They also vary in their need for sophisticated workers. The interconnectedness of the four ET elements ensures that their functioning can only be understood in concert. This brings us to the issue of congruence among ET elements.

Congruence and the New Business Paradigm

The ET Model and its four elements are summarized in Figure 5. The four elements; people, environment, technology and structure, are intimately interlinked so that the function of each is affected by the function of the others (11). For an organization to work optimally, it must achieve congruence among the elements so that they operate synergistically.

lease insert Figure 5 approximately here

In a sense, those who argue for the new business paradigm have got it right, at least partially. On their assumption that the environments of all organizations in the new economy are highly uncertain, it follows, according to the ET Model, that all organizations should adopt highly flexible structures, highly non-routine technologies, and highly sophisticated people. They will thus have aligned all of their systems with the new business reality, and with each other. This quintessential "new paradigm organization" is depicted in Figures 6 and 7 with the vertical line on the right which connects the high ends of all four dimensions. Firms such as Microsoft, Yahoo and the re-born IBM are arguably close to having achieved congruence of this sort. However, if any element should drift out of position, congruence and synergy would suffer.

lease insert Figure 6 and 7 approximately here

But, according to the ET Model, the new paradigm organization is only appropriate in highly uncertain environments. At the far left in Figure 6 is the quintessential "old paradigm" organization, also summarized in Figure 7. To continue with our examples from the automobile industry, we might consider the prototypical automobile assembly plant, in North America, in the 1950's. The environment then had relatively low uncertainty. Flexibility in organizational structures was not at a premium. Organizations that adopted structures with low flexibility achieved considerable operational economies and were able to cope with the relatively certain environment. Non-routine technologies were certainly adequate in these circumstances and people with relatively low levels of sophistication worked well enough in the rigid structures with the routine technologies. So there is as much synergy in the old paradigm organization as there is in the new. To have taken on the extra costs of flexible structures, non-routine technologies and sophisticated people would not have been a viable economic proposition at that time, given their incongruence with the relatively certain environment.

The middle configuration in Figure 6 shows an incongruent organization. The various elements are not aligned with each other and will not function synergistically, lowering the viability of the organization.

Figure 6 can also be used to illustrate the main point of this paper, that it is possible to go too far down the road to the new paradigm organization. The environments of firms before the advent of the new economy can be placed on the uncertainty dimension at their appropriate

points. The new economy is having the effect of moving those points to the right. As a consequence, in order to maintain congruence, firms must move the positions of their other elements to the right as well. Although it is likely that most business environments have moved to the right on the uncertainty dimension, some have probably moved more than others, and different environments started in different places. Consequently, there is still some spread in uncertainty positions along the dimension, and firms should respect that spread in their strategies. Some will have to position their structures, technologies and people further to the right than others. Going too far to the right creates incongruity and its attendant dysfunctions and incurs the extra costs. Getting it right is a very important judgement call.

The Essence of Management

As illustrated in Figure 8, it seems unlikely that any real organization will ever get all of its elements truly, congruently aligned. There are just too many uncontrollable factors involved in environment, structure, technology and people to allow such perfection. It follows from this that management consists, essentially, of two broad classes of activities.

please insert Figure 8 approximately here

The first broad class of managerial activities consists of attempts to bring the ET elements into better alignment with each other. For example, a firm may find that a great many of its people are not sophisticated enough to deal with the non-routine technologies and flexible structure it has in place. It may then embark upon a program of hiring new people using more rigorous selection criteria, job reassignment of existing workers, and more thorough training, all

to raise the general level of sophistication of their workers. Another example is an upgrade of information technology to meet the demands of an environment that has become more uncertain. This change in technology may require a change in people and structure as well, if it is to be successful. Generally speaking, the movement of elements along dimensions is a major task requiring major initiatives and huge investments in resources and time. Those who have been involved in re-engineering projects and/or the implementation of new information systems know this only too well. That is why so many management teams prefer to struggle on performing tasks that belong in the second major category of activities.

The second major class of managerial activities is the solving of problems created by the discrepancies among the ET elements. When the ET elements are not aligned, it creates dysfunctions and the greater the misalignment the greater the dysfunction. A common dysfunction occurs when people and structure are not sufficiently aligned. A firm may have developed a labour force of high sophistication through the experience of dealing with a quite uncertain environment and non-routine technology. However, if the structure has low flexibility because of high centralization and formalization, people will find it very frustrating. Bureaucracy will hamper their ability to function at a level necessary to carry out their jobs effectively. That frustration can lead to interpersonal conflict, absenteeism and poorly done jobs. It is up to the manager to deal with these dysfunctions, and to ensure that the work of the organization gets done in spite of them.

Although we have spoken of two broad sets of activity as if they were the sole province of managers, people at all levels of the organization can be involved in them. One great advantage of a workforce with high sophistication is that it is capable of handling many of the dysfunctions

that result from misaligned elements, without the direct intervention of management people with high sophistication are also more capable of dealing with the first broad class of activities described above, the shifting of ET elements along their dimensions. Highly sophisticated workers greatly facilitate the implementation of major organizational change.

Some readers may be interested in diagnosing their own organizations in the manner shown in Figure 6. For this purpose, Figure 9 is provided as a blank to be filled in. One approach to identifying discrepancies among the elements is to consider the various dysfunctions that occur in the organization. Those dysfunctions usually have their origins in discrepancies between elements and, if analysed, can lead to a diagnosis that can be graphed on Figure 9.

Please insert Figure 9 approximately here

In summary, the ET model shows us that an organization can go too far down the road to the new paradigm. It can make its structure too flexible, its technology too non-routine, and its people too sophisticated, for the level of uncertainty found in its environment. This overzealous adoption of the new paradigm involves unnecessary expenditures and creates organizational dysfunction. It is important for management teams to make good judgements about how far they should go with the new organizational paradigm. The ET Model, which provides a framework for the consideration of the many complexities involved in making such judgements, can help managers articulate their questions and issues but it cannot provide the answers. The model can guide, but it cannot provide the detailed analysis. That must come from those who are intimately knowledgeable about the workings of the individual organization.

Figure 1

Environmental Uncertainty and its Sub-dimensions

Environment:	low uncertaintyhigh uncertainty
Variability:	low.....high
Complexity:	low.....high

Figure 2

Structural Flexibility and its Sub-dimensions

Structure: **low flexibility.....high flexibility**

Formalization: **high.....low**

Centralization: **high.....low**

Figure 3

Technology Routineness and its Sub-dimensions

Technology:	routine.....non-routine
Variability:	low.....high
Complexity:	low.....high

Figure 4

Human Sophistication and its Sub-dimensions

People:	low sophistication.....high sophistication
Motivation:	existence.....relatedness.....growth
Cognition:	low capacity.....high capacity
	low complexity.....high complexity
	high bias.....low bias

Figure 5

The PETS Model

The four elements of organizational function are:

PEOPLE

All those individuals who work for the organization as employees. People can be classified on the dimension:

LOW SOPHISTICATION.....HIGH SOPHISTICATION

ENVIRONMENT

All those factors outside the organization that have an impact upon it or potential to impact upon it. Environments can be classified on the dimension:

LOW UNCERTAINTY.....HIGH UNCERTAINTY

TECHNOLOGY

The physical and mental tools that people use to perform their work. Technologies can be classified on the dimension:

ROUTINE.....NON-ROUTINE

STRUCTURE

The set of agreements people in the organization have about who will do what and how they will do it. Structures can be classified on the dimension:

LOW FLEXIBILITY.....HIGH FLEXIBILITY

CONGRUENCE:

The elements must be appropriately aligned with each other for optimal organizational function. For example, low flexibility structures work poorly in highly uncertain environments and people with high sophistication are frustrated working with routine technology.

Figure 6

Various Configurations of the PETS Elements

Environment

low uncertainty.....high uncertainty

Structure

low flexibility.....high flexibility

Technology

routine.....non routine

People

low sophistication.....high sophistication

**+ Old
Paradigm
Organization**

**+ New
Paradigm
Organization**

**+ Incongruent
Organization**

Figure 7

Old and New Paradigm Organizations

THE NEW BUSINESS PARADIGM

ENVIRONMENT:	HIGH UNCERTAINTY	the new economy
STRUCTURE:	HIGH FLEXIBILITY	the new organization
TECHNOLOGY:	NON-ROUTINE	the new technology
PEOPLE:	HIGH SOPHISTICATION	the new worker

THE OLD BUSINESS PARADIGM

ENVIRONMENT:	LOW UNCERTAINTY
STRUCTURE:	LOW FLEXIBILITY
TECHNOLOGY:	ROUTINE
PEOPLE:	LOW SOPHISTICATION

Figure 8

Congruent and Incongruent Combinations of the PETS Elements

LOW UNCERTAINTY								HIGH UNCERTAINTY							
ROUTINE				NON-ROUTINE				ROUTINE				NON-ROUTINE			
LO FLX		HI FLX		LO FLX		HI FLX		LO FLX		HI FLX		LO FLX		HI FLX	
LS	HS	LS	HS	LS	HS	LS	HS	LS	HS	LS	HS	LS	HS	LS	HS
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

This figure shows various combinations of the PETS elements. With the simplifying assumption that each element could be in one of two states, each represented in a row:

Top row ENVIRONMENT Low uncertainty or High uncertainty

Second row TECHNOLOGY Routine or Non-routine

Third row STRUCTURE Low flexibility (LO FLX) or High flexibility (HI FLX)

Fourth row PEOPLE Low sophistication (LS) or High sophistication (HS)

With each of the four elements allowed either of two states there is a total of 16 possible combinations of the elements, as numbered in the cells in the bottom row. Scanning up through the rows from each numbered cell gives the state of the elements for that cell. For example, cell number 7 is LS (people of low sophistication), a structure of high flexibility (HI FLX), non-routine technology and a low uncertainty environment. In cell 7 there are incongruencies among the elements. Of the 16 combinations illustrated, only two have complete congruence among all the elements. Which are they? End note 12 has the answer.

Figure 9

Form for Diagnosing the PETS Elements in an Organization

Environment

low uncertainty

high uncertainty

Structure

low flexibility

high flexibility

Technology

routine

non routine

People

low sophistication

high sophistication

Endnotes

- 1 There are a number of excellent analyses of the new economy and its implications for organizations in both the popular and academic business presses, including: M J Mandel, "The 21st century economy," *Business Week*, August 31, 1998, p 58; D Tapscott, *The Digital Economy* New York: McGraw-Hill, 1996; *The Economist*, "The world economy survey" Sept 28, 1996, 1-46; R A Bettis and M A Hitt, "The new competitive landscape" *Strategic Management Journal*, 16, 1995, 7-19; K Schwab and C Bradja, "Power and policy: The new economic world order," *Harvard Business Review*, Nov -Dec, 1994, 40-50; F G Steingraber, "The new business realities of the twenty-first century" *Business Horizons*, Nov -Dec, 1996, 2-5; R J Sternberg, "Managerial intelligence: Why IQ isn't enough" *Journal of Management*, 23(3), 1997, 475-493
- 2 A number of writers have used uncertainty to capture the essentials of the environment although some have used different numbers of, and names for, the sub-dimensions For a fuller discussion uncertainty and the environment see: B Chakravarthy, "A new strategy framework for coping with turbulence," *Sloan Management Review*, Winter, 1997, 69-82; R L Daft, *Organization Theory and Design* (5th ed) St Paul, MN: West Publishing Company, 1995; G G Dess and D W Beard, "Dimensions of organizational task environments" *Administrative Science Quarterly*, 29, 1984, 52-73; R B Duncan, "Characteristics of organizational environment and perceived environmental uncertainty," *Administrative Science Quarterly*, 17, 1972, 313-327; Jarley, J Fiorito, and J T Delaney, "A structural contingency approach to bureaucracy and democracy in U. national unions" *Academy of Management Journal*, 40(4), 1997, 831-861 The measurement of environmental uncertainty has also received some attention

in the literature, see: B K Boyd, G G Dess, and A M Rasheed, "Divergence between archival and perceptual measures of the environment: Causes and consequences," *Academy of Management Review*, 18(2), 1993, 204-226; J L Rice, "Handbook of Organizational Measurement," *International Journal of Manpower*, 18(4/5/6), 1997, 435-541

3 Descriptions of the new economy can be found in the references in endnote # 1

4 Structures are commonly classified along a dimension running from mechanistic to organic, see: T Burns, and G M .talker, *The Management of Innovation* London: Tavistock, 1961; J A Courtright, G T Fairhurst, and L E Rogers, "Interaction patterns in organic and mechanistic systems" *Academy of Management Journal*, 32(66), 1989, 773-802; R L Daft, *Organization Theory and Design* (5th ed) .t .aul, MN: West ublishing Company, 1995 The sub-dimensions of formalization and centralization are commonly used for that dimension, although others are also often included The mechanistic-organic dimension is very similar conceptually to the low flexibility - high flexibility dimension being used here The term flexibility has the advantage of stating explicitly what the most important characteristic of the dimension is when an organization is trying to match its structure to the environment Rice (in endnote 2 provides a number of instruments for measuring structures

5 See, for example: D Ancona, T Kochan, M .cully, J Van Maanen, and D E Westney, "The New Organization " Module 1 in *Managing for the Future*. Cincinnati, OH: .outh-Western College ublishing, 1996; and R A Bettis and M A Hitt, "The new competitive landscape " *Strategic Management Journal*, 16, 1995, 7-19

6 This particular set of five characteristics of the new organization comes from Ancona *et al*, *ibid*.

7. This characterization of technology is taken from Chertow, "A framework for the comparative analysis of organizations" *American Sociological Review*, 32, 1967, 194-208

However, the terminology has been changed since Chertow's is found confusing to some readers

Instruments for measuring routineness are reviewed by M. Withey, R. L. Daft, and W. H.

Cooper, "Measures of Chertow's work unit technology: An empirical assessment and a new scale" *Academy of Management Journal*, 26, 1983, 45-63

8. See references under endnote 1

9. The term sophistication has elicited such a number of objections from those already acquainted with the ET Model that it is necessary to justify its use. Objectors argue that it is too value laden and, perhaps, insulting to those who might be classified as unsophisticated. The term continues to be used here because not even the objectors have been able to suggest a more appropriate alternative. It should also be noted that the values inherent in this application of the term are a reflection of the values inherent in the long tradition of managerial and psychological literature from which it is derived. The sophistication dimension is based partly upon psychological theories of human needs, many of which propose value laden hierarchies, for example, Maslow and Alderfer (see references below). In the management literature, the work of McClelland and of Hackman and Oldham (see references below) are progenitors of the sophistication dimension presented here. Sophistication is also based upon cognitive capabilities, for which there is also a long tradition of value-laden literature about improving the knowledge, skills and abilities of workers. The valuing arises because we believe that organizations work better if certain kinds of people do their work. The term sophistication reflects that viewpoint and does not intend to value people in any other frame of reference.

The idea of motivational levels or hierarchies is based in the psychological literature in such works as A Maslow, *Motivation and Personality (2nd ed.)* New York: Harper & Row A , 1970 The idea that people are driven by different kinds of needs, that different need profiles are appropriate for different jobs, and that incentives should be tailored to satisfy the needs that are motivating the "right" kinds of job behaviour, can be found in D C McClelland, *Human Motivation* Glenview, IL: .cott, Foresman, 1985; J R Hackman, and G R Oldham, *Work Redesign*. Reading, MA: Addison-Wesley, 1980; and C Alderfer, *Existence, Relatedness and Growth: Human Needs in Organizational Settings*. New York: The Free Press, 1972. Here, Alderfer's three level hierarchy is used, (existence, relatedness, growth) because it is broad enough to include all the needs proposed in other taxonomies and captures the fundamental logic of types and hierarchies and yet is easy to grasp intuitively so that it can be discussed in a broader context without having to spend a great deal of time explaining it

There is a vast literature on cognitions in the workplace, including: L Falkenberg, "Improving the accuracy of stereotypes within the workplace," *Journal of Management*, 16, 1990, 107-118; F Luthan and R Kreitner, *Organizational Behaviour Modification and Beyond: An Operant and Social Learning Approach* Glenview Ill : .cott, Foresman, 1985; . Ramsay, C Gallois and V J Callan, "ocial rules and attributions in the personnel selection interview," *Journal of Occupational and Organizational Psychology*, 70, 1997, 189-203

Instruments for measuring most of these human characteristics can be found in rice, *ibid*
 10 Treatments of this theme include: . Baker, and L Armstrong, L , "The new factory worker " *Business Week*, .eptember 30, 1996, 59-68; Cappelli, and A Crocker-Hefter, "Distinctive human resources are a firm's core competencies " *Organizational Dynamics*,

Winter 1996, 7-22; A Farnham, "Are you smart enough to keep your job?" *Fortune*, January 15, 1996, 34-48; R Henkoff, "The best service workers " *Fortune*, October 3, 1994, 110-122; J Pfeffer, *Competitive Advantage Through People* Boston: Harvard Business School Press, 1994; J B Quinn, Anderson, and Finkelstein, "Leveraging Intellect " *Academy of Management Executive*, 10(3), 1996, 7-27

11 Treatments of the interdependence of the elements and their combined effects upon performance include: J A Courtright, G T Fairhurst, and L E Rogers, " Interaction patterns in organic and mechanistic systems " *Academy of Management Journal*, 32(66), 1989, 773-802; J W Dean, J Yook, and G I Usman, "Advanced manufacturing technology and organizational structure: Empowerment or subordination?" *Organization Science*, 1992, 203-229; M A Glynn, "Innovative genius: A framework for relating individual and organizational intelligences to innovation " *Academy of Management Review*, 21(4), 1996, 1081-1111; T R Mitchell, "Matching motivational strategies with organizational contexts " In B .taw and L L Cummings, *Research in Organizational Behaviour*, Vol. 19 Greenwich CT: JAI Press, 1997, 57-149; K arker, T D Wall, and R Jackson, "'That's not my job': developing flexible employee work orientations " *Academy of Management Journal*, 40(4), 1997, 899-929; A H Van de Ven and A L Delbecq, "A task contingent model of work-unit structure " *Administrative Science Quarterly*, June, 1974, 183-197; H W Volberda, "Building flexible organizations for fast-moving markets " *Long Range Planning*, 30(2), 1997, 169-183; T D Wall and K Davids, "Shopfloor work organization and advanced manufacturing technology " *International Review of Industrial and Organizational Psychology*, 7, 1992, 363-398

12 Only cells 1 and 16 have congruence among all their elements