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M. E. Burke
University of Salford

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“RELATIONS BETWEEN ORGANISATIONAL DESIGN AND INFORMATION PROCESSING SYSTEMS: A PASSIONATE AFFAIR OR A STORMY INTERLUDE?”

Burke, M.E., Information Systems Institute, University of Salford, UK

Abstract

“This paper considers the issues surrounding the fit between information systems and organization structures. The paper uses philosophical ideas concerning knowledge and applies them to organizational design and information processing in order to encourage alternative perspectives and new ideas. This is achieved by a discussion of the issues surrounding organizational design and the impact of design on information processing; an overview of the ideas concerning the theory of knowledge proposed from both a rational and an empirical viewpoint. The paper closes with a discussion of the means by which philosophical considerations can assist towards new forms of information processing.”

Keywords: Philosophy, organization structures, information systems, epistemologies.

1 INTRODUCTION

Organisations cannot exist without information. Information is vital to enable the processes that operate within the organisation. Information and processes have been defined in terms of four roles (Davenport, 93) as: a supporting tool for business innovation; operational processes; management processes and approaches to management within processes. Yet what is information? In order to understand what information is we must look to the foundations of what we term knowledge. If all organisations are based on knowledge there is a need to question and consider what we mean by the word knowledge. The questions of what can we know and how can we know are questions which philosophers have tried to answer throughout the centuries. It is only through examining some of these answers and applying them to today's organisation that we can move closer to understanding organisations. There are various theories of knowledge created by philosophers throughout history and it is therefore to philosophy that we must look in the first instance to consider the basis of organisations. This paper will concentrate on two theories – that of the French philosopher, Rene Descartes (1596 – 1650) and that of the British philosopher John Locke. (1632 –1704). Although both men lived in the seventeenth century their ideas are still valid today and can, with some careful thought, be applicable to the changing world of information processing.

If information processing is to achieve so many goals for the organisation there must be an issue between the design of the organisation and the information processing that happens within the constraints of that design. This leads us to the questions of relationships - can the relations between organisational design and information processing systems be characterised by using an analogy of human relations, for example as a long term “passionate affair” or as a “short stormy interlude?” A passionate affair or romance can be characterised as being dynamic and mature whilst a short stormy interlude could be characterised as volatile and argumentative yet forming a strong bond for a short while. Can we use these ideas to enhance our understanding of this special relationship between organisational design and information? If organisations are to use information systems for coping with continual and rapid change can the two sets of characteristic be analysed to allow for a system which is applicable in most circumstances yet flexible enough to take into account the different periods of an organisations life. In addition the organisation does not, of course, operate within a vacuum but an ever-changing external environment.

The changing external environment is a major issue which organisations often respond to by restructuring the shape of the organisation. The theory that we live within a world of flux – of continuous change where continuous change is seen as a fundamental constant was proposed by a Presocratic philosopher - Heracleitus of Ephesus. He considered that although objects may look real i.e. like static objects they are really composed of matter so they should, more accurately, be defined as processes. If this idea is applied to organisations then the structures i.e. the pattern of the organisation is in itself merely a process. If the structures are processes then it should not be hard to make the information processes fit the organisation structure. In theory this has sound possibilities but over the years it has been shown that it is not a simple or easy task to match the information systems with the organisations shape. The purpose of this paper is thus to discuss some of the ways in which characteristics of the relationship between design and processing can be analysed, and to discuss philosophical ideas about knowledge and apply them to organisational design and information processing in order to create new ideas and new ways of thinking. This will be achieved by a discussion of the issues surrounding organisational design and the impact of design on information processing; an overview of the ideas concerning the theory of knowledge proposed by a rationalist (Descartes) and an empiricist (Locke) and how these relate to other epistemological theories such as historicism and pragmatism. The paper closes with a discussion of the means by which philosophical theories of knowledge can assist towards new considerations of information processing.

Organisational shape is important as this single factor affects the nature of the organisation's internal environment which in turn influences motivation, production, service levels, attitudes to customers, absenteeism and so on. The generally accepted view of organisational design that has evolved is that the structure of an organisation should match or fit characteristics of certain variables both inside and outside the organisational system (Tushman & Nadler, 1978). The traditional variables, which can be seen to affect the organisation, include information and communication technologies (ICT's); the age of the organisation; the history of the organisation; the nature of the environment; the nature of the business and the culture of the organisation. However all variables operate within the inner or outer core of the organisation and it is therefore important when discussing organisations to identify general assumptions about how the inner and outer cores of the organisation function. The standard classification of assumptions can be interpreted as follows. Organisations are open social systems which need to deal with areas of uncertainty. In order to deal with this uncertainty the organisation must develop information processing mechanisms, which can deal with internal and external areas of uncertainty. Organisations can be viewed as information processing systems in order to facilitate the effective collection, processing and distribution of information. However they can also be broken down into fragments and viewed as a set of sub organisations or divisions and departments.

These theories were proposed in the late 1970's and much work has been undertaken since then hence it is important to compare how these ideas have been affected by changes in the current climate. First, areas of uncertainty have increased to the point where there are no longer any areas of solid facts. Change is so vast and all encompassing that organisations have had to find new ways of managing the information – hence the rise in popularity of what is now known as Knowledge Management. The role of organisations as information processing systems has also been radically affected by the development of information and communications technology, as technology tends to form the core of most organisations. Organisations can still be viewed as subsets but because the nature of work has changed so radically organisations have had to place more emphasis on the completion of short-term goals. Two major assumptions which affect organisational design are that there are no longer any standard patterns of working and that technology is now a major driving force which affects the design of organisational systems. However it must be noted that whilst such theories can aid organisational design they cannot “guarantee organisational success due to the fact that the effectiveness of a structure is fundamentally determined by the uncontrollable elements of human nature” (Burke & Tulett, 1999).

Yet Tushman and Nadler's work is important as they put forward propositions based on their assumptions as to how information processing can affect organisational design. The proposition of most relevance here is the one known as P3, which states, “different organisational structures have different capacities for effective information processing”. They comment that structural conditions affect a departments' ability to attend to, and deal with, uncertainty (uncertainty being defined as how much or how little information is needed to complete a task). This in turn is affected by the type of structure – i.e. whether the organisation has a mechanistic or organismic type structure as “organismic structures are able to deal with greater amounts of uncertainty in information processing than mechanistic structures”.

Later work concerned the “punctuated equilibrium organisational model” (Tushman and Romanelli, 1985) which demonstrates the interaction between radical and incremental change. The model proposes that organisations progress through convergent periods punctuated by reorientations which mark and set timescales for the next convergent period. The convergent periods can be defined as longish time spans of incremental change and adaptation and reorientations as shorter periods of radical discontinuous change. The research demonstrated that change (and progress) occurs on five areas of organisational activity – namely, organisational culture, strategy, structure, power distributions and control systems. All the areas are important but for the purposes of this paper the third area, that of structure, is the most relevant and interesting.

The literature in this area is vast as many writers have postulated ideas on organisational designs. These include ideas that organisations can be seen to be “based on a series of compromises, for instance, between central control and empowerment, globalisation and centralisation, scale and scope economies, efficiency and effectiveness and between spatial separation and process integration” (Li,1997); that organisations are “composed of a number of interdependent dimensions such as structure and process constructs where structural features can be defined as organisation of task units, while the process features are concerned with social interaction” (Van de Ven,1976) – and that “the overall pattern of organisational design can be assessed by set measures” (Khandwalla,1973). Work undertaken by (Gresov, 1989) explored the conditions under which work unit designs fail to fit their contexts. He used a multiple contingency approach which focussed on issues such as misfit and conflicting contingencies and concluded that the work sections which faced conflicting contingencies were more prone to design misfit and lower performance.

Finally, then, the variables of what constitutes an efficient organisation design are numerous, subjective, open to misinterpretation, occasionally unintentionally biased, dependent on a myriad of variables, complex, sometimes intangible and transitory. It is therefore not surprising that goals and tasks sometimes fail to neatly fit into pre-destined organisational structures.

3 PERSPECTIVES ON INFORMATION PROCESSING

Information processing and its success or otherwise cannot be left to chance but requires a careful study which includes the relationship to organisation structures and shape. Earlier in the paper we mentioned analysing issues which would allow for the different types of relationships between organisational design and information processing, using as an analogy two kinds of human relationships. The description of these relationships is of course subjective yet aims to take on board an open interpretative viewpoint. The long term “relationship” can be seen in organisations, which can be characterised, as having

- a planned (as opposed to emergent) strategy. An organisation where the information systems would be meticulously planned and well executed within the organisation.
- a stable operating environment
- a fairly static organisation structure.

The shorter-term relationship, which we could analyse as more volatile and argumentative, can be seen in organisations which are:

- an emergent strategy – which changes as different factors and stakeholders gain more or less influence
- operating in a volatile and changing environment whilst the organisation itself has remained static. For example older organisations (usually ripe for take-over) or younger organisations which have not yet settled on a structure. However these younger organisation sometime retain this fluidity to best advantage.
- constantly changing structure or having to adapt to new rules brought on by merger with a another organisation

These ideas can of course be much further developed yet they are useful as a basis for thinking about what kind of structure we may need for an organisation which will undertake a particular form of task. Most organisations are not considered in this way but rather as concerns regarding the most efficient structure. The fact that the mission of the organisation cannot be achieved without adequate attention to the information processing system is all too often overlooked. This leads to misinterpretation of communication and can result in a thousand different ways of completing tasks by different sections of the organisation leading to a completely fragmented and ultimately a broken organisation.

One influencing factor worth considering in more detail is that of the rapid developments in technology. Yet what factors drive the technology and therefore the information systems of an organisation? In order to answer this question it is important to take an objective view and examine the

initial technology patterns of some years ago. The following factors which were identified as those which influenced the use of technology (Maddison, 1984) - an organisation's need to continually improve and evolve; the human and social factors resulting from changing methods of working; the fact that IT products change, grow and improve in performance and accessibility; the pressure of IT producers; the growth of specialist skills and the changes in organisations.

In order to consider how these particular factors have changed and evolved into new patterns it is important to take a closer look and apply them to life in the 21st century. In order to survive it is crucial that an organisation must continually improve and evolve. The human and social factors resulting from IT has led to more flexible ways of working due to the development of fast effective telecomms. The increase in "remote" methods of working has had an impact on the way in which managers are able to motivate – and indeed manage the human resource in general. The growth in IT products, the improvements in performance and accessibility have made IT one of the most powerful of all the driving forces. The pressure of the IT producers has resulted in increasingly fierce competition. In addition pricing issues and product performance have become even more competitive. The growth of specialist skills is very relevant in this century – there is a crucial need for all employees to have the skills necessary to navigate the new ICT systems. In addition most organisations have now recognised the need for continuous training in this area.

It can be seen then, that all these pressures form the driving forces of the internal environment as each of the factors affect the working conditions and the culture within the organisations. The driving forces themselves however, can only be successfully managed if the organisation has devised successful methods of controlling the way in which information flows within the organisation structure.

The traditional analysis of information flows in organisations is that information can be said to flow either horizontally or vertically through an organisation. Both types of information flows are important for different reasons - both have advantages and disadvantages and need to be carefully managed both as separate entities and as combinations. It is also essential to carefully co-ordinate the way in which technology is used to control the systems.

As organisations grow in size and complexity the need for strict control of information in order to provide a service or manufacture a product within exact specifications is increasing. Thus the need for more tightly controlled and co-ordinated information systems becomes a major requirement for most organisations. The idea of system dynamics in organisations (Forrester, 1965) is concerned with organisational actions where actions are seen as a series of flows. The flow of information within the organisation is seen as the "integrating mechanism" and the direction of the flow can be seen as pivotal to the success of the organisation. Later work (Rice and Aydin, 1991) examined network proximity as a mechanism for social information processing and found that "social information operates positively through communication and work unit mechanisms and negatively through the mean attitude of one's structurally equivalent position", thus demonstrating the importance of selecting an appropriate structure for information processing purposes.

Mintzberg, (1989) in his concern for the continuous process of learning and acquiring knowledge commented, "like distinguished craftsmen, organisations become distinguished because they master the details". It is the underlying detail of this philosophy that will now be considered.

4 THEORIES OF KNOWLEDGE

Throughout history humans have theorised about knowledge – about how we can ascertain different types of epistemologies. Although the ideas set out by Descartes and Locke are the primary ones to be developed in this paper, it is worth taking a moment to consider other views. Many of these ideas are very complex and justice cannot be done to the theories in a paper such as this. Nevertheless, this section presents a useful yet necessarily brief overview of several epistemologies.

One of the early ideas about knowledge was created around 5 BC in Greece by a group of Athenian “intelligent sages” who came to be known as “Sophists”. Together, after much thought and discussion they decided that it was impossible to tell if any thing was really true, and thus they developed a way of leading one’s life without knowledge. This was achieved by a consideration that all things should be measured according to man’s needs and wants. Hence the saying “Man is the measure of all things” which was attributed to Protagoras, one of the founding members of the Sophist movement. The Sophist philosophy was therefore based on “training for success” by establishing schools, which trained people how to speak and act in terms of the persuasiveness of the argument that could then be used to best advantage in, for example, the political arena. The criticism of this theory however was that it was not based on positive, sound, established knowledge and can therefore be seen to lack integrity and to some extent honesty – although the Sophist would argue that their epistemology was more honest than most in that they were not alluding to know anything – but freely admitting that they knew nothing (for certain).

Immanuel Kant approached the theory of knowledge by considering the limitations of what we can truly know. He posited that there are two different kinds of limitations in existence. The first is concerned with the view that “what actually exists makes up total reality” The second limitation concerns the fact that human beings can only know of things which we are able to experience and understand. Kant believed that the most astute way of understanding the world and our knowledge of it - could be discovered through science - in that science was seen as a discipline which could measure, experiment and provide solutions to all things. Yet within this view of science, as humans we are still able to exercise a free will that is difficult to measure and quantify. Kant dealt with this problem by stating that science cannot be applied to all aspects of humans because science cannot reach what he termed the “noumenal world” (the world which science cannot measure). Kant tried to understand that it is not just the empirical world that exists and is governed by scientific laws – but that a non-empirical world also exists in which humans have free will – even if as a race we are not yet capable of fully understanding that world.

Other writers, such as Weber examined knowledge from a sociological viewpoint and considered the subjective meaning that people attach to actions in different social situations. He then attempted to classify the actions according to a typology that created a knowledge-base of actions associated with emotions. In this work he was aiming to prove that emotions were becoming less important and that rationality based on logic and knowledge were becoming more important in the achievement of goals. This work formed the basis of Weber’s push towards bureaucracies as the most efficient way of organising tasks and thus achieving goal fulfilment. Weber was also viewed as an “idealist” in that ideology should mould the beliefs of society -yet Weber has also been criticized for narrowness in his thinking – for being inward rather than outward looking in his views. How then does Weber’s controlled bureaucracy sit with Kant’s notion of free will? It is difficult to align these views, yet by their very diversity we are able to note that problems of knowledge, reality and truth are difficult and all facets of the problem are still worth pursuing in the 21st century.

No we return to other great philosophers – Descartes and Locke whose ideas are central to this paper.

Descartes’ ideas are of great importance as they contributed to the principles of modern philosophy - indeed he is known as the “Father of Philosophy”. He was concerned with what it is actually possible to know for certain. He decided that there must be starting points for philosophy other than those already proposed – many of which he found to be problematic. Descartes loved the precision of maths and based on his mathematical tendencies he proposed four rules for thinking which he labelled his “Method of Cartesian Doubt”(Warburton,1998). These can be interpreted as, first, never accept anything except clear and distinct ideas; second, divide each problem into as many parts as are needed to solve it; third, order thoughts from the simple to the complex and finally always check thoroughly for oversights. After considerable thought using these rules he deduced that all knowledge of external things is in the mind. Descartes concluded (famously) that “I think, therefore I exist” (Cogito ergo sum) as, if he did not exist then he could not be derived or misled about anything. He saw this as his foundation on which to base the rest of his philosophy. He aimed to “lay the foundation of all

philosophical and scientific knowledge entirely by a priori reasoning- i.e. by reasoning that does not appeal to senses, experience or observation”(Horner & Westacott,2000). In this way Descartes can be said to hold a rationalist view of knowledge.

This, of course, is a brief resume of some very complex ideas concerning the origins of knowledge. Prior to consideration of how Descartes ideas can assist in considering how organisation structures can better be designed as information processing systems we need to consider a philosopher with very different views about the theory of knowledge.

Locke carefully considered how people think and understand and concluded that the mind is like a “white paper” which is blank when we are born and that all understanding and knowledge comes from our experiences (Empiricism). He looked at the origins and limits of human knowledge and concluded that all the information we have arises through our five senses - he believed that if ideas originate from experience then the content of thought must stem from sensation. He proposed that all complex ideas originate from each one of the five senses. Locke then took this argument further – he classified senses into primary and secondary qualities. Primary qualities he defined as those ideas which may differ under certain circumstances whilst he defined secondary qualities as the power to produce ideas which do not necessarily look like their objects. For example, colour would be classified as a secondary quality whereas shape would be classified as a primary quality as colour can look different under various light patterns but the shape of an object is defined and always the same.

Although on first consideration this may sound reasonable there are criticisms of Locke’s ideas from various quarters. Plato, for example, was thought to have considered that we are born with a certain amount of knowledge whilst Berkley insisted that Locke’s claims that objects have primary and secondary qualities were “unsupportable”. Berkley maintained that as we can only know what is in our own mind it is difficult to prove the existence of anything outside our own minds therefore Locke’s view that the shape of an object is always the same cannot be supported as we do not really know what constitutes the other persons view of, (for example) a “round” shape.

Locke and Descartes can be thought of as “ the founding fathers of two opposing schools of philosophy – empiricism and rationalism, one considering knowledge as the experience of the senses and one trusting to the speculations of reason” (Kenny,1984). The consideration of these philosophical theories about knowledge can allow different perspectives to be applied to the world of organisational design and information processing.

5 PHILOSOPHICAL PERSPECTIVES: NEW CONSIDERATIONS

The art of information handling has become, in many ways, a craft skill. It has been said that “Michelangelo devoted his last years entirely to sculpture, his preferred art. In 1555 he smashed the Pieta (now restored) in a fit on anger because he realised the impossibility of achieving the ideal he sort” (Rasponi,1985)

In some ways it could be said that there is a parallel between the almost perceived “impossibility” of setting up a model for information systems which are constantly changing and the great artists feelings of frustration in achieving an ideal end product. Information can be crafted in that it can be moulded, rearranged, and is available in constantly changing formats. Information viewed in this way can be seen as a pliable, soft concept. How can ideas from the philosophy of knowledge assist towards new considerations of information processing? Although Descartes ideas that all knowledge of external things is in the mind is interesting - it does not immediately lend itself to new considerations of information processing but the *way* in which he reached this point by using his system of four rules for logical thought can be seen as helpful.

These four rules can help information processing in the following way. The importance of clear and distinct ideas can be seen as very important within an organisation as matters concerning what information is needed when and in what format is fundamental to the existence of the organisation.

Clarity in these matters is vital to the success of the organisation. The ideas of the division of problems can be applied to organisations as the divisions within the design of organisations are created in order to allow information to flow in the appropriate direction. The ordering of ideas – from simple to complex can be seen as the life cycle of information processing. During the early stages of the formation of an organisation - when the organisation is young and small - the needs are fairly simple and easy to identify. As the organisation progresses through the business life cycle it reaches mid point, becomes more complex and layers of information processing are required. As the organisation matures its needs for information develop as all the variables inherent in the structure take on different weightings of importance and the need for successful information processing eventually form the core of the organisation. The fourth rule, checking for oversights and errors can be seen as the systematic reshaping of the structure in order to constantly take account of the organisations changing external environment.

This is almost a preliminary way of thinking about information processing – Descartes provides an initial stage for consideration whilst Locke can provide the second and more complex stage.

Locke's notion of the ideas of the mind as a "white paper" has a feeling of freshness, a quality of newness, of being able to start with the metaphorical "clean slate" – it is perhaps the reason why this idea has such appeal. If all our understanding of knowledge comes from experience then our experiences throughout the ages of the different shapes and structures of organisations should enhance our knowledge and this should (in an ideal world) be applicable to information processing in order to create the "perfect organisation". However, as the perfect organisation shape has not yet been achieved it is necessary to reflect and further consider Locke's theories.

Locke's notion that the content of thought must stem from sensation – through each of our five senses is interesting. Does an organisation "sense" its need for information? Can a multi – directional network be analogous to Locke's ideas about the senses? Can the organisations technology network be seen as the sensing mechanism and the information processing system the central nervous system of the organisation? A multi-directional communication network in an organisation can certainly be seen as beneficial as it facilitates the employment of a task culture. Unlike mechanistic structures where the individual is functionally isolated and there is specialized differentiation of functional tasks, some organisations employ permanent and interactive teams thus disregarding rigid role definition and allowing the redefinition of the individuals task as organisational requirement or external changes dictate. In addition collaborative units benefit from non-routine tasks because they facilitate feedback, error correction, and the synthesis of "new" ideas. If this is so, then Locke's classification of primary and secondary qualities perhaps have further relevance.

One way to define secondary qualities was to say that objects could look different under different lights patterns. This idea can be applied to organisations as they may change and alter shape according to types and usage of information processing systems. Should information-processing systems be seen as static and unchangeable – or are they designed to be pliable, soft concepts which mould themselves to the shape of the organisation structure. This question can perhaps be answered by considering the systems concept of "equivifinity" – the notion that systems, as well as organisations can have multiple paths of processes in order to achieve a desired "end" i.e. data received by the organisations and analysed to distinguish various types of task specific, useful information.

Locke's ideas about primary qualities were that, for example, some features of an object may be seen as static and unchanging and these ideas may help to consider the advantages of mechanistic structures of organisations. Mechanistic traits are sometimes employed when, for example, undertaking tasks where the level of information processing uncertainty is minimal. This means that the organisation does not have to employ complex information processing structures and the need for lateral communication is reduced. In this way Locke's notion of primary qualities as those which are "static" can be seen to have a relation to the mechanistic model of information processing. Yet Hjørland (2002) considered that rationalism agreed with historicism "in that our experiences are determined by our psychological makeup" and this view is certainly worthy of consideration and, indeed, quite

helpful as an insight into how our past has been formed and therefore how our future may be affected. There may be some merit in creating a combination of the epistemological views to create new ideas which help with our understanding of information processing.

6 CONCLUSION

Structure is one of the most important variables of an organisation and the current economy is driven by information and the value of information. The picture of the co-existence of structures and information processing is not yet complete – in this paper some broad ideas have been applied to established principles. Organisational change and restructuring is one of the most difficult tasks and a philosophical framework which assists with this process would be both a helpful contribution to the literature and of practical assistance to those involved with organisational redesign and information processing.

This paper has set forth tentative ideas about the relationship between the origins of knowledge and the potential success of organisational designs that can achieve optimal information processing. More work needs to be undertaken as to what precisely constitutes “fulfilment” of information needs, as this is likely to be attached to many variables such as time, currency, format and accuracy. The author is currently conducting research to test the validity of this hypothesis. This research is using a set of criteria derived from a variety of epistemological schools to explore the practical (as opposed to theoretical) implications of the theories set out in this paper. The work is being undertaken in sub-units and divisions of large, established organisations and initial results will be available during 2004. Whether one considers that the relation between organisational design and information processing systems is a passionate affair or a stormy interlude depends on many variables but it is an interesting approach and one that may result in a happy and lifetime union or reunion.

References

- Burke, M & Tulett, K. (1999) Impact of information needs on organisational design. *Journal of the American Society for Information Science*. 50 (4), pp. 380-381
- Davenport, T.H. (1993) *Process innovation: reengineering work through information technology*. Harvard Business School Press, Boston (Mass.)
- Forrester, J. (1965) *Industrial Dynamics*, MIT Press, Cambridge, MA.
- Gregso, C., (1989) Exploring misfit with multiple contingencies *Administrative Science Quarterly* Sept 34(3), 431 -454
- Hjørland, B. (2002) Epistemology and the socio-cognitive perspective in information science, *Journal of the American Society for Information Science and Technology* 53 (4). 257-270
- Horner, C. & Westacott, E. (2000) *Thinking through philosophy*. CUP, Cambridge
- Kenny, A. (1984) *The Oxford illustrated history of western philosophy* OUP, Oxford .
- Khandwalla, P. (1973) Viable and effective organisational design of firms *Academy of Management Journal* 16, (3) 481-495
- Li, F. (1997) From compromise to harmony: organisational redesign through information and communication technologies. *International Journal of Information Management* 17 (6) 451-464
- Magee, Brian (1998) *The Story of philosophy*. DK, London
- Maddison, R. (1989) *The Management of information systems in Information systems and IT for managers*. OUP, Milton Keynes.
- Mintzberg, H. (1989) *Mintzberg on Management. Inside our strange world of organisations* .Free Press, New York, NY
- Rasponi, S., (1985) *Michelangelo*. Bloomsbury Books, London
- Rice R. E. & Aydin, C. (1991) Attitudes toward new organisational technology: network proximity as a mechanism for social information processing. *Administrative Science Quarterly*, 36 (2) pp.219-226

- Tushman, M.L. & Nadler, D. A. (1978). Information processing as an integrating Concept in organisational design. *Academy of Management Review* 27, (3) 613-624
- Tushman, M.L. and Romanelli, E. (1985) Organizational evolution: a metamorphosis model of convergence and reorientation, *Research in Organisational Behaviour*, 7, 171-222
- Van de Ven, A. H. (1976) A framework for organisation assessment. *Academy of Management Review* 1, (3) 64-78
- Warburton, Nigel (1998) *Philosophy: the classics*. Routledge Oxford,