ABSTRACT

The widespread adoption of the internet means that, for many people, the computer is now a major means of communication with other people far and wide. As a result many forms of human organisation have an increasingly virtual character; the people who co-operate in the organisational endeavour are not necessarily in face-to-face contact. These developments can be classed as new forms of socio-technical systems in which emergent and virtual social systems are dependent upon and mediated by the internet and all the technical applications it has spawned. [Article copies are available for purchase from InfoSci-on-Demand.com]

Keywords: Human-computer Interaction; Open Systems; Socio-technical Systems; Task Interdependencies; Virtual Communities; Work Organisations

INTRODUCTION

The widespread adoption of the internet means that, for many people, the computer is now a major means of communication with other people far and wide. As a result many forms of human organisation have an increasingly virtual character; the people who co-operate in the organisational endeavour are not necessarily in face-to-face contact. These developments can be classed as new forms of socio-technical systems in which emergent and virtual social systems are dependent upon and mediated by the internet and all the technical applications it has spawned. It is important now to be examining the socio-technical nature of these virtual communities and the implications of the forms of interaction that mediate human communication in these communities.

There is a danger that, in the excitement to study new phenomena, all that has been learned about the operation and design of socio-technical systems in the past 50 years might be overlooked. The aim of this paper is to examine some of the major concepts in socio-technical systems theory to emerge before the internet and to evaluate their relevance to the new forms of virtual organisation that are now appearing. This
paper will focus upon the contributions of what has become known as the Tavistock Institute tradition of socio-technical systems theory, an approach to understanding operational work systems developed originally by Emery and Trist (1960) and Rice (1958) at the Tavistock Institute of Human Relations in London and expanded by others around the world in the subsequent half-century, see for example, Herbst (1974), Pasmore et al (1982), Pava (1983), Mumford (1987), Cherns (1987), Weisbord (1990), Clegg (2000) and Klein (2005). Other theorists have approached socio-technical systems issues from different conceptual bases but the purpose here is to evaluate the current relevance of the rich vein of research and practice that the Tavistock Institute work has inspired.

A SOCIO-TECHNICAL SYSTEMS THEORY OF OPERATIONAL WORK ORGANISATIONS

The Tavistock Institute of Human Relations researchers created socio-technical systems theory in a particular context. They were studying organisations engaged in daily work tasks such as coal mining and the weaving of cloth and were intrigued that introducing new technical systems to improve work performance often had the reverse effect. Four important elements of the conceptual structure that evolved from this work are introduced below because they have continuing significance in an age of virtual organisation:

- **The collective operational task.** The system in question is one that undertakes the operational delivery of collective tasks, i.e. achievement of overall task objectives depends upon the co-operative endeavour of a social system in which people occupy work roles within which they have responsibility for some part of the collective task.
- **Social and technical sub-systems.** Overall task performance in the system is under-

taken by the human resources in the social system making use of technical resources designed to support the tasks in question. In an effective socio-technical system the technical and social systems are co-optimised in order that an integrated approach can be taken to the performance of the collective task.

- **Open systems.** The work organisation is an open system in transaction with its environment and it has to adjust its behaviour as environmental conditions change. Accordingly the social and technical sub-systems have to enable the socio-technical system to be flexible in the short term and to evolve in the long term.

- **The unfinished system, reflection and redesign.** As an open system that needs to be able to cope with new demands, the operational system that does the work is always unfinished in the sense that it has to renew itself to optimise the way it tackles emergent requirements. As a consequence there have to be resources available that can reflect on the appropriateness of the current operational system and undertake any redesign that may be necessary.

The relevance of these conceptual foundations to the emerging phenomena of virtual organisation is explored in the sections below.

SOCIO-TECHNICAL SYSTEMS THEORY AND THE QUALITY OF WORKING LIFE

The first studies of work organisations as socio-technical systems in the 1950s were focused on collective operational tasks that deliver the daily products and services of an organisation. The basic proposition was that the collective work of an organisation is a product of the co-ordinated action of human resources making use of technical artefacts. In the initial studies the technical resources were a very long way from the ICT resources of today. After the second world-war,
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