



Chapter I

Introduction: Information Systems as Constrained Variety— Issues and Scope

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INTRODUCTION

This chapter seeks to cast light on the commonly encountered ‘human-centred’ versus ‘technology’ debate in information systems (IS: Clarke and Lehaney, 1998; Clarke and Lehaney, 1999; Lehaney, Clarke et al., 1999). It takes as its starting point a view which sees information systems as complex, adaptive, human activity systems, enabled by information technology (IT). Two approaches dominate in trying to understand such systems. The first redefines them as purely technical systems, for which a fixed and definable objective can be determined: from this point, the problem becomes one of design. The second approach sees the whole system through the views of the human participants: here, the problem initially is one of debate, aimed at determining a consensus view of the system of concern before moving on to designing relevant solutions.

The technical view outlined above might be seen as an attempt to reduce the system’s complexity, by removing the voluntaristic, probabilistic behaviour which the human actors bring to the system. Once this is done, more technologically focused IS managers are on comfortable ground, having redefined the system as one which is highly deterministic, and for which a solution can be achieved through the design of a new or improved system. Similarly, the human-centred view may be seen as excluding technical considerations in order to reach agreement on the part of participants before proceeding further.

To try to understand these and other possible positions, this chapter looks at the IS domain through the concept of constrained variety (Ashby, 1956). In the section which follows, we will first look at the theoretical grounding which casts light on this problem. Subsequent sections then discuss how IS may be constrained,

and what this means for understanding such systems. Examples are given of systems for which the variety constraint has been drawn differently, and some reflections and conclusions are drawn.

THE LAW OF REQUISITE VARIETY

Ashby's (1956) 'Law of Requisite Variety' is a *systems* concept, and, in so far as an information system may be seen generally as a *system*, the 'Law' may be related directly to information systems. Ashby (1956) introduced the idea of variety as, in one respect, the number of possible states in which a system can exist. Ashby's work addressed the idea of probabilistic systems, and used the concept of variety to express the number of different ways in which a system may be configured before the system itself is no longer able to survive.

Think, for example of the system of traffic lights. The colours red, amber and green have six possible colour variations or 'variety' (using a maximum of two colours and a minimum of one colour at any one time): red; green; amber; red and amber; red and green; amber and green. As an example, only four of these are used in the United Kingdom, but should more be required, the two currently possible but unused combinations could be actioned within the existing variety of the system. If seven colour combinations were required, the system would no longer be able to cope, and would need to be redesigned, at substantial cost.

Added to this concept of 'constrained variety' is Ashby's further assertion that only variety can destroy variety. For a manager to control a system, this infers that the manager must have at his or her disposal at least as much variety as the system has. This 'rule' has far-reaching consequences when dealing with systems for which complexity stems from both technology and human activity.

The conclusion to be drawn from this is that control in systems depends on either reducing the variety in the system (variety reduction), or increasing the variety we have at our disposal to manage the system (variety amplification). This has implications for those engaging in the development and management of human-centred information systems. In the following sections, four types of variety constraint are considered (technical, social, socio-technical, and critical), and are critiqued from the perspectives of variety reduction and variety amplification.

CONSTRAINT 1: TECHNICAL

The Human-Centred Position

Any study of the theory and practice of information systems from a technical perspective soon reveals the domain to be problematic. The most important single reason for this is that, whilst information systems management may often be pursued as a predominantly technical endeavour, it nonetheless has to work within a given social framework.

This adherence to technical problem solving leads to tensions when the system

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