

# Chapter XXV

## Objects as the Primary Design Principle for International Information Systems

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### ABSTRACT

*This exploratory research project set out to investigate the architecture and design principles of international information systems. Analysing six case vignettes in a modified grounded theory approach, a two-dimensional topology for international information systems—postulated from previous research as a seed concept—was confirmed as a useful architecture paradigm. In its terms, international information systems are configured from two elements: core systems (common for the whole enterprise) on the one hand, and local systems (specific only for each site) on the other. The interface between the two is a third component. The cases showed that achieving the correct balance between core and local can be a difficult political process and requires careful organisational engineering to be successful. One case vignette, in particular, highlights the logical and organisational difficulties in defining these systems elements. Object orientation as the fundamental design principle is investigated as an approach to provide a solution for this problem. Because it enables implementation differentiation and flexibility for future functional changes, it is conjectured that object technology is an optimal—technical—development strategy for international information systems. Directions for further research are outlined.*

### INTRODUCTION

The notion that globalisation is the only key to survival in a rapidly shrinking world has been a hackneyed cliché for many businesses since the early 1980s. Equally, the pivotal importance of information technology as a key business driver has not been seriously questioned in 30 years. Yet the

obvious fusion of these two truisms, the application of information technology throughout global operations, is still widely ignored by academics (Gallupe & Tan, 1999) and largely misunderstood by practitioners. As a result, international information systems<sup>1</sup> projects over the last 20 years have often been downright disastrous.<sup>2</sup> Research into why these applications are difficult and how they could

be mastered should be of high priority, but it is not: The ABI/INFORM database lists 32,919 papers with information systems as a keyword between 1985 and 2000. For the same time period, keywords to do with international information systems occur in 234<sup>3</sup> papers (i.e., in two thirds of 1 percent).

Furthermore, the sparse research efforts by the academic community have been sporadic and dispersed over many, disjointed and often irrelevant<sup>4</sup> topics (Palvia, 1998; Gallupe & Tan, 1999). This has left the field devoid of a firm theoretical base and framework from which to advise practitioners and to direct further applied research.

This exploratory paper first validates a generic architecture common to international systems. Selecting and building an appropriate IT architecture is considered an important building block for the successful development of any complex system (Earl, 1989). Because such an a priori architecture simplifies the design process, it has the potential to make the development of international information systems faster and less risky.

Validation of the architecture model then establishes a useful framework for further research into the nature of IIS. Combining the two-dimensional topology with the notion of object-oriented analysis, design and development of IIS provides a method for building IIS that is clearer, would avoid failure through destructive politics, and, thereby, removes a large portion of the risk associated with these systems. It, furthermore, provides eo ipso the flexibility required for the ever-changing information systems and technology environment within multinational enterprises.

The chapter is organised as follows:

- After a review of the (sparse) literature, previous research into the architecture of IIS is summarised.
- Next, the methodological backdrop to the approach used in the study—qualitative research, using grounded theory principles, especially the use of ideational concepts for sketching out a theory and its validation by re-casting these concepts—is introduced.
- The case vignettes are then described and their IIS structure expressed in terms of the postulated architecture model.

- Finally, the use, if the architecture model as a framework for analysing, designing and building IIS is brought out, and the benefits of an object-oriented approach are set out and demonstrated on examples drawn from the vignettes.

## **INTERNATIONAL INFORMATION SYSTEMS IN THE LITERATURE**

The literature does not clearly identify a generally accepted term for information systems technology applied across borders. Often “global” is used (e.g., by Ives et al., 1991), but “transnational” is also in general use (e.g., by King et al., 1993, 1999) for such systems. The first inevitably invites associations of vast enterprises covering the planet, whereas “transnational” is open to possible confusion with the precise use of the term coined by Bartlett and Ghoshal (1989) for describing one specific style of a firm’s operation in more than one country.

In this paper, therefore, the term “international”<sup>5</sup> is used. Furthermore, to distinguish international information systems (IIS) from other distributed systems, in this paper they are defined as:

*The distributed information systems (within one firm) that support similar business activities in highly diverse environments, commonly found across country boundaries.*<sup>6</sup>

Most reviews of international information systems in the literature<sup>7</sup> tend to agree that past research into IIS is sporadic and spread over a wide array of topics. Only in the last few years have researchers begun to direct their attention to the design and development of IIS.<sup>8</sup> Some of this recent research focuses on the structure and architecture of IIS (e.g., Gibson, 1994; Burn et al., 1996; Targowski, 1996; Grover et al., 1996; and Peppard, 1999) and the role of an information technology infrastructure in general (Weill, 1992, 1993; Weill et al., 1994a, 1994b, 1995, 1998; Broadbent et al., 1997). With the ever-increasing ubiquity of information technology and its ever-increasing pervasiveness, infrastructure has now acquired the role of the main technology architecture. This notion has been developed

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