

# Chapter I

## Modeling Work Processes and Examining Failure in Virtual Design Organizations

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### ABSTRACT

*Based on two case studies originally conducted to develop process support for virtual (distributed) design, this chapter models the virtual process observed in two industrial sectors characterized by original design and adaptive/variant design activity, thereby requiring different types of creativity. These models are used to generate a list of virtual problems or 'failures' which are subsequently examined using the engineering based techniques 5W2H and failure modes and effects analysis (FMEA) to develop insight into virtual team problems and possible solutions. The suitability of the design field is shown for the study of creativity in virtual teams and the link between design, creativity and business performance discussed. In many cases, if support is provided to solve virtual team problems not directly associated with creativity then team members may free up time and energy to focus on the increased 'cognitive capacity' required for higher creativity.*

### INTRODUCTION

This chapter advances research first conducted on mapping the virtual (distributed<sup>1</sup>) design space (MacGregor, 2002a, 2002c) for the development of appropriate virtual team support. The study context was two large multinational companies

involved in the design and development of products, with sites in the UK, but with very different client and product development, or co-creation focus. One is an engineering design organization from the oil and gas sector involved primarily in adaptive and variant design. The other is involved in product design within the fast moving

consumer goods (FMCG) sector and is characterized by higher levels of original design. The differences in this experimental test-bed allow a comparison of how virtual work is characterized across different types of design activity as well as the corresponding requirements or pressures associated with creativity.

An understanding of the virtual design workspace, established through the two cases, is developed through an examination of failure. Failure in this context is defined as some form of suboptimal virtual work which may result in the cessation of collaboration and affect overall performance, satisfaction and ultimately, creativity. Requirements are specified in response to the challenges and failures highlighted.

Design provides a fitting experimental test-bed for virtual teams and creativity. The suitability of design and its fit with creativity, virtual work, and business performance is discussed in the next section. This is followed by a description of the research methodology used in the cases. Next, various models are presented which aim to describe the virtual work in each organization. The section, “Summary of Virtual Problems” constitutes the failure focus of the chapter, developing a process failure modes and effects analysis (FMEA) which examines the severity, occurrence and remedial action associated with virtual work. Finally, the main useful output of the FMEA and implications for creativity are discussed briefly in the conclusion.

## **Virtual Work, Creativity, and Design**

A note on the applicability of using the design field as an experimental test-bed for creativity is useful. Many of the chapters in this book are focused on the design and/or new product development fields. These areas, especially in the context of virtual work, can be grouped under the general activities of co-creation. Bessant, Whyte, and Neely (2005) link design to innovation by stating that: “Design is the purposive application of

creativity to all the activities necessary to bring ideas into use either as product (service) or process innovations.” But how, exactly does design fit with creativity? First, it is important to note the increasing attention to creativity in general for increased business performance. In a world of increasing demands, challenges, and competition, the most innovative companies and next generation leaders will be those who sustain high levels of creativity inside the enterprise and across their networks. The Department of Trade and Industry (DTI) of the UK Government recently released an economics paper on ‘Creativity, Design and Business Performance’ (DTI, 2005). They define creativity as “the production of new ideas that are fit for a particular business purpose” and design as a “structured creative process.” It could be argued that for creativity to be successful in the highly pressurized environment of virtual teams, a structure for creativity is required, which may therefore be met by design. Of course, the very essence of creativity demands that it be allowed flexibility and freedom, and not be constrained—and best practice design strikes the right balance between chaos and control. Iterative experimentation and cycles of convergence and divergence that are required for creativity are also established features of good design.

The DTI specify that creativity and design, used effectively, are important competitive tools for firms. They detail the work of Swann and Birke (2005) showing the link between design, creativity, innovation, and productivity. Creativity is shown as the root of business performance with design an important delivery mechanism to transition creativity into innovation and, ultimately, productivity and business performance (Figure 1).

To fully understand these relationships one must understand the nature and characteristics of design. Design, like innovation does not just concern products. Tether (2005) details the many and varied roles and applications of design, from artistic painting through interior design and

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