In the system view of human factors, who is accountable for failure and success?

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Abstract

Human factors research and practice is tentatively exploring exciting developments in science—the embrace of systems thinking and complexity—and what it might mean for our understanding of human-machine systems and their successes and failures. Rather than following reductive logic, and looking for the sources of success and failure in system components, complexity and systems thinking suggests that we see performance as an emergent property, the result of complex interactions and relationships. A central problem today is that this may clash with how we think about accountability. When systems fail, we tend to blame components (e.g. human errors and the "villains" who make them), and when they succeed spectacularly, we tend to think in terms of individual heroism (e.g. the A320 Hudson River landing). In this paper, I lay out the contrast between a Newtonian ethic of failure, followed in much human factors work, and one inspired by complexity and systems thinking.

Introduction

Complexity is a defining characteristic of high-technology, high-consequence systems today (e.g. Perrow, 1984), yet componential explanations that condense accounts of failure down to some individual human action or inaction still reign supreme. An analysis by Holden (2009) showed that between 1999 and 2006, 96% of investigated US aviation accidents were attributed in large part to the flight crew. In 81%, people were the *sole* reported cause. The language used in these analyses has judgmental or even moralistic overtones too. "Crew failure" or a similar term appears in 74% of probable causes and the remaining cases contain language such as "inadequate planning, judgment and airmanship," "inexperience" and "unnecessary and excessive . . . inputs." "Violation" of written guidance was implicated as cause or contributing factor in a third of all cases (Holden, 2009). Single-factor, judgmental explanations for complex system failures are not unique to aviation—they are prevalent in fields ranging from medicine (e.g. Catino, 2008), to military operations (e.g. Snook, 2000), to road traffic (Tingvall & Lie, 2010).

The problem of safety analysis reverting to condensed and individual/componential explanations rather than diffuse and system-level ones (Galison, 2000) was one

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