Stitching the Patchwork Quilt: Integrating the Diverse Literatures Relevant to Complex Product Innovation in a Government Monospony

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Innovation is widely recognized as an important driver of economic growth and efficiency across multiple disciplines.(Utterback 1974) However, despite significant scholarly attention by economists, sociologists, business and military strategists, psychologists and technical historians among others, there remains limited consensus, among the disciplines, as to what innovation is and how it should be best encouraged. Part of the problem is that the dynamics of innovation appear to be strongly related to the environment in which innovation occurs[1] (Nelson 1993; Rothwell and Zegveld 1994) and the choice of the "unit" of innovation.[2] (Utterback and Abernathy 1975; Henderson and Clark 1990) Since the choice of these parameters – context and product unit – often relates to the domain interests of the investigator, multiple seemingly contradictory explanations have emerged. For example, individual characteristics and the structure of organizational relationships have both been shown to be primary drivers of innovation (Susskind and Zybkow 1978). Similarly, von Hippel's emphasis on lead users as a important source of innovation (Morison 1968; von Hippel 1988) contradicts the notion that innovation is catalyzed by visionary leaders in positions to enact change from the top-down (Rosen 1994). Rather than being contradictory, it is likely that different studies are accurately observing different pieces of an extremely complex phenomenon. (Fagerberg, Mowery et al. 2005). If a consistent system-level picture is to emerge, attention must be given to the ways in which insights from the various innovation disciplines complement each other.

One area where this is particularly important is in government acquisition of complex technological products as in the defense and space sector, with fighter aircraft, tanks, submarines, and spacecraft. With an expectation for each system to be vastly superior to its predecessor, and with only a single viable customer in most cases, much of the technology development burden falls to the government. (Sherwin and Isenson 1967; Adams and Adams 1972) As a result, complex organizational systems have been put in place, with the goal of catalyzing breakthroughs relevant to complex product innovation.(Szajnfarber, Richards et al. 2008) Within the umbrella of the department of defense, there are basic science research labs, technology development centers, advanced test facilities, formal project teams, mechanisms to incorporate operational needs etc.

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[1] (Nelson 1993) examines differences across national innovation systems; while (Rothwell and Zegveld 1994) illustrate the impact of differing economic conditions over American history)
[2] (Utterback and Abernathy 1975) focus on the basic production unit in their investigation, while (Henderson and Clark 1990) derive insights on the relationship of architectural and component linkages by examining a more complex "unit" of innovation.

Thus, insights regarding the differences between environments that foster entrepreneurial behavior and structured incremental change (Utterback 1994), or how incentive structures are best designed to encourage innovation (Teece 1986) may be equally as relevant as the more traditional insights derived from "grand historical narratives, operational histories, or bureaucratic-political case studies," characteristic of military innovation studies. (Grissom 2006) The goal of this paper is twofold. First, it seeks to identify areas where insights from the non-defense sector literature are most relevant to increasing our understanding of the government acquisition structure. Second, it will explore the utility of the government acquisition process as a framework for integrating a wide range of innovation insights.

To accomplish these goals, it will begin by constructing a diagram of categories of organizations involved in the government space innovation system, based on previous work by the authors(Szajnfarber and Weigel 2007; Szajnfarber, Richards et al. 2008). Based on this map, each of the bodies of literature discussed above (including military innovation studies, economics, sociology of technology, and business strategy) will be mapped onto the part of the process they inform. For example, insights from the innovation in military organizations literature are concentrated within the bounds of military organizations themselves (c.f. (Peck and Scherer 1962; Sapolsky 1972; Posen 1984; Rosen 1994; Farell and Terriff 2002), where the business literature focuses on the interaction among various user groups and along the manufacturing supply chain (c.f. Tushman 1977; Teece 1986; von Hippel 1988; Anderson and Tushman 1990; Henderson and Clark 1990; Abernathy and Clark 1993; Nelson 1993; Rothwell and Zegveld 1994; Utterback 1994; Christensen 2003). Once this map has been constructed, gaps and overlaps in the literatures can be identified and conflicts investigated. In addition to the literature map, the major output of this work will be set of key areas for future investigation, with proposed strategies for addressing many of them.

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