

Building Resilience in Large High-Technology Projects: Front End Conditioning for Success

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ABSTRACT

Success in mega-projects is frequently discussed among project theoreticians and practitioners. This research focuses on high-technology projects and draws on recent literature and fieldwork at ten contemporary mega-science projects in Chile, Australia, and Europe. This study concludes that project success is not random, and early adoption of certain approaches, activities, and launch conditions will position a project for success and resilience. Nine resilience factors (beyond a priori programmatic artefacts) are grouped into three 'attitudinal' factors, and six 'conditioning' factors and then examined in detail against three case study projects. The study's conclusion show that attitudinal factors remain a challenge, especially within institutional type high-tech projects, and launch conditioning shows mixed levels of application. Through the nine factors, this paper offers newly consolidated insights for high-tech project start-ups and presents the case for co-application of contingency funding and 'proto' task forces in response to unknown risks, and advocates the establishment of more formal information 'traffic' management through an empowered centralised project information office.

Keywords: Ambiguity, Contingency, High-Technology, Information Management, Lessons-Learned, Mega-Project, Optimism, Project Success, Resilience, Risk

INTRODUCTION

Success and failure in projects is a frequent topic among both project theoreticians and practitioners. Mega-projects especially have received attention from academic authors and the popular press, often recounting performance failures and cost and time overruns, which sometimes lead to *fiascos* (Grün, 2004). Less reported are the great successes where project goals were met, budgets contained, and most importantly, the customer or users were satis-

fied. Regardless of outcome, each case offers a learning opportunity providing the causal factors are investigated and the lessons applied.

This study posits that project success, unlike project planning (Flyvbjerg, Bruzelius, & Rothengatter, 2003) is not indeterminate by nature, and that undertaking certain activities, coupled with application of particular policies and launch conditions at the front end, positions a project for success and resilience. Evidence of continued high-tech project failure (e.g., The Standish Group, 1995, Proccacino, Verner, Overmyer, & Darter, 2002) indicates that a specialist examination is warranted, with the

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aim of convincing project managers to focus harder in nine areas contributing to project robustness and resilience. In this paper, I aim to identify the early conditions required for high-tech mega-project success, beyond the basic ‘givens’ of project structure, funding, tools, and plans.

Resilience is defined here as being akin to robustness in the sense of building strength and the ability to recover from, or adjust easily to, misfortune or change. The parameters of mega-projects are not tightly specified here, except to note that these endeavours typically have hundreds of millions or even billion dollar budgets, time-frames usually measured in at least years, and often a high level of public or political attention. In this paper, high-tech projects are defined as those involving research and development (R&D), a significant information technology (IT) component, application of leading edge science/engineering technologies, and with substantial infrastructure requirements.

LITERATURE

Compared to the amount of project management practice guides, Books of Knowledge (BoKs), and ‘how to do it’ literature, written project management theory is less common and better described as a collection of techniques and best practice than a scientific treatment of the topic. In response to project management approach and attitudes, Erno-Kjohede (2000) tackles the management of research projects, addressing the underlying concepts of complexity and uncertainty at the conceptualisation phase, and the balancing of risk-taking and failure. Difficulties with early stage risk assessment in relation to over-reliance amid uncertainty are examined by Bakker, Cambre, Korlaar, and Raab, (2010), Flyvberg et al. (2003), and Gerald, and Kutsch, (2010). Project shaping as a management craft is investigated by Smith & Winter (2010) who show clear links to project success, while Miller and Olleros examine episodic style project shaping as a competitive advantage (Miller & Lessard, 2000). Blanchard (1990) and Cook-

Davies (2002) discuss the ‘people’ aspects of new projects and the pivotal role of management as the first human resource, while new work by Jani (2010) asserts that self-efficacy enables resilience in IT project teams. Nonetheless, attitudinal factors for project shaping and context setting have yet to be set out in relation to high-tech projects specifically. A number of early critical success factors (CSF) are proposed by Elenbaas (2000) who notes the crucial conditions and complex environments within project start-ups. Much referenced authors Shenhar and Dvir (2007) emphasise the need for early tailoring of project success measures and dimensions. In their examination of project peripety (an abrupt turn of events), Engwall and Westling (2001) explore assumptions around linear project processes and the limiting effects of articulating imperfect knowledge at project start-up. Lechler and Dvir (2010) offer recent work on linking project management structures to project success, arguing for serious attention to early organisational structure. Weston (2007), Fellows and Alexander (2010), and Fisher (2010) each touch on early stage risk of immature technologies and the gap in understanding between industry and institutions. While these (and other) authors address diverse facets of early stage project conditioning, there remains a gap in the literature for an empirically based summary of early stage conditioning factors concerning resilience within high-tech projects.

STUDY APPROACH AND METHODOLOGY

This study draws from material largely published between 2000 and 2010. While peer-reviewed papers and books offer expert knowledge, reports from project publications revealed more practical experience. Discussions at relevant conferences and workshops gave further insights; in particular the topics of peripety, optimism, and mission assurance which were prominent at the 2010 NASA Project Management Challenge, an annual best practice networking event (NASA, 2010a).

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