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ScienceDirect

Procedia Computer Science 20 (2013) 325 – 330

Procedia Computer Science

Complex Adaptive Systems, Publication 3
Cihan H. Dagli, Editor in Chief
Conference Organized by Missouri University of Science and Technology
2013 - Baltimore, MD

The Root Cause of Failure in Complex IT Projects: Complexity Itself

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Abstract

Increased demand for better technology and perpetual global expansion continue to provide developers with many project opportunities for success, as well as failure. While no industry is immune from project failure, the Information Technology (IT) industry is shown to be more susceptible to risk and failure than those of other industries. Agile project management, which facilitates adaptation to changing circumstances and alleviates rigid formal controls, has become more popular in the software development industry though is not entirely compatible with traditional project management approaches.

In this paper we will examine the primary causes of IT project management failure stated in modern literature, analyze these causes, and discuss the degree of complexity within the projects from a systemic perspective related to emergence, non-monotonicity, and non-ergodicity. The paper concludes with some conceptual management approaches that respond to these "true" root causes of failure, for applications in agile organizations and beyond.

Selection and peer-review under responsibility of Missouri University of Science and Technology

Keywords: project management, project failure, information technology, information systems, complex adaptive systems, complexity, PMBOK, agile

1. Investigating Failure in Complex Projects

Any undertaking that involves creating a new product or process is fraught with peril, but IT projects regularly fail. In a study published by The Standish Group of over 50,000 IT projects between 1992 and 2004, only 29 percent could be classified as successes [1]. Most project failures can be classified into one or more of the following categories: (1) failure to meet the approved schedule, (2) failure to achieve cost objectives, and (3) failure to provide the expected project scope. These aspects of failure are often characteristics within the following four categories of failure, defined by Lyytien and Hirchheim [2]:

- Correspondence failure: Systems design objectives or specifications not met.
- Process failure: System cannot be developed within the allocated budget or schedule.
- Interaction failure: User attitude, satisfaction, and frequency of use do not correspond to the level of system usage, i.e. the system is implemented out of necessity and without increased task performance.
- Expectation failure: System does not meet stakeholder requirements, expectations, or values.

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doi:10.1016/j.procs.2013.09.280

1.1. Commonly Stated Causes of Project Failures

There are at least two types of projects to consider when evaluating causes of failure [3]. Type 1 are well understood, routine projects with a clearly defined scope and few unknowns. The extent of their complexity is that they may be intensely detailed. They may run late or over budget though will only fail if technical expertise is lacking to handle unexpected deviations from the plan. Type 2 projects, also considered *complex*, typically have many unknowns and an unclear scope. Difficulties may arise in these projects even in the beginning, and the client will often not approve the project itself. Planning problems, especially those dealing with defining project scope, are generally a major cause of failure when dealing with projects that are of the second type [3].

The term "perceived failure" was fathered by Dr. Harold Kerzner who suggested that failed projects are the result of some combination of both "actual failure" and "planning failure" [4]. *Actual failure* occurs because there is a discrepancy between what was planned and what was accomplished, whereas *planning failure* occurs because there is a discrepancy in what was planned and what was actually achievable. Kerzner acknowledged the fact that human dynamics play an important role in project management failure, citing poor motivation, productivity, and human relations; lack of employee and functional commitment; delayed problem solving; and unresolved policy and stakeholder issues [4].

Murray provided the following attributing factors of IT project failure, some which are characteristic of tendencies observed in complex projects [5]:

- Unrealistic project scope given the available resources and project development experience.
- Improper management of scope creep, the continuous expansion of the project scope.
- New technology that is critical to the project has not been previously developed.
- The organization's issues are not understood.
- Custom work is needed for the organization's business activities.

Kweku Ewusi-Mensah, a professor of Information Systems at Loyola Marymount University, developed a unique view of project failure by focusing on discarded projects, in particular the ones that were cancelled by managers or sponsors because they believed that the project would not be successful. He projected the risk factors of abandonment that were associated with these projects and paralleled them to those theorized in software risk management research [6]. A comprehensive overview of what he identified as "abandonment factors" is shown in Table 1, as well as the other risk factors he found most noteworthy in literature.

Table 1: Software management risks

Boehm, 1991	Ropponen & Lyytinen, 2000	Ewusi-Mensah, 2003: "Abandonment Factors"
• Personnel shortfall and straining computer science abilities • Unrealistic schedules and budgets • Developing wrong functions, properties, and/or user interfaces • Constantly changing requirements • Shortfalls in procured components or labor	• Scheduling and timing • System functionality • Subcontracting • Requirements management • Resource usage and performance • Personnel management	• Unrealistic project goals and objectives • Poor project team composition • Project management and control problems • Inadequate technical expertise • Problematic technology base/infrastructure • Lack of executive or support/commitment • Changing requirements • Cost overruns and schedule delays

These stated causes of failure are indeed striking; however, many appear to be manifested as by-products of two enveloped root causes: a lack of adequate and sufficient resources (including skilled management personnel provided for the project) and the complexity inherent within the project itself.

Recent studies in IT project failure broaden the paradigm slightly by including the complexity and size of a multi-faceted projects as a root cause [7]. Project management education teaches us that identifying and considering areas of risk as well as their impact in the beginning and throughout the project can increase the likelihood of success. Even so, the major frameworks used are not conducive to understanding the underlying nature of systemic complexity inherent in complex adaptive systems (CAS).