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Stakeholder perceptions of software project outcomes: an industry case study

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Abstract

BACKGROUND: In spite of their limited scope, measures reflecting adherence to schedule, budget and specification continue to dominate the assessment and reporting of project outcomes. OBJECTIVE: We set out to explore how the parties involved in the acquisition and deployment of a self-contained software system viewed the project's outcomes, and the measures they considered. METHOD: Large volumes of empirical data were collected as part of a longitudinal case study conducted in a large multi-national company and were analyzed using qualitative methods. RESULTS: While the conventional criteria remain of interest, the evidence reported here indicates that a richer set of contributors influence perceptions of project success and failure. CONCLUSIONS: The evaluation of project outcomes needs to become far more sophisticated and, at the very least, other measures should be considered alongside traditional measures.

Keywords: Software projects, project outcomes, case study.

1. INTRODUCTION

Software project outcomes are often described at a high level in terms of 'success' or 'failure', drawing on what some authors refer to as the 'iron triangle' [1,2] of adherence to cost, time and scope. Hence we see these measures cited frequently in the literature as being indicative of a software crisis, and as motivation for more methods, tools, processes and so on. While these are undoubtedly useful overall indicators, they are inherently limited in scope. This limitation is particularly evident, when attention is given to the broader set of concerns commonly in focus in a business context i.e. business benefits to the organization. Furthermore, given the increased diversity of those involved in contemporary software projects, these three measures reflect outcomes that are considered to be important by only a subset of a project's stakeholders [2]. We therefore asked the following research question: how do stakeholders in a software acquisition project perceive project outcomes? To answer this question, we conducted an in-depth longitudinal case study of a software project that involved several diverse stakeholder groups.

Next, we review prior work on project outcomes of software systems development and software engineering. We then describe the case study design and the methods used in data collection and analysis. In Section 4 we present the analysis – given the objective of our work and its focus on perceived project outcomes, this deals minimally with the project and rather is focused on the perceptions of those involved regarding its emerging outcomes. We then discuss the results of our work and their implications for the measurement and reporting of project outcomes. The paper closes with our conclusions and consideration of directions for future research.

2. RELATED WORK

In the literature on software systems development, software project outcomes are typically described in terms of 'success' or 'failure' – although identifying just what constitutes these can be problematic [3]. It is generally recognized that success and failure are multi-dimensional constructs, with interrelated technical, economic, behavioral, psychological and political dimensions (e.g. [4-6]), and there is therefore a lack of consensus on how to define and measure them (e.g. [7,8]).

In order to make them more tangible, project outcomes have been defined in terms of the software systems development process (e.g. [6]) and/or its product (e.g. [4]), such definitions reflecting the iron triangle or other measures. Some authors have proposed additional concepts of software system success, such as implementation and solution success [9]. Other researchers have approached project outcomes in terms of the ability of a software system to meet the expectations of its stakeholders, either individuals or groups [10], who may judge it by different criteria [4,11]. Moreover, their evaluative assessments may change over time [7,8], in response to political maneuvering, persuasion, or changes in the organizational and technological context [5,8].

A number of authors suggest that success or failure should be thought of as a process, rather than a single discrete outcome (e.g. [8]). Accordingly, the success or failure of a software system is constructed as the result of negotiated or contested subjective interpretations and should be viewed against the historical context of software systems development and use, and the complex social and political interactions it involves [8].

Finally, in the often-cited IEEE Computer Society definition of software engineering [12]: *the application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software, and the study of these approaches; that is, the application of engineering to software*, the iron triangle accounts primarily for the *development* part of software engineering. Moreover, if we take *engineering* more generally, we encounter a broader set of considerations relating to utility, safety, and the needs of humanity or society. Adherence to budget and schedule does not effectively reflect such criteria. Underlying this mismatch is the fact that software engineering success does not necessarily equate to software project success; the former is a necessary but not sufficient condition for the latter. The trend toward component-based development, distributed enterprise-wide applications and evolving software-intensive systems of systems [13] will only exacerbate this situation, leading us to further question the appropriateness of such evaluations.

In summary, project outcomes vary along a continuum, may be interpreted from different perspectives, at different times, and are in many cases constructed through processes of sense-making and negotiation. In view of this, others have emphasized the need to develop a more extensive framework for defining software project outcomes [2,10]. The case study that follows draws on extensive empirical evidence to illustrate why this is the case.

3. CASE STUDY DESIGN

In undertaking this interpretive research, our intention was to develop an in-depth understanding of project outcomes that is meaningful beyond the research site. The validity of this understanding relies on its ability to provide a convincing explanation and on the clarity of the logical reasoning underpinning its argument. In constructing our account we have strived for authenticity, plausibility, and criticality – the three criteria that interpretive case studies need to demonstrate [14].

To address the research question, a software project in a large multi-national organization (referred to as AlphaCo) was followed for over two years. The project entailed developing a sophisticated database solution to replace existing financial spreadsheet models used to manage the company's information technology (IT) outsourcing contract. It involved the acquisition, configuration and deployment of a commercial software package by external consultants. As such, it provides a useful exemplar of contemporary software systems development practice.

The project owners were the unit responsible for managing the contract, the ISOM team (a pseudonym), a small team of business analysts, including Claire and Gary, led by Dave, the ISOM Manager. The project sponsor was James, the IS Commercial Service Manager, to whom the ISOM team reported. Consistent with organizational policy, an external project manager, Frank, was hired to manage the project through to its expected completion in December 2005, and external consultants, SoftCo (also a pseudonym), were engaged to supply a multi-dimensional database and OLAP tool (MDS, SoftCo's proprietary application development tool) and to develop the desired database solution. SoftCo's project team included Marie (project manager), Nancy and Ross (both senior developers), and various junior developers.

The project was followed through development and into use by the first author from mid-2005 to mid-2007. Field work involved an intensive 8-month period of participant observation coinciding with the main project activity, followed by a number of site visits as work on the project became more sporadic. In total, 558 hours were spent on site, observing project activities and meetings and conducting 34 semi-structured interviews with internal staff (including the ISOM team, their managers, senior IS managers and other AlphaCo IS staff) and external staff (Frank and the SoftCo project team). Combining interviews with observation enabled questions to be tailored to the individual experiences of key informants, in an iterative process of observation and verification [15]. All project documentation was made available to the researchers. Various internal organizational documents and publicly-available articles on AlphaCo and its IS function were reviewed to provide contextual information.

Comprehensive thematic analysis was used to analyze the data collected from field notes, interview and meeting transcripts, emails, and project and organizational documents. Data were read multiple times by the first author, categorized and compared across common themes that emerged during project enactment, informed by the relevant software systems development literature.

4. RESULTS

4.1. Development and use of the MDS solution

Work on the MDS solution began in early November 2005. It entailed iterative cycles of building (by Nancy and Ross), testing (by Frank and Gary), and amendment. Solution development quickly fell behind schedule, and milestones had to be revised. By the end of 2005, the expected completion date and Frank's departure date, the MDS solution was largely complete but untested. Gary then took over as project manager, responsible for getting the MDS solution tested and operational within the live environment – a process which (for various reasons) took until mid-2006 to achieve. In April, despite ongoing problems with the MDS solution, the IS Project Office encouraged Gary to formally close the project, to avoid it registering as a 'red light' on the AlphaCo IS balanced scorecard.

In early 2006, a major restructuring of AlphaCo IS began, which introduced considerable disruption and change within AlphaCo IS (including to senior IS management personnel). The project's small size and its ownership by a support service, rather than a business unit producing direct business value, meant it "fell off the radar" (Dave, informal conversation, 23 March 2007) during this period. The restructuring changed the reporting requirements for the former ISOM team, which was down-sized and given wider responsibility (for IS-wide financial management and performance reporting). One consequence was that the MDS solution was essentially unused, from the time of its completion (in August 2006) until July 2007, the end of the research period.

4.2. Reflections on Project Outcomes

A clear measure of project success had not been implemented in AlphaCo IS. With respect to monitoring project performance, the IS Project Office utilized standard measures of on time, to budget and to specification. For product delivery, success encompassed business acceptance of the solution as well as the delivery and realization of benefits as outlined in the project's business case.

So, in terms of their measures, the ISOM database project was completed to specification and within budget, but ran over time. Gary's final monthly progress report noted that the project was completed by the end of February 2006, "A little late, due to resource issues, well under budget, despite a few small 'out-of-scope' items being added, [with] full benefits described in [the business case] expected" (project document, March 2006). In his Closure Report, Gary noted that "All objectives … have been met … The finishing deadlines for the project were stretched out longer than expected" (project document, April 2006). In fact, it was not until August 2006 – six months late – that the MDS solution was finally transferred to the live environment. At the time the project was formally closed (April 2006), actual project costs were within budget. Subsequent costs required to transfer the solution to the live environment were treated as additional, requiring separate approval (although had these been included as project costs, the project would still have been within budget).

Other members of the ISOM team also considered the project to have been successful, though delayed in terms of delivery. James, the project sponsor, noted that, "It meets all the requirements … [although] it's taken longer to implement than initially per the Project Plan" (James, interview, 14 June 2006). Similarly, when asked about the project, Claire suggested that "It's gone okay. No major issues … It's been a good project … Things [just] took a bit longer to complete, to finalize" (Claire, interview, 20 June 2006). Dave, the ISOM Manager, also considered the project to be successful. To account for the delays in testing the MDS solution and transferring it to the live environment, Dave distinguished between solution development and deployment:

> *The project was a success … In the project, the model was built, it was delivered … The final deployment, I see as something being quite different, because the model operates as intended.* (Dave, interview, 25 May 2006)

Indeed, in terms of product success, the MDS solution was perceived by members of the ISOM team as being superior to their original spreadsheets. The Closure Report prepared by Gary noted that the "New model [is] far superior to present solution … much improved … more accurate and useful ... The final result is a very useful application that has endless opportunities" (project document, April 2006). This was also borne out by comments made in interviews and conversations e.g. "It works well. We can pull heaps of stuff off it … The thing seems to run perfectly" (Gary, interview, 27 October 2006). In fact, many of the ISOM team's evaluative statements about the MDS solution were future-oriented and rehearsed benefits anticipated earlier in project documentation:

> *We never quite knew how quick it would be to produce ad hoc reporting. So, it's in the ad hoc space that it's* ***going to be*** *most valuable.* (Claire, interview, 20 June 2006, emphasis added)

> *The reports that we come up with, to make recommendations from,* ***should be*** *more reliable, more complete and more informative"* (Dave, interview, 25 May 2006, emphasis added)

By mid-2007, however, the majority of these benefits had not been realized, as the MDS solution had essentially not been used for the purposes for which it was intended. The level of change and disruption associated with the AlphaCo IS restructuring had removed much of the perceived relevance of the MDS solution. Despite predictions by Gary and Dave that the need for the MDS solution would be recognized within the company when things had begun to "settle down again" (Dave, interview, 23 March 2007), this had not eventuated by the end of the research study.

In terms of project success, the SoftCo developers, Nancy and Ross, were generally pleased with what they had achieved:

> *From my perspective, I think [the project] went well … To get [the basic model] done within those three weeks or four weeks, I think that went quite well ... Nancy and I worked quite well to get it done in that timeframe.* (Ross, interview, 22 December 2005)

Even so, Nancy was disappointed that they had not made delivery on time: "It's gone alright. But, I mean for me … I like to deliver a project on time and it didn't get delivered on time" (Nancy, interview, 22 December 2005). Marie, SoftCo's project manager, also emphasized the achievement attained, noting that with more time the interaction with AlphaCo staff would have increased:

> *I think it went relatively well. It was a bit rushed. Like I would have loved to have seen six to eight weeks for the project to do it well. The other thing was there was not enough time to get Gary and Frank and Claire up to speed with MDS, to understand how MDS works.* (Marie, interview, 21 December 2005)

The SoftCo team felt that, once minor problems had been addressed, the MDS solution had achieved what it was meant to. This was evident not just to the researcher, but to members of the AlphaCo project team. As Gary observed:

> *[The SoftCo team] do all talk highly of it. When you get away with them out for a beer afterwards, they don't go, 'I think we sold you a hospital pass' … They are quite positive about it. They believe in it.* (Gary, interview, 5 January 2006)

Frank, AlphaCo's external project manager, also believed that even if the solution development process had not been ideal, SoftCo would (eventually) deliver a suitable solution:

> *I think [SoftCo] are going to come up with the solution we wanted at the end of the day … Maybe they could've tried and said, 'If we had another week, we could deliver you a better solution or a solution that might go a little bit more smoothly in terms of the development process'.* (Frank, interview, 12 December 2005)

SoftCo's goal had been to use the successful delivery of the MDS solution to launch an ongoing relationship with AlphaCo. Despite Marie's view that "the client relationship was good" (Marie, interview, 21 December 2005), at the time fieldwork concluded, achievement of this goal was not evident. The cost to SoftCo had been high. The team worked long hours to complete the MDS solution (much longer than forecast or billed) and Marie openly acknowledged that SoftCo were not making any money on the project and were seeking to minimize their losses where possible.

4.3. Discussion

The case study is an exemplar of contemporary software systems acquisition and deployment. What should have been a small, well-defined project was anything but that, experiencing delays and difficulties more typical of larger, complex projects. It could be argued that, ultimately, the inability to complete the ISOM database project and produce a usable MDS solution in a timely manner was crucial to its subsequent non-use. In retrospect, the failure to exploit the short window of opportunity available before the AlphaCo IS restructuring meant that the utility of the solution and the reports it produced was not demonstrated, and their use did not become institutionalized within AlphaCo.

The study provides evidence that project outcomes are more complex than is conveyed by traditional concepts of success and failure, or measured by the iron triangle. From our analysis we now make a number of general observations about stakeholders' perceptions of project outcomes (illustrated here by example), as being:

- Empirical – stakeholders draw their conclusions regarding project outcomes based on what they observe or experience before, during, and often after, a project. Thus, we see the gap between the official documented record of the project (completed early 2006) and what occurred in practice (solution transferred to the live environment in August).
- Temporal – outcomes are considered frequently and assessments may change over time. At the planned delivery date, the project was a failure - the system had not been delivered and did not meet specification. Six months later, it was considered a success – delivered late but on budget and to specification.
- Personal – the specific experiences of each stakeholder inform and influence their assessment of a project. For instance, the SoftCo developers considered the project to be a success, but their company's objectives were not achieved – they did not turn a profit and the relationship between the two organizations ended with the project.
- Multi-dimensional – the diversity of elements considered across the range of stakeholders suggests that the iron triangle reflects only some of the outcomes of interest. In terms of the product delivered, the project was seen as a success. However, in terms of solution value and benefits accrued, the project had failed.
- Contextual – projects do not exist in a vacuum, but take place at a certain time in a certain context comprised of people, processes, group and organizational structures, all of which influence project outcomes, and stakeholder perceptions of those outcomes. The restructuring that occurred toward the end of the project saw the ISOM team disbanded, with team members redeployed or assigned other responsibilities. Project currency was lost and the very need for the solution no longer existed.
- Negotiated – the assessment of outcomes is influenced by political and social interactions, as well as technical and managerial considerations regarding functionality and aspects addressed by the iron triangle. Institutional pressure was exerted to get Gary to close the project early, even though there were still problems with the MDS solution. AlphaCo IS's formal reporting interest was put ahead of those of the ISOM project team.

5. CONCLUSIONS AND FUTURE WORK

We set out to investigate how project stakeholders form their perceptions of software project outcomes through an in-depth longitudinal case study. Our analysis provides evidence of the definitional ambiguity of software project outcomes as well as their multi-dimensiona1, emergent and unpredictable nature. We support calls to re-conceptualize success and failure [8] with the intention of providing more inclusive frameworks for defining or characterizing project outcomes relevant to both research and practice [2,10]. Further studies of project outcomes should consider a richer set of measures in order to investigate the wider relevance of the general observations made above.

6. ACKNOWLEDGMENTS

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