Is it Time to Rethink Project Success?

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Abstract

The notion of success and failure in software projects are confusing. Failure is often considered in the context of the iron triangle as the inability to meet time, cost and performance constraints. Yet, while there is a consensus around the prevalence of project failure, new projects seem destined to repeat past mistakes. This paper tries to advance the discussion by offering a new perspective for reasoning about the meaning of success and the different types of software project failures. The paper advocates rising beyond the fixation with internal parameters of efficiency. It begins by discussing the limited insights from existing project failure surveys, before offering a four level model addressing the essence of successful delivery and operation in software projects and considering the different measures required in order to utilise richer measurements of success.

Keywords: project success, project failure, output, outcome, software project management.

1.0 The Extent of Software Project Failures

The popular computing literature is awash with stories of software development failures and their adverse impacts on individuals, organisations, and societal infrastructure. Indeed, contemporary software development practice is regularly characterised by runaway projects, late delivery, exceeded budgets, reduced functionality, and questionable quality that often translate into cancellations, reduced scope, and significant re-work cycles [1]. The net result is an accumulation of waste typically measured in financial terms. For example, in 1995 failed US projects cost $81 billion, with an additional $59 billion of overspend, totalling $140 billion [2]. Capers Jones contended that the average US cancelled project was a year late, having consumed 200% of its expected budget at the point of cancellation [3]. In 1996, failed projects alone totalled an estimated $100 billion
In 1998, 28% of projects failed, at a cost of $75 billion, while in 2000, 65,000 US projects were reported to be failing [2]. McManus and Wood-Harper [5] reported that the cost of software project failure across the European Union in 2004 was €142 billion. More recently, a McKinsey-Oxford survey of more than 5,400 software projects revealed that half of all projects significantly fail on budgetary assessment, while 17 per cent of projects actually threaten the very existence of the company, with the average project running 45 per cent over budget and seven per cent behind schedule, while delivering 56 per cent less functionality than predicted [6]. According to the report achieving $15 million in benefits now requires an average spending in excess of $59 million.

Consultancies and polling organisations have attempted to collect market data about the prevalence of failure. The Standish Group, for example, has been compiling an annual failure survey since 1994. In 1995, 31.1% of US software projects were cancelled, while 52.7% were completed late, over budget (cost 189% of their original budget), and lacked essential functionality [2]. Only 16.2% of projects were completed on time and within budget; only 9% were in larger companies, where completed projects had an average of 42% of desired functionality (ibid.). The 1996 cancellation figure rose to 40% (ibid.) before improving to around 15% in 2002 (see Figure 1). However, the most recent figures reveal that the current failure rate is 21% [7] with 63% of overall projects labelled as not successful.

![Figure 1 Standish Figures 1994-2012](image)

While the research approach used by the Standish Group has been challenged over the methodology adopted and its rigour [8, 9, 10, 11], the figures provide a well-referenced baseline related to the extent of software project failures. Other studies appear to confirm the high failure rates. For example, Taylor [12] reported that
only 130 projects out of 1,027 were considered successful, while a 2004 PriceWaterhouseCoopers study surveyed 10,640 projects and revealed that only 2.5% of companies achieve budget, scope and schedule targets on all their projects. Sauer and Cuthbertson [13] reported that 16% of IT projects (with a major emphasis on software development) were considered successful, however Sauer, Gemino and Reich [14] noted that 67% of the projects were nonetheless delivered close to budget, schedule and scope expectations. More recently, McManus and Wood-Harper [5] discovered that only one in eight IT projects can be considered truly successful, with almost a quarter (23.8%) cancelled due to issues related to requirements, change, communication, business process alignment and overspend. Using similar definitions IBM [15] reported that only 40% of projects experienced by 1,500 change management executives met their schedule, budget and quality targets, while KPMG [16] observed that 70% of surveyed organisations in New Zealand had experienced a failure in the previous twelve months. Following interviews with 600 developers, Geneca [17] reported that 75% of project participants lacked confidence in project success, admitting that their projects are ‘doomed right from the start’.

Jones [18, 19] investigated the likelihood that the average US software project will be cancelled, typically due to cost and schedule overruns, failure to meet requirements, poor planning, estimating, quality control or excessive requirements creep, relative to size. The results indicate that none of the eight domains investigated are fully successful for large systems of above 10,000 function points in size, showing the average probability of cancellation at 36%. He warned that the ‘development of large applications in excess of 10,000 function points is one of the most hazardous and risky undertakings of the modern world’ [18, p. 54]. Applications in the region of 100,000 function points are more likely to fail with an average cancellation likelihood reading of 51%, with some sectors such as Management Information Systems displaying higher failure rates (70%). Jones [19, p. 308] concluded that: ‘Cancellations, major delays in excess of one calendar year, and cost overruns in excess of 100 per cent remain endemic problems for software applications in the 100,000 function point size range, and larger.’ Jones [20] further added that: ‘large software projects are almost always over budget, usually delivered late, and are filled with bugs when they’re finally delivered. Even worse, as many as 35 per cent of large applications in the 10,000 function point or more size range will be cancelled and never delivered at all.’

Flyvbjerg and Budzier [21] contended that IT projects are now so big and their influence so wide ranging across many aspects of the organisation, that they pose a singular new kind of risk that can sink entire corporations, cities, and even nations. Their global survey of 1,471 IT change projects showed that while the average cost overrun on large initiatives was 27%, one in six projects showed a cost overrun of 200%, on average, and a schedule overrun of almost 70%. As software is integrated into bigger products and systems, the concerns can become magnified.
‘The software industry has the highest failure rate of any so called engineering fields. An occupation that runs late on more than 75 per cent of projects and cancels as many as 35 per cent of larger projects is not a true engineering discipline.’ [20]

2.0 Beyond Simple Success Measures

The relationship between success and failure is not clear. Some view the relationship as a binary function so that a project is either successful, or not. The research by McManus and Wood-Harper [5] describes failure as ‘those projects that do not meet the original time, cost and requirements criteria’. The Standish Group makes a further distinction between ‘failed projects’ and ‘challenged projects’. Failed projects are cancelled before completion, never implemented, or scrapped following installation. Challenged projects are completed and operational projects which are over-budget, late, and with fewer features and functions than initially specified. Successful projects, in contrast, are completed on time, on budget, with all specified features. Figure 1 also shows the relationship between successful, challenged and failed projects. Observing the Standish figures over the past nineteen years, would appear to indicate a rough rule of thumb suggesting a split of 25% of projects being successful, 50% being challenged, and 25% failing.

The Oxford Dictionary defines success as: a favourable outcome; doing what was desired or attempted; the accomplishment of an aim or purpose; or the attainment of wealth or fame or position. Failure is broadly defined as lack of success supporting the idea of a binary relationship. In an attempt to make further sense of the relative positions of success and failure, software surveys have clearly found it useful to introduce the idea of partial failure (or challenged projects) as an intermediate position between success and failure, potentially indicating dissatisfaction with a two state explanation. Indeed many project outcomes do not fall directly into either category.

The majority of the studies mentioned above define success as meeting all the criteria associated with the budget, schedule and performance; with failure viewed as a failure to meet all of the same criteria. This implies that if a project is finished on time, within budget whilst offering the expected performance it can be viewed as successful. Conversely, failing to meet any of the criteria will deem it a failure. The view is predicated on the traditional measures applied in project management and generally known as the triple constraint, the golden triangle or the iron triangle. This idea presupposes high estimation accuracy with regard to the initial formulation of the variables of the triple constraint [11] when the degree of uncertainty is at its greatest.

Traditional project management theory holds that optimising the three criteria will result in ideal performance on a project. Typical projects thus require a balancing act between the so called triple constraints of time, cost and performance as expressed in the original triangle conceived by Dr. Martin Barnes in 1969 (see
performance’. The original release named that corner ‘quality’, but this was soon corrected to performance ‘to reflect whatever the finished product was supposed to achieve’ [22]. Performance means satisfactory function of the product, which has to be fully defined. This could be specified in terms of rate of return, profit, beat the enemy, impress visitors, or in the case of software the scope and expected functionality. The whole point of the triangle is that the spot can be placed at such a point that its closeness to each corner represents its relative importance and helps the project manager to make informed decisions about the project. Trade-offs and adjustments are therefore made by restricting, adding to, or adjusting the cost, time and performance associated with a project. The triangle enables managers to consider each decision and its implications on the dimensions of time, cost and performance and integrate the different project management functions. For example, the more that is requested in terms of performance, the more it is likely to cost and the longer the expected duration. If the client needs to have a certain performance delivered very rapidly, this will increase the cost due to the need to work faster and have more resources involved in the development, albeit with increased communication costs. The more features expected from a system, the higher the cost and the longer the expected duration. Conversely, if the costs need to be kept to a minimum, one may need to consider the essential performance, or the overall project scope, and compromise there [23].

Figure 2 Cost, time and Performance Trade-off

The three factors clearly play a key part in determining the degree to which a project is challenged (or even deemed a failure); yet they may be uncontrollable by the project manager. Indeed, Capers Jones observed that the most common constraints encountered are: fixed delivery dates; fixed-price contracts; staffing or
team size limitations; and performance or throughput constraints [24] i.e. fixed
time, price, staffing level, performance and scope. Many managers are thus looking
to control other factors that may alter the outcome of the project, in particular, as
the constraints often occur in concert. Measuring success on the basis of pre-
established parameters that cannot be adjusted is therefore of limited value.

3.0 Rethinking Project Success

Project success is a rather nebulous concept and the focus on the triple constraint
can be too limiting. Indeed, Linberg [25] asserted that a whole new theory of
project success is needed. Pinto and Slevin [26] noted that success combines issues
related to the project itself with issues related to the client. Moreover, software
developers and systems analysts have recognised long ago that user involvement,
satisfaction and buy-in are crucial to the success of software projects. Prototyping
and user-driven approaches were developed to maximise the potential for
satisfaction for various stakeholders and thus increase the likelihood of user
acceptance of the ultimate system.

Baccarini identified the need to distinguish between project management success
and the success of the product which entails dealing with the effects of the
project’s final delivered product [27], thereby allaying the need to define a further
dimension concerned with client expectations which have already been expressed
in the desired performance functionality. Ironically, this chimes with the original
(but often misunderstood) intention of the Barnes’ triangle (figure 3) to capture the
agreed upon definition of the purpose of the project or how the complete project
would perform. Given that the product will be utilised by the client there is a
degree of correspondence between the dichotomies put forward by Pinto and
Slevin and by Baccarini. Indeed, de Wit [28] observed that measuring progress and
cost are part of project control, which should not be confused with measuring
success. Cooke-Davies likewise made a distinction between the focus on project
performance and the need to look at the success of a project [29].

Having multiple categories of success would suggest that it is possible to be
successful in some areas and not successful in others. It thus makes it possible to
understand mismatches between the different criteria and groups. Moreover, it
implies that the traditional triple constraints of cost, time and performance only
reveal part of the picture. In other words, it may be possible to maximise the
traditional criteria and yet deliver a product that is not valued by the users.
Likewise it is also possible to exceed the traditional criteria but deliver a product
that is valued and adopted by the user community, despite exceeding the budget or
the schedule, or even both.

The discussion thus far indicates that at least two different levels of success can be
identified. Indeed, according to Munns and Bjeirmi [30] it is possible to achieve a
successful project even when management has failed, and also possible to deliver a
failed project following successful management. However most studies and
surveys of software project failures tend to focus on the traditional criteria of efficiency embedded through the triple constraints of time, cost and performance. They thus ignore the deeper aspects associated with the delivered product, its perceived utility and value, the expectations and needs of stakeholders, the intended performance of the product and the project context.

Further evidence of the need to look beyond the traditional criteria is provided through Table 1, which summarises an extended and refined set of common issues that were originally identified across six project failures covered in detail in [31] and extended through a sequence of workshops with practitioners, the mapping of factors in 150 failed projects and a series of four international surveys resulting in the revised figure presented in this paper.

<table>
<thead>
<tr>
<th>Area</th>
<th>Typical additional issues</th>
</tr>
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<tbody>
<tr>
<td>Relationship management</td>
<td>Vendor-client disagreements, partnerships, long-term perspective, respect, joint working</td>
</tr>
<tr>
<td>Trust</td>
<td>Lack of trust, reliance, co-operation</td>
</tr>
<tr>
<td>Communication</td>
<td>Information, barriers, exchange, ambiguities</td>
</tr>
<tr>
<td>Management of expectations</td>
<td>Stakeholder engagement, needs assessment, involvement</td>
</tr>
<tr>
<td>Politics</td>
<td>Organisational politics, blocks, defensive routines</td>
</tr>
<tr>
<td>Escalation of commitment</td>
<td>Sunken costs, pressure, escalating investment</td>
</tr>
<tr>
<td>Risk management</td>
<td>Exchanging risks, effective transfer</td>
</tr>
<tr>
<td>Contract management</td>
<td>Contractual engagement, multiple interpretations, expected obligations</td>
</tr>
</tbody>
</table>

The obvious message from the set of issues is that the traditional efficiency criteria as embedded in the triple constraint do not appear to have played a part in the build-up to any of the failures. Instead, the issues identified were more concerned with the product (as well as the assumptions and expectations surrounding it) and the overall business success.

### 4.0 Towards Multiple Levels of Success

Success, it would appear, needs to be understood at multiple levels in order to appreciate the complex dynamics and subtle impacts. A tabular representation of four levels of success, which builds on the earlier discussion, is offered in Table 2.
Table 2 Levels of Success

<table>
<thead>
<tr>
<th>Levels of project success</th>
<th>Focus</th>
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<tbody>
<tr>
<td>Level 1: Project management success</td>
<td>Efficiency and performance</td>
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<tr>
<td>Level 2: Project success</td>
<td>Objectives, needs, stakeholders</td>
</tr>
<tr>
<td>Level 3: Business success</td>
<td>Benefits, value creation, delivery</td>
</tr>
<tr>
<td>Level 4: Future potential</td>
<td>New markets, skills, opportunities</td>
</tr>
</tbody>
</table>

Level 1 represents project management success and is thus concerned with internal efficiency and performance measurement and optimisation at the project level through the tracking of the cost, schedule and performance parameters. Level 1 success is therefore to do with project delivery against the constraints or measures imposed on the project.

Level 2 is focused on the overall effectiveness of the project through the lens of what is actually being delivered. Success is measured through the utility and acceptability of the output that has been delivered. The achievement of the objectives is thus assessed in terms of the satisfaction of the customer and the different stakeholder groups and the satisfactory addressing of their needs. Level 2 success reflects the acceptability and impact of the resulting artefact, its usefulness, the degree to which it is used, the match with the project objectives, needs and requirements, the relationship with the different stakeholder groups, and the overall impact on the customer.

Level 3 is centred on the business efficiency which is assessed through the realisation of identified benefits of the project and the creation and delivery of internal value. The outcome of the project contributes to business success through the satisfaction of business objectives and the delivery of identified benefits and realised value. Success equates to maximisation of financial and business efficiency measures, such as sales, profits or ROI, as well as realised benefits and delivered value.

Level 4 is forward looking and opportunistic and enhances the business horizon by projecting future gains and opening new avenues, capabilities, skills and markets. Strategic opportunities require a continuous and long-term approach that seeks to derive not just immediate benefit but also maximise opportunities for cornering the market, creating killer applications and building the potential for self-enhancing positive feedback loops to secure future growth. Level 4 success is achieved through the realisation of new opportunities and harnessing of new potential through the application of continuous improvement, growth and further
development. It may include new uses or ideas that were not originally considered as well as the development of new competence or capability.

The focus identified in Table 2 provides a clue as to the nature of measurements required at each level. Measurement at Level 1 focuses on determining the progress and efficiency of the project management effort for example through the use of earned value management. Measures for Level 2 are concerned with measuring the achievements of objectives, needs, requirements and expectations. Measures for level 3 emphasise the business value using traditional economic measures such as sales, revenue, and delivered value, as well as applying benefit realisation approaches. Measures for Level 4 require more creative measurement of opportunities, capabilities and market position. The combined levels offer a richer way of conceptualising and making sense of the complex phenomena surrounding success in and around projects.

5.0 Measuring Success

Determining the success of a project is not simple. It is often said that success is in the eye of the beholder, and can mean different things to different people. Consequently, analysing the dimensions of success and failure is a complicated task that requires an understanding of the different levels of success and what each one can offer:

**Project management success** implies tracking data related to predicted cost, time and scope. Measuring performance against efficiency considerations is relatively straightforward. Determining progress through monitoring the achievement of milestones (e.g. using Earned Value Methods) enables project managers to track the achievement of pre-defined targets. It is a very useful focus when there is little residual uncertainty or when the project is clearly understood. However, it is debatable whether the measurement of an arbitrarily pre-defined target is completely meaningful, especially when project managers play little, if any, part in the initial estimation. Typical measures would focus on the efficiency of the process emphasising milestones, identified defects, and delivery and change management measures (including approved change requests), as well as earned value management measures showing project management progress, cost and schedule variances, cost performance index, and estimate to complete.

**Project success** relates to the effectiveness of a project and is normally considered in terms of the achievement of requirements and needs, and the acceptability of the outputs. In order to provide meaningful values, measures should relate to the requirements identified and be established and acknowledged as part of the needs assessment and requirements management processes. Stakeholder management is central to the identification and assessment of the concerns of different stakeholder groups and the issues impacting the development team. de Wit [28] defined success as encompassing a high level of satisfaction concerning the project result amongst key stakeholders and users, while Lyytinen and Hirschheim [32] framed
the effort in terms of meeting stakeholders’ expectations in terms of the balance between the objectives, constraints and benefits. Project success can therefore be viewed as equalling and exceeding the expectations of clients, users and stakeholder groups, thereby emphasising elements of user acceptance, and stakeholder satisfaction and management. Typical project success measures would identify achieved project requirements, satisfaction levels, recorded complaints, usage figures for the delivered artefacts, and met expectations.

**Business success** pertains to the organisational value derived in terms of finance, environmental, and social concerns, and their balancing. The perspective often requires a longer timeframe that considers value creation and delivery over investment cycles and the contributions made towards the achievement of strategic objectives of the organisation defined in the business case. Business success can refer to the payback period, but often extends to consider the accumulated benefits (i.e. realising the stream of benefits allocated to the project as they are cascaded down from the strategic objectives) accruing from an investment in a project or initiative. Business success measures typically address realised benefits, delivered value, rate of return, breakeven calculations, payback calculations, sales achieved, revenue measures, environmental and social targets, and increasingly, may focus on reputation, influence marketing, and sustainability ratings.

**Future potential** extends the time horizon of consideration into the longer-term utilisation of the outcomes and results of projects and actions. It allows the accumulation of longer-term benefits that result from adjustments, improvement and re-balancing. The intention is to seek to increase the accrued value from projects by exploring and exploiting opportunities beyond the agreed business case. Given the long-term focus it cannot be assumed that project assumptions, and intended outcomes retain their relevance over time. The aim therefore is to maximise organisational value in accordance with the evolving strategic direction. When projects are completed under conditions of uncertainty, they are often subject to positive feedback cycles, systems dynamics, and complex interactions that uncover new opportunities and strategic openings. Potential opportunities can often lead organisations to explore new directions, expand into a particular market or occupy a certain leading position within a sector, and adjust their strategic intentions to match their new ambitions. Measures will focus on the identification and utilisation of emerging opportunities and adaptation to new market conditions that result from experiencing, learning, adaptation and strategic re-positioning.

### 6.0 Conclusions

Project failures have been used to highlight the need to improve IT software project practice. Many of the studies and surveys focus on project management success (or failure), which can be described as a subset of internal efficiency measures and imposed constraints ignoring the impact on the project and the business. In order to improve project performance project managers need to look beyond such measures and focus on project success—an area concerned with the effectiveness and relevance of the project output. Project managers are also
increasingly asked to consider the value derived from the project, the sustainability implications as well as issues related to environmental, social, and societal impacts.

Such considerations require a richer and more complex mapping of success. Success is a complex and multi-layered concept that needs to be understood at different levels and timeframes. Indeed, the impact of success often extends beyond a single project. This paper offers a wider perspective, which takes in a range of project success levels thus enabling practitioners to move beyond the simplistic measures that continue to be offered. The success view determines actions and colours new developments. Increased attention to enterprise objectives and utility, rather than simply endeavouring to optimise correctness according to pre-imposed constraints, can open a new dialogue about the needs of a profession seeking to fundamentally and essentially improve its track record and enable project management practice to rise beyond the continuous obsession with failure.

Further work is needed to encourage the research and practice communities to consider project management success at a number of levels. Practitioners will need to make links between strategy, business, and project management delivery functions, while researchers are likely to try and make sense of requirements and expectations that emerge from a multi-level model that invites new types of surveys to make sense of the success and failure in software projects. Ultimately, in order to overcome failure we must learn to appreciate success and grow up enough to look beyond the simplest manifestations of an imperfect practice.

“Success is not final, failure is not fatal: it is the courage to continue that counts.”
– Winston Churchill

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