Public sector enterprise system implementation

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Abstract: Much has been written about Critical Success Factors (CSFs) for private sector Enterprise System implementation success. Our focus is on CSFs for public sector enterprise software implementations, and our research concludes that differences exist between CSFs in Private and Public Sector enterprise software implementations. These differences are described in this paper. Private sector CSFs apply to the public sector, but additional factors apply uniquely to the public sector. Our primary conclusion is that public sector success is more difficult to achieve, and that government acquisition rules must be revised to align with the CSFs.

Keywords: standard software; enterprise systems; Critical Success Factors; CSFs.

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1 Introduction

The management literature contains many references related to Critical Success Factors (CSFs) for successful enterprise system implementations (Akkermans and van Helden, 2002; Baker and Frolick, 2003; Bingi et al., 1999; Ehie and Madsen, 2005; Esteves-Sousa and Pastor-Collado, 2000; Fortune and White, 2006; Fui-Hoon and Lau, 2001; Grossman and Walsh, 2004; Hong and Kim, 2002; Karlson et al., 2006; King, 2005; King and Burgess, 2006; Motwani et al., 2005; Scheer and Haberman, 2000; Stjernström, 2003; Sun et al., 2005; Umble et al., 2003; Wang et al., 2005; Wong, 2005; Zhang et al., 2005). While this literature is also relevant for the public sector, public organisations and decision processes are different. The authors have formed impressions of these differences from working on a number of public sector implementation projects. To understand and validate these differences, we interviewed programme executives and implementation team members from most completed or underway projects across the US Department of Defense (DoD).

After reviewing and analysing the results of interviews conducted for this project, we reached several conclusions. In general, virtually all of the private sector CSFs identified in the research literature apply to the public sector. However, there are additional CSFs that apply only to the public sector, which are over and above the private sector factors. These differences are described in detail below, but the major conclusion of the research is that implementation success is much more difficult to achieve in the public sector. There are unique distinctions between the public and private sectors affecting cost, implementation cycle times, and the ability to fully leverage the benefits of business process integration that properly implemented enterprise software solutions provide.

As we were completing the research project, we observed that the implications of this research are much broader than enterprise software implementations, and many have been discussed previously in other contexts. Many of the conclusions apply equally to proprietary software development efforts, if they are scoped to cross domain boundaries, as well as general large-scale business transformation efforts. Having stated that, we draw no conclusions in this paper about proprietary development efforts, and we note that commercial enterprise software is still the ‘gold standard’ for core business system implementations in the private sector. In that sense, whether one likes or dislikes commercial enterprise software is a moot point, as the next best alternative for business systems (massive customised implementations) is not palatable. However, since enterprise system implementation is a form of business transformation, we believe the same CSFs apply to large-scale transformation efforts.

2 Historical perspective

Much has been written about enterprise system implementation in the private sector (Al-Mashari and Al-Mudimigh, 2003; Al-Mashari et al., 2006; Booker, 2000; Boston Consulting Group, 2000; Mabert et al., 2003; and many others). Likewise, as previously noted, much has been written about CSFs for successful enterprise system implementation in the private sector. Since most of the CSF literature is relevant for this research, we summarise that information in Table 1.
Table 1  Summary of private sector critical success factors

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<tr>
<td>1</td>
<td>Competent and empowered implementation team</td>
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<td>2</td>
<td>Top management support and leadership</td>
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<tr>
<td>3</td>
<td>Business plan and vision that documents realistic scope and expectations</td>
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<td>4</td>
<td>Effective communication across all stakeholders</td>
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<td>5</td>
<td>Rigorous project management</td>
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<td>6</td>
<td>High-level executive sponsor who has the power to set goals and legitimise change</td>
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<tr>
<td>7</td>
<td>Sound management practices and stable legacy systems</td>
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<tr>
<td>8</td>
<td>A culture that can absorb organisational change</td>
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<tr>
<td>9</td>
<td>A focus on business processes and minimum customisation of the enterprise software product</td>
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<tr>
<td>10</td>
<td>A solution architecture to drive project monitoring and integration testing</td>
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<tr>
<td>11</td>
<td>Rigorous project monitoring and performance evaluation</td>
</tr>
<tr>
<td>12</td>
<td>A shared context for growth and expansion as opposed to cost reductions</td>
</tr>
<tr>
<td>13</td>
<td>Sufficient budget to complete the project</td>
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Since the information in Table 1 is described in the aforementioned literature, we do not provide a lengthy detailed description, and we encourage the reader to access and study this literature. As previously mentioned, this literature is equally critical for the public sector, and every public sector manager should understand it prior to initiating an enterprise system or a business transformation project.

Gulledge and Sommer (2003) have written about the potential benefits of public sector enterprise systems, but to our knowledge, nothing has been written that specifically addresses public sector CSFs. In that sense, this paper fills a void. Our intent with the research project was to provide information that has research value, but in addition, to provide public managers with information that will help them make better decisions. In that sense, our objective was to provide results similar to that provided by the Boston Consulting Group (2000) in their survey of private sector enterprise system implementations.

3  Background for public sector enterprise system implementation projects

Enterprise software is engineered to enable the business processes of an enterprise. (Raymond et al., 2006). This means that the solution is engineered to provide full enterprise capability when it is implemented as an integrated solution that spans domains (i.e., stovepipes, see Gulledge et al., 2005, for example). The public sector, with rare exceptions, has not been able to implement this software as it was intended to be implemented. For our study we placed more emphasis on the US DoD, where many large-scale enterprise software projects are currently underway. We believe many of these same results apply to other public sector organisations, and while we focus in this paper on defense implementation projects, we believe the results are be generalised to the US Government as a whole. From our observations, what follows are the major problems encountered in large public sector implementation projects. We follow in a later section with a more detailed analysis of each factor.
Enterprise software projects are a form of business transformation (the software follows as an enabler of a transformation initiative). Public sector contracting rules often treat enterprise system projects as information system development projects, which means the system is managed as a proprietary development project known as a ‘programme’, with dollars associated with the programme, and typically bound within a parochial set of requirements known as a ‘stovepipe’. This orientation will never work with commercial enterprise software products, as enterprise standard software, by definition, is an enterprise transformation project. For example, in the Army, if Financial Management and Logistics could be defined in one solution, then 75% of the transactional Army would be enabled as an integrated solution, possibly enabled in a single commercial software product. The current route of multiple SAP solutions interfaced to each other adds some benefits in terms of replacing old technology, but by and large the benefits of integration (the primary value from commercial software) are not fully realised. While there are some truly integrated enterprise initiatives in the public sector, it is safe to say that they are the exception rather than the norm.

Enterprise software projects must be led by business owners who have to live with their long-term consequences. This rules out:

- Outsiders, who are unlikely candidates for leading internal organisation transformation efforts (e.g., externally appointed programme managers)
- Military personnel who rotate (they are gone before the implementation is complete)
- CIO or other IT support personnel (they do not own the business processes that are being transformed)
- Contractors on performance-based contracts (no government agency should allow a contractor to define its requirements for transformation, and then implement the transformation – this is the model for expensive disasters, because of the obvious organisational conflict of interest).

The governance models and decision cycles of the DoD do not support the requirements for best-practice enterprise software implementation. Private sector critical decisions are made in hours, and the requirements for rapid decision making are often written directly in private sector implementation contracts. In the public sector, consensus decision making can extend the decision process for months; completely destroying any chance of timely implementation. When decisions cannot be reached and schedules slip, descoping often occurs. Since many programmes have no Solution Architecture (i.e., a documented view of the projected end-state), the descoping is subtle and seldom shared outside of the project. In many instances where systems integrators wield significant influence in many aspects of governance, the customer may not be aware that the project scope has changed.

The public sector project owner usually has little control over the financial resources required to ensure project success. In fact, the government is organised to ensure that there is financial separation. While this separation provides a ‘firewall’ to protect
against fraud, it creates a constant and ongoing problem of trying to align funding with project schedules. The problem is compounded when coordination is required across multiple implementation projects.

- In public sector projects there is typically no single enterprise voice to the enterprise software provider, and no enterprise voice from the software provider to the government. In fact, the software provider’s sales team does not approach the government agency as an enterprise, but as an industry, with every organisational unit being a sales opportunity. The sales force has divided the DoD in the same way they would align along industry verticals. The sales people do not stray outside of their verticals, but on the inside, any sales potential is treated as fair game. There is little communication across verticals, because the sales incentive compensation structure does not support it. There is little respect for enterprise boundaries or integration, even as it applies to the integrity of the commercial software product. As one sales representative intimated in an interview, ‘it is much easier to sell to stovepipe, because you only have to convince one person to close the sale. Integration requires consensus across multiple stovepipe owners, and this makes it much more difficult to close the sale’.

- DoD acquisition rules do not allow enterprise software vendors to disengage from the sales cycle until post go-live. On the surface, this seems like a good idea, but it causes major problems. Since the sale is not officially closed until after go-live, the DoD is impaired from working with the vendor’s technical implementation team. The sales team remains engaged as centre focus; filtering all requests for technical advice, and engineering all responses that go back to the customer. Disengagement implies that sales incentive bonuses are placed at risk, so disengagement does not occur.

- When the enterprise software provider is teamed on the implementation project for consulting, a direct organisational conflict of interest exists. The software provider orchestrates the requirements to align with product availability and expediency in closing the sales cycle.

- DoD requirements are not directly addressed by the software provider. The requirements are addressed through special interest groups or vertical user groups. For example, with SAP requirements are addressed through a group called the DEIG (Defense Interest Group), where the US DoD has an equal voice with Denmark, Norway, New Zealand, Singapore, etc.

- DoD implementation consultants (i.e., integrators) are typically not trained on the new enterprise product offerings (e.g., Fusion, NetWeaver, Data Hubs, Force Element, Mobile Engine/Infrastructure), and they are still implementing last generation technologies, even though the new technologies (NetWeaver, Oracle Data Hubs, etc.) are precisely what the DoD needs. The new solutions provide flexibility to meet the requirements of a large and unwieldy enterprise; the old technologies provide rigidity. This is not so much a negative result as a realistic result. There is a well-known technology adoption lag between the private and public sectors. For example, the first public sector enterprise software project in the DoD did not occur until 1998, many years after the first private sector implementation.
The solution must be well defined in a Solution Architecture prior to the project being released for the realisation phase. The Solution Architecture defines the requirements for the end-state, and all implementation progress should be measured relative to the Solution Architecture. The project governance structure should recognise the Solution Architecture, and monitoring and control should be maintained at the level of the Project owner and the Executive Steering Group. For oversight reasons, the Solution Architecture should not be placed under the control of the Programme Manager.

None of the above issues negate or mitigate the factors in Table 1, so the interesting research question relates to any additional CSFs that should be considered for DoD implementations. If these are known, then the public/private CSFs can be used as one component of an implementation readiness assessment, where CSFs are benchmarked against best practices. This type of organisational assessment is indicated in Figure 1. Also, any changes in DoD acquisition regulations relative to enterprise system implementation projects should address the 23 CSFs discussed in this paper. If the CSFs are important for project success, then the implementation contract should do everything possible to ensure the CSFs are addressed.

Figure 1  Organisational assessment through best practice benchmarking

The implications are that the CSFs can be used to assess implementation readiness by benchmarking a proposed project relative to the CSFs. If all CSFs are not addressed, a project should not be allowed to move forward until they are, or a justification is provided for why a particular CSF does not apply. As indicated in Figure 1, this approach is consistent with a layered strategic model, where CSFs are aligned with strategic goals. It is important to note that the model also applies to project execution, where
Key Performance Indicators (KPIs) should be defined to monitor progress relative to the CSFs, just as objectives are the mechanism for monitoring progress in realising strategic goals.

So, as Figure 1 indicates, our assessment framework aligns:

- Mission with Best Business Practices
- Strategic Goals with Critical Success Factors
- Objectives with Key Performance Indicators.

While a somewhat crude measure, the organisational alignments in Figure 1 suggest that underperformance against CSFs can only lead to negative consequences. This implies that an analysis of CSFs is a good indicator of a project’s health and should be used as a key part of any evaluation or contracting methodology. It is interesting to note that a formal analysis of CSFs is required by current DoD acquisition regulations.

4 What about the quality of the software products?

While the popular press often attributes project failure to the enterprise software provider, we found no evidence that is the case. The companies are sometimes guilty of over-promising through aggressive marketing, but that is not the root cause of project problems. There are no significant problems with commercial enterprise software products. Most of the problems are caused by:

- Applying variations of weapon system acquisition rules that are specifically designed for hardware systems to enterprise transformation projects,
- Not being a smart customer and not interacting with the enterprise software provider in a smart way
- Not following the enterprise software provider’s recommended implementation instructions
- Not using the enterprise software provider’s recommended implementation tools
- A DoD culture that treats business systems as families of independent systems that are interfaced across stovepipes.

Until these problems are addressed, the DoD will not realise its investment in enterprise software, even as the solution providers open their products through service-oriented enterprise solutions.

5 Research methodology

We were intimately familiar with many of the projects that were included in this study. Some would say that this is a disadvantage or possibly a source of bias, but it was a significant advantage in helping us derive conclusions that are useful to public executives. We attempted three research approaches, none of which was completely satisfactory:
Qualitative Case Study Research

Quantitative Survey Research

Theoretically Augmented Data Synthesis and Expert Opinion.

The strengths and limitations of each research approach are discussed below.

5.1 The strengths and limitations of qualitative research

The problem with qualitative research methodologies, as they apply to this public sector research space, is that the accuracy of programme-oriented interviews is questionable. By ‘programme-oriented’ we mean direct interviews with the programme management staff, the programme executive office, or the project owner. We discovered (through failure) that these types of interviews are biased.

We developed a detailed survey instrument and we personally interviewed many programme officers across the DoD. The results, at first, seemed quite shocking. For many programmes in the sample that we knew had significant problems, the programme officers reported that ‘everything was under control’ and that ‘all objectives were being met’. In one project, which we knew was clearly going to fail, the programme manager reported that everything was proceeding according to schedule and all objectives were being met. In fact, shortly after the interview, the project was terminated, and it was still called a success (i.e., a positive learning experience).

After evaluating the first round of interviews, we were convinced that another approach must be used. The results were simply not believable, and in some cases did not pass the ‘laugh test’. Our assessment was that government programme officers will never say negative things about their programmes, because they might jeopardise the project funding stream. We suspect the same is true around much of the private sector research that uses qualitative interviewing techniques to collect data, and at a minimum, studies that use such an approach should be evaluated with care. This is not to say that we did not receive some useful information from the interviewing approach, but much of the negative information was suppressed.

For the project that was terminally ill, we do not have a clear explanation of that behaviour, but it certainly had characteristics of the behavioural ‘death march’ described by Royer (2003). As opposed to bureaucratic inertia or management incompetence, Royer found that the denial of failure resulted “ironically, from a fervent and widespread belief among managers in the inevitability of their projects’ ultimate success”. This behaviour, which Royer called “collective belief”, can cause “an otherwise rational organization to behave irrationally”. Royer’s case is convincing, and if her hypothesis is true, then much of the interview-based qualitative research in this area must be interpreted with care.

5.2 The strengths and limitations of quantitative research

As we found out, quantitative research in these areas also has problems. The traditional limitations of quantitative research are prevalent in our research. We had a relatively large sample of projects to examine, so sample size was not a limitation. We quickly uncovered, however, that the most important factors were not quantifiable. For example,
how do you quantify ‘improper contract scope’ or forms of implied ‘conflict of interest’? It is impossible, leaving the alternative of suppressing the nonquantifiable factors and only focusing on those that are easily measured.

This option, while convenient, assumes away the most critical behavioural factors in our study. That is, we are placed in a position of assuming away some of the most important factors to accommodate quantification. After reviewing the work by Ehiie and Madsen (2005), we concluded that this option, while practical, would not yield useful or even relevant conclusions for our effort.

5.3 The strengths and limitations of data synthesis and expert opinion

Useful policy analysis requires including quantitative and non-quantitative factors. In many cases non-quantitative ‘intangibles’ dominate the analysis process. The authors are intimately familiar with many of the projects in the sample, and in several cases we know many of the people working within the projects, or have good relations with others who have oversight responsibilities on the projects. Instead of enforcing strict interviewing rules, such as ‘all project owners or programme managers will be interviewed’, we interviewed intimately involved participants who could and would speak with deep project knowledge. In some cases, a promise of anonymity was required, but the end result was a rich understanding of the factors that emerged from the study.

The expert opinion factor involves the experience of the authors, who among them have approximately 75 years experience in large-scale enterprise integration projects. We ‘stripped’ any project-specific unique problems from the analysis, and we synthesised the common list of public sector-specific critical success factors presented in this paper. In some sense, our research methodology was more like that of an historian; comparing, contrasting, aggregating in some cases, dissecting in others, and synthesising. We have no way of probabilistically stating error probabilities as one would in the testing of a statistical hypothesis, but we believe strongly that our results apply, in general, to public sector projects, and certainly to projects in the US Department of Defense.

6 Detailed analysis of the additional critical success factors for DoD enterprise software projects

The additional critical success factors that we determined for DoD projects are summarised for convenience in Table 2.

If the CSFs have value, then it is natural to try to mitigate problems that impede achieving success. In the public sector, this is accomplished through understanding the impediments and developing policy to remove or mitigate the impediments. By definition, policy implementation requires resourcing alternatives that can positively achieve the policy objectives. This process is difficult, and it takes many years to enact. Some of our CSFs are easily attained through intelligent decision making, but others fall in a category that will take many years to mitigate.
Table 2  Additional public sector critical success factors

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<td>1</td>
<td>Acquisition procedures must be appropriate for large-scale enterprise integration efforts, with the implementation contract aligned with the solution boundaries of the enterprise software product.</td>
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<tr>
<td>2</td>
<td>Project ownership should reside with a business executive inside the enterprise, and not with an external programme manager.</td>
</tr>
<tr>
<td>3</td>
<td>The governance model must support quick and rapid decision making for the life of the implementation effort.</td>
</tr>
<tr>
<td>4</td>
<td>The public sector project should have control over the financial resources required to ensure project success.</td>
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<tr>
<td>5</td>
<td>There must be a single enterprise voice to the software solution provider.</td>
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<tr>
<td>6</td>
<td>The software acquisition rules must allow rapid sales closure to enable the sales team to disengage and the technical team to engage.</td>
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<td>7</td>
<td>The acquisition rules must protect against conflict of interest between the software sales team and the software requirements oversight process.</td>
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<td>8</td>
<td>Commensurate with CSF number five, the customer must provide clear requirements to the software provider, and the software provider must work with the customer to meet those requirements.</td>
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<td>9</td>
<td>Contracts must be awarded to implementation consultants that are properly trained and maintain ongoing expertise on the technologies that are being implemented.</td>
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<tr>
<td>10</td>
<td>The project should build to an independent Solution Architecture, and the progress of the implementation should be monitored relative to the Solution Architecture.</td>
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6.1  Additional analysis of public sector CSF 1

6.1.1  Acquisition procedures must be appropriate for large-scale enterprise integration efforts, with the implementation contract aligned with the solution boundaries of the enterprise software product

The CSF associated with contracting for a solution is the most critical for long-term success in the DoD. Efforts are underway in the DoD to change the Acquisition rules, but as long as the DoD programme office structure remains unchanged, it is unlikely that the rule changes alone will solve the problem. This structure question relates directly to critical success factor number two. When purchasing a weapon system, the usual model is to have an independent programme manager assigned to the project. The programme manager is an expert on the acquisition rules, having deep skills in project management, cost analysis, and the administrative aspects of running a project. It is not a requirement that the programme manager have expertise relative to the engineering or execution aspects of the product that is being procured. The programme manager’s job is to maintain cost and schedule, while ensuring acquisition regulations are not violated.

An enterprise transformation programme should not be managed as a government acquisition programme using rules similar to procuring military hardware or proprietary designed and developed software point solutions. The contract for the enterprise transformation effort must align with the boundaries of the enterprise software product. This means that contracts cannot be written for programmes that reside in organisational domains, but must be written to align with solutions that flow across organisational domains. Government rules for purchasing Major Automated Information Systems (MAIS) are not appropriate for commercial standard software implementation projects.
An example is provided in Figure 2, which draws on a Navy implementation solution. The Navy awarded four SAP projects inside a single enterprise. Instead of trying to understand how SAP could best enable the entire enterprise, the focus was shifted to forcing the four projects to fit within stovepipes within the enterprise. This creates insurmountable complexity by fragmenting the enterprise product, and forcing it to be interfaced back together. This type of problem can be avoided if the acquisition rules are revised so that contracts are let for enabling enterprise solutions as opposed to fragmented families of systems. The landscape described by Figure 2 is realised more often than one would expect. We call the situation in Figure 2, ‘the implementation of enterprise software in a non-enterprise environment’. The probability of failure is significantly enhanced when this implementation approach is pursued.

Figure 2  Navy sub-enterprise divided into four stovepipes

6.2 Additional analysis of public sector CSF 2

6.2.1 Project ownership should reside with a business executive inside the enterprise, and not with an external programme manager

Successful enterprise software projects are typically led by business area owners. These people have deep skills and expertise in the implementation domain, and they are admired, respected, and trusted by their colleagues. Furthermore, they have to sell the solution to their colleagues in the business line, and they have to live with the success or failure of the implementation. This CSF is rarely satisfied in the DoD, and to the best of our knowledge, little effort has been made to rectify the situation. CSFs one and two are
critical failure points for the DoD, and they can only be changed by a long-term effort resulting in a revision of the acquisition regulation and a revision of how large transformation projects are managed.

6.3 Additional analysis for public sector CSF 3

6.3.1 The governance model must support quick and rapid decision making for the life of the implementation effort

CSF three is deeply rooted in the culture of the public sector, but this problem can be overcome by good management. For example, it is generally acknowledged that the SAP implementation project at the Defense Logistics Agency has a strong governance structure with good decision making from the top. This acknowledgement derives from the fact that there has been stable senior leadership at the top of the programme for many years, and crisp decisions are driven directly from the top of the organisation. If people in leadership positions are constantly changing, and if the project has a fragmented governance structure, then failure is more likely. Unfortunately, most of the projects that we analysed fell into the latter category. This follows directly from the fact that most senior military leaders rotate jobs every 2–3 years, and the implementation cycle times for large scale transformation project tend to be longer than this rotation period. Public sector culture is aligned with consensus decision making, and a key characteristic is a desire to not reveal ‘bad news’ to senior executives. Enterprise executives must be creative in establishing mechanisms that deliver accurate project information and issues directly to the project executive and the executive steering committee. A simple best practice governance model that delivers results is presented in Figure 3.

**Figure 3** Governance model with delineated roles

![Governance model with delineated roles](image-url)

Note: No employee of any organisation below the dotted line can participate in any of the organisations above the dotted line!
6.4 Additional analysis of public sector CSF 4

6.4.1 The public sector project leader should have control over the financial resources required to ensure project success

Critical success factor four states that financial control should reside with the project executive. Public sector projects are often plagued by continuous reviews by people who know very little about enterprise software. There is a continuous interaction in these reviews with a primary objective of ensuring that dollars continue to flow to the project. Project success, in terms of scope and business process alignment, is relegated to a lower priority. A complete industry of contractors has evolved, with the sole objective of helping the programme manager sustain the flow of money. The project executive should control the money, and the focus of the reviews should be on the monitoring of actual project outcomes. In the private sector, the project leader has complete control, and the project leader also understands the consequences of cost overruns and failure, which are typically fatal. We have actually identified cases in the public sector where failures were deemed successes, and the project leader was promoted. However, this is the unusual case. In the public sector, the programme manager usually moves to a new job through a scheduled rotation and leaves someone else to clean up the mess.

6.5 Additional analysis of public sector CSF 5

6.5.1 There must be one enterprise voice to the software solution provider

The fifth and sixth critical success factors for public sector organisations relate to how the software providers are organised and how their sales teams engage the DoD customer. All ERP software providers have government sales teams which are typically comprised of people who share the ‘customer culture’ as opposed to the ‘product culture’. Enterprise software products are integrated, which means the products enable business processes that flow across the enterprise. The implication is that the system is purchased once and shared across ‘stovepipes’. For example, accountants do not own and maintain their own systems, but they share the enterprise systems, along with logisticians, transportation planners, and other enterprise organisational components.

The implications for a software sales team are straightforward. From a sales point of view, the sales team must obtain agreement from multiple stovepipe owners to complete the sale. In the private sector, the sale is settled at a higher organisational level, and the implementation is imposed on the stovepipe owners. That is, the enterprise system is purchased and managed at an enterprise level. The legal separation of the Office of the Secretary of Defense (OSD) and the Services and Agencies makes this approach difficult in the DoD, so implementation is focused on the sub-enterprise level; e.g., Army, Navy, DLA, etc. These enterprises are semi-autonomous units, so they could qualify as enterprises in the traditional definition of the term.

However, the government sales teams do not interact at this level. Because of consensus decision making, funding flows, and government culture, it is much easier for the sales team to engage at the sub-enterprise stovepipe level than at the enterprise level. To close the sale at the enterprise level, the sales team must obtain consensus across the stovepipe owners. If the sales team focuses on the stovepipe owner as the customer, then less agreement is required, since budgets are usually managed and controlled at the stovepipe level. This leads to fragmented smaller sales (Finance, Logistics, etc.), which is a misapplication of the enterprise software product.
The end result is many ERP implementations within the enterprise, and usually bound in stovepipes, requiring extensive interfacing. In some cases we even identified multiple enterprise systems implemented in the same stovepipe. This, of course, is a disaster for the enterprise, but the sales team is incentivised to perpetuate this model. It is much easier to get agreement from one person to close a sale than it is for multiple people to close a sale. Sales incentives drive fragmentation; hence, there must be one enterprise voice to the software vendor, and particularly to the software vendor’s sale team. No private sector company will allow a software vendor to market throughout their divisions and departments, and the DoD organisation should not allow that behaviour.

6.6 Additional analysis of public sector CSF 6

6.6.1 The software acquisition rules must allow rapid sales closure so the sales team can disengage and the technical team can engage

Another key issue is the procedures used by the government to purchase enterprise software licences. A pricing model that is often used is to price the software on a ‘per-seat’ basis. That is, the price of the software increases as the number of licenced users increases. During the design and realisation phases of an implementation, a relatively small number of seats are required to support the development team. The seat requirements increase dramatically during the deployment phase, enhancing the software provider’s revenue.

Since sales team incentives are proportional to revenue, the members of the sales team cannot fully realise their incentive payments until deployment. The design and realisation phases are quite lengthy in public sector projects, and this is a critical period that requires interaction on a technical level with the software provider. However, the interaction is awkward at best, since the sales team is still engaged, ensuring that the project moves forward as quickly as possible, independent of technical considerations. Technical decisions should be made on the best technical information that the software provider can provide, not on information filtered through the sales team.

DoD acquisition rules must address this problem. Once the sale is closed, the sales team must disengage; and the implementation should follow the provider’s recommended implementation methodology and use the best technical advice the software provider is able to deliver to the government. Follow-on sales and account management should be focused on the single point of enterprise contact. The DoD is a large and important customer, so this separation is enforceable. Such separation is common sense, and in the long-run the separation is better for the software provider and the DoD customer.

6.7 Additional analysis of public sector CSF 7

6.7.1 The acquisition rules must protect against conflict of interest between the software sales team and the software requirements oversight process

CSF seven does not apply to all enterprise software providers; only to those who also provide implementation consulting services. The government has a right to believe that the software products it acquires will function as represented by the sales team. The implementation methodologies of many consulting companies involve consultants directly with requirements generation and monitoring. One could question the appropriateness of this involvement, but it becomes a particular problem when the consultants and the software provider are from the same company.
DoD acquisition rules address conflict of interest, but contractor policies often do not address implied conflict of interest, or the perception thereof. If the products cannot deliver as advertised, the government and its contractual consultants have an obligation to address the deficiencies appropriately. This is much more difficult if the software provider and the consultants are one and the same. This problem is easily resolved in the private sector. If the products do not deliver, the provider and/or the consultants are not paid. The same should be true in the public sector. If the products do not deliver as represented, the software provider and/or the consultants should not be paid.

6.8 Additional analysis of public sector CSF 8

6.8.1 The customer must provide clear requirements to the software provider, and the software provider must work with the customer to meet those requirements

CSF 8 seems straightforward, but it is not. In the DoD, requirements are typically text-based and organised in a spreadsheet. This approach to requirements definition is agreeable with a traditional waterfall-oriented systems engineering methodology. Such an approach might be appropriate for the development of hardware systems, but it is inappropriate for complex enterprise system implementation projects.

It is appropriate, as a starting point, to define text-based requirements, but with enterprise systems the managing and monitoring of those requirements relative to business process requirements are critical. In general, commercial software can only execute a given set of business processes. If there are customer requirements that fall outside of the capabilities of the software, then the de facto the requirements cannot be met. Hence, all requirements are business process requirements, and they may be addressed only through a thorough pre-implementation gap-fit analysis. Enterprise products do not allow the flexibility of incremental requirements analysis, as might be the case in a proprietary software development effort.

The requirements problem can only be solved by following a business process oriented gap-fit analysis approach, such as that described by Gulledge (2006). The ‘to-be’ business processes of the implementing organisation must be compared with the processes that are executable in the software product. This approach is depicted in Figure 4.

There is no short-cut and other approaches will lead to a sub-optimal requirements analysis. It is appropriate to map the text-based requirements in the spreadsheet to the business processes to be implemented, which provides a mechanism to ensure critical requirements are not de-scoped. This mapping is accomplished in a Solution Architecture, and it is the primary mechanism for ensuring requirements are realised as planned.

On the software provider side, they try to channel all customer requirements through a single entry point that is usually focused on an industry vertical. This means specific customer requirements are synthesised through a user group for consensus. The end result is that specific requirements are not addressed, and group requirements may not meet the need of the US DoD. For example, with SAP, the US vote counts the same as the votes from many smaller countries that clearly have requirements not shared by the US DoD.
Figure 4  Addressing enterprise systems requirements through gap-fit analysis

Note: The Gap-Fit concept with enterprise software is quite simple. Commercial software executes business processes. The implementing organisation has a set of desired to-be business processes. The analysis compares the processes executed by the software to the desired organisational processes, and a comparison is made. The results of the comparison are documented.

6.9 Additional analysis of public sector CSF 9

6.9.1 Contracts must be awarded to implementation consultants that are properly trained and maintain ongoing expertise on the technologies that are being implemented

The implementation of commercial enterprise software requires different skill sets than those typically possessed by a DoD systems integrator. DoD systems integrators have traditionally designed and developed (i.e., written code to build) software solutions based on customer requirements. Software engineering and development is a small part of an enterprise software implementation effort, and in fact, consultants trained in those skills are not appropriate for the core of the implementation project.

The objective of commercial enterprise software implementation is to align the product with the business processes of the receiving organisation without writing code. This requires deeper business-related skills than those that typically reside in a defense system integrator. The implementation consultants must have a deep knowledge of the business process capabilities of the products that are being implemented, and they must be capable of aligning those capabilities with the ‘to-be’ business process requirements of the implementing organisation. Hence, on-the-job training will not work. The best implementation consultants are those that have many years of deep domain experience. For example, the best consultant for implementing SAP in a depot maintenance environment is one who:

- Has many years experience working in a depot maintenance environment
- Has implemented SAP many times in a depot maintenance environment.

Good software engineering skills are not a prerequisite.
To make matters even more complicated, the technologies of the products are changing. The skills required to implement SAP NetWeaver or Oracle Fusion are different than those required to implement SAP R/3 or Oracle 11i. The DoD must force implementation consulting companies to unambiguously demonstrate that their implementation teams have these skills. The low cost bidder with the best past performance qualifications is simply not good enough.

6.10 Additional analysis of public sector CSF 10

6.10.1 The project should build to an independent Solution Architecture, and the progress of the implementation should be monitored relative to the Solution Architecture

One would never build a house from a photograph, so why would one build a software solution without a detailed architecture? In a construction project the general contractor monitors the sub-contractors relative to the blue print, and if the construction specifications are not met, the subcontractors are not paid. Good project management requires that the same care be taken in enterprise software implementation projects.

The specifications for the project should be documented in a Solution Architecture. The contractor and all sub-contractors should build to the Solution Architecture, and implementation progress should be measured relative to it. To proceed in any other way is equivalent to constructing a building without a blueprint. A product will be delivered, but it is unlikely to meet specifications; hence, it is unlikely to meet operational requirements.

The temptation is to define the requirements from the bottom up by letting the implementation consultants and the customer subject matter experts project the ‘to-be’ solution from the ‘as-is’ business processes. To date, this has not worked on specialised DoD business processes. The local stovepipe-oriented teams do not have the global vision to design a solution, and they certainly do not have the capability to design solutions that diverge radically from the ‘as-is’. Solutions should only be designed at the highest level, and they must be designed with complete customer management involvement. Once the solution is designed and approved, it is passed to the implementation teams, who must build to the design, just as a construction manager builds to the externally-imposed blueprint.

Furthermore, a monitoring mechanism must be established to ensure the requirements of the Solution Architecture are being realised. The actual work performed on the project must be synchronised with the Solution Architecture over time, and any deviations must be managed to resolution. Any approaches that deviate from this approach will result in scope creep, de-scoping, missed requirements, or other results that place implementation success at risk.

7 Summary and conclusion

This paper examines critical success factors for large scale software implementation projects. Many studies have examined CSFs for private sector implementation projects, and we provide a survey of that literature. By applying the same study approach to public sector projects we derive two interesting conclusions:
1 The private sector CSFs identified in the literature review apply to the public sector as well

2 There are additional CSFs that apply to the public sector.

These CSFs were presented with additional elucidation, and they were arranged in tabular format for easy reference. We note that these same CSFs could be arranged as a de facto ‘checklist’ to be applied in the early organisation phase of an enterprise software project, and they could be used to assist in project design.

The results of this paper are significant for those executives inside the DoD who have oversight roles in large-scale enterprise implementation projects. If the CSFs are not being addressed, there is an obligation to understand why they are not being addressed. Furthermore, it is the responsibility of oversight executives to ensure acquisition rules are written so they align with and support the CSFs as opposed to providing incentives that are contrary to the CSFs.

References


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Notes

1 The literature on critical success factors is usually traced to the early work of Rockart (1979).
2 See, for example, the work of Bashein et al. (1994) as applied to Business Process Reengineering.
3 Domain is a word that is often used in the public sector when referencing an organisational stovepipe.
4 In general, non-defense projects are less complicated since they do not include the detailed logistics processes that are contained in defense solutions. Logistics, in the context of defense, includes acquisition, supply, maintenance, distribution, transportation, and disposal of an item.
5 All of the products have ‘bugs’, and there is a disciplined process for addressing the bugs. Significant problems relates to structural problems in the software that could actually cause project failures.
6 See Quade (1989) for a good discussion of these issues.
7 This seems simple and logical, but it is entirely inconsistent with government culture. It is normal to have a stand-alone financial system that is interfaced to an inventory system, which is interfaced with a human resources system, etc. This family-of-systems approach preserves organisational and budgetary boundaries, but it is totally inconsistent with the concept, the theory, and the actual implementation practice of enterprise software.