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The Nexus of Definitions and Understandings in Complex Defence Procurements.

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Abstract

Many authors have examined the e-procurement process to formulate precise definitions in an attempt to place them within discrete categories. Given the broad spectrum that encompasses e-procurement, this attempt to qualify a rapidly evolving field could prove unsuccessful. It would also yield inconsistent results if not considered from a multi-faceted and interdependent viewpoint. Within this complex environment it has long been considered that the adoption of e-procurement has been uneven. This contention is mainly due to the broad scope of what opportunities it presents and the aspirations of the businesses considering them. The aim of this paper is to consider the problematic nature of definitions of e-procurement via a narrative outlining some of the existing previously defined categories. This narrative will concentrate on a well-documented project failure, the Super Seasprite project. This is undertaken to illustrate how competing definitions of procurement and the nature of the procurement complexities can contribute to a project failure.

Keywords: E-procurement, Super Seasprite; SEA1411, E-commerce; Defence, Helicopter, Definitions, Project Failure

Introduction

The changeable and indistinct nature of definitions of commerce can seem largely unconnected to project failure. However, some of the issues which played a role in the failure of the Super Seasprite project (designated SEA 1411) can be identified where there were existing gaps between a comprehensive and universally understood set of definitions for procurement processes and the

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actual project progress. Hence definitions can be seen as a critical factor in the failure, or success, of projects which rely on complex understandings between contracted parties. This work is intended as a catalyst for discussions into these phenomena. It uses a Defence project to apply some initial ideas used as a working premise and considers some areas for future consideration.

The advent of a means to quantify a relative value of goods and/or services requires the development of some form of exchange mechanism. These exchange mechanisms have continuously evolved in complexity throughout the agricultural, industrial and computer revolutions, allowing for a continuous improvement in the methods of procurement.

Adoption Challenges

The current phase in the evolution of procurement displays the tendency to prefix existing terms that relate to goods and service with 'e' to denote *electronic*. This trend is becoming ubiquitous, but has not always been evenly and/or pro-actively adopted. Whilst industry has actively embraced these technologies, there is a disparity between the stated aims and implementation. As recently as 2018 Brandon-Jones asserts "*Despite the widespread organisational adoption of e-procurement systems, we continue to witness disappointing performance outcomes from their implementation*" (2018). Most medium to large scale industries already employ e-procurement as part of their online business strategy. However, this evolution and the increased level of sophistication which is required in the contemporary transfer of goods and services via e-procurement has not always enjoyed consistent adoption.

This uneven progression towards e-process dominance occurred at the same time as other major influencing factors which complicate the task of quantifying e-procurement as distinct from the wider technological advances adopted by commerce. In this regard, advances in communications technologies have significantly influenced commerce processes. E-commerce, in some instances, generates unnecessary activity without a corresponding increase in productivity, whilst others have streamlined everyday tasks providing valuable productivity gains.

Most accept that e-procurements have had a positive impact on the commercial procurement process (Brandon-Jones and Carey 2011, Toktaş-Palut, Baylav et al. 2014). Despite this apparent success, a standardised definition remains unformed. This may in part be due to the ongoing nature of this phenomenon which replaces existing procurement processes. This varies from systematic to ad hoc, successful to unsuccessful and sometimes a combination of the interaction of all these factors. As electronic based systems become central to industry they are often not replaced by completely new, improved systems, creating incompatibilities and/or gaps in process implementations. Hence the definition of e-procurement morphs in response to this uneven process.

The ongoing effort to define e-procurement falls into the category of a 'wicked problem' (Rittel and Webber 1973). Two (of the many) hallmarks of wicked problems are they have no obvious resolution and have contradictory or changing requirements making them difficult to reconstruct. This theory is often used when discussing economic or political issues with "...no determinable stopping point" as Tonkinwise asserts (2015). In short, there is no reliable moment in time when have we reached an effective definition of e-commerce or a reliable means of categorisation.

Categorisation requires unique and complex systems to be reduced to their constituent parts to analyse how particular practices and strategies can be used. However, the relevant literature

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broadly advances three less than definitive notions of what constitutes e-procurement, each of which has an impact on a different part of this seemingly nebulous process.

Definitions: Extent and Nature of E-procurement

At its most advanced, e-procurement utilises machine learning / artificial intelligence (AI) to predict requirements using 'big data' (Wang, Gunasekaran et al. 2016) which can support significant innovations such as "*raw materials, lead times, environmental and business risks*", which have proven invaluable (Chopra 2019). The dynamic and complex nature of using AI for full automation as a mainly knowledge-based economy means that e-procurement in defence is likely to largely remain an ad-hoc hybrid system used to support traditional procurement methods and not to replace them. Wang and Gunasekaran argue that big data' offers not only the benefits of automation but the accompanying challenges for organisations "*that would like to reap the benefits from analysing this massive influx of big data.*" (2016 p.98). However, the use of 'big data' in supply chain logistics has the potential (if used in government procurement) to support a new set of tools which could analyse and identify systematic irregularities that currently exist.

A less complex definition of e-procurement reduces the previous definition whilst emphasising automation, and mostly removes the need for human interaction from the procurement process.

The least complex definition of e-procurement centres around the use of information technology to streamline the communications involved in a procurement process (Mahalik 2012). This includes implementation of electronically transmitted e-catalogues, invoices, orders, payments, automatically generated status emails or ad hoc correspondence all using electronic document storage via web or peer to peer protocols (Palmer and Gupta 2011). These implementation improvements to the procurement cycle timeframe coupled with the resulting improvements to the integrity of the information can be best considered as evolutionary not revolutionary as it is essentially traditional procurement made paperless (Bulut and Yen 2013, Aminah, Ditari et al. 2018). As would be expected in an age of electronic communication ubiquity, these overlapping definitions, share the internet as a common factor enabling data exchange, analysis and/or automation.

The attempt to develop inclusive definitions for procurement and e-procurement could be combined with the assertion by Weber and Khademian (2008) who identified six areas that could be attributed to collaborative problem-solving as it relates to procurement. These are: understanding and communication; the balance between innovation and accountability; building capacity by enlarging public, private and political landscapes; flexibility; establishing trust-based relationships and employing substantive policy knowledge. These ideas were embraced by Defence Materiel Organisation (DMO) as part of their acquisition reform program (Gray 2008). Most of the six areas which could be generally described as qualitative would be greatly supported by the use of a dynamic communication and accounting system. Using these definitions should provide a clearer understanding of strategic procurement or conversely used to comprehend the nature of any project failure.

Procurement Complexities

Attempts to quantify e-procurement are numerous, and hence any definition that tries to encompass all the factors of e-procurement would be inconsistent or inappropriate when applied to

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any single organisation. These definitions are often difficult to formulate as there are no clear boundaries. Some academic publications that address this issue suggest the distinction between types of e-procurement be divided into at least six categories (Brandon-Jones and Carey 2011).

However, there seems to be an anecdotal consensus that traditional paper-based procurement is becoming obsolete. Therefore, the most relevant debate centres around the most appropriate features of e-procurement to adopt in particular situations. One of the most obvious advantages of e-procurement is offered by the ability to track and interrogate purchases with greater ease and detail (Harris 2002). This tracking feature becomes particularly useful in defence as 'real-time' status of goods or knowledge services are critical to the satisfactory operation of defence readiness and in health to locate virtual prices of medical apparatus.

Moreover, any system which requires record keeping with integrated intelligence as more than just data archiving would greatly improve the issues encountered in complex projects. Hence, applying e-procurement methods could and should be invaluable to avoid project failures. By learning from the failures of the past, especially unsuccessful Defence projects which become unviable, the recurrence of similar mistakes can be avoided or lessened, if not eliminated if e-procurement is employed appropriately.

Defining and categorising procurement is largely an intellectual pursuit, and as such offers an invaluable overview to a landscape of competing notions. A well-documented example of how such notions interact producing a particular outcome could be the Australian Governments project for the upgrade of the intermediate multi-role helicopter fleet, the Super Seasprite project (Australian National Audit Office 2009).

Case Study: Introduction

On 17th January 1997, Australia's Defence Minister, Ian McLachlan, announced that Kaman's Super Seasprite was the Government's choice for a new fleet of multi-role naval helicopters, designated as Project SEA 1411. Following a tumultuous 12 years of financial and technical issues, the project was cancelled in March 2008, as *"none of the Super Seasprite were ever accepted as a full capability helicopter"* (Australian National Audit Office 2009 p.24). The issues that effectively ended the SEA 1411 project were complex and numerous (Blenkin and Ferguson 2008, Mortimer 2008, Australian National Audit Office 2009). Hence, SEA 1411 became a cautionary tale for the Defence Department of how not to procure.

The Mortimer Review (2008) in general, and the Auditor General's report (2009) specifically, ensured that the lessons learnt from SEA1411 were documented for future reference. Blenkin and Ferguson (2008) contends *"The Super Seasprite debacle had its genesis in four decisions made by the Department of Defence during the mid-1990s"*. These areas were,

- Undertaking joint venture with Malaysia for the Offshore Patrol Craft
- Specifying the requirements to fit both vessel styles
- Requiring a highly capable anti-ship missile defence
- Continually changing the technical specifications requiring a one-off procurement rather than Military off the shelf (MOTS).

They concluded that *"these decisions effectively doomed the project to an ignominious death"* (Blenkin and Ferguson 2008).

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Case Study: Background

The project began in the 1980's, when the Commonwealth of Australia's Department of Defence began an investigation into possible replacements for the six river class destroyer escorts naval roles (Fairall-Lee, Miller et al. 2007). This project, whilst not the subject of this paper, had a major influence on SEA 1411. The design the Royal Australian Navy (RAN) decided upon what would become the ANZAC (Australia New Zealand Army Corps) class frigates, a joint undertaking with the Royal New Zealand Navy (RNZN) (Jones 2001). Central to the design requirement was the capability to operate ship borne helicopters. Simultaneously, Defence were considering a new offshore patrol class (OPC) vessel, to be developed and built with the Malaysian government (Revolvy 2019). Hence, initially the tendering process for the helicopters were developed not only to comply with the requirements for the ANZAC frigates, but also with the planned joint offshore patrol vessels. This dual role requirement dictated the technical criteria relating to this tender in regards to the size and weight requirements, ruling out many of the available medium to large scale helicopters (Australian National Audit Office 2009).

On 18 October 1995, a request for tender was released for helicopters that could meet the design criteria. Tenders for the 14 helicopters were received from America's Kaman Corporation and Britain's Westland Helicopters, covering the overall helicopter package; both responses were significantly higher than the original estimates (Australian National Audit Office 2009 p.19).

Case Study: Influencing Factors

During the course of the SEA 1411 project, various technical shortages and contractual issues made the project unworkable for the Australian government. Issues such as the ADF airworthiness rules, (which were introduced a year after the contract was signed) were indicative of evolving specifications which added to an already fluid set of requirements that were not captured clearly in the contractual specifications (Australian National Audit Office 2009 p.26). Also, Defence opted to manage the project in-house hence adopting this risk; a theme common throughout the project. Also, budgetary constraints, which precipitated a reduction of 3 helicopters, and a renegotiation from new to refurbished airframes (Australian National Audit Office 2009 p.25) affected the project scale and hence the 'economies of scale' (O'Sullivan and Sheffrin 2003).

The RAN's decision to reduce the crew requirements from the traditional three to two could be seen as an innovation. However, this decision to reduce crew numbers required a reconfigured Integrated Tactical Avionics System (ITAS) which ANAO argues "*was fundamental to achieving the objective*" (2009, p.19). Further, the agreement to accept an interim solution/configuration by Defence, whilst adding schedule complexity, reinforced the notion that the procurer was willing to accommodate a supplier who had repeatedly failed to produce the contracted deliverables (Australian National Audit Office 2009).

Case Study: Discussion

Project SEA 1411 was based on a critical milestone-based contract in preference to a contract using liquidated damages as a disincentive. A milestone or deliverable based contract has payments

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linked to completion of specific deliverables or outputs for a set price (Lysons and Farrington 2016). Whilst milestone-based contracts are not an uncommon practice, their success relies on sticking to the delivery milestones to ensure appropriate and timely delivery (Priya Datta and Roy 2011). However, deficiencies in agreed milestones need to be adequately identified, communicated, addressed and must be accompanied by the courage of the procurer to make the supplier aware of a breach and to enforce its contractual obligations. Literature supports the argument that Defence has a unique relationship that differs from the standard public-private partnership (PPP) (Quick 2006, Stewart and Ablong 2013). As Wylie and Markowski indicatively assert, *“Defence procurement is a more complex process than most procurements”* (2010).

The use of milestones as a project accountability device is normally considered more effective in procurements that have a precedent in a similar project where that system worked successfully. Milestones show static points in time and are more suitable to traditional manual procurement methods, whereas a dynamic and ongoing relationship could and should indicate important stages of a project in real time. Hence, by the time they are realised the requirements for the milestone may no longer be relevant. In a strategic procurement, milestones can be difficult to define and run the risk of being interpreted incorrectly or measuring some dimension of the project which is no longer relevant to the project success as it was at contract commencement. Defining what is a critical milestone or deliverable can often also be misconstrued.

Of the six areas cited previously by Weber and Khademian (2008), understanding and communication are closely connected and both enhanced by the speed and ease of electronic communication (email, instant messaging etc) in preference to more traditional paper-based methods as part of the general e-procurement communication process and are discussed by Weber and Khademian as a “balance”. At first glance innovation and accountability may seem to be incompatible. However, it is possible to have both as the National Museum of Australia project showed (Australian National Audit Office 1999) by the use of committees populated by representatives of all contracted and subcontracted parties.

Political landscapes are reliant on success for ongoing health. The Seasprite project yielded little political capital to the incumbents (Liberal/National Coalition Government) who terminated the project. Also, it gave limited ammunition to the opposition (Labour Party) as they had approved the project originally. Hence, the politics of the project was problematic to both sides. In comparison the public landscape just wants its tax money spend on worthwhile project’s that would benefit Defence and therefore the safety of Australia at large.

These factors generated collectively a perception of lack of certainty within the Seasprite project and a widely held view that this project was ‘troubled’. As a general proposition, uncertainty has a negative effect upon levels of trust or perceptions of skill by both involved. Hence, uncertainty about trust or competency is reliant on continuity and professionalism and is damaged if needlessly interrupted or seen to be of lesser importance (Mouzas, Henneberg et al. 2007, Camén, Gottfridsson et al. 2011). This can be seen with the move of the software development carried out by Kaman to a series of subcontractors adding unnecessary levels of separation between the procurer and the prime contractor. This is one example of the numerous issues which fostered an atmosphere of continuing uncertainty which continued to erode levels of trust in the project as a flagship project. The acrimonious end to the project and the expedited re-sale which took place after its termination illustrated the lack of trust between parties. Trust as a factor in innovative and complex relationships/projects traditionally require long-term engagement, but can be aided by ongoing indications of good will and open communication.

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However, a mix of technical over-confidence by the supplier, coupled with a 33% reduction in the human resources per helicopter crew, lead to a need for both supplier and procurer to change their traditional relationships continually; hence the procurement option used was unsuited to such dynamic challenges. This uncertainty was incompatible with a milestone-based contract and as such the work program degenerated into a constant state of flux. This lack of clarity of information and objectives became problematic in an evolving and increasingly interdependent relationship. In short, insufficient financial leverage was applied to Kaman despite demonstrable failure in adherence to the project's schedule. SEA 1411 also did not have, or did not adhere to, traditional procurement risk management practices (Elmar and Mark 2010). The risk rating regime in April 2009 was, at the time, the only defence project that was "*showing all three traffic lights as red for cost, schedule and capability*" (Australian National Audit Office 2009 p.45).

The change of government's procurement body for the project also exacerbated the governance as, initially, the responsibility for managing the procurement was the Naval Aviation Project Office, mainly a uniformed office which was moved to a primarily civilian office. This was also made worse by a significant loss of staff who did not want to relocate to another state; the 2000 implementation of the Defence Material Organisation (DMO), bringing together the separate procurement agencies under one umbrella (Australian National Audit Office 2001). Further, in 2005, the agency was commissioned as a prescribed agency, constituting three major changes to the procurement authority over the life of the project.

This reorganisation of the project resulted in a critical loss of specialist staff (Australian National Audit Office 2009). This loss of experience should have been addressed through a process of succession planning and detailed record keeping to mitigate any loss of both specific and institutional knowledge. This is articulated best by the ANAO when they published their First Lesson Learnt as Defence major capital equipment procurement is a complex long-term venture that is heavily reliant on the skills of personnel employed within DMO. Careful consideration is required in the planning of major capital acquisition projects to confirm that personnel with the right skills will be available, in sufficient numbers, to enable the smooth conduct of procurement and technical activities required to support capability delivery (2009 p.65).

The complexity and scope for the SEA 1411 project created through an inappropriate contract framework and the lack of due diligence created an environment in which a single miscalculation could and did adversely affect the project. This series of missteps, according to the ANAO, resulted in a misadventure which cost in excess of a \$1.4 billion (2009). Any single reason attributed to the failure of the project would prove inadequate for use in determining a governance structure for future projects. As ANAO stated, "*the decision to cancel the Project cannot be attributed to any individual factor*" (2009 p.14). This report which was the widest ranging and detailed investigation into SEA 1411, listed the major factors affecting the failure of the procurement as:

- Inadequate understanding of the procurement, and changing requirements
- Inability to retain qualified staff throughout the procurement process
- Inadequacies in cost estimation
- Lack of understanding and recording risks
- Acceptance of interim solution to Super Seasprite which did not deliver desired outcomes
- Prime contract was not updated to include new airworthiness rules
- Poor contract management processes and applications

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The nature of custom defence acquisition procurement requires necessary innovation by either the supplier or the procurer, or a combination of the two. This innovation is pivotal, regarding the potential for cost and time overruns are a recurring feature of this type of procurement method. Innovation in SEA 1411 seemed to be ill-directed, however, it assumed prominence over issues of accountability.

Due to the idiosyncratic nature of Defence's application of e-procurement strategies the only reliable indication of the advantages, lessons and implications is best explained using an indicative example. One such pertinent example of how e-procurement has developed as a capability retrospectively looking at how major projects were recorded 25 years ago. At that time, it was predominantly paper-based record keeping, relying on human involvement to archive information into manual corporate filing systems. Hence, significant amounts of information were incomplete due to inexperience of staff or the assumption that the information was not relevant.

Over time losses due to staff turnover decreases and degrades the corporate or institutional memory of where information is located and consistent working definitions. Currently with the advent of software knowledge management systems such as sharepoint® and objective®, all information and correspondence are corporately held and easily accessible, ensuring there is no reliance on any one staff member for particular corporate knowledge. This includes procurement, decisions and other factors that influence the major project acquisition. This use of e-procurement methodologies could mitigate any potential recurrence of the issues that adversely affected the Super Seasprite project. Similarly, the use of electronic processes provides an easily auditable trail for future enquiries or political scrutiny.

Contemporaneous Comparisons

This level of complication and unique requirements meant that the procurement process would have been more successfully pursued as a strategic alliance procurement between the parties (Edler and Georghiou 2007). This type of relationship allows for the development of technology in a collaborative environment (Yates 2012) rewarding both parties for positive performance in time and budget and holding both parties accountable for performance below the agreed standard. An example (concurrent) of how SEA 1411 could have been arranged can be seen by another Federal Government flagship project, the construction of the National Museum of Australia (NMA) as the ANAO report highlights,

Project alliancing is a relatively new method of contracting that seeks to deliver a cost-effective outcome within a set time frame for a project through the project owner—in this case the Commonwealth— sharing project risks and rewards with contractors. (Australian National Audit Office 1999 p.11)

However, major factors that could be identified for implementing an improved procurement strategy are ones ensuring that experienced and qualified personnel are appointed in overseeing defence procurements, safeguarding the continuity of experience or detailed succession planning for long term projects. This, incorporated with improved procurement processes such as strategic procurement for major defence acquisitions would improve the likelihood of a successful outcome.

In line with the Federal Government's policy position regarding public service staffing levels, the necessity for procuring external research becomes essential to the success of Defence's operations. Effectiveness, as used in the literature, constitutes an ongoing and real time competitive advantages

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between alternative suppliers of goods and services. Defence is less reliant on e-procurement as a strategic tool in this regard, as there is a smaller requirement for competition as it has routine recurring traditional product procurement activities.

The impact on Defence's procurements is appropriately examined through the types of procurements it most commonly undertakes. At the most reductive level changes to 'ways to work' as influenced by e-procurement at Defence would be modest, such as documentation would be increasingly held on computer servers rather than in filing cabinets. The literature concerning e-procurement in national government bodies does give a close approximation to Defence's role, however the European Union (EU) conducted research on the impact of e-procurement in government (Ferreira and Amaral 2016). It concluded that the most appropriate definition for government e-procurement would be based upon the transition from paper to paperless methods of service delivery.

"According to the European Commission, e-procurement refers in general, the replacement of pre-contractual procedures, on paper, by communication and processing based on technology and information systems. And should, however, be developed taking into account the political and legal specificities of the public sector" (Ferreira and Amaral 2016 p.10).

This aligns with other aims of

"e-procurement, in terms of governance, increases competition, empowers more transparent decision-making processes, combats corruption, regarding the management, reduces paperwork, allowing time and money gains" (Ferreira and Amaral 2016 p.9).

These two factors, (a) paper to paperless and (b) overarching political considerations, are substantial influencing factors in any institutional analysis of Defence.

Conclusion

E-procurement has the potential to reduce timeframes, costs and to increase internal integrity to the process (Daffen, Daffen et al. 1996). Following this argument, the key advantages of Defence's knowledge management regime is affected by e-procurement lies in its ability to store, sort, track and identify specific project data. The advent of mobile communications and moreover mobile device applications provides significant improvements in processing time for essential communications.

As the Gallaher report on the American federal government data storage survey of capital facilities details, there are vast resources expended upon reproducing technical information (a phenomenon with the term 'interoperability') which, whilst generated accurately, was never systematically archived.

Owners and operators have the largest interoperability costs of all the stakeholders: over \$10.6 billion, or about 68 percent of the total \$15.8 billion of inadequate interoperability costs calculated for the capital facilities supply chain (Gallaher, A. C. O'Connor et al. 2004 p.120).

The Australian Defence Organisation as part of the Commonwealth Government, is restricted by commonwealth procurement regulations. This restriction exacerbates the negative propensity to impact on their ability to incorporate innovative e-procurement methodologies. This conflict between requirement for innovation and availability of robust systems contributes to the wicked

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problem which affected the SEA 1411 project. SEA1411 highlights in very obvious ways the impact a wicked problem can have on a project, even a project which cost the Australian public \$1.4b. As a result, the constant change of requirements coupled with a lack of understanding of the impact of these changes impacted on the delivery of the helicopters.

Defence employs the term 'acquisition support' as a definition different in scope to e-procurement possibly so unrelated as it understands it, that standard definitions are insufficient. In this case the e-procurement process that supports this the most is the use of Information Technology (IT) to streamline documentation. All documentation is executed electronically, supported by the extensive use of electronic signatures and digital certificates. Hence the future changes for e-procurement ensures a need to be innovative and necessarily hybrid (Pongsuwan 2016).

Following this line of thought, there is the restriction that Defence processes are dictated by central applications. This diversity of procurement types requires perfunctory items to be obtained in line with other government arrangements. whilst research based contractual activities and one-off expensive items would be problematic if not impractical to attain at the more sophisticated level.

Some purchases challenge easy qualification and some have intangible elements which do not fall into a binary state such as supplied or not supplied. The challenges are to use these emerging tools where they would represent the most effective gains.

Almost inevitably every commercial function will become electronically based, and e-procurement will render paper-based methods of data handling a curiosity, as all procurement will become e-procurement if even the most simplistic definition is applied. Therefore, whilst the definitions of e-commerce and other forms of structured communications of meaning require fluid and coherent levels of understanding to function, conversely with ill-defined understandings, dysfunction should not be unexpected. Hence, the intersection of a complex and competing set of definitions and the understandings of multiple parties involved in diverse activities remains the pivotal interaction around which the efficiency and effectiveness of Defence procurement rotates.

This paper has considered the initial ideas of how current academic definitions of contributing factors have affected the delivery of a specific project. It has offered a narrative that pertains to the Seasprite project, and outlines what e-procurement is as well as examining the qualitative descriptions that are used to define the delivery of a project. Further work could be undertaken including investigating other failed projects in a similar manner to ascertain if there are common themes such as changes in scope and overseeing agencies. Further work may also include clarifying definitions for what constitutes e-procurement.

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