A Contingency View of Organizational Infrastructure Requirements Engineering

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ABSTRACT
Delivery of IT projects in today’s rapidly changing business environment is a challenge. Conventional investment approaches result in lumpy capital allocations, which encourage managers to include many potential future business requirements in each capital request. This locks in the delivery of future requirements despite high market uncertainty. The resulting projects are large and complex from both a technical and management perspective. In the management literature, new frameworks are emerging that draw on Real Options valuations to justify early infrastructure investment and provide fine-grained control over business initiatives in an uncertain world. Business managers can then build on the infrastructure by selecting business initiatives to maximise option value. However, this requires engineering approaches that separate infrastructure and business requirements and minimises their dependencies. This paper explores a contingency approach to Requirements Engineering (RE) to minimise initial requirements and maximise future strategic options, challenging the research community’s dominant paradigm of completeness, correctness and consistency.

Categories and Subject Descriptors
D.2.1 Requirements/Specifications

General Terms
Management, Documentation, Verification

Keywords
Requirements engineering, strategic alignment, business value

1. INTRODUCTION
Aligning IT strategy with business strategy is a perennial top concern for CIOs [1-3] and is increasingly difficult to achieve as organisations use IT in strategic market engagements [4]. With uncertain business outcomes, managers find it difficult to justify investing in IT by using the traditional capitalism allocation frameworks. However, strategic use of IT investments yields

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the greatest return [5]. So, managers adopt tactical measures to secure funding for a flexible IT infrastructure.

Today’s investment approaches are problematic for managers facing an uncertain environment. These investment frameworks require up-front identification of all the requirements to calculate the necessary schedule and benefits with confidence. However, future requirements are unknown or may change in response to the market.

This paper presents an approach to requirements engineering that is contingent on uncertainty. It takes the example of CommSec, Australia’s leading on-line discount stockbroker and examines how an alternative investment and requirements engineering approach works in a highly uncertain environment. This challenges what have become the traditional objectives of requirements engineering: completeness, correctness, and consistency [6]. Instead, in today’s business environment there is a need to both minimise initial requirements and maximise future options. This presents a new opportunity for requirements engineering.

The structure of the paper is as follows. Section 2 reviews requirements engineering research in the context of uncertain strategic IT investments. Section 3 explores the underlying theoretical framework for managing IT investment options and the framework for explicitly modelling strategic alignment of IT. Section 4 demonstrates how these two frameworks are appropriate under conditions of high uncertainty. Section 5 presents the industrial case study of CommSec before applying the frameworks presented in Section 3 to the case. Section 6 presents a discussion of the case and implications for industry practice. Section 7 discusses implications for a new research agenda based on a changed paradigm and Section 8 offers conclusions.

2. BACKGROUND
Zave (1997) describes requirements engineering (RE) as being “concerned with the real-world goals for functions of and constraints on software systems. It is also concerned with the relationship of these factors to precise specifications of software behaviour,” [32]. This definition partitions RE into two parts. The first is concerned with the achievement of real world goals, such as business objectives and processes, in making sure that the software is of use, the organisation or market needs it and the requirements “provide value” [7]. This part of the definition tends to be soft in nature – there are no magic formulas for guaranteeing that requirements are precise and complete [8].

The second of the Zave definition is where most RE research has focussed. The central question addressed is, “Are the
requirements complete, consistent and correct?" Researchers often address these issues in a theoretical or mathematical way e.g. Zowghi and Gervasi [6]. For strategic IT investments, it is extremely difficult to provide sensible answers to the completeness, consistency and correctness questions. In practice, the environment is uncertain, the requirements are ambiguous and the time to gather information is short. Indeed, the argument here is that completeness, consistency and correctness are the wrong objectives.

2.1 The Right Questions
Managers who make strategic IT investments ask questions such as:
1) Do we have alignment with key strategic objectives? Where is the evidence?
2) Have we scoped the problem? That is, what is the boundary of the business problem or objective?
3) Have we considered all strategic options that contribute to the objectives within scope?
4) Are we maximising the value of our options? Do we mitigate risks optimally?
5) What are the dependencies among the strategic options? If so, do they cause significant premature commitment?
6) What is the minimum IT infrastructure we must commit to now to generate the right but not the obligation to execute these strategic options quickly, at a time of our choosing?

Fundamental to these questions is the concept of "requirements triage" [9], which, in this case, implies prioritising the minimum set of infrastructure requirements necessary to support the desired options based on an organization’s strategic business objectives. Related to triage is an understanding the limits of the problem scope [10]. In a business strategy context, the problem scope includes the immediate needs of the organization as well as possible needs later on. Essentially, the business aims to retain flexibility in the face of uncertainty and trade off commitment on IT infrastructure for quick execution of subsequent business projects.

The challenge is to understand and structure the relationships between the strategic objective, business initiative options and the IT infrastructure, all within a changing environment where the market preferences are unclear. The engineer’s role is to set up the project to separate IT infrastructure requirements, maximise the business initiative options, and minimise initial requirements, thereby reducing complexity and market risk. The nature of the strategic business problem is that requirements are not correct, complete and consistent.

2.2 Dependencies
Dependencies among IT-based business projects are insidious in that they suppress strategic flexibility and encourage systemic failures. Fortunately, the RE research community addresses the issue of requirements dependencies in a number of ways. One is by modelling dependencies between actors and goals [11, 12], where an actor can be dependent upon a goal’s success in order for the actor to do something else. Kovitz recommends describing dependencies in a dependency diagram to show the ex-ante pre-conditions to events and the ex-post results of each action [13]. His diagram is akin to a Petri-net and describes a situation with known requirements and a goal to control a machine. Carlshamre and Regnell [14] compare two release-planning processes for a product line at Ericsson. Both processes address a major problem of eliminating requirements dependencies between each product release. The authors describe the explicitness and the scope of the dependencies as a step in achieving this goal. For Ericsson, the dependencies are causal, temporal, logical and value-related, which the authors note but do not address. Dahlstedt and Persson recognised that researchers need to classify these different kinds of dependencies in order to manage them better and suggest that this could be the beginning of a new research agenda [15].

Missing from the requirements engineering literature is an explanation of how to describe dependencies among strategic IT-based business initiatives and their shared supporting IT infrastructure. Furthermore, the decision framework for trading off dependencies against flexibility is only beginning to emerge in the management literature.

3. FRAMEWORKS: BP3 AND B-SCP
This section briefly describes the theoretical frameworks that address the right questions. It introduces BP3, an investment appraisal framework in the management literature, and then B-SCP, an IT-business alignment framework in the requirements engineering literature. This section then illustrates these frameworks by applying them to a hypothetical problem.

3.1 Overview of BP3
BP3 draws extensively on the Real Options and Information Systems literature to develop a two-stage process of investing in IT. Stage 1 draws on Dixit and Pindyck’s [16] Real Options theory to justify a technology infrastructure platform on the value of the right to invest in subsequent IT-based business projects. Having developed confidence in the platform, the business can wait and see how market preferences unfold before committing to the Stage 2 business investment. This decoupling of technology development from commercialisation favourably shapes market risk by limiting the downside to the premium paid acquiring the platform [17].

In extending Real Options to IT, the infrastructure is seen as a technology platform that subsequent business projects may effectively commercialise [18, 19]. The infrastructure generates options to invest in the portfolio of IT-based commercialisation projects.

Essentially, the infrastructure investment is a premium paid to acquire the right but not the obligation to subsequent business projects. Figure 1 shows how using Real Options results in a portfolio of business projects unbundled from each other and the IT platform that they share, whilst projects and platform align for valuation purposes.

Requirements engineers must: (1) ensure alignment of requirements to the strategic need; (2) capture infrastructure requirements to maximise business initiative options; and (3) group business requirements into business initiatives with minimum dependencies between them to maximise option value. In the first stage, the requirements capture focuses on the infrastructure needs and dependencies between options. Detailed business requirements are not required until the business decides to exercise an option [20].

3.2 Overview of the B-SCP framework
With BP3 addressing management’s IT strategy needs, this paper draws on a complementary requirements engineering
framework to develop a contingency view of requirements engineering techniques. An appropriate and powerful framework specifically targeting business strategy uncertainty is the Business Strategy, Context and Process (B-SCP) methodology. This paper applies only the business strategy and context part of the framework, leaving a discussion of process integration to be found in [21, 22]. For a demonstration of where strategic goals come from and in explicitly aligning strategic goals to systems requirements, see [23, 24]. This paper presents a brief overview of the B-SCP framework and draws the reader’s attention to these two other papers for a full description of the notational elements.

B-SCP is a requirements analysis framework [23, 24] that enables verification and validation of requirements in terms of alignment with and support for business strategy. The framework uses problem diagrams to model business contexts [10] and applies elements of I* goal modelling, drawing on Yu [12], in recognition of business strategy analysis and modelling approaches. Figure 2 shows an example B-SCP problem diagram.

dependencies reduce portfolio value and limit strategic flexibility.

Figure 2. Integrating goals & context (adapted from [24])

B-SCP is a candidate solution to BP3’s requirements engineering needs by providing a means to deconstruct and explicitly model business strategy and IT in a business context and by validating strategic alignment of IT systems with requirements. B-SCP achieves this by (1) identifying a clear linkage between the strategic business options and their infrastructure requirements, and (2) by capturing and describing the dependencies between projects and their supporting IT infrastructure.

Figure 4 applies B-SCP’s goal modelling [25] and problem diagramming [10] requirements analysis approach to the BP3 example in Figure 1. Project A may implement requirements R1, R2 and R3, with a schedule that starts the project in 6 months time and executes it for 6 months. Project B may satisfy requirements R4, R5 and R6. The business conditions for project B may not have arisen and it is possible project B will remain unimplemented for another two years, or longer. However, R2 in project A is dependent upon the implementation of R6 by project B, with project A unable to co-opt R6 because R6’s primary use is within a different business unit. Forcing business unit B to implement part of project B early is politically dangerous, with a fixed budget for

3.3 Combining BP3 and B-SCP

In applying requirements engineering to BP3, the critical challenge is to determine the infrastructure changes that will support the optional business projects but without eliciting the complete business project requirements. Without a clear linkage between the strategic business options and the infrastructure, the IT function has neither a case to justify its choice of infrastructure design nor funding to implement it. Furthermore, BP3 has a requirement to identify dependencies among the portfolio of optional business projects. These dependencies reduce portfolio value and limit strategic flexibility.
project A and business unit B reluctant to make an early commitment. This forces a consideration of the strategic importance of projects A and B for the wider organisation and of requirements R2 and R6.

There are two basic options:

1. Accept the risk and implement R6, which requires the calculation and management of both risks and costs for it effectively implements part of project B ahead of commitment to that project. To accept this dependency reduces the value of the option over project B when cost justifying the infrastructure upgrade. Bringing R6 into project A would increase project A’s scope, complexity, schedule and costs and should have a counter effect on project B.

2. Sacrifice R6, while recognising the associated costs and benefits. Implementation of project A may be easier but it will deliver less benefit than originally conceived, which would reduce its option-value but may improve the option-value over project B. An extension of this strategy is start project A but then hold it in abeyance until execution of project B, which would increase program management requirements but capture the benefit of R2 to project A, albeit with some delay and contingent on project B’s execution.

In this case, the decision to implement R6 would draw on the business strategy. The question becomes “what is the value of R6 to executing the strategy?”

Adopting a top-down strategic imperative, which is not necessary for B-SCP or BP3, the overall process to solving these problems is first to ascertain and describe the business strategy, including the vision statement. With the intended explicit strategy in hand, the organisation formally defines the strategy’s scope. BP3 then elicits the options that fit within that strategic scope before B-SCP captures the minimum requirements necessary to describe the strategic options from an option-valuation and infrastructure design perspective. An iterative BP3 process then negotiates an option-value, optimises the portfolio and justifies the infrastructure.

Figure 4. Linkage to strategic business options and capturing requirements interdependencies in applying B-SCP to BP3

With justification complete, the organisation allocates the central IT function the funds it needs to build the infrastructure able to support quick execution of the optional business projects. Once the owning business-unit determines that the conditions are right to execute an option then B-SCP describes that project’s strategies, objectives, goals, processes and context in detail, ensuring explicitly traceable alignment to the vision and business strategy.

4. COMMSEC CASE STUDY

To illuminate the above issues in businesses today, examine the case of Commonwealth Securities [26]. CommSec is Australia’s largest discount stockbroker with over 1.2 million customer accounts, an average of X0,000 daily trades, which represents Y% of all Australian Stock Exchange (ASX) daily trades, and a staff of Z’00 people. Formed in mid-1995, it has been profitable since its second year of operation. CommSec has maintained its leadership position through periods of tough competition, variable transaction volumes and global economic uncertainty. It has extended its services to include margin lending, superannuation and managed funds, and has successfully managed its technology to maintain low-cost, high availability services while delivering incremental functionality in line with, or just in front of, the market.

This on-line discount stockbroker upgraded its IT infrastructure ahead of its business needs. The CEO implemented a major program of IT-enabled change to support potential new products and services. First, he upgraded the IT Infrastructure to ensure availability and flexibility but without any new positive cash flows. He subsequently leveraged this infrastructure’s flexibility as business opportunities became available, easing out releases over an extended period to allow incremental training of operators and customers, and to keep the web site fresh and interesting. Each rapid development contributed to the emergent strategy.

“One of the things that we’ve done well over time is that we have tried very hard to continually be releasing stuff to the Internet site. We don’t break projects down into three-month deliverables and deliver six bits of functionality every three months. We try and run lots of projects and that’s to give our clients a sense that we are moving forward. That tells your clients that you’re still working, you’re still thinking, you’re still trying to add value.” – Michael Blomfield, CEO, September 2002.

The infrastructure in this case was the aging settlement clearing system, Broker. The hardware was underpowered, the database vendor no longer supported the version of the database and there were problems with tables overflowing and the database crashing. The Broker application also lacked the flexibility to access data from other systems, making it difficult to extract customer information and contribute to other developments.

A traditional approach to this, which CommSec examined and then discarded, would review the business processes, issue an RFP to buy or build a new application and then re-host the new solution. Essentially, the traditional approach would replace the entire system. Instead, CommSec co-funded the redevelopment of the existing system with the vendor, upgraded to a new version of the database (Oracle 8i) but left the functionality unchanged. The business funded the infrastructure upgrade because it recognised the value of the flexibility to design and choose when to invest in future business initiatives.

This approach unbundled the changes to the platform with the changing of business functionality and business processes, which minimised the potential impact on customers, reduced the complexity of the system replacement and provided a robust and scalable platform.

As the market grew and more competitors entered, CommSec responded rapidly to changing market needs. Rather than allocating development capability to delivering requirements that may or may not have eventuated, development engineers were able to respond rapidly by developing new services with a sustained effort. New features included market depth
From a business perspective, this approach minimises risk by reducing the complexity of system upgrades introduced by the behaviour traditional investment approaches drive. As Beggs, Head of Equities, explains:

“As soon as you start talking to any developers about upgrading the system and talk to any of the business people about it, they start telling you all the things you could have, and all the things you need to have, but you don’t have now. However, complexity grows exponentially as a function of the number of changes, driven by the effort for specification, coding, and user acceptance testing, as does the potential for unintended consequences to the production environment.”

Each IT-based business project had a separate definition and was relatively small. Each project was time-boxed to contain project schedule over-runs, to limit each project’s ability to drain resources from other projects and to minimise the portfolio of projects’ interdependence. Each project delivered different customer benefits and came under separate executive approval.

Complementing this new framework for IT investments were a range of technologies and practices. Technologies such as web services allow more modularity in systems design [27], refactoring simplifies infrastructures in preparation for change [28, 29] and Rapid Application Development techniques improve the reliability of dynamic uncertain business projects [30].

5. APPLYING BP3 AND B-SCP

The CommSec case illustrates the challenges facing a company that tries to capture maximum benefits by defining its requirements for infrastructure early, in anticipation of possible business needs. This section uses CommSec to illustrate the application of BP3 and the operationalisation of the requirements analysis using B-SCP. In this case study example, we illustrate how B-SCP is used first to link infrastructure requirements to strategic business options and then to capture requirements interdependencies between options requirements, tasks that are critical to BP3.

The first step in identifying options is to describe the business strategy, making sure the options fit within and fill the scope of the business strategy. Figure 5 presents a horizontal high-level problem diagram of the CommSec vision, business strategies, BP3 objectives and project options, and infrastructure problem. At the highest level in the diagram, CommSec’s vision was to provide easy low-cost access to the Australian stock market for everyone. In order to attract customers, CommSec’s business strategies were to be the low cost, high volume provider for online trading and to be the rapid customer-function market leader; i.e., continuously being the first-to-market for this e-commerce service.

To meet these strategies, CommSec’s key objectives were to ensure timely release of investment options and to provide a scalable, flexible and reliable infrastructure. It is at this level that applying BP3 determines the right options to justify the infrastructure and allocates the decision on option timing to the business. One strategic option to consider in detail is straight through processing, which automates the connection between the Front End in the infrastructure and the Broker machine. In technical terms, it was middleware, which the context diagram in Figure 5 represents as a domain of interest. Another strategic option is the broker rebuild that affects much of the infrastructure because all the domains interface with the Broker so the requirement constraint connects to the infrastructure box rather than a specific domain within it. The Watch list is a live-feed of stocks and share prices that appears on the Front End domain. The Front End is the web browser that the Customer uses to access CommSec’s products. The SMS option allowed customers to trade and receive information over the cellular phone network.

The SMS option is dependent upon the Watch list (the arrow from the SMS option in Figure 5 to the Watch list depicts this dependency). This means that the value of the SMS option reduces because it needs the Watch list implementation. The SMS domain in the context diagram is also dependent upon flexibility in the Front End implementation. However, at this level of abstraction, it is not possible to tell what the specific requirements, infrastructure dependencies and constraints will be. The other options are Car Insurance, Financial Planning and Margin Lending. As can be seen in Figure 5, the Car Insurance option did not execute because the right market conditions never emerged.

The machine domain in Figure 5 is the Broker. It is through the Broker that much of the processing of trades, margin lending and financial planning can occur. However, in describing an infrastructure that consists of programmable machines, it might appear more logical to constrain the Broker rather than just the other domains but this would break Jackson’s guidelines for Problem Frames, which states that a machine should guarantee the requirements have their effect in the problem domain. The machine guarantees this through its interfaces to the domains of interest in the problem domain – in the CommSec case the problem domain is the Infrastructure and the Customer. It is in these domains of interest that the requirements have an effect [10]. As such, the requirements – the vision through to the options in Figure 5 – directly affect the Front End in terms of how the Customer uses the CommSec broker system. Normally, B-SCP would model how the requirements reference the Customer but to maintain the clarity of diagram the requirements’ definition and contexts appear later.

Figure 5 is a high-level overview only with the options representing entire development projects. It is abstract to the point where the direct and explicit connection between options and infrastructure shown in Figure 5 are not obvious in practice. The strategic decision that CommSec took to provide easy low-cost access and rapid release of products necessitated that the IT infrastructure was ready to meet the needs of all the potential options. CommSec’s challenge was to capture necessary and minimally sufficient requirements to design an infrastructure and perform portfolio maximization through reducing dependencies. The crux of CommSec’s problem was to upgrade the infrastructure before the IT-based business projects - before committing to detailed requirements capture. The portfolio of projects must have minimal-to-no dependencies when an option exercises because dependencies reduce an option’s value, putting the infrastructure justification at risk. For instance, if execution of the SMS option requires that Watch List be already complete then this constraint reduces the value of the option to invest in the SMS – it has value only if Watch list executes.

The business unit that owns an option has no obligation to execute it. Timing of the investment is under their purview and
dynamically aligns with market developments to maximize returns and minimize risk. Within this framing, there is no commitment to the IT-based business projects, which reduces a number of management behaviours that lead to escalation in commitment. Instead, each project presents its own business case at a time of the business unit’s choosing. Some options remain unexercised, effectively abandoned without making premature commitment. As can be seen in Figure 5, CommSec did not exercise the Car Insurance option so the ‘X’ appears in Figure 5.

The Watch list problem diagram depicts a business initiative to “Provide a new communication channel to the Customer”.

Its supporting goal is that the customer can tailor the watch list to support their individual needs. To ensure accuracy for the customer, a measurable objective is that the “Watch list must deliver accurate information 100% of the time”. This requirement (reference ‘aa’) means the Broker (interface c) must accurately gather the Stock Market live feed and the Front End must display the feed in the appropriate format (requirement constraint ‘bb’) and through interface ‘b’. The “Customer choice of trades and prices of stock to watch” control these activities (requirement ‘cc’) and are set up through interface ‘a’ in the context diagram.

Figure 5. Problem Diagram of CommSec Developments

The SMS problem diagram has the same business strategy as the Watch list - “provide a new communication channel to the Customer”. The SMS initiative would allow the Customer to receive live SMS feeds of what they want when they want it and to allow Customers to conduct trades when they want. The Customer has two SMS feed streams options: to receive regular updates on stock prices chosen from the Watch list and to Conduct trades over SMS (requirement reference ‘ff’). The Front End is constrained by requirement ‘ee’ to present these options to the Customer, who makes the selection of none, one or both. Interface ‘d’ then updates the SMS domain via interface ‘f’. The objective “SMS delivers accurate information 100% of the time” enables the goals. Requirement ‘dd’ references the Stock market live feeder domain. This domain interfaces with the Broker machine that transforms the feed information into a format that the SMS domain can transmit through interface ‘g’ and via interface ‘e’ to the Customer, meeting requirement ‘gg’. The Customer can also start trades via SMS to the Broker. Only with this in place, will “trades be allowed”, providing the Customer with regular accurate updates and so they can make investment decisions with more confidence.

Figure 7 shows an example dependency, D1, between two requirements. The SMS activity, “Customer received regular updates on stock products from chosen Watch list” is dependent upon Watch list implementation and, in particularly, upon the goal “Tailor Watch list to Customer need”. Exercising the SMS option would implement all of its requirements, including the Watch list on which it is dependent.

Figure 6. CommSec’s options (adapted from [20])

This example dependency reduces the business value of the SMS option because it is dependent on the Watch list implementation. There are three alternative paths to take based on these considerations. First, do not exercise either option. Second, implement the Watch list and then the SMS, given the right conditions. Finally, implement part of the SMS but not the Watch list. This would allow CommSec to send regular
information updates to its Customers but not send any real time data and information about stock prices.

6. DISCUSSION
The combination of BP3 and B-SCP techniques resolves a number of recognized industry problems in both requirements analysis and IT investment. First, it addresses requirements uncertainty in a rapidly changing business environment. The combination achieves this by using requirements analysis techniques to determine a flexible IT infrastructure and structure businesses requirements into separate business initiatives with minimal dependencies. Business managers then select which requirements to implement as the market unfolds. This approach to requirements analysis unlocks two key benefits addressed by BP3: (1) it reduces the complexity of IT projects by decoupling building the IT infrastructure platform from the execution of multiple, smaller, business initiatives; and (2) it reduces market risk, by committing to expensive requirements gathering as late as possible, rather than at conception of the initiative. This allows business managers to invest in business initiatives in response to market conditions.

This approach favourably structures IT projects to increase project performance at a time when IT in strategic market engagements is high and growing.

There are some similarities between Soft Systems Methodology (SSM) [33] and BP3 combined with B-SCP. However, SSM does not address real options or investment decisions, does not consider an organization’s competitive business strategy and in our experience does not provide a convincing mechanism for determining low-level systems requirements, and trade-offs between requirements, for IT systems and their supporting infrastructure.

7. TOWARDS A NEW AGENDA
The CommSec case presents a real-world example of a requirements engineering problem of major importance. Indeed, the success or failure of CommSec’s business was dependent on getting the infrastructure requirements right. This provided the flexibility to exercise business initiative options in rapid response to the market. Requirements gathering and project execution for each business initiative was not held up by collecting future requirements for other business initiatives that may not be required or may change.

The BP3 approach requires identification of infrastructure requirements in advance of selecting which business initiatives to implement. Starting the implementing of some business requirements without knowing all of them will challenge a requirements engineer who insists upon requirements to be complete, correct and consistent.

If requirements engineering limits the definition of its research domain to this paradigm, it will preclude itself from addressing many of the hardest-hitting, real-world requirements problems that are of greatest importance and value to industry. Therefore, the proposal here is that the requirements engineering research community broaden the scope of its domain to include problems where requirements specification is incomplete and subject to change.

This moves towards a new agenda for requirements engineering research to address the first half of Zave’s definition discussed in Section 2. To address “real-world goals for functions of and constraints on software systems” [32] RE research needs to address key issues that include: (1) extending the scope of requirements problems to include business strategy and strategic options, (2) approaches to unbundling requirements and minimise dependencies, and (3) requirements analysis techniques geared to maximize economic value of IT investments.

8. CONCLUSION
Traditional IT investment and project delivery techniques assume the ability to articulate all requirements up-front. They find it difficult to deal with uncertain environments. A new approach, BP3, addresses this difficulty by using Real Options valuations and separating requirements into IT infrastructure and a series of business project options. The benefits of this include reduced complexity and reduced exposure to market changes.
Operationalisation of this approach requires the use of RE techniques. B-SCP validates requirements against the business objective and models the requirements and dependencies to minimise upfront requirements and maximise options. This moves RE towards a new research agenda that provides an alternate view to the RE community’s dominant paradigm of Completeness, Correctness, and Consistency.

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