INTEGRATING RO AND THE RBV INTO A STRATEGIC IT DECISION-MAKING MODEL – AN INTERPRETIVE HERMENEUTIC APPROACH

Suvankar Ghosh, University of South Dakota, 414 East Clark St., Vermillion, SD 57069, Suvankar.Ghosh@usd.edu, (605) 677-5545

Alan Brandyberry, Kent State University, P.O. Box 5190, Kent, OH 44242-0001 abrandyb@kent.edu, (330) 672-1146

ABSTRACT

We employ an interpretive hermeneutic approach to develop a normative model for formulating information technology (IT) strategy leveraging the theories of real options and the Resource-Based View. Unlike abstract and contemplative models for formulating strategy, our model for IT strategy is concrete, action-oriented, and hence can be readily operationalized by practitioners. Furthermore, in stark contrast to the empirical positivist strain of research that is the staple approach in the information systems (IS) discipline, we demonstrate that useful models for guiding key managerial decisions can be built using an interpretive hermeneutic approach. We show how to apply this qualitative methodology in building a decision-making model for enterprise integration, which is a priority area of investment for IT organizations.

Keywords: Real options, Resource-Based View, Interpretive Research, Hermeneutics, Enterprise Integration

INTRODUCTION

Real options (RO) (Dixit & Pindyck, 1995; Graham & Harvey, 2001; Fichman, 2004), the Resource-Based View (RBV) (Barney, 1991, 2001), and the Dynamic Capabilities Approach (DCA) (Teece et al., 1997) are well established and interrelated theories for explaining how firms develop competitive strategy in a stochastically-changing world. Firms strive to build a valuable portfolio of real options that they can judiciously exercise to gain competitive advantage as the world changes around them. Strategy, in other words, unfolds as a sequence of exercises of real options such as entry into a new geographical market, launch of an innovative product, or the realignment of strategic partner relationships (Bowman & Hurry, 1993). The firm's ability to exercise such real options at opportune times is not fortuitous and is in fact predicated upon careful acquisition and nourishment of unique resources which enable the firm to appropriate market opportunities when they arrive. Moreover, it is not simply inert resources but also managerial capabilities for combining and recombining a firm's resource endowments in innovative ways that enables a firm to effectively exploit market opportunities (Teece et al., 1997). This is where the RBV morphs into the DCA and unique resources plus dynamic capabilities become the basis for the real options that a firm possesses at any given time to address the opportunities and threats in a stochastically-changing market landscape. As an aside, we use the term capability to encompass not just unique but inert resources but also the

managerial capabilities the firm possesses to dynamically combine and recombine these resources in innovative ways.

That is the theory, but ultimately the question is how this theory can be translated into concrete decisions and actions by practitioners. More specifically, the question for the IT practitioner is how the interrelated theories of RO, RBV, and the DCA can be used in making concrete decisions about a firm's IT strategy. In creating theory to explain phenomenon and then developing managerial prescription based on that theory, IS research has overwhelmingly relied on the quantitative positivist research (QPR) model. In a nutshell, in the QPR approach, hypotheses between constructs are formulated and empirically tested and these "validated" hypotheses become the basis for developing managerial prescription. While QPR has dominated IS research to date, the importance of qualitative research is rising in the IS discipline (Benbasat and Zmud, 1999). Following the traditions of interpretive research, we build a model called the **C**apability **U**ncertainty **Re**al **Op**tion**s**, or CURE-OPS, Model for identifying the preferred real options of a firm as it considers a strategic IT investment. We also discuss how the principles of interpretive hermeneutics (Klein and Myers, 1999), a bedrock set of principles in interpretive research, were employed in this study.

THE CURE-OPS MODEL

RO and the RBV, along with its DCA extension, have underscored the salience of two constructs, uncertainty and firm capability, in the formulation of a firm's competitive strategy. The CURE-OPS model ties the RO and RBV/DCA theories together by mapping the generic set of options that a firm possesses when contemplating a strategic IT decision into a 2x2 matrix with uncertainty and firm capability representing the two dimensions of this matrix (Figure 1). The generic set of options available to a firm in any strategic investment are the defer option for postponing the investment; staging and piloting options for building out the investment in small stages or pilot projects; alter-scale and scope options for adding and removing capabilities after the initial investment; the abandon option for exiting from the investment; and strategic growth options for growing the investment beyond its current scope (Benaroch, 2002).

Each quadrant of the 2x2 matrix in Figure 1 represents a certain scenario of uncertainty and firm capability. The generic options are mapped to these scenarios such that the type of option mapped to given scenario is exactly the kind of option you need in that scenario. In scenario I, where decision context uncertainty is high and the capability of the firm to exploit the technology is low, it is best to simply defer making any investment decision. When uncertainty has lessened but firm capabilities for successfully exploiting the technology are not high enough, the firm should consider exercising piloting or staging options. In scenario III where the firm has the capability to effectively exploit the technology but uncertainty is still high, the firm should choose a path that maximizes its alter-scale, alter-scope, and abandon options. Scenario IV, where both the firm's capability for exploiting the technology is high and uncertainty is low, presents the best scenario for taking a deep dive into the technology. The real options that have value in this scenario are the strategic growth options in Benaroch's taxonomy. The generic CURE-OPS Model gives a starting point for defining technology strategy but it needs to be further contextualized and also an approach developed for the firm to recognize the level of uncertainty in the decision context and its own capability with regard to a technology. It is in

these steps of completing the model where we apply interpretive hermeneutics.

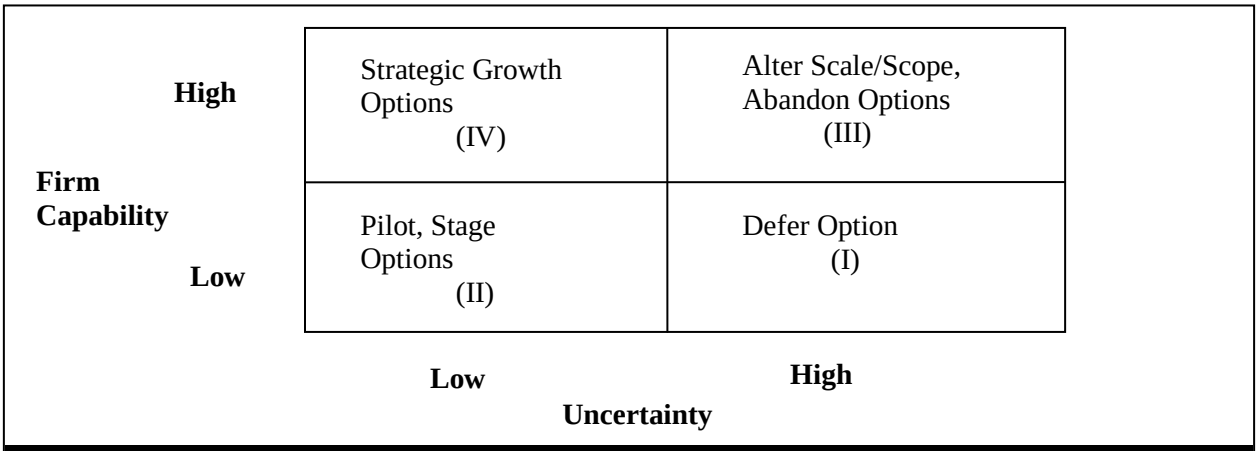

Figure 1. The Generic CURE-OPS Model

PRINCIPLES OF INTERPRETIVE HERMENEUTICS

Interpretive hermeneutics is fundamentally about understanding a phenomenon by interpreting various types of textual information that have been generated by participants in that phenomenon (Boland, 1985; Butler, 1998; Klein and Myers, 1999). In our case of developing a model for the phenomenon of decision-making about strategic IT investments by firms, interpretive hermeneutics begins with a perusal of wide tracts of textual information contained in user and vendor web sites, product literature, technology and market analyses by consultants and firms, trade journal articles, news items, consumer reports, and standards organization documents. Interpreting, analyzing, and synthesizing these diverse pieces of information into a meaningful picture is the substantive work of interpretive hermeneutics. However, what is important to recognize and what makes interpretive hermeneutics partly a science is that this work of dissecting information and putting it all together is guided by a core set of principles (Klein and Myers, 1999), which are as follows:

- **Contextualization** – Phenomena being studied must be placed in a specific context.
- **Hermeneutic Circle** – The hermeneutic circle refers to understanding a complex whole by iterating between the whole and its parts.
- **Interaction** – Interaction between the researcher and the subjects enhances the quality of the research.
- **Abstraction and Generalization** – The cognitive technique of abstraction and generalization allows for making general assertions even though the sample of study may be small.
- **Dialogical Reasoning** – Dialogical reasoning forces the researcher to question their assumptions, discover biases, collect all the facts, and assess the consistency between the facts and conclusions
- **Multiple Interpretations and Suspicion** – This principle encourages the researcher to not accept things at face value but to be naturally suspicious and search for alternative interpretations.

APPLYING INTERPRETIVE HERMENEUTICS

We applied interpretive hermeneutics in this study in several important ways in terms of contextualizing the study as well as understanding and developing measures for the uncertainty and firm capability constructs in the model.

Contextualization – Enterprise Integration

The study of any phenomenon must have a specific context. That context actualizes and gives voice to the real participants in a phenomenon. These participant perspectives captured in textual form then provide the raw material from which interpretations, abstractions, and generalizations can be made. But first, there must be a specific context. For this study of building a normative model of technology strategy, we chose enterprise integration (EI) as the specific context. EI is about integrating a firm's disparate systems, applications, databases, and business processes, and is arguably one of the most important priorities of an IT organization (Bloomberg & Schmelzer, 2006; Linthicum, 2000).

Hermeneutic Circle and Dialogical Reasoning – Developing the Measures

The hermeneutic circle was applied in understanding uncertainty in the context of technology decisions. By studying various industry reports, news items, and journal articles, we first identified market uncertainty and technology uncertainty as the two major types of uncertainty inherent in decisions of technology strategy in the EI space (Ghosh, 2007). However, the principles of the hermeneutic circle as well as dialogical reasoning made us question whether we had indeed correctly deconstructed uncertainty into its constituent parts. It was this exercise of applying the hermeneutic circle which led to a further deconstruction of technological uncertainty into its parts pertaining to the uncertainty in the architecture, performance, and standards of the technology since there is much confusion in these areas (Hoffman, 2005; Gottlob et al. 2005).

In addition, any major technology has a number of use cases or ways in which the technology is principally applied. This led to the idea of viewing uncertainty in terms of the use cases of EI. Again, perusal of user and vendor web sites revealed the key use cases of EI to be:

- **Message brokering and transformation**-- Message transformation involves mapping messages from one format to one another, such as from a proprietary format to XML (W3C Recommendation XML, 2008), so that different systems and applications can exchange messages that both can understand. The reliable transfer of messages can be accomplished by a message brokering system such as an Enterprise Services Bus (ESB) (Fiorano ESB, 2009; Progress Software ESB, 2009) with the message transformation function being provided by a service on the ESB.
- **Process orchestration** -- In process orchestration, the message transformation capability is augmented by a process orchestration function for managing and integrating business processes. Microsoft BizTalk Server is an example of a process orchestration product (Microsoft BizTalk Server, 2007)

- **Persistent storage of XML data** – Given the centrality of XML in EI, information in XML format has to be persistently stored. This can be accomplished by shredding XML data and storing it in relational format; migrating older relational databases to their hybrid versions which can store both relational as well as XML data conforming to the XDM data type (W3C Recommendation XQuery and XDM, 2007); or deploying newer pure XML databases.
- **Enterprise information integration** -- The integration of heterogeneous data across multiple stores of structured, unstructured, and semi-structured databases and proprietary applications through metadata integration or database federation is viewed as the final major use case of EI (MetaMatrix Enterprise, 2007).

Mapping uncertainty along the two dimensions of the type of uncertainty and the use case of the technology results in an uncertainty mapping matrix as shown in Table 1. Depending on the use case and the type of uncertainty, the level of uncertainty may be high or low. This leads to developing a measure for uncertainty where if the percentage of cells in the uncertainty mapping matrix is above a certain threshold such as 50%, then the overall uncertainty in the decision context is deemed to be high.

A similar process of perusing relevant textual information, dialogical reasoning, and closing the hermeneutic circle led to a measure for the firm's EI capability which was rooted in the Capability Maturity Model (Pawlik et al., 2003). Using the CMM as the basis, different levels for the firm's capability in EI are defined as shown in the Enterprise Integration Maturity Model (EIMM) in Table 2. Using this table, a given firm simply has to recognize where it fits in terms of its maturity with EI.

Table 1: EI Uncertainty Mapping Matrix

	Type of Uncertainty				
		Architecture	Market	Standards	Performance
Use Case	Message Brokering and Transformation	**High**	**High**	Low	**High**
	Process Orchestration	Low	**High**	**High**	**High**
	Storage and Retrieval	**High**	**High**	Low	**High**
	Enterprise Information Integration	Low	**High**	**High**	**High**

CONCRETE CONTEXTUALIZED MODEL FOR ENTERPRISE INTEGRATION

Developing the final contextualized model for EI (Figure 2) involves mapping the key technology alternatives available to firms for entering the EI space such as deploying an ESB (Fiorano ESB, 2009) or an EAI suite (Tibco BusinessWorks 2007) or doing a small pilot project

into the quadrants of the generic CURE-OPS Model shown in Figure 1. ESBs offer a plethora of alter-scale and scope options, hence the ESB strategy best fits into quadrant III. The EAI Suite solution which comes complete with a full range of capabilities is best for a firm which is not uncertain about its requirements, is operating in a stable market and technology environment, and has highly-developed capability to exploit EI, which it could have acquired from outside the firm or developed through working on other projects. Quadrant II is where the firm makes a small foray such as a pilot project for integrating XML and relational data for a given application.

Table 2: Enterprise Integration Maturity Model

EIMM Level	Characteristics
Level 1	Organization has basic expertise in manipulating XML data, individual pockets of XML knowledge exist but it is not widespread.
Level 2	The basic XML expertise is now more widespread and the organization is capable of pursuing multiple projects that handle XML data.
Level 3	Organization is starting to acquire expertise in enterprise architectures such as SOA and Web Services (Bloomberg & Schmelzer, 2006) but sufficient breadth and depth of expertise in SOA does not yet exist.
Level 4	Organization has a solid understanding of SOA and Web Services and has the breadth of capabilities to deal with not just integration issues *per se* but also to manage the integration infrastructure.
Level 5	Organization is capable of optimizing the integration infrastructure, improving performance, and expanding the scale of EI infrastructure.

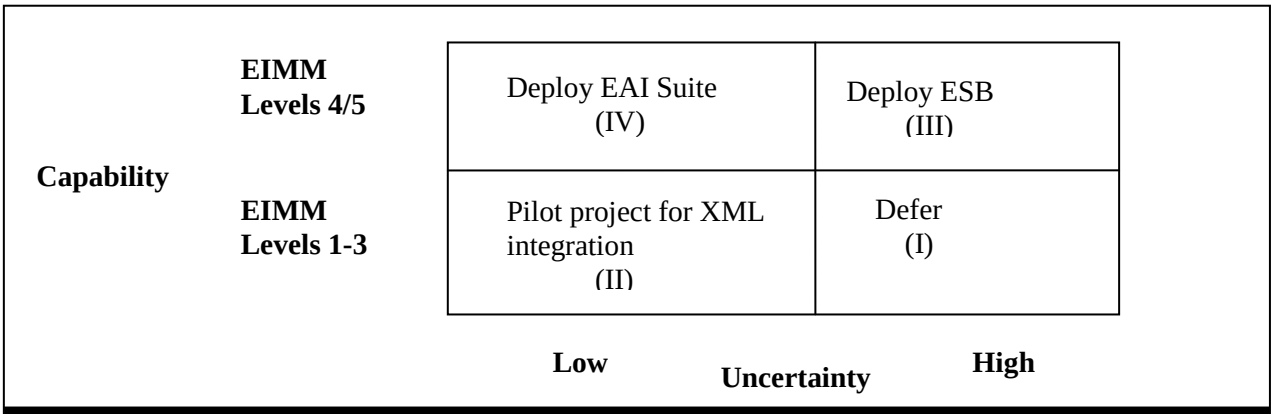

Figure 2: Strategic Decision-Making Model for EI

CONCLUSION

In this article, we employ an interpretive hermeneutic approach to develop a normative model for decision-making on strategic IT investments that leverages the precepts of the allied theories of RO, RBV, and the DCA.

References

References are available upon request from Suvankar.Ghosh@usd.edu.