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Offshore Software Development: Is the Benefit Worth the Risk?

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Abstract

The offshore information services market is estimated to be valued at $30 billion to $40 billion, with a large portion of that being in the software development area. Much of the justification for going offshore for software development services is purported to be a demand for skills that exceeds the current supply. While there is evidence of this, the current literature cites the primary motivation as cost reduction. Recent reports of U.S. companies outsourcing software development to offshore companies, while simultaneously laying off U.S. workers, appear to add credence to this assertion. This papers looks at the benefits versus the risk of foreign outsourcing for software development, and develops a set of critical success factors, which lead to a series of recommendations for companies considering foreign outsourcing.

Keywords: Off-shoring, outsourcing, information systems strategy

Introduction

The offshore information services market is estimated to be valued at $30 billion to $40 billion. While the types of outsourcing run the full gamut of IT related services, a growing proportion of the offshore market is in the software engineering and software development area (IT Africa, 2001). Much of the justification for going offshore for software development services is purported to be a demand for skills that exceeds the current supply. The fact that many software companies are offering attractive hiring and recruiting bonuses may be evidence that this is true (Raval, 1999), however much of the information technology literature cites the primary motivation as cost reduction (Gopal, Mukhopadhyay & Krishnan, 2002). Recent reports of U.S. companies outsourcing support to offshore companies, while simultaneously laying off U.S. workers add credence to this assertion (Vaas, 2002). One stark example was the hiring of 6,000 offshore IT workers by Electronic Data Systems, Corp. during 2001, a year in which the U.S. IT workforce declined by 5% due to layoffs (Vaas, 2002).

Regardless of the motivation, more and more companies are making the decision to take software development offshore. Today, over 220 of the Fortune 1000 companies are doing software development offshore (Top Companies, 2001). It's projected that in the next fifteen years about 3.3 million white-collar jobs in about 550 service job categories will be moved offshore. A large portion of those will be in the IT field, and many who have already ventured there are finding, that while the benefits can be significant, there are also many risks and pitfalls that must be overcome (Ramarapu, Parzinger & Lado, 1997). Offshore development presents new management challenges that are often not considered when costs are analyzed.

Literature Review

This paper will begin with a look at some of the benefits as well as the risks associated with offshore software development. Examples from domestic as well as foreign companies will be cited to illustrate their past experiences. This will be followed by a review and analysis of some of the criteria for success for companies involved in offshore software development, which have been identified in recent literature. Next, it will look at several companies who have ventured into the offshore software development arena, and analyze their performance against the identified critical success factors. The paper will conclude with a set of recommendations for companies considering taking software development offshore.

A Brief History

Outsourcing of information technology began over 10 years ago. The first major instance was in 1990 when Kodak reported that it had outsourced the entire operation of its information center (Rajkumar & Mani, 2001). Offshore software development is a relatively new trend in the outsourcing field and has been fueled by the globalization of information technology as well as the improvements in telecommunications facilities (Gopal, Mukhopadhyay & Krishnan, 2002).

In recent years Ireland, Israel and Russia have become major sources of software development expertise, however India is quickly becoming recognized as a global information technology superpower. In the first seven months of 1999 over $750 million flowed into Indian software companies from overseas (Miller & Kaye, 1999). In 1999 and 2000, 1250 Indian companies exported software, including applications for Enterprise Resource Planning (ERP), Computer Aided Design/Computer Aided Manufacturing (CAD/CAM), and e-Commerce (Field & Bentsen, 2000). Today, the higher education system in India produces over 65,000 highly skilled software engineers each year. The Indian culture is also highly supportive of continuous self-improvement and the learning of new skills (Denison-Smith, 2001).

Offshore software development takes on several different forms. Generally, the options fall into four broad categories. The first of the categories involves the sponsoring of foreign individuals on employment visas. This would typically be an option chosen for short term, limited needs, but could also lead to a means of recruiting qualified candidates for longer term employment. While this practice has a great deal of benefits, it is probably the most controversial today, and has lead to a great deal of scrutiny over the past few years. Prior to 1999, the number of H-1B visas that could be granted in any one year was set at 65,000 (Immigration, 2000). In 1999, legislation was passed that allowed an annual increase in that limit reaching 195,000 in fiscal 2003, before reverting back to 65,000. On the one side, a national association of engineers and computer scientists is lobbying Congress to study the impact that these changes in the H-1B visa program has had, resulting in the loss of jobs to foreign information technology professionals (Lewis, 2002a). On the other side, some information technology employers are attempting to quietly persuade Congress to extend the annual H-1B visa limit above the level of 65,000, in order to take advantage of more low cost professionals for the longer term (H-1B, 2002).

Another category of outsourcing involves the engagement of a domestic or offshore consulting firm that could provide the needed offshore skills and manage them overseas for the sponsoring company. The third category is a variation of the second, and is for the offshore company to recruit the workers and send them to the company's domestic location. The fourth category involves the establishment of a physical presence of the business overseas, by the sponsor company. This could be through a joint venture with an existing foreign firm, or the establishment of a wholly owned subsidiary (Raval, 1999). The alternative chosen is dependent on many factors, and each has pros and cons, which must be weighed against the companies objectives and specific circumstances. The following sections will look at some of the benefits and risks that companies have experienced in the use of offshore software development.

Benefits of Offshore Software Development

Many companies seek offshore development opportunities because they are motivated by cost savings. In 1997, the annual cost of an information system professional in the United States, including salary, benefits, and overhead was approximately $100,000 to $150,000 per year. During that time period, the same skills were available in India or Ireland for one-third the cost, including travel and additional communications costs (Ramarapu, Parzinger, & Lado, 1997).

The situation has not changed in recent years. Ewarenow.com, a company that develops Microsoft based software for medium-sized companies, gave its first offshore development contract to a Thai-based company in 2002. Labor costs of skilled Thais were one-third the cost of U.S. based resources. Had the company chosen to go to India for resources, they would likely have saved even more (Karnjanatawe, 2002). The degree of cost savings and the amount of time for them to be realized however depends on the option chosen for offshore development as well as the type of resources being used. Most companies find that partnering with an offshore company offers the best chance for success (Cassidy, 1998).

For companies highly dependent on software, keeping up with the competition represents another benefit of going offshore. In the process of developing its Global System for Mobile Communications (GSM) product, Lucent Technologies, Inc. recognized that much of the mobile standards for GSM are driven out of the European Community. In order to ensure that they remain in step, Lucent maintains a development staff of over 1000 people in eight locations, including the U.K., Germany, France, India and the U.S. (Anthes, 2000).

Some companies find that enhanced productivity is an inherent benefit of going offshore, particularly when an offshore partner has proven systems and procedures in place. Many offshore companies demonstrate their commitment to improved development procedures through the arduous certification process of the Software Engineering Institute's Capability Maturity Model (CMM). Additionally, with an offshore partner being several time zones away, round-the-clock productivity can be achieved with no increase in overhead (Sinha, 2001). Differences in work habits can also add to productivity. In India, for example, the typical workday runs from 9 or 10 AM until 7 or 8 PM, with a Monday through Saturday workweek (Field, 2000).

Proponents of increasing the H-1B visa limit point to another benefit. In baseball vernacular, they view H-1B holders as a farm team for new talent. By bringing in visa holders on a temporary basis, they see an opportunity for a try-before-you-buy approach, while simultaneously making use of low-cost labor in the process (H-1B, 2002).

Risks of Going Offshore

While offshore software development can offer the potential for significant benefits in terms of cost savings and access to specialized expertise, there are also a number of risks that must be considered. Many of the risks are no different than those encountered in any global venture, such as language, cultural differences, and exposure to fluctuating exchange rates. The nature of software development however presents a number of additional unique risk factors that must be considered.

Communication failures and delays represent significant risk in offshore software development. Researchers have found that software developers rely heavily on informal communications of the water-cooler variety in determining best practices and techniques. When development teams are globally dispersed, these communications tend to break down or be subject to considerable delays (Anthes, 2000). Additionally, language barriers and differences in communications styles often make it easy for miscommunications to occur. Western managers in Russia, for example, sometimes have difficulty recognizing when a message given to a Russian worker has been successfully received. In Western culture, a message sent is assumed to be received and will be acted upon if no questions are received. In Russian culture, where asking questions and talking are often assumed to invite trouble, feedback is rarely provided, even though the message may have been received (Cooley, 1997). Studies have shown that effective communications can significantly reduce project uncertainty and improve project performance (Gopal, Mukhopadhyay & Krishnan, 2002).

Language barriers can also cause problems with standards and conventions used in developing software. As an example, the format used to enter a date can be vastly different across different countries, causing downstream errors if not anticipated up front. Variations in spelling, pronunciation and special terminology can also be the source of considerable problems (Ramarapu, Parzinger, & Lado, 1997).

Cultural differences also represent a significant risk. One aspect of those differences is in the area of trust. Developers attempting to troubleshoot a problem, tend to call on whomever they believe can help to solve the problem. Developers from different cultures, however have varying levels of comfort with taking on problems not specifically assigned to them. Developers working at multiple sites within the same geographic area sometimes have difficulty developing a mutual sense of trust. That mistrust is compounded when cultural differences, based on global separation, exist (Anthes, 2000). Some of these cultural differences can also impair communications. In southern India, for example an up and down nodding of the head signifies disagreement, while in North India the movement matches the side-to-side movement well known in America (Sinha, 2001).

Political risk must always be a concern, as in many countries the political climate can change overnight. Political instability can seriously jeopardize a company's operations in an offshore environment (Sinha, 2001). Additionally, the low-cost labor in some countries is often associated with strikes and work stoppages, which can be disastrous to a software development project (Ramarapu, Parzinger, & Lado, 1997). The recent acceleration of the use of H-1B holders, with simultaneous reductions in the U.S. workforce has introduced a new risk in recent months. As more and more U.S. workers are impacted, the potential for worker backlash in the form of organizing or employee activism also increases (Lewis, 2002b). In many cases existing employees are being required to train the incoming workers, only to find that when the training is complete, they will be out of a job (Vaas, 2002).

Criteria for Evaluation

Ramarapu, Parzinger, & Lado, (1997) defined a set of criteria that should be evaluated when considering a decision regarding offshore development. First, the current state of the information systems department should be reviewed. Because of the

difficulties that may be encountered in coordinating the use of offshore resources, an organization with a high degree of project management expertise is likely to be more successful than one with little expertise. Additionally, information systems managers who have expertise working in a multinational environment are more likely to be able to deal effectively with the cross-cultural issues and language barriers that will inevitably arise.

Next, the nature of the task being evaluated for outsourcing should be scrutinized. Development tasks making use of structured methods and tools are more likely to be successful, than those requiring high levels of communication during the development process. The long-term goals of the organization should also be evaluated against the expected benefits from the offshore development decision. Cost should not be the only factor considered. Unless the organization has a goal of developing long-term partnerships overseas, offshore development may not be the best solution in the long run.

The state of the technology and expertise should also be considered. The acquisition of complementing technology and expertise should be one of the objectives in seeking out offshore resources. Countries such as India have spent millions of dollars educating natives on specialty development tools such as Powerbuilder and Oracle. Gaining this experience domestically can be very costly and time-consuming.

Finally, the current working environment should be evaluated. The mix of new development versus maintenance should be assessed to ensure that the type of work to be outsourced results in a positive, rather than negative effect on productivity and client satisfaction. For example, a company with a high degree of creativity in a work force which derives the majority of their job satisfaction from new development rather than the tedium of software maintenance, might choose to take the maintenance tasks offshore.

Rajkumar & Mani (2001) evaluated offshore software development from the perspective of Indian suppliers and concluded that there were four factors that contributed to project success. The first is management factors, such as strategy and commitment. The second is project factors, such as ensuring that projects are of the proper size in relation to the level of experience a company has with offshore projects, providing proper project definition, optimizing the mix of resources, and ensuring effective communications mechanisms. The third factor is the customer factor. Included is ensuring that an appropriate number of customer visits are planned, customer education mechanisms exist, and that the software life cycle is adaptable to the customer's needs. The fourth factor is the staff factor. Adequate staff rotation and attrition must be planned for, as well as the acquisition of visas. Cultural and work ethic differences also need to be considered.

Gopal, Mukhopadhyay & Krishnan (2002) point out that the effectiveness of offshore software development projects should be focused on the performance measures of effort, elapsed time and software rework. In a study of 34 projects within Indian software firms, they found a triangular relationship between the three measures. By enhancing quality processes, such as through the use of the CMM, rework late in the project can be minimized, thereby reducing effort and elapsed time. This is borne out by the findings of Intelligroup, a global professional services firm, which concluded that quality and process maturity are among the most significant issues facing companies who are looking to outsource. They sought the ISO 9001 certification of their Advanced Development Center in Hyderabad, India, both as a commitment to quality as a means of delivering superior services, as well as a stepping stone in the implementation of the framework required for CMM certification (Intelligroup, 1999)

An analysis of the factors identified above, combined with the previously discussed risks and benefits, leads to the development of a set of four "critical success factors", which may be indicators of an organization's likelihood to succeed in an offshore software development venture. These critical success factors are:

- Maturity of the Management Team – This refers to maturity at two different levels. The first is the with respect to the team of managers who will be directly responsible for the management of the offshore venture, and their level of expertise in the area of project management, as well as their experience working in a multinational environment (Ramarapu, Parzinger, & Lado, 1997). The second refers to the level of strategy and commitment demonstrated by senior management, such as commitment to the achievement of ISO or CMM certifications (Rajkumar & Mani, 2001; Gopal, Mukhopadhyay & Krishnan 2002; Intelligroup, 1999), or the commitment of adequate funding for training, consultant support, or relationship building (Rajkumar & Mani, 2001).

- Maturity of the Organization's Processes – This goes hand in hand with the maturity of the management team and refers to the effectiveness of the processes in place within the domestic organization. Process maturity, again demonstrated by achievement of ISO or CMM certifications, will allow the organization to adequately define the performance

expectations for the offshore venture, as well as evaluate the performance once under way (Gopal, Mukhopadhyay & Krishnan 2002; Intelligroup, 1999).

- Clarity of the Objectives – Whatever the objectives are for going offshore, they should be clearly articulated to the management team, the work force that will be affected in any way, and the offshore management entity; whether it be a foreign company, consultant or an overseas subsidiary (Ramarapu, Parzinger, & Lado, 1997; Rajkumar & Mani, 2001). Companies who turn to offshore outsourcing rarely return the jobs to domestic resources. Unless this is understood and communicated upfront, there is a high potential for affected management and employees to feel abandoned and betrayed downstream (Vaas, 2002).

- Level of Preparation – This factor relates to the integration of the previous three, ensuring that both the domestic company and the offshore company are prepared for the venture. From a project perspective, ensuring that the nature of the project is appropriate, and of a manageable size for the initial venture is important (Ramarapu, Parzinger, & Lado, 1997). From a management standpoint all of the necessary training should have taken place (Rajkumar & Mani, 2001), and from a process standpoint the domestic processes should be prepared to interface with the offshore ones way (Gopal, Mukhopadhyay & Krishnan 2002; Intelligroup, 1999).

Off-Shoring Case Studies

In January 2002, General Motors launched a complex web based application that allows registered GM vehicle owners to track warranty, recall and service information online. This application marked GM's first foray into the offshore software development arena. For this venture, GM chose to use a New Jersey based management company to lead the project. The company placed two to four project leaders at GM's Detroit headquarters, who managed a team of 25 developers in Bangalore, India. GM recognized up front that the complexities of the foreign relationship required an on-site liaison familiar with the intricacies of the offshore operation, and looked to the consultant to perform that function. Additionally, the project leaders placed by the consultant provided strong project management skills to keep the project on track (Copeland, 2002). The project was completed in six months, with no compromise in quality at a 50% cost savings over the use of in house or U.S. based consultants (Dietderich, 2002).

An analysis of the GM venture against the critical success factors shows many of the reasons for the success of the venture. The management team recognized that in house expertise did not exist and a management company with specific expertise in directing a foreign relationship and strong project management skills was needed. This demonstrated maturity resulting in strategy and commitment to the project. The objectives of cost savings and meeting an aggressive deadline were made clear early on, and communicated to the management company. Likewise, proper preparation for the venture was accomplished. A relatively small project was selected as the initial venture, and appropriate time and care was spent in defining the requirements and the objectives. Selecting the appropriate project was a key factor in the success of the GM project (Dietderich, 2002).

A number of companies, such as Land's End, broke into the offshore development world as a result of the Y2K problem. Land's End began working with an India based company in 1997, charging them with the responsibility for the analysis of 6 million lines of COBOL code. At the end of the Y2K initiative, Land's End and the offshore company had built up a strong working relationship, and the offshore developers had gained considerable knowledge about Land's End's legacy systems. Land's End continues to take advantage of that knowledge and the offshore relationship to work on other legacy system related projects. This strategy frees up local developers to work on strategic Initiatives. The current ratio of offshore to on-shore workers at Land's End is about 4 to 1 (Swanson, 2002).

In analyzing the Land's End example against the critical success factors, again shows a clear-cut statement of objectives, a well-defined project and effective preparation at the outset. While management appears to have been somewhat committed to the venture at the start, the success of the Y2K venture lead to a much stronger level of commitment and paved the way for the longer term strategy in place today. From the standpoint of the processes, Land's End management admits that, while their processes were "pretty loose and pretty informal" going into the Y2K initiative, the strength of the processes in place at the offshore company have helped to bring more structure to the on-site environment (Swanson, 2002).

Performing Y2K work was not a success story for all companies venturing into the offshore world. PRT Group, Inc., a Manhattan based consulting company, launched a software development facility in Barbados in the late 90s. The sole objective of the venture was to attract inexpensive resources from places like India and other countries; to come to Barbados and work on a large number

of Y2K contracts the company was already involved in or projecting to acquire. Prior to their entry into the offshore environment, PRT was one of the fastest growing hi-tech companies in the country. In late 1997, the company went public at $13 per share. By early 1998, the stock was selling at $21 per share. Projected backlogs were so large, that the company began turning away business for fear of not being able to attract sufficient resources to complete it. By early 1999 the stock had plummeted to $3 per share and the company went into collapse quickly after that (Walsh, 1999). While the company was successful at attracting talent from 16 different countries to its Barbados facility, the delay of obtaining several Y2K contracts, followed by a lack of new business to backfill completed projects caused talented resources to return to their homeland (Hopkins, 1999).

While one analysis of the reasons for PRT's decline points at the decision to go public (Hopkins, 1999), an analysis of the offshore venture against the critical success factors is also noteworthy. From the standpoint of management maturity, the rating would have to be low. PRTs founder and CEO was a young entrepreneur with a flare for making money quickly. He failed to take the time to truly develop a strategy focused on the success of the offshore venture, and focused more on the acquisition of low priced labor. Similarly, and granted due to the pressures of going public, most of the focus was on courting and satisfying investors, rather than on ensuring the adequacy of processes needed for doing business globally (Walsh, 1999). A similar point can be made about clarity of objectives, and level of preparation for an offshore venture. The primary focus of the company from 1997, when the IPO occurred, and 1999, when the company collapsed, was on analysts and investors rather than on the success of the offshore venture (Hopkins, 1999).

In 2000, the Hartford Insurance Group Claim Systems organization piloted an offshore development study. Their dual objectives consisted of cost reduction and meeting the need for increased systems resources. They began the pilot by offshoring projects that had well defined objectives and consisted primarily of *new development*. They reported mixed results. They concluded that projects that had very well defined objectives with a well defined scope were good candidates for off-shore development. However, many of their projects did not have specifications that were clearly defined. Off-shoring system maintenance was difficult for the same reason, many of the maintenance requests did not have clearly defined specifications, requiring the frequent communication with end users to define exactly what was required. As new development projects were sent off shore, an internal motivational issue was the perception that the onsite staff was relegated to *inferior* maintenance tasks. The decision to send software development offshore, in this case to an Indian consulting firm, presented several management challenges. The first was the view that their systems provide a competitive advantage and as such there was an unwillingness to share that information with a third party, who could use the knowledge to obtain consulting assignments with other insurance companies. Secondly, as more development is sent off-shore, so is the expertise needed to maintain those systems. As a result, there must be a willingness to make a long term commitment to off shore development. Finally, they observed they did not have the expertise in house to properly handle international legal redress in the event of a contractual problem (Nadaff, 2001).

Discussion

In determining whether or not to go offshore for software development, companies need to ensure that they are considering all costs, as many hidden costs are often overlooked. Some of these include license transfer fees, charged by software houses, foreign taxes, travel costs, and after sales support costs (Ramarapu, Parzinger, & Lado, 1997). In addition, there can be start-up costs as the off shore firm develops the expertise necessary to thoroughly understand the requirements of the systems.

Secondly, the ultimate purpose for going offshore should always be kept in focus. For example if the ultimate purpose is to enhance productivity by minimizing mundane work, then having local programmers perform new state-of-the-art work and outsourcing maintenance should be the goal. If reducing costs is primary, then the compensation differences in various countries should be a key focus (Raval, 1999). This is especially true for companies whose core business is software development. These companies seeking to take advantage of the economies associated with offshore development, but concerned about maintaining their in-house control, might choose to set up subsidiaries in countries where competitively priced expertise exists (Barclay & Domeisen, 2001).

Cultural differences must be well understood, as many of these differences affect the way that people work. For example, most American entrepreneurial technology firms have a tendency toward a work-week averaging 45 to 60 hours per week, while European software companies average a more relaxed 40 hour week. On the other hand, the extended Indian work-day starting at 9 or 10 AM and ending at 7 or 8 PM, with a six day workweek, present the opposite extreme (Field, 2000). Failure to recognize these differences could result in a perception of differing work ethics without taking into consideration the related efficiency or productivity differences (Carmel, 1995). Even minor cultural differences should be taken into account. For example, differences in holiday schedules can lead to inefficiencies when there is a mutual dependency for the software being developed.

Controlling the quality of software is a major challenge under the best of circumstances. In a global environment its importance is greatly heightened. Many foreign companies are recognizing this and taking steps to ensure that they are competitive in the world software market. More and more companies in India, Brazil, and China are developing processes consistent with CMM level 5 standards (Hilson, 2001). Five of the largest software development companies in India, all with revenues exceeding $175 million have achieved the CMM's top rating. The largest, Tata Consultancy Services, has annual revenue of just under $690 million (Greeneneir, 2002). Of the 64 worldwide companies who have attained CMM level 5 status, 51 of them are located offshore. That's 79% of the total (Process maturity, 2002). Companies planning to go offshore for software development would be well served to seek out companies that have made that investment. It is critical to have procedures and documentation in place not only to support initial development, but sustained maintenance. Companies that have demonstrated commitment to CMM standards build quality into their processes as well as their systems.

Companies going offshore must also ensure that they are in total compliance with all laws, both in the country they are going to, as well as in the United States, as laws change dynamically. One example of a recent trend is particularly appropriate in the software area, as it is a form of intellectual capital. In a twist on the strategy of reincorporation in low tax jurisdictions like Bermuda, some companies are now moving intellectual capital abroad to shelter income from overseas sales. Legislation is currently moving through the senate to restrict this practice (Simpson, 2002). Additionally, as companies enter into international contracts they must understand the legal system of the off shore country, in order to understand their rights should an issue arise.

Another area to closely watch is the dispute on H-1B visa limits. Legislation signed into law by President Clinton in October 2000 doubled the $500 per employee fee to be paid by employers who petition H-1B workers. The point of this increase was to ensure that the use of non-immigrant labor was temporary and limited in number (Statement, 2000). Continued lobbying on both sides of this issue may potentially alter the course of events again before the immigration limit reverts back to 65,000 next year.

Conclusion

A recent study of fifty information technology executives indicated that on average each had spent $8 million on offshore software development services in 2000. Projections are that the average outlay will increase to $28 million, or 28% of IT budgets in 2003 (Greenemeier, 2002). Foreign outsourcing is not for everyone however, and it is a decision that must be made carefully. While many companies have enjoyed significant benefits, the decision is subject to many variables. Solid management commitment, clearly stated objectives and considerable preparation is required if it is to be successful. Each company must evaluate the risks versus the benefits based on their own unique situation. Many companies have found that pilot projects, with carefully monitored progress, are an excellent way to begin the evaluation (Raval, 1999; Ramarapu, Parzinger & Lado, 1997). Companies must first determine their off shoring readiness. This includes a clearly defined objective for entering into an off shore development agreement. Companies must also determine which type of structure they will utilize to effectively manage information technology that is developed off shore. In addition, companies must consider the legal requirements and structure to establish enforceable contracts internationally. Finally, consideration must be giv en to the strategic positioning of information technology within a firm. If it provides a sustainable competitive advantage then an organization must decide if they are willing to engage others in their development. Additionally, they must consider how they will transform their internal information technology support to work effectively with off shore development partners.

Future Work

his research has served as the basis for a continuing investigation into the strategic implications of off-shoring information technology development. Based upon the case study research, a model that defines the decision making process to determine organizational readiness will be developed. The authors intend to test this model through survey research which will consider both the organizations that are making off shore information technology decisions and the off shore development firms to determine the factors that influence off shore decisions.

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Available upon request of the authors.