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IT Does Matter (At Least When It Is Properly Managed)

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ABSTRACT

The works of (Ackoff, 1967), (Dearden, 1972), and more recently (Carr, 2003) argue that IT is becoming a commodity. From their perspective, IT is not so much a source of competitive advantage, but more of a mundane requirement of the environment similar to electrical service and other utilities. Carr presents several compelling arguments to support his commodity view of IT. We feel that such a view fails to consider the dynamic and innovative nature of the IT industry. To the contrary, we argue that if the commodity view of information technology is correct, then the organization and management of those resources become ever more important.

Assuming that roughly the same technology is readily available to all competitors of similar stature, the matter of competitive advantage will be determined by innovative, effective, and efficient use of IT. Several prominent authors including, (Keen, 1993), (Feeny and Willcocks, 1998), (Venkatraman and Henderson, 1998), and (Luftman, Papp, and Brier, 1999) have proposed rigorous theoretically derived models that can be employed in order to achieve success. We analyze each and conclude that each model addresses only a portion of the problem. Some factors we label as "competencies" and others as "bridges". IT competency is self-explanatory. "Bridges" are techniques which link technology to organizational strategy or mission. Using the key components of those models, and based upon the concepts of alignment and maturity detailed by Luftman, a new synthesized model for achieving IT superiority is developed and presented. The factors identified in the model are to be employed by the management function to focus generic IT on the organization's mission and vision in order to achieve success.

Keywords

Sustainability, Strategic Alignment Maturity, Strategy and Implementation.

INTRODUCTION

Information technology (IT) is the backbone of world commerce, in fact, it is estimated that businesses spend over $2 trillion a year on IT (Carr, 2003). The legitimacy of IT and information systems (IS) has been the subject of several articles over the last several years. The interested reader is directed to (Ackoff, 1967) and (Dearden, 1972) for early examples of literature that questions the legitimacy of IT and IS. In Nicholas Carr's much talked about article in the May 2003 issue of Harvard Business review, "IT Doesn't Matter", he posits that the strategic importance of IT has diminished. Carr argues that much like the railroads, telegraph, and electricity, IT is a commodity and not a source of competitive advantage to an organization. Carr presents several analogies in support of the view that IT is quickly becoming a commodity. In the 30-year period from 1846 to 1876, railroads increased their total track from 17,424 to 309,641 km of track. This increase of 1,677% resulted in overcapacity and hence falling prices. In the 20-year period from 1849 to 1869, the total telegraph wire in Europe went from 2,000 to 110,000 miles. This increase of 5,400% resulted in overcapacity and hence falling prices. In the 28-year period from 1889 to 1917, the number of electrical central stations went from 468 to 4,364. This increase of 832% resulted in overcapacity and hence falling prices.

Carr argues that IT will suffer the same fate as these industries. He argues that IT is a transport mechanism that carries data from point "a" to point "b"; much like railroads carry goods, telegraph lines carry data, and electrical lines carry electricity. As such, it is a commodity that is available to all organizations. Custom, high-cost, software is no longer economically feasible when customers can purchase existing software from established vendors. The Internet has increased the rate at which IT is being made a commodity by providing a suitable medium for the distribution of data and applications. According to Carr, the rapid deflation of cost as evidenced by Moore's Law is a final reason that IT will become a commodity. Moore's Law dictates that approximately every 18 months the density of circuits on a computer chip will double and hence processing power doubles while cost is held constant. The cost of computing power is dramatically decreasing. For example, in 1978 the cost of one million instructions per second was $480. By 1985, the same computing power cost only $50, representing a 90% decrease. The same one million instructions per second cost only $4 by 1995, representing a decrease of 92% over ten years and a 99% decrease over the 17 year period.

According to Carr, there are several factors that indicate IT is close to the end of its build out and hence close to the end of its glory days. IT is more powerful than is required to meet the information processing needs. IT is ubiquitous in that it is somewhat affordable to all. The Internet and fiber optic cable are at a point where they are not being fully utilized because there is more capacity than demand. IT vendors, such as Microsoft, are attempting to position themselves as commodity suppliers or even utilities. And finally, the tech investment bubble has burst, in the past, bursting of investment bubbles has signaled the end of the glory days of an industry.

IT IS CRITICAL TO SUCCESS

Successful organizations will realize and utilize available resources to achieve competitive advantage. In the early days of computerized information systems, leading organizations employed computerized record keeping and accounting systems. However, in today's highly competitive environment it is essential that organizations make use of basic computerized record keeping and accounting systems. In addition to basic record keeping and accounting systems, many organizations are using information technology for purposes only dreamed of just a few short years ago. Many IT products are in their infancy stages and as such, they have not been fully exploited (Williams and Williams 2003). For example, the relatively new yet significant area of knowledge management systems are an integral part of many organizations today; in fact, U.S. companies spent $4.5 billion on software and other technologies that allow for sharing knowledge with colleagues (Gilmour, 2003). Success is not achieved by chance; business goals need to be carefully aligned with IT in order gain competitive advantage. Even though IT has moved from an administrative support role toward more of a strategic role, there is limited research focusing on developing a holist framework to understand how best to effectively manage the IT function (Henderson and Venkatraman 1999). Without a holistic framework, organizations will operate at a sub optimal level.

Fortunately, there are several researchers who are developing frameworks and models that attempt to provide guidance for IT management (Keen, 1993), (Feeny et al., 1998), (Venkatraman et al., 1998), and (Luftman et al., 1999). In addition to developing models, there are authors who make justifiable arguments that IT can be used to deliver business value and competitive advantage (Williams et al., 2003). Utilizing the best and most relevant portions of the models, a new model for achieving IT superiority will be developed.

Keen

In Keen's 1993 article, "Information Technology and the Management Difference: A Fusion Map", he argues that access to IT and IS is essentially the same for all competitors and the organization with successful management will triumph. IT is readily available to all market participants, as such, management that can mesh the business processes, people, and technology aspects of IT into a single entity will be victorious over those who cannot (Keen, 1993). Figure 1 shows Keen's model for managers' successful IT implementation.
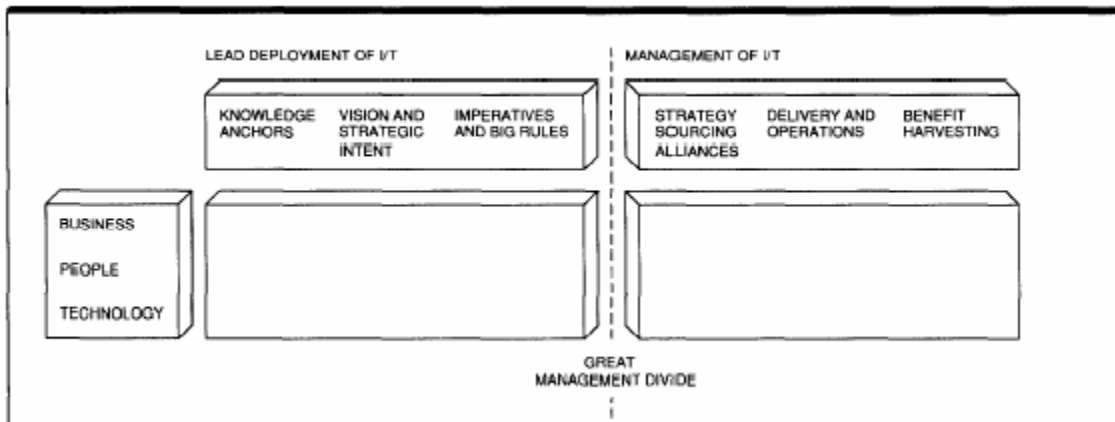

Figure 1. The Fusion Map: Leading and Managing IT. Keen 1993.

Keen addresses knowledge anchors, vision and strategic intent, and imperatives and big rules in his "Fusion Map" while he does not address strategy sourcing alliances, delivery and operations, and benefit harvesting. Knowledge anchors are obtained from observing the environment. Inevitabilities, strong probabilities, and likelihoods are examples of knowledge anchors. To be successful organizations need to be aware of their environment. For example, if there is a certain law on the horizon that requires certain information to be reported to the government regarding loan applications, it would be unwise to develop a new information system incapable of producing those reports. Business imperatives and big rules are concrete

activities that must be completed in order to achieve success. An example of an imperative or big rule would be when a top level manager at a brokerage firm dictates that a new Internet based stock market trading system need to execute a market order in less than 30 seconds. Vision and strategic intent provide a big picture for the direction and goals of the organization.

To achieve overall success in the deployment of IT, an organization must bring together their understanding and treatment of business, people, and technology in light of knowledge anchors, vision and strategic intent, and imperatives and big rules. When a business imperative has a corresponding technical imperative IT becomes a priority for business success. With the imperatives defined, the managers (people) can focus on the how of the strategy. When first developed, technical solutions can provide a great deal of competitive advantage to adopters. However, after time the once innovate solution becomes commonplace and in many cases ubiquitous to the industry. Consider the 1991 announcement of Citibank that it would process loan applications in 15 minutes. At the time this was a very lofty goal as its competitors took days for the same procedure, however, in time the 15 minute loan application became commonplace. In fact, the new paradigm of the Internet allows customers to receive several loan offers from banks by filling out one application. So it goes that technology starts as fresh and innovative and then moves to commonplace only to see dramatic advancements and then starts anew under a new set of rules.

In today's competitive environment, effective exploitation of knowledge can provide the necessary edge for success. Knowledge stems from scanning environmental truisms and identifying likely outcomes given those truisms. Knowledge anchors are key factors that are used in business planning. It is difficult to be at the forefront of determining what environmental truisms will have a lasting impact on business operations. For example, in the 1970s, many airlines did not anticipate that the computerized ticket reservation system would be a critical success factor. However, American Airlines was able to capitalize on their computerized SABRE reservation system and that system is one of the reasons American Airlines survived the period of airline deregulation when so many carriers did not.

In determining vision and strategic intent, a long-term approach is necessary. Strategic intent and vision are not so much concerned with the "how" of strategy but more the big picture. President Kennedy's commitment to land a man on the moon is such an example. Such proclamations are bold to make. However, audacious goals are sometimes the catalyst that propels an organization to the next level.

Imperatives set the priorities and purpose for action. Without imperatives, organizations would flounder due to a lack of overall direction. Big rules augment and implement imperatives as they are more specific and result in actual policy statements. Big rules need a solid business reason to exist because, without big rules the business unit will lack focus and purposeful intent.

So per Keen, these three factors are necessary for IT development and pre-conditions of successful IT-based business strategy. However, it is important to remember that management of the IT and IS function is implemented by humans and is therefore only as good as the humans doing the implementing.

Feeny and Willcocks

The management function is critical to the success of any organization. In today's high-tech environment, all competitors have access to roughly the same technologies and resources. It is probable that the competitors that can most efficiently and effectively utilize the available resources will enjoy prosperity. Prior to expending effort to managing resources, it is imperative to realize which environmental factors will play a critical role in management decision making.

Feeny and Willcocks (1998) identified nine core capabilities of IS. These nine areas were developed based on three areas of previous research. The first area of research is based on how the CIO's role, persona, and experiences are a critical influence on the IS function (Earl and Feeny, 1994). The second area of research relates to four target capabilities that CIOs thought were important (Feeny, Abl, Millie, Minter, Selby, and Williams, 1997). The final area of research involves IS and IT outsourcing (Lacity and Willcocks, 1996). Table 1 describes the nine core capabilities as proposed by (Feeny et al., 1998).

Per Feeny and Willcocks, these nine core capabilities of IS are critical to the success of an IS department and hence essential to the overall success of the organization. Within a particular organization these factors will vary in terms of their business-level management relevance. Further, the relative importance of each of these nine elements will change over time as environmental factors change.

Core IS Capability	Description	Discussion
Leadership	Integrating IS/IT effort with business purpose and activity.	Leaders play a critical role in the ultimate success or failure of any organization. IT leadership can play a pivotal role in determining how top management and the overall organization view IT.
Business Systems Thinking	Envisioning the business process that technology makes possible.	It is important to understand the connections and interdependencies in business activity. If such an understanding can be achieved, a holistic view of the organization and environment can be developed. This holistic view can lead to organizational success.
Relationship Building	Getting the business constructively engaged in IS/IT issues.	Relationships must be formed between organizational and IS communities. These relationships will help to ensure that users will understand the capabilities of IS, help IS staff and end users work together, and assist end users develop a sense of ownership and satisfaction.
Architecture Planning	Creating the coherent blueprint for a technical platform that responds to current and future business needs.	In developing this blueprint, careful consideration must be given to technology, suppliers, and business directions. The goal is to develop an appropriate technical platform as well as the policies that will allow for the integration of IS across the firm.
Making Technology Work	Rapidly achieving technical progress – by one means or another.	The business environment is very complex. In order for technology to work, technical problems need to be identified and solved. Developing new paradigms for the application of technology will help the organization to thrive.
Informed Buying	Managing the IS/IT sourcing strategy that meets the interests of the business.	When making an informed buying decision, one must analyze the external market for IS/IT services, select a sourcing strategy, and manage the acquisition process.
Contract Facilitation	Ensuring the success of existing contracts for IS/IT services.	Many organizations have lengthy contracts that dictate how and when various services will be provided by multiple suppliers. A single, dedicated, point of contact will help ensure smooth facilitation of these contracts.
Contract Monitoring	Protecting the business's contractual position, current and future.	In order to maintain acceptable service levels, it is important to rate each supplier and compare the results to external benchmarks.
Vendor Development	Identifying the potential added value if IS/IT service suppliers.	Ideally, suppliers will be looking toward the log term and will want to develop a win-win relationship rather than focusing on meeting the minimum requirements that are spelled out in the contract.

Table 1. Adapted from Feeny and Willcocks, 1998.

Venkatraman and Henderson

Venkatraman and Henderson (1998) in their piece, "Real Strategies for Virtual Organizing", argue that the three "vectors" of customer interaction, asset sourcing, and knowledge leverage combined with a strong IT platform comprise the key to a successful business model in the knowledge economy. Figure 2 presents the three vectors along with three stages.

Vectors and Characteristics	Stage 1	Stage 2	Stage 3
Customer Interaction (Virtual Encounter)	Remote experience of products and services	Dynamic customization	Customer communities
Asset Configuration (Virtual Sourcing)	Sourcing modules	Process interdependence	Resource coalitions
Knowledge Leverage (Virtual Expertise)	Work-unit expertise	Corporate asset	Professional community expertise
Target Locus	Task units	Organization	Inter-organization
Performance Objectives	Improved operating efficiency (ROI)	Enhanced economic value added (EVA)	Sustained innovation and growth (MVA)

Figure 2. Virtual Organizing: Three Vectors and Three Stages. Venkatraman and Henderson 1998.

The customer interaction vector highlights the evolving relationship between company and customer. In today's highly competitive environment, customers have more access to information regarding competitors. As such, customers have an unprecedented opportunity to compare all competitors in the marketplace. It is generally accepted that organizations provide information to customers. In such an information-rich environment, the organization that can provide the best overall experience for the customer will gain market share. Technological innovations have provided and will continue to provide new and creative methods to share information with customers and for customers to share with other customers. Email interaction is one such method that did not even exist a few years ago but is now common place. There are several other emerging information sharing techniques that have been made possible by the Internet; for example, consumer to consumer auctions, entertainment delivery, and individualized stock market research.

The asset configuration vector identifies the need to be integrated into the digital economy. IT techniques such as electronic data interchange (EDI) have streamlined relationships customers and suppliers. For example, Wal-Mart requires its business partners to have EDI capabilities. Although these technologies require an initial capital outlay by Wal-Mart's business partners, they are profitable for both Wal-Mart and its business partners in the long-run.

The knowledge leverage vector deals with leveraging the knowledge within and across organizational boundaries. Considering today's complex products and services, knowledge is seen as an asset that is replacing land, labor, and capital as a critical component of organizational success. It is proposed that organizations that can effectively manage and utilize knowledge from their associates will enjoy continued success while those who cannot will falter.

Each of these three vectors is applied over three stages. The first stage focuses on task units such as customer service. Stage two is concerned with applying the vectors at the organizational level. Stage three applies the three vectors to achieve inter-organization coordination.

Luftman

In his 2000 article, "Assessing Business-IT Alignment Maturity", Luftman writes that business-IT alignment is "applying Information Technology (IT) in an appropriate and timely way, in harmony with business strategies, goals and needs" (p. 3). Alignment includes both effectiveness (doing the right things) and efficiency (doing things right). The components of alignment as discussed by (Luftman 1996) are described in figure 3.

I. BUSINESS STRATEGY

1. **Business Scope** – Includes the markets, products, services, groups of customers/clients, and locations where an enterprise competes as well as the competitors and potential competitors that affect the business environment.

2. Distinctive Competencies – The critical success factors and core competencies that provide a firm with a potential competitive edge. This includes brand, research, manufacturing and product development, cost and pricing structure, and sales and distribution channels.

3. Business Governance – How companies set the relationship between management, stockholders, and the board of directors. Also included are how the company is affected by government regulations, and how the firm manages its relationships and alliances with strategic partners.

II. ORGANIZATION INFRASTRUCTURE & PROCESSES

4. Administrative Structure – The way the firm organizes its businesses. Examples include central, decentral, matrix, horizontal, vertical, geographic, federal, and functional.

5. Processes - How the firm's business activities (the work performed by employees) operate or flow. Major issues include value added activities and process improvement.

6. Skills – H/R considerations such as how to hire/fire, motivate, train/educate, and culture.

III. IT STRATEGY

7. Technology Scope - The important information applications and technologies.

8. Systemic Competencies - Those capabilities (e.g., access to information that is important to the creation/achievement of a company's strategies) that distinguishes the IT services.

9. IT Governance - How the authority for resources, risk, conflict resolution, and responsibility for IT is shared among business partners, IT management, and service providers. Project selection and prioritization issues are included here.

IV. IT INFRASTRUCTURE AND PROCESSES

10. Architecture -The technology priorities, policies, and choices that allow applications, software, networks, hardware, and data management to be integrated into a cohesive platform.

11. Processes - Those practices and activities carried out to develop and maintain applications and manage IT infrastructure.

12. Skills – IT human resource considerations such as how to hire/fire, motivate, train/educate, and culture.

Figure 3. The Twelve Components of Alignment. Luftman 1996.

In their 1999 piece, "Enablers and Inhibitors of Business-IT Alignment", Luftman, Papp, and Brier identify factors that help or hinder business-IT alignment. Data from over 500 firms were used to identify these factors. Figure 4 presents their key findings.

It is interesting to note that many of the inhibitors are the mirror image of the enablers. For example, the number one enabler for alignment, senior executive support for IT, and the number five inhibitor, senior executive do not support IT, are essential the same construct. Further, the number one inhibitor, IT/business lack close relationships, is the mirror image of the number four enabler, business – IT partnership. As such, it is important to consider that success in a given area may mean the company will achieve successful alignment while the failure in the same area may result in less than optimal alignment.

Enablers	Inhibitors
Senior executive support for IT	IT/business lack close relationships
IT involved in strategy development	IT does not prioritize well
IT understands the business	IT fails to meet its commitments
Business – IT partnership	IT does not understand business
Well-prioritized IT projects	Senior executives do not support IT
IT demonstrates leadership	IT management lacks leadership

Figure 4. Top enablers and inhibitors for business-IT alignment. Luftman, Papp, and Brier 1999.

TOWARD A COMPREHENSIVE SUCCESS MODEL

The works of (Ackoff, 1967), (Dearden, 1972), and more recently (Carr, 2003) argue that IT is becoming a commodity. From their perspective, IT is not so much a source of competitive advantage, but more of a mundane requirement of the environment similar to electrical service and other utilities. Carr presents several compelling trains of thought to support his commodity view of IT. However, such a view fails to consider the dynamic and innovative nature of the IT industry.

Assuming that roughly the same technology is readily available to all competitors of similar stature, the matter of competitive advantage will be determined by innovative, effective, and efficient use of IT. Several prominent authors including, (Keen, 1993), (Feeny et al., 1998), (Venkatraman et al., 1998), and (Luftman et al., 1999) have proposed rigorous theoretically derived models that can be employed in order to achieve success. However, each model addresses only a portion of the big picture. A synthesis of these notable techniques can lead to improved success levels. Figure 5 presents an overview of a model for achieving IT superiority. This model was derived using the key components of (Keen, 1993), (Feeny et al., 1998), (Venkatraman et al., 1998), and (Luftman et al., 1999).
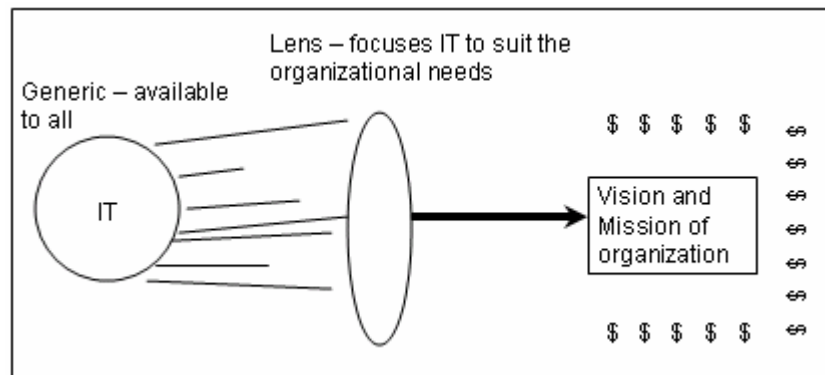

Figure 5. Comprehensive Model for Achieving Competitive Advantage with IT.

IT is generic in the sense that it is available to all competitors of similar resources. The key to achieving success is to focus the available IT resources on the vision and mission of the organization. A critical success factor of this model involves developing the components of the lens. Table 2 presents a synthesis of how several renown models can be combined to use the lens to function as a bridge between IT and the mission and vision, and hence the ultimate success of the organization.

The goal of the lens portion of the model is to take relatively broad IT components and focus on how to effectively use them to achieve the vision and mission of the organization. Ultimate success will come from effectively and efficiently utilizing the components of the lens.

Source	Item	Rational
(Keen, 1993)	Meshing business processes, people, and technology.	In order to focus general IT functions on the mission and vision, the big picture is imperative.
(Feeny et al., 1998)	Leadership.	Leadership is critical to managing IT.
(Feeny et al., 1998)	Business Systems thinking.	Using IT creates the possibility to improve operations.
(Feeny et al., 1998)	Relationship building.	Relationships that are formed between top management and IT leaders will help facilitate communication regarding IT implementation issues.
(Venkatraman et al,. 1998)	Customer interaction.	IT facilitates new and innovative methods to share information with customers.
(Venkatraman et al., 1998)	Asset configuration.	Appropriate use of IT assets assists with integration in the digital economy.
(Venkatraman et al., 1998)	Knowledge leverage.	Utilizing knowledge across and within business units will support operations and lead to overall success.
(Luftman, 2000)	Business scope.	Organizations need to posses an acute awareness of what their market is and how they compare with competitors and potential competitors.
(Luftman, 2000)	Distinctive competencies.	Organizations need to be in tune with their critical success factors and core competencies such as brand name and distribution channels.
(Luftman, 2000)	Business governance.	To achieve overall alignment, organizations need to be aware of how they interact with management, stockholders, and the board of directors.
(Luftman, 2000)	Administrative structure.	In order to successfully achieve strategic alignment, organizations need to be aware of the strengths and weaknesses of their particular organizational management structure.
(Luftman, 2000)	Processes.	A firm should know what the critical processes are in conducting day-to-day operations.
(Luftman, 2000)	Skills.	Organizations need to possess a knowledge of manage their associates.

Table 2. Components of the lens.

Whether IT is a commodity or not, competitive advantage can be gained or maintained by wisely managing the available resources. "When every leading firm in an industry has access to the same information technology resource, the management difference determines competitive advantage or disadvantage" (Keen, 1993) p.17.   However, it is evident that not all managers are able to successfully implement IT. Research indicates that five major factors: lack of corporate leadership, poorly communicated goals/deliverables, inadequate skills and means, poor project management, and deviation from timetable/budget are the leading culprits in why IS projects are abandoned (Oz and Sosik,. 2000).

We concur in this assessment and suggest that the proposed lens accomplishes the structure and practice necessary to overcome these deficiencies. Therefore it is our position that information system sustainability is an internal process under the auspices of management. However, this process is not without challenges. Von Hippel (von Hippel, 1994) postulated that information used in organizational problem solving is "sticky' – a term he uses to describe information that is costly to acquire, transfer and use in a new location. This describes, we think, the difficulties experienced in business as technical and non-technical managers attempt to deploy IT resources against organizational and environmental problems. Von Hippel proposes that this stickiness can be reduced and information become more readily accessible if organizations invest in methodologies to enhance information transfer and that this becomes more likely when information transfer is frequently required. This requirement is met within the framework of our proposed lens, as cross-disciplinary communication is required and its effectiveness measured on a continuous basis, with constant improvement and increasing maturity the goal.

Expanding on von Hippel, Ramaprasad and Rai (Ramaprasad and Rai, 1996) envision the process of management to be understandable in terms of the generation and dissipation of information within the organization. They argue that organizations are subject to entropy as in all nature. The proper function of management is to maintain a balance between information generation and dissipation. Incomplete information results when there is more dissipation than information generation; information overload results from the inability to internally dissipate information as fast as it is being generated. Achieving a balance negates "stickiness." They state "the epistemology and ontology of (the) organization have to match." That is to say that what the organization knows and what it is must be in synchronization. Organizations that are able to create balance via organizational structure, policy and procedure will put themselves in a leadership position and reap economic rewards. The organization with management that can use the lens to focus IT on their mission and vision will prosper.

CONCLUSION

When managers and executives fail to see how IT can change the old paradigms of there operations, they start to see IT as a commodity (Brown and Hagel, 2003). IT combined with innovative managerial techniques will help organizations realize competitive advantage (Champyn, 2003). When managers and executives are able to properly utilize IT, their organizations will gain competitive advantage and hence reap economic rewards. While IT is considered by some to be a ubiquitous commodity, the skill and insight required to use IT for competitive advantage is a rare and valuable resource (Brown et al. 2003). There is a definite gap between IT's potential and business's realization of that potential; this gap creates fertile ground for creative managers and executives to develop new strategies for narrowing the gap (Brown et al. 2003). Organizations that can take generic IT and use the lens to focus or bridge the management function in order to achieve the mission and vision will achieve competitive advantage and ultimately success.

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