CHAPTER 6 – RESULTS, CONCLUSION AND LOOKING AHEAD

In this chapter, I round up the results of my work, bring out its implications, and suggest prospects for further research in the field. I summarize the research objectives that I had sought to address in this work within the overall context of mapping the advances in IT for business and showing a movement towards enterprise integration. These are:

- Objective 1(a): As businesses consolidate and integrate around their core competencies, do they tend to outsource more? (b) Is this desirable?

- Objective 2: Do business cycles have an effect on the developments in information technology?

- Objective 3: How is the nature of business transformed in terms of (a) transactional ability, (b) competitiveness, (c) impact on workers?

- Objective 4: To identify trends in this transformation in terms of (a) cost-performance structures, (b) architecture, (c) platform features, (d) security threats and countermeasures, (e) EAI, and (f) business continuity.

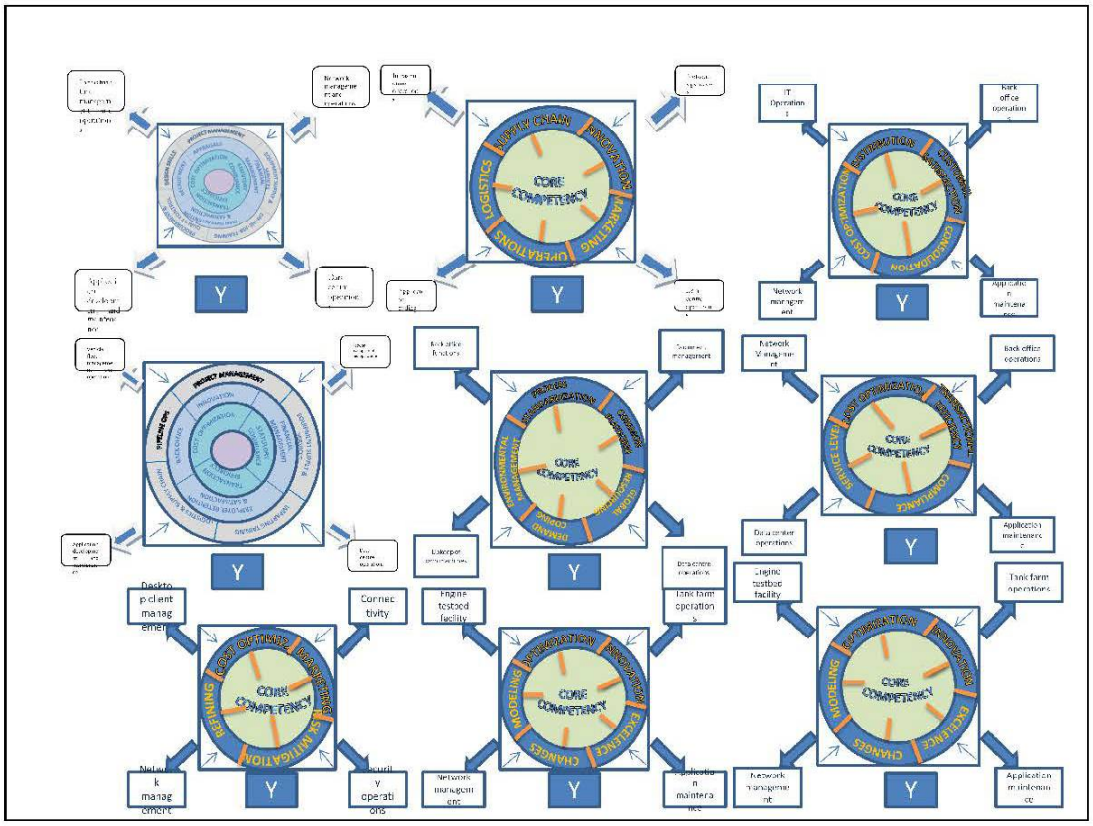
- Objective 5: To inquire into the question whether this transformation can be controlled; and

- Objective 6: To construct a model framework for a business to succeed in the present day situation by utilizing IT to enhance its core competencies.

Objective 1: My analysis of the case examples in the preceding chapter embodies answers to these questions. The case examples demonstrate that organizations consolidate and integrate around their core business competencies. At the same time they also tend to outsource the non-core activities. This is the most apparent when the organization (a) reached a certain level of maturity in the scale of operations or (b) focused on rapid implementation of IT

because of external pressures – as in the case of SGN. This trend is shown by all the companies with the exception of ERG, which chose not to outsource its IT initially. However, once it expanded its scale of operations, the outsourcing occurred. Hence, since this was exhibited by all the case examples, I conclude that (depicted in diagram 6.1 below):

Diagram 6.1 – Result – Core competencies and outsourcing



a. Companies consolidate around their core competencies as they reach a certain scale of operation.

b. When they reach that scale of operation, they tend to outsource non-core competency activities. Table 6.1 below show the benefits accruing from outsourcing.

Table 6.1 Benefits from outsourcing

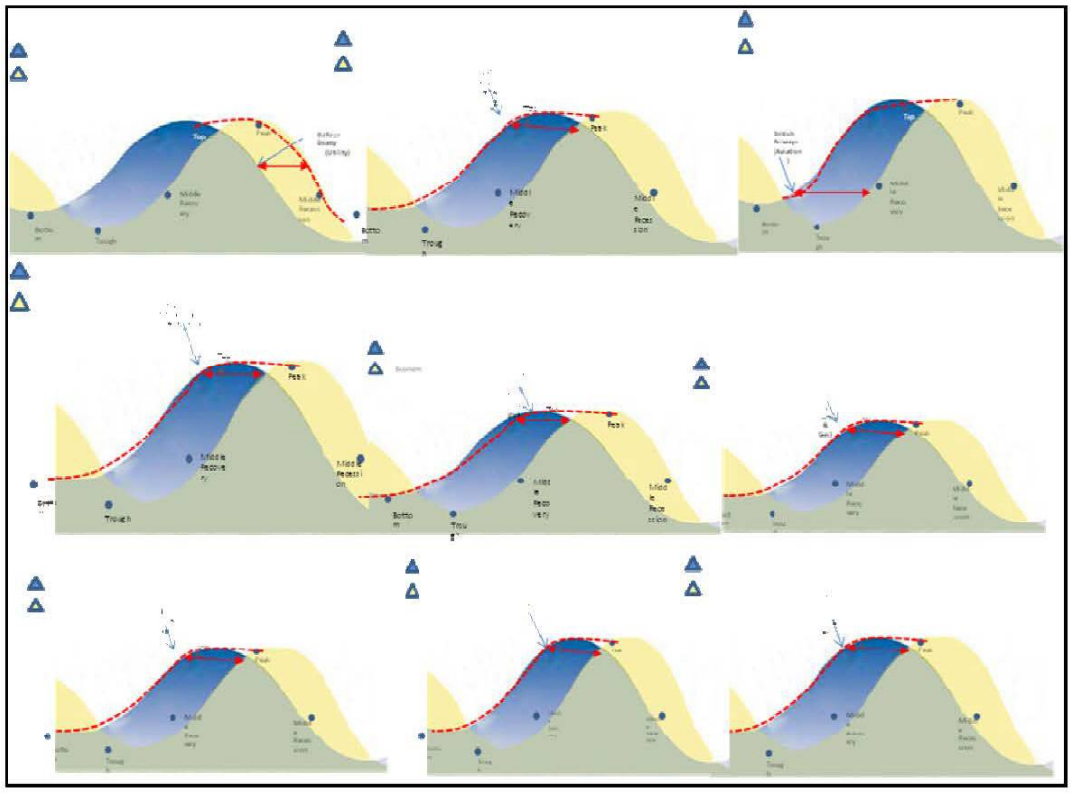
Displayed Characteristic	Balfour Beatty	BA	SGN	BG	BP	Petrobras	HPCL	ERG	Petrom
Cost advantages (TCO)	Y	Y	Y	Y	Y	Y	Y	Y	Y
Rate of change of new technology	Y	N	Y	N	N	Y	Y	N	N
Service level improvement	Y	Y	Y	Y	Y	Y	Y	Y	Y
Improvement on SLA exception rate	Y	Y	Y	Y	Y	Y	Y	Y	Y
Enhanced internal customer satisfaction	Y	Y	Y	Y	Y	Y	Y	Y	Y

As shown in the above table 6.1, since the outsourcing yielded benefits for most of the case examples, I conclude that it is desirable. However, all the examples exhibited retention of the IT control and management function within their own control. Thus I further conclude that it is desirable not to outsource IT leadership within the organization.

Objective 2: Business cycles too have an effect on an organization's adoption of IT as well as on the development of IT itself. The case examples demonstrate that the companies adopted those IT initiatives that had a direct impact on the top and bottom line – depending on their relation to the business cycle relevant to their country of operation. The result has been consolidated in Diagram 6.2 below. Cost optimization mechanisms were implemented in times when tightening the belt was warranted, and revenue increasing initiatives were carried out when there was a growth cycle in operation. All the examined companies showed this trait. The adoption of IT initiatives for companies like BA, BG, BP, ERG and Petrom was driven by their desire to maintain a leadership position using technology as a leveraging factor – which manifested itself in initiatives that led to their riding the wave of the economic cycle; whereas companies like SGN, Balfour, Petrobras and HPCL used technology to keep their business cycles stable even when the business cycle was at a downturn by extending their

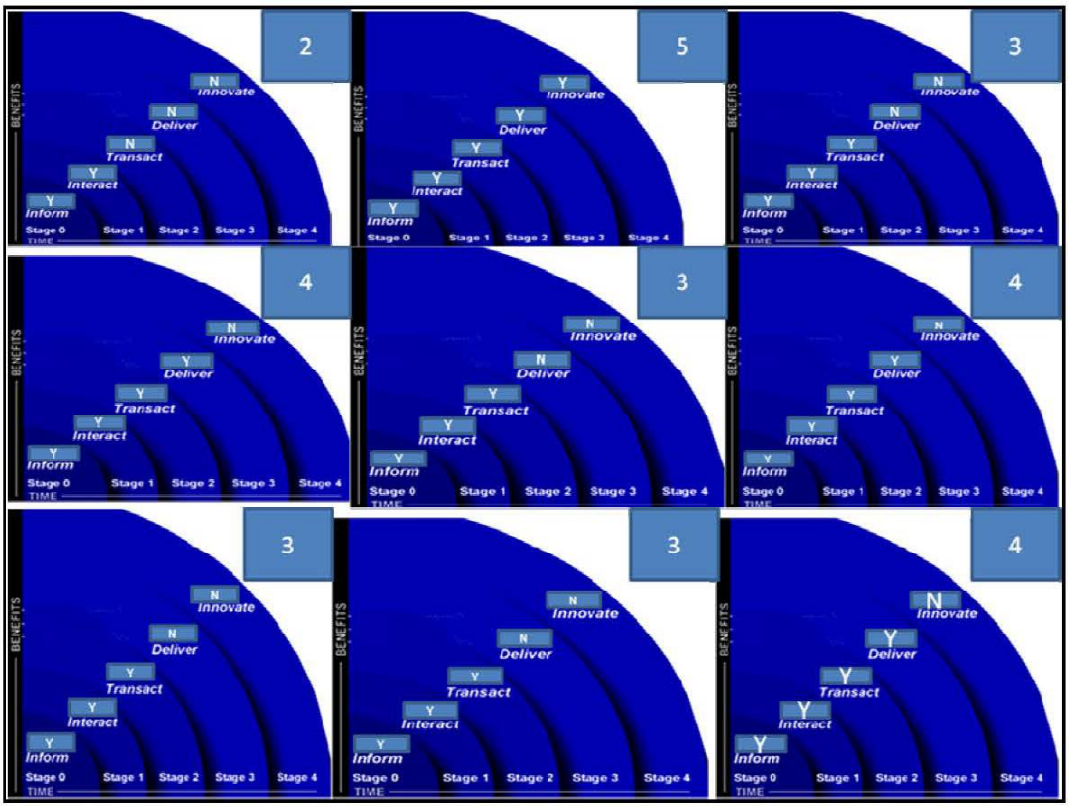
native business cycles. The fact these belonged to different industries further contributes to my conclusion that similar trends should be expected across a cross section of verticals.

Diagram 6.2 – Result - Link between economic cycle and companies' business cycle



Objective 3(a): The examined cases all exhibited significant enhancements in their transactional abilities in terms of accuracy, speed and ease of transacting. This was coupled with process changes that magnified the impact of this increase and contributed directly to the firm's performance. I divide this into five stages that are illustrated in the diagram 6.3 below.

Diagram 6.3 – Result - Stages of transactional efficiency

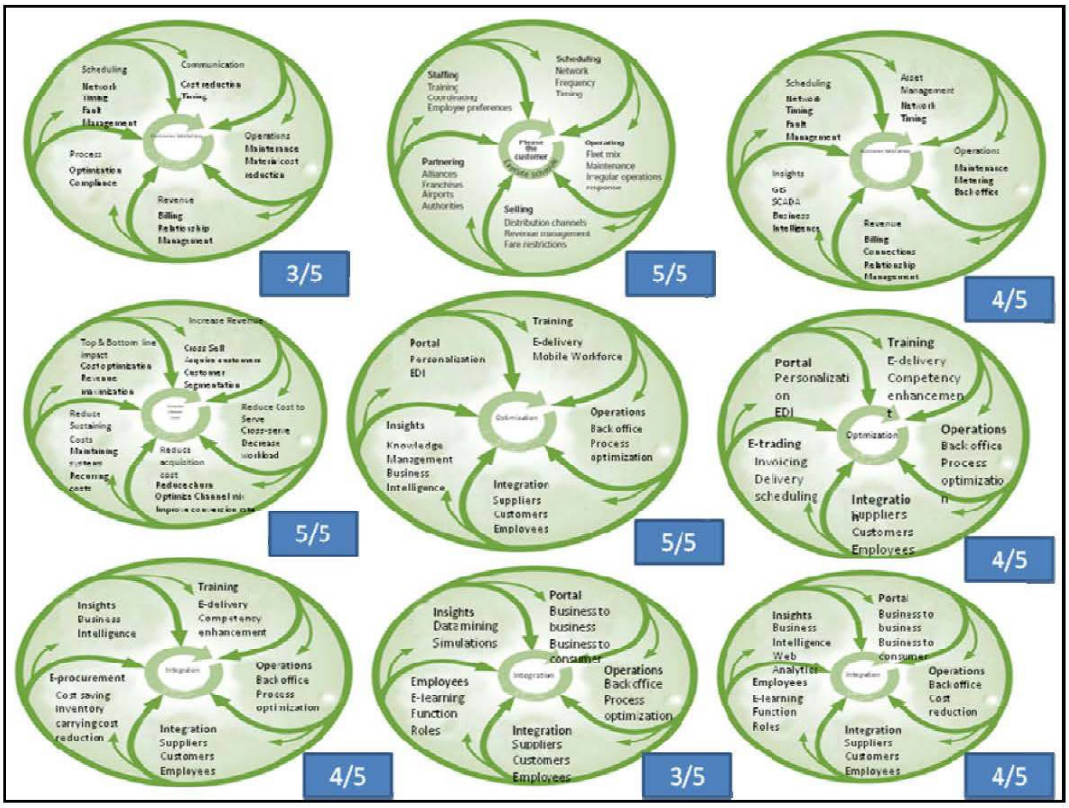


All the case examples show that the companies were able to disseminate information (inform) within their functional areas after implementation of automation initiatives. Secondly, all firms acquired the ability to interact – i.e. generate revenue, cut costs and retain the same service delivery levels thereby adding to profitability. Third, eight out of nine firms acquired the ability to shift from physical to electronic transactions thereby building relationships within the organization and also with their customers and partners. Fourth, four companies exhibited a movement towards electronic modes of interaction with their customers and suppliers as the primary mode of interaction. Finally, after the emergence of this stage of transformation, one of the companies advanced towards the innovate stage – whereby new innovative services were created to further boost revenues and provide a differentiation factor for the business.

Objective 3(b): Empirical observation confirms that resources (capital, labor, technology) and talent tend to concentrate geographically. This result depicted in diagram 6.4 reflects the fact

that firms are embedded in inter-firm relationships with networks of suppliers, buyers and even competitors that help them to gain competitive advantages in the sale of their products and services. While arms-length market relationships do provide these benefits, at times there are externalities that arise from linkages among firms in a geographic area or in a specific industry (textiles, leather goods, silicon chips) that cannot be captured or fostered by markets alone. The process of "clusterization," the creation of "value chains," or "industrial districts" are models that highlight the advantages of networks.

Diagram 6.4 – Result - Areas in which companies implemented operational efficiencies boosting competitiveness

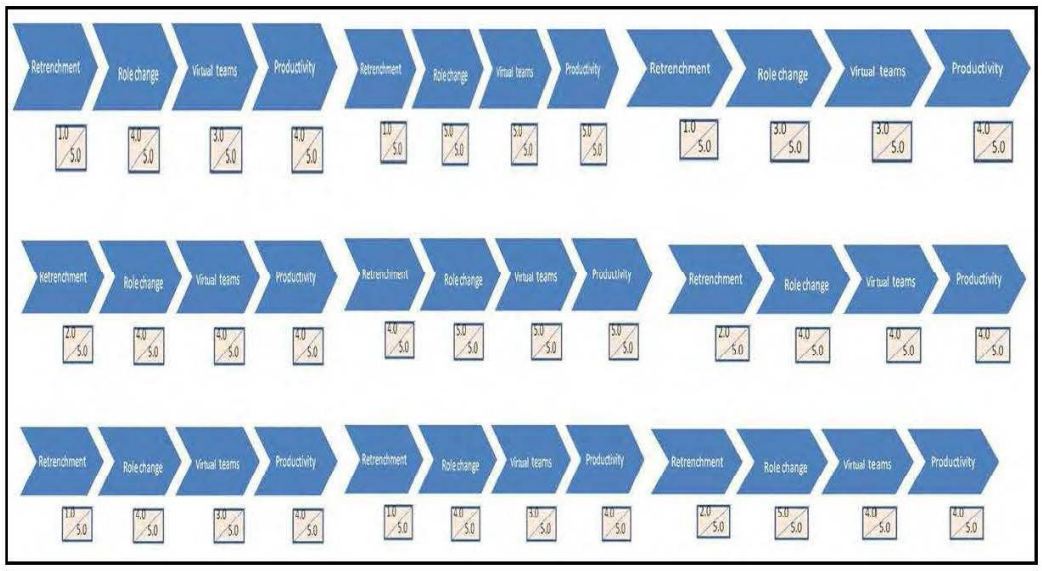


In terms of competitiveness, the companies were able to reach beyond geographical boundaries. Further, all them displayed competitive advantage through the deployment of IT. However, benefits accrued more due to the judicious deployment of IT rather than the initiative itself. For example, BA had to try thrice to actually get its ERP system working the

way it wanted, whereas others did it the first time around. This brings out the importance of IT leadership within the organization. The scores assigned to each of the initiatives in the diagram 6.4 above contribute to competitiveness. Each initiative implemented by each case example did this to a lesser or greater extent. Since this feature is common to all the case examples, I am led to conclude that IT transforms the business towards greater levels of competitiveness in multiple ways.

Objective 3(c): The case examples brought out the impact on workers. This is shown in the diagram 6.5 below.

Diagram 6.5 – Result - Impact on workers due to technology.



Regarding impact on workers, the case examples demonstrate changes in the structure of organization as well as in the employees' roles because of the implemented initiatives. Further, focus on imparting training and learning on these initiatives emerges as an important criterion of success of the initiatives. The case examples also demonstrate the formation of small, geographically dispersed teams linked by IT emerging as the dominant model. The analysis indicates that none of the IT initiatives implemented had an adverse impact on workers in terms of retrenchment. In most cases except for BP, few workers were retrenched. Rather, they were moved to new responsibilities and roles within the organization based on change in

the structure of the firm. All the examined cases display high incidence of role change and job function change among workers. The only case where the impact was lesser was in SGN – which was a freshly formed entity and hence did not have much scope for change. The third characteristic indicated was the formation of smaller, leaner, virtual teams that were geographically dispersed. For Balfour Beatty, the impact of this was slightly on the lesser side – possibly because of the nature of the company's business. Nevertheless, significant impact in the other cases leads to a conclusion that this type of transformation is to be expected. The fourth and last characteristic, productivity was universally displayed across all cases examined. Worker productivity improved within the workplace. Additionally, due to mobile workforce initiatives, the effective number of productive hours a worker could spend also increased thus further contributing to the overall performance of the company. It is reasonable to expect this type of transformation across a cross-section of verticals as it is exhibited in all three verticals under consideration.

Objective 4(a): Trends displayed by the case examples in terms of cost-performance structures, indicate that over time, the cost of IT has decreased and performance levels increased. All the firms examined had concrete implemented plans to refresh their IT procurements with pre-defined time periods. All of them recognized and appreciated the need to do this – again with risk mitigation for possible security issues due to old systems as the paramount condition.

All the case examples realized substantial cost savings. These are classified according to a price-performance ratio where price refers to direct or indirect cost savings and performance refers to direct or indirect revenue. The computation of this, however, is done by dividing the performance by the price, or more appropriately, taking the benefits accrued and dividing them by the costs incurred.

All the case examples have displayed the multiplier value as high positive values as shown in diagram 6.6 below. This has led me to conclude that IT transforms the cost-performance structures for companies. The impact of this could be on cost structures (affecting the bottom line) or top line revenues or a combination of the two. Typically, the companies examined

adopted IT initiatives that led to both numerator and denominator being impacted – with the numerator increasing and the denominator decreasing.

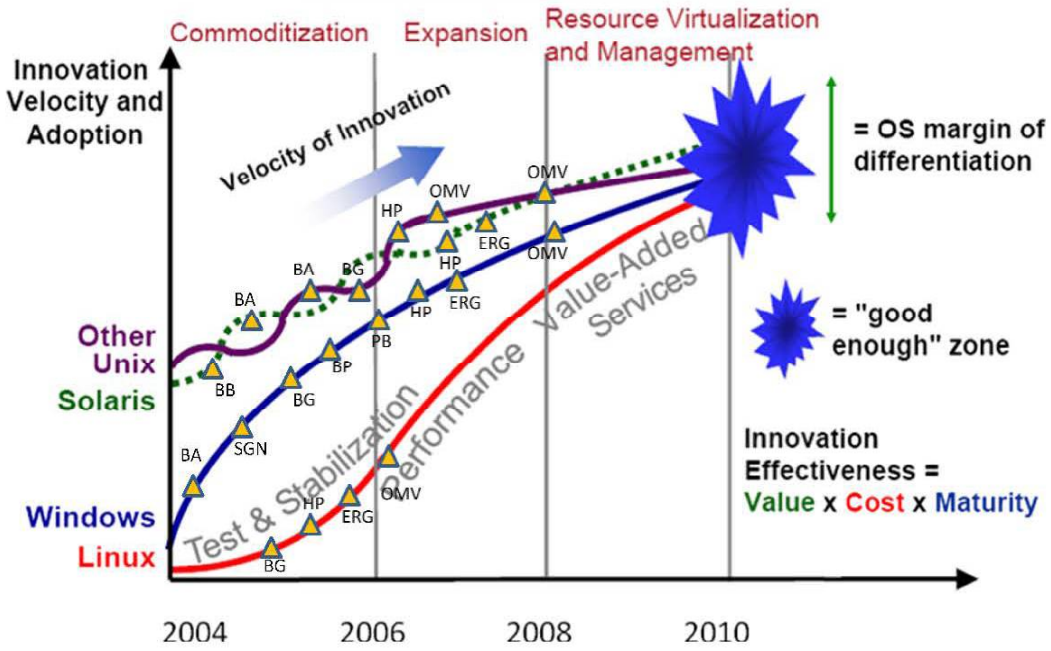
Diagram 6.6 – Result - Cost component reduction

Objective 4(b): Regarding architecture, the companies displayed a clear trend to move towards thin client architecture by using RDP or VNC based computing environments or operating web architectures for their applications. Also, the companies displayed signs of moving towards service oriented architecture (SoA). Vendors as well displayed this on one hand by providing platforms for SoA based business architecture and on the other making business applications that are SoA compliant.

The diagram 6.7 below indicates the architectures and operating environments in use in each of the companies. Together, they constitute more than 98% of production operating environments in the world. (Mac OS is considered in the 'other UNIX' segment.) As can be seen, these OSs became mainstream with their commoditization – in terms of adoption

coupled with the support vectors provided by the principal companies (like certifications, certified partners, solution providers etc.) Over time these architectures have grown to support newer technologies like virtualization and thin client architectures.

Diagram 6.7 – Result - Architectures and operating environments in use

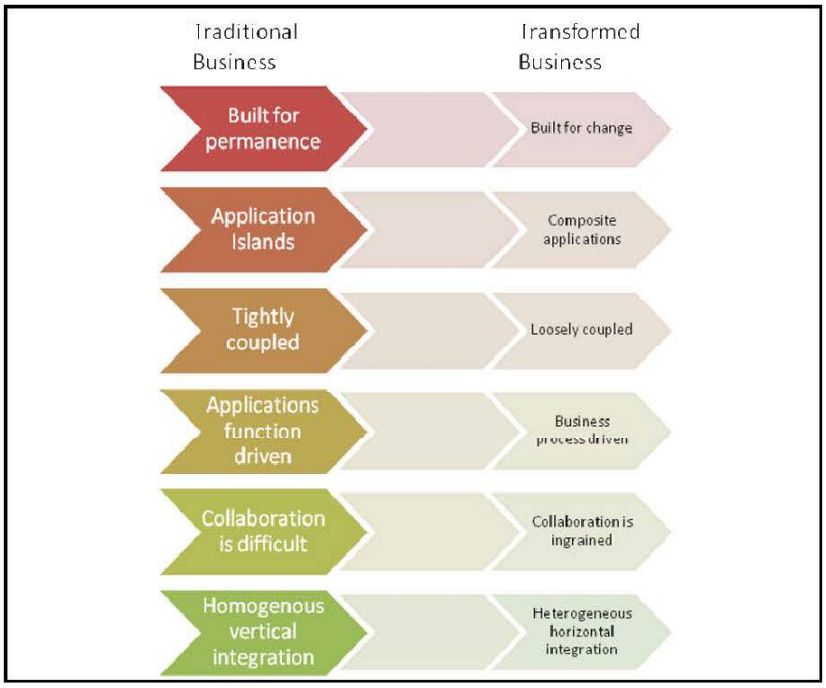


Most importantly, inter-operability is happening between all these platforms. Nowadays, it is common to find RDP UNIX clients and VNC Windows clients as well as server functions for each. The 'margin of differentiation' between these OSs is therefore decreasing – with more sophisticated GUIs being developed for each. Last but not the least, each of these OSs now supports native virtualization as well as comprehensive web application development and connectivity APIs to just about any database platform in the world. These architectures are moving away from system-DNAs (where the base operating environment, the database, and the choice of middleware was provided by a single vendor) and towards standards based computing – where the consumer is free to choose the technology they are most comfortable with.

Objective 4(c): In terms of platform features, the case examples demonstrate a movement away from proprietary platforms and a shift towards standards based platforms that are built

on loosely coupled systems. Typical characteristics of this transformation is shown in Diagram 6.8 below.

Diagram 6.8 - Transformation characteristics



BA, BG, BP and Petrom adopted SoA as their default choice for platform. Of the others, Balfour, SGN, Petrobras, and ERG obtained the platform due to the fact that their choice of enterprise system supported this. HPCL, though implemented an older version of JDE and hence did not get the direct benefit of this, does plan to adopt this platform in future.

A number of cases displayed a movement towards OSS (open source software) as the platform of choice, although a greater number went with commercially available systems. The main reasons for this choice could be attributed to a better marketing strategy, availability of funds, and the confidence of getting the required support for the platform.

Objective 4(d): The case examples highlight with respect to security and vulnerabilities as shown in diagram 6.9 the crucial importance of protecting information assets as knowledge. This was coupled with standard, commoditized defenses at all levels beginning with the

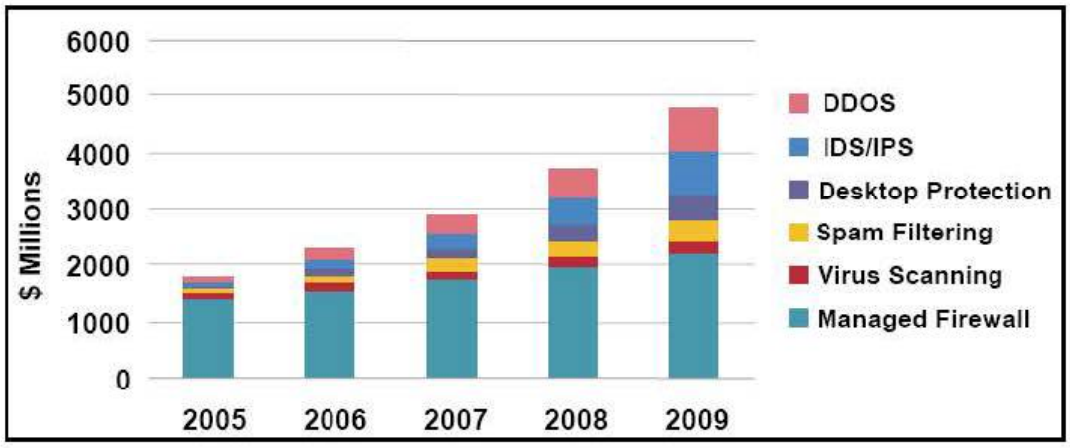
perimeter and going up to individual network services and endpoint computing terminals. The initiatives deployed by companies were standard in terms of categories – only the vendor (out of a limited set in each category) differed to an extent. However, the implementation and protection methodology was the same in each case.

Security threats indicated a distinct tendency of moving away from the machine and shifting towards the human. Organized crime targeting humans like Phishing, Pharming and spam emerged as common threats – as did keyloggers and botnets. The countermeasures, likewise, showed a tendency towards pro-active defense against these threats. Each of the companies examined displayed similar trends in their facing security threats as well as their adoption of countermeasures as displayed in diagram 6.10 below.

Diagram 6.9 – Result - Top security risks and vulnerabilities

Malware: Infection of the organization's systems or network by viruses, worms, Trojans, adware, or spyware
Phishing: Impersonation of the organization through email or electronic means in an attempt to obtain confidential information
Pharming: Diversion of Internet traffic to an imposter site by means of DNS poisoning or browser address bar attack in an attempt to obtain confidential information
Spam: Unsolicited or unwanted email messages
Denial-of-service: Attempts to overwhelm or overload the organization's network or system resources with the intent to degrade their performance or make them unavailable
Unauthorized access by outsiders: Unauthorized access or use of systems or the network by outsiders
Vandalism/sabotage: Defacement, destruction, or other damage to the organization's systems, network, or Web site
Extortion: Demands for money or other concessions based on threats to use electronic means to harm the organization's network, systems, or reputations
Fraudulent transactions: Fraudulent electronic transactions that result in financial loss or damage to the organization or its customers
Physical loss: Physical loss or theft of computer, storage media, or other devices and any associated data
Unauthorized access by insiders: Successful access by insiders to system functions or information for which they are not authorized
Insider misuse: Violation of the organization's policies regarding acceptable use of computing/network resources

Diagram 6.10 – Result - Security revenues by countermeasure category.

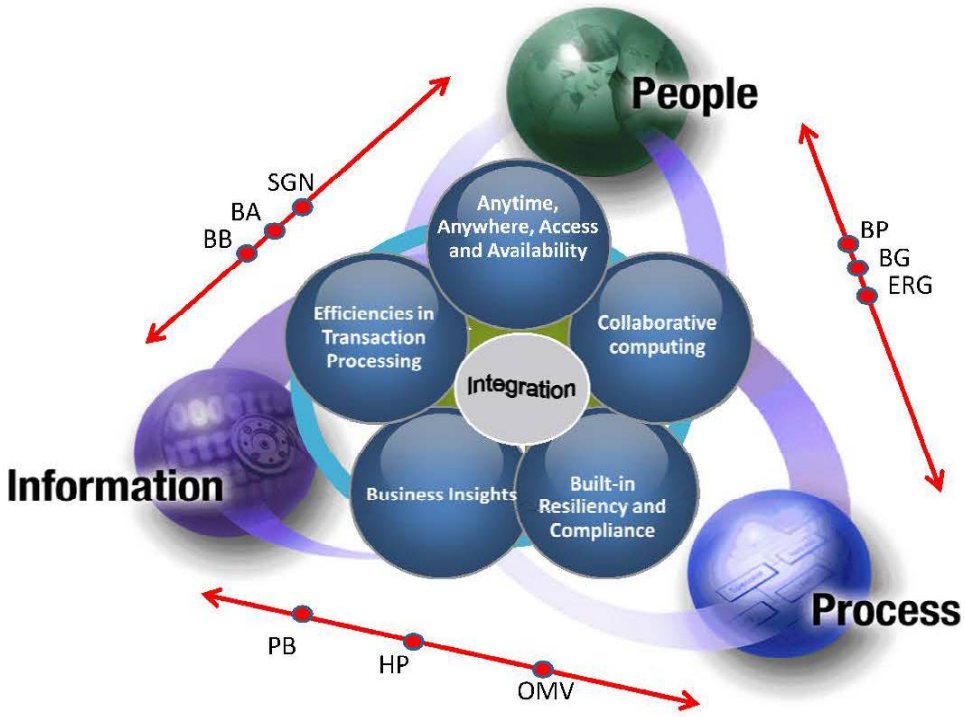


Ethical hacking emerged as a popular concept employed by some companies in our case examples for penetration testing of their network security. However, the companies that did this were fairly advanced in the technology adoption path (BA, SGN and BG). Further, these companies had a lot to lose in terms of reputation should they be affected by a data compromise issue. All the case examples universally were affected by these threats thus leading to the conclusion that this nature of transformation should impact companies across industries.

Objective 4(e): The case examples indicate a distinct trend towards EAI as shown in diagram 6.11 below – where no unproductive or isolated IT systems were retained in the organization. There is a definite move towards the ultimate in enterprise integration – boundaries are blurred or non-existent between people, information and processes; where anytime information is available to mobile workers. This information is stored in data warehouses where it is accessed by BI tools to provide business insights. The storage of this information ensures business resilience, compliance and business agility and flexibility.

The diagram 6.11 shown below illustrates the characteristics of EAI for all the case examples examined. As all case examples moved towards and adopted this, therefore I conclude that this is another important aspect of IT enabled transformation.

Diagram 6.11 – Result - Characteristics of Enterprise Application Integration



Objective 4(f): Enterprise management and business continuity all indicated a dramatic growth of data and information. This applies to all the case examples. Further, to deal with this information explosion, all the companies adopted newer, faster storage technologies like NAS and SAN, which, coupled with content management and ILM solutions enabled them to cope with the massive volumes of information. The case examples also demonstrate an increasing reliance on IT systems and the need for their availability 24x7. Security and possible threats have made most of these companies establish disaster recovery and business continuity plans with remote replication being a popular strategy (adopted by 6 out of 9 companies discussed in the preceding chapter.)

The case examples show a movement towards a complex IT environment and the need for systems management applications. The companies adopted such systems to address issues in real-time as well as pro-actively prevent potential issues from becoming problems. Finally, all the examples highlight a movement towards enterprise integration – in terms of people,

processes and information. These companies universally realized and appreciated the importance of this synergy and they tried in their own way to achieve it. Some have achieved it more than others. See the diagram 6.12 for an illustration of the case examples movement and progress towards this goal.

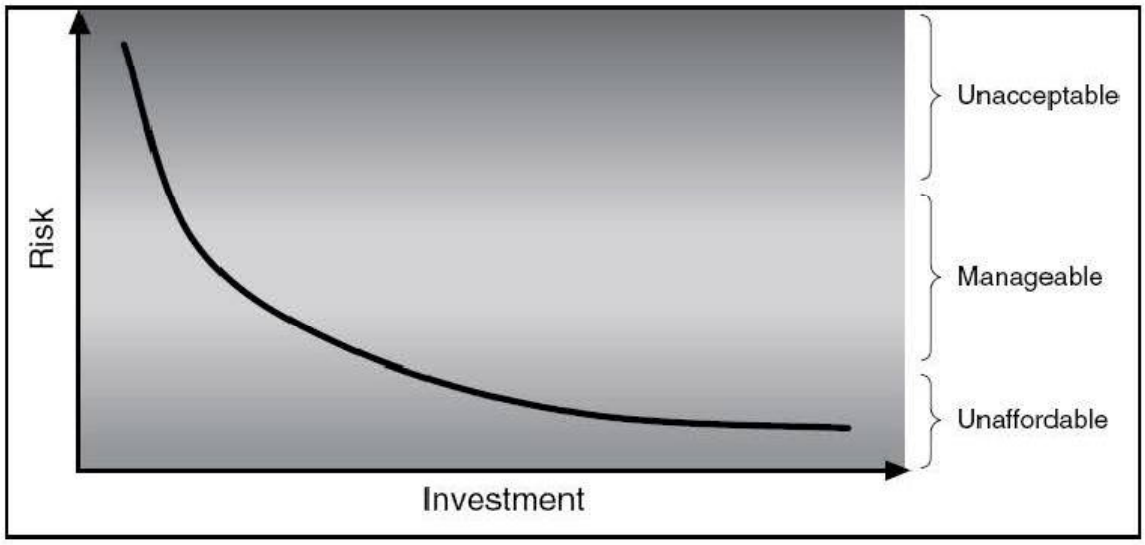
Diagram 6.12 – Result – Movement and progress towards achieving the goal of business continuity

Objective 5: The case examples examined in the preceding chapter have also demonstrated that, other things being equal, there are 3 key factors that drive the adoption of IT for business transformation –

- reduced risk and cost structures,
- customer centricity and services levels and,
- revenue and market share

If we plot these on a graph as in diagram 6.13 below, we find that there is a trade-off between the level of investment and risk as far as IT spending to support the business is concerned. High investment in IT minimizes the level of risk factors like technological obsolescence, maintenance costs and business integration. Conversely, a low level of investment increases the level of risk.

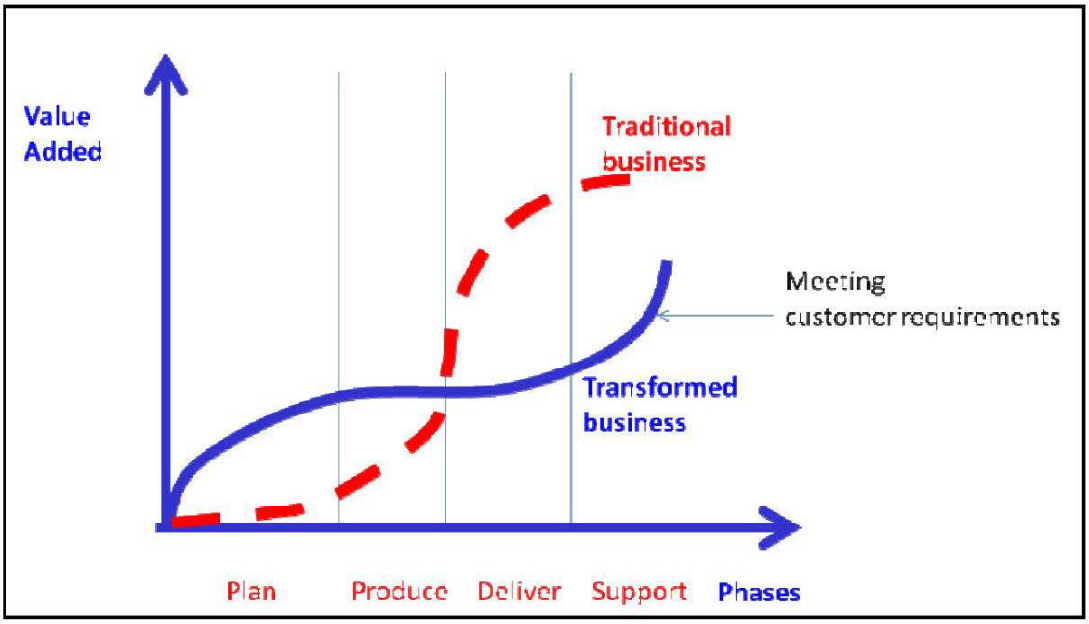
Diagram 6.13 – Trade-off between level of investment and risk w.r.t IT spending



This is demonstrated by almost all the companies that were examined. In each case there were a number of driving factors ranging from competition to curtailing expenditure, to a necessity caused by a merger or acquisition. At the lower end of the graph, the level of investment required becomes too much for organizations to afford and justify the expense in terms of benefits accrued. At the higher end of the graph, (the other extreme) though the investment is extremely low, the level of resulting risk becomes unacceptable to the organization as it is unmanageable. The key therefore seems to be to strike a balance between the level of investment and the level of risk such that the risk is manageable. It is this strategy, as the case examples demonstrate, that will benefit organizations the most.

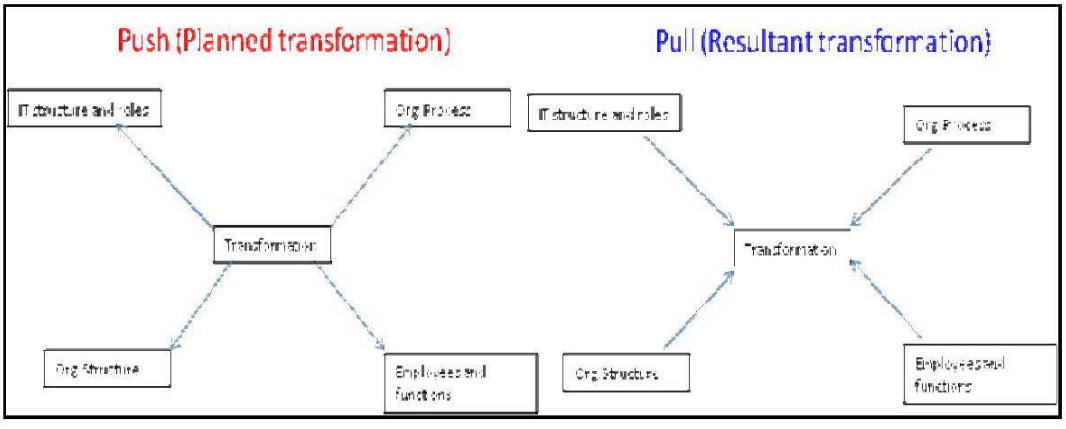
Another aspect that emerges from the case analysis is that as one examines the traditional business value chain and divides the activities of providing a product or service, one can identify four distinct phases of plan, produce, deliver, and support. In the traditional business model, the value addition in the first two activities was low – with the major addition coming in after the production phase. The new IT- transformed business, however, offers distinct value at each stage. This is illustrated in the diagram 6.14 below.

Diagram 6.14 – Value accrued at various stages of IT transformed business



Our analysis identifies also that there were two modes of transformation – in one mode the transformation was planned and actively pursued as a goal by the organization; and in the other the transformation was what happened as an outcome of other transformations within the enterprise. This is illustrated in the figure 6.15 below.

Diagram 6.15 – Push and Pull mode of transformation



If one examines the pattern of transformation based on these four parameters, one can classify the examined cases into the transformation types (planned or resultant) that the business experienced as done in diagram 6.16 below.

Diagram 6.16 – Classification of cases basis the type of transformation

	Early	Middle	Current	Consulting Company
Balfour Beatty	*(Isolated applications)* IT as driver, use employees and process as levers and impacted structure. Transformation was planned.	*(Maximo)* Process as driver, use structure and employees as levers and impact IT. Transformation resulted.	*(Scheduling and mobile workforce)* Employees as driver, use structure and IT as levers to impact process. Transformation resulted.	*TCS*
BA	*(Mainframe applications)* Structure as driver, use IT and process as levers and impacted employees. Transformation was planned.	*(ba.com, SAP)* Process as driver, use employees and structure as levers and impacted IT. Transformation resulted.	*(T5)* IT as driver, use process and employees as levers and impacted structure. Transformation resulted.	
Scotia Gas	*(Mainframe applications)* Structure as driver, use IT and employees as levers and impacted process. Transformation was planned.	*(Maximo)* Process as driver, use IT and structure as levers and impacted employees. Transformation was planned.	*(Web 2.0, SoA)* Employees as driver, use IT and process as levers and impacted structure. Transformation resulted.	
BP	*(Mainframe applications)* Process as driver, use IT and employees as levers and impacted structure. Transformation was planned.	*(SAP)* Structure as driver, use IT and process as levers and impacted employees. Transformation was planned.	*(Semantic search)* IT as driver, use process and employees as levers and impacted structure. Transformation was planned.	*Accenture*
BG	*(Mainframe applications)* Structure as driver, use IT and employees as levers and impacted process. Transformation was planned.	*(SAP)* Process as driver, use employees and structure as levers and impact IT. Transformation was planned.	*(britishgas.co.uk)* IT as driver, use structure and process as levers to impact employees. Transformation was planned.	
Petrobras	*(Mainframe applications)* IT as driver, use process and employees as levers and impacted structure. Transformation	*(SAP)* Process as driver, use IT and structure as levers and impacted employees. Transformation was planned.	*(E-trading)* Structure as driver, use employees and process as levers and impacted IT. Transformation was planned.	

	resulted.			
HPCL	*(Mainframe applications)* IT as driver, use structure and employees and impacted process. Transformation resulted.	*(ORACLE-JDE)* Process as driver, use IT and employees as levers and impacted structure. Transformation was planned.	*(Portal)* Structure as driver, use process and employees as levers and impacted IT. Transformation was planned.	*CapGemini*
ERG	*(Mainframe applications)* IT as driver, use process and structure as levers and impacted employees. Transformation resulted.	*(SAP)* Process as driver, use IT and employees as levers and impacted structure. Transformation was planned.	*(GEIS integration)* Structure as driver, use IT and employees as levers and impacted process. Transformation was planned.	
OMV-Petrom	*(Isolated applications)* Process as driver, use IT and employees as levers and impacted structure. Transformation was planned.	*(SAP)* Structure as driver, use process and employees as levers and impacted IT. Transformation was planned.	*(Web-analytics and BI)* IT as driver, use process and structure as levers and impacted employees. Transformation was planned.	

The matrix above shows the dynamics of transformation over a period of time. If one takes the example of British Petroleum, in the 'early' phase, with the advent of automation, they focused on introducing process optimization through automation of their operations in different fields. As a consequence, this had an impact on their structure – in terms of organizational hierarchies, departmental re-structuring etc. In the 'middle' phase, they went through two major acquisitions and thus integration of the merged company's information systems became a key focus issue. This led to the adoption of a standardized system (SAP) across all entities. This affected the employees whose roles and functions changed within their areas of work. In the 'current' stage, the organization wished to use IT extensively to impact top and bottom lines. The myriad of changes implemented had implications for the organizations structure – in terms of its interactions with its shareholders, customers and other companies both within its industry and external to it. In all the three stages, a conscious effort was made by the organization to change the way it did business. Hence the phrase 'transformation was planned'. Similar analogies can be drawn from the other cases that have been shown in the above matrix.

Diagram 6.17 – Business transformation at Balfour Beatty

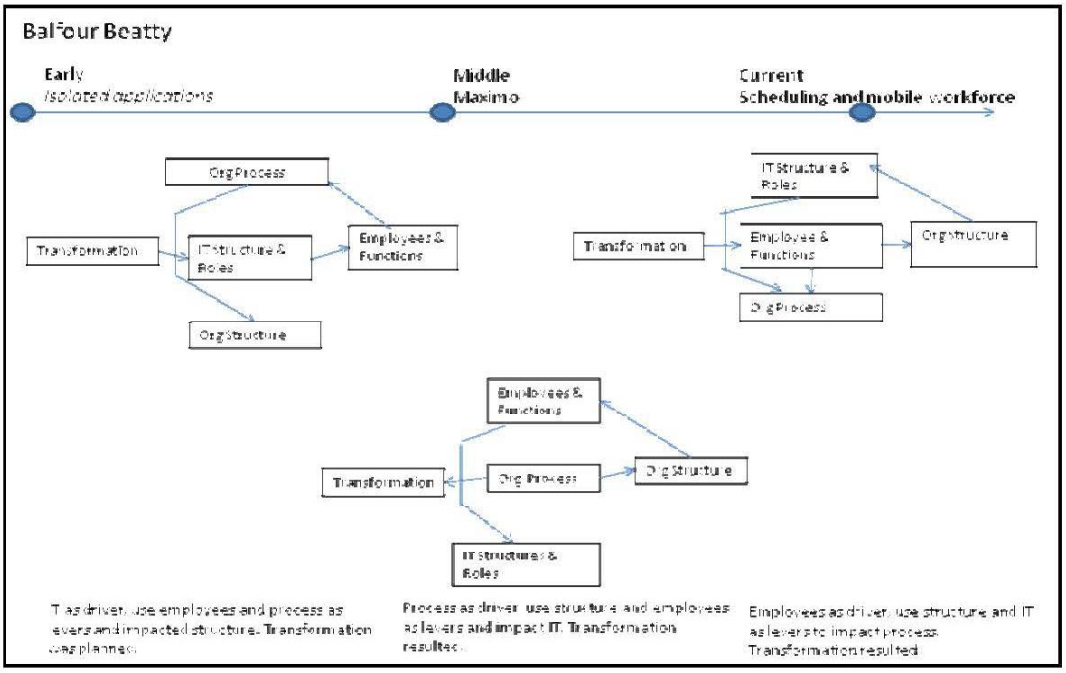


Diagram 6.18 – Planned transformation at BA

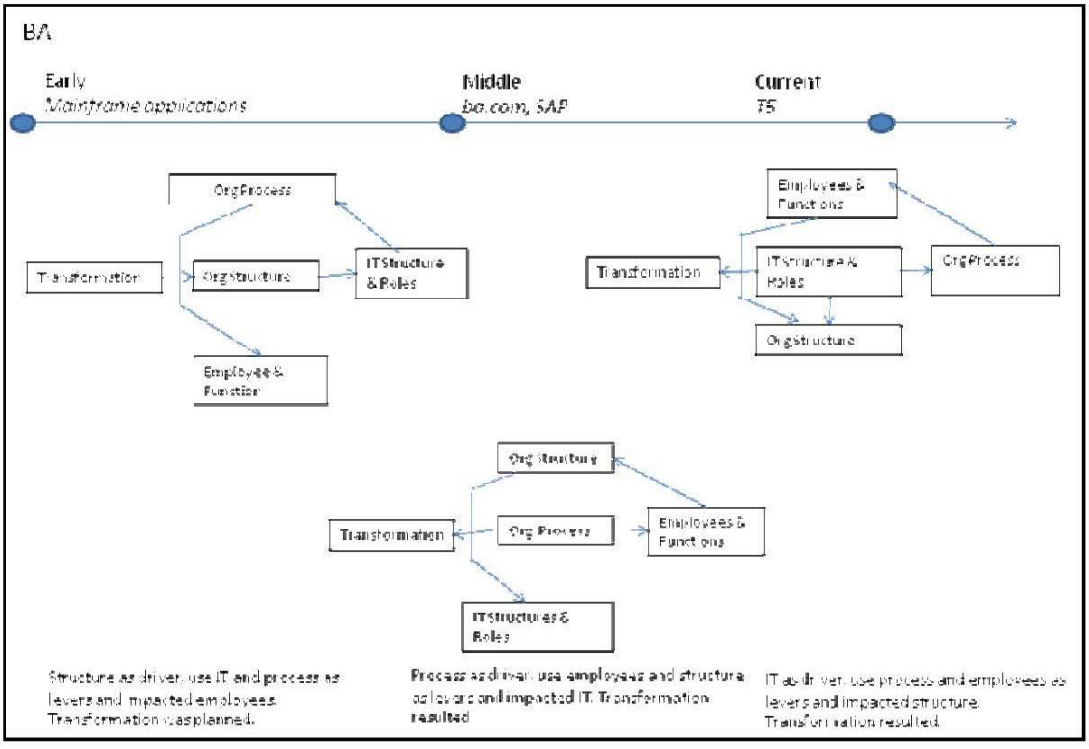


Diagram 6.19 – Business transformation at Scotia Gas

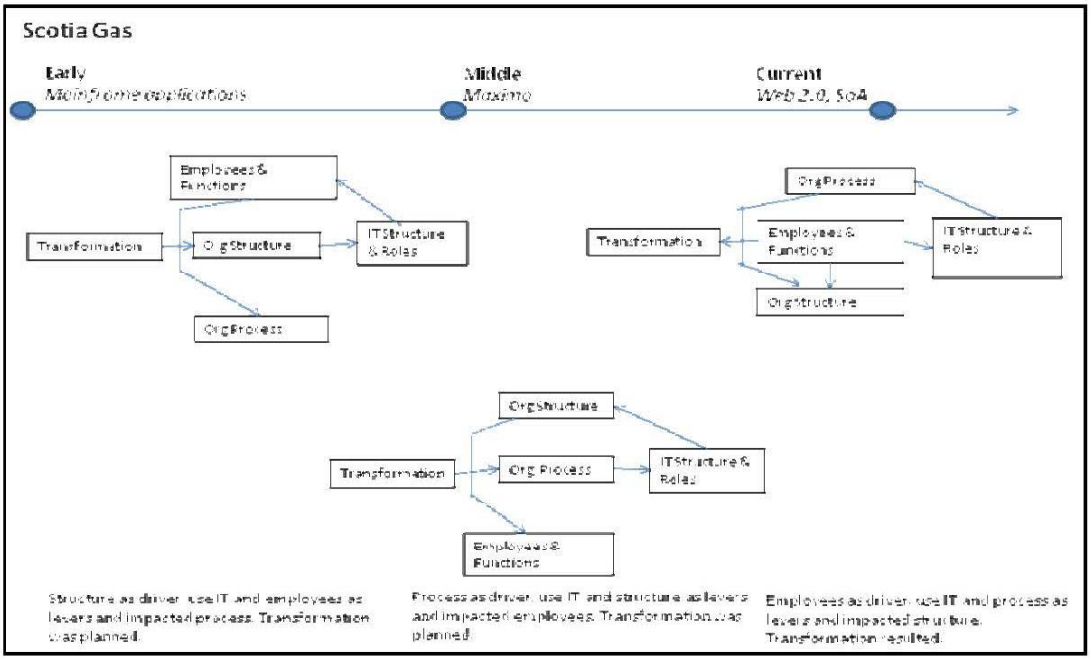


Diagram 6.20 – Business transformation at BG

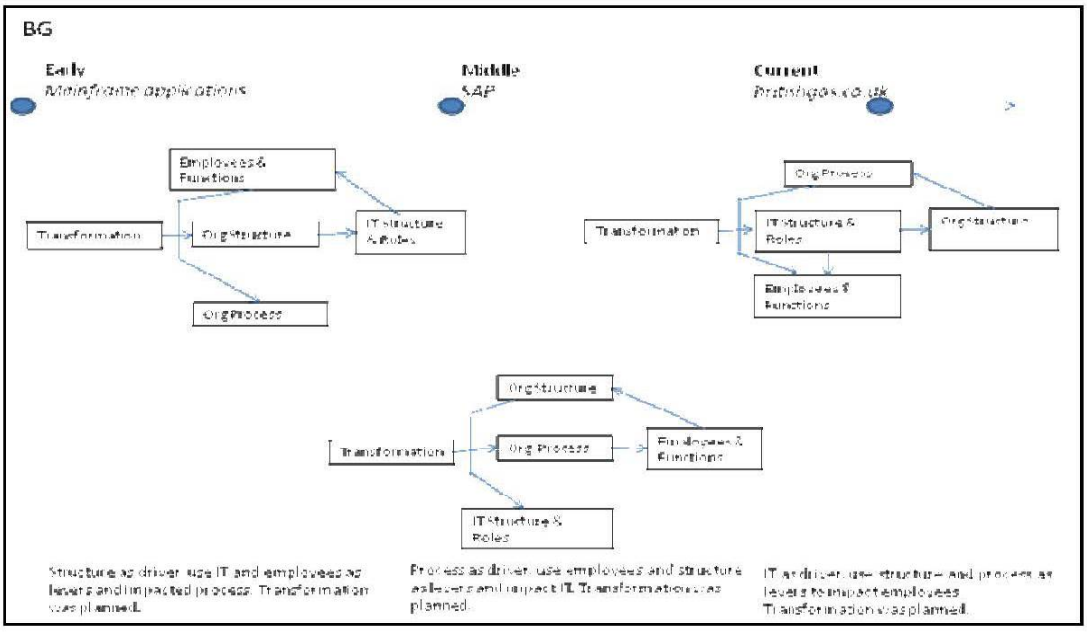


Diagram 6.21 – Business transformation at BP

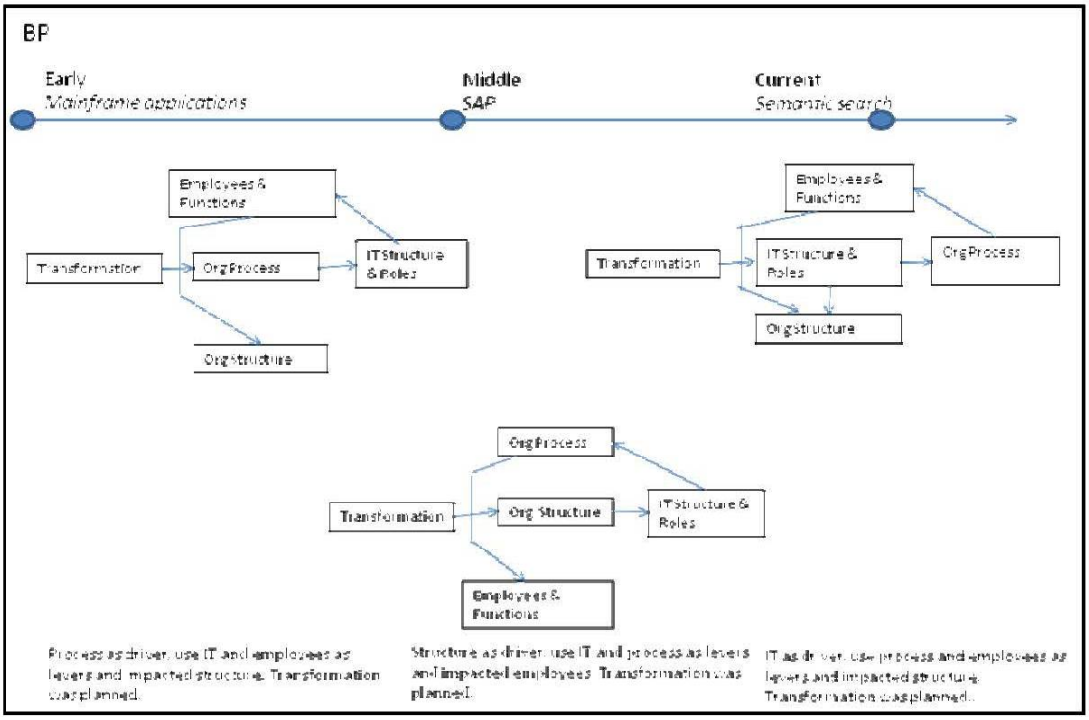


Diagram 6.22 – Business transformation at Petrobras

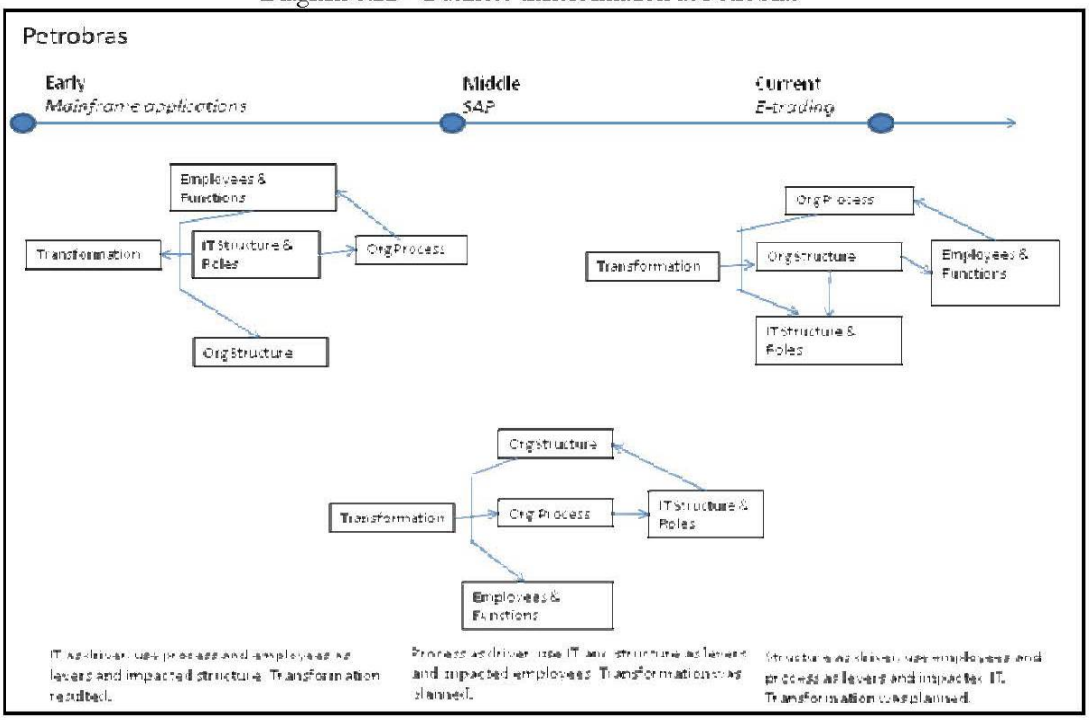


Diagram 6.23 – Business transformation at HPCL

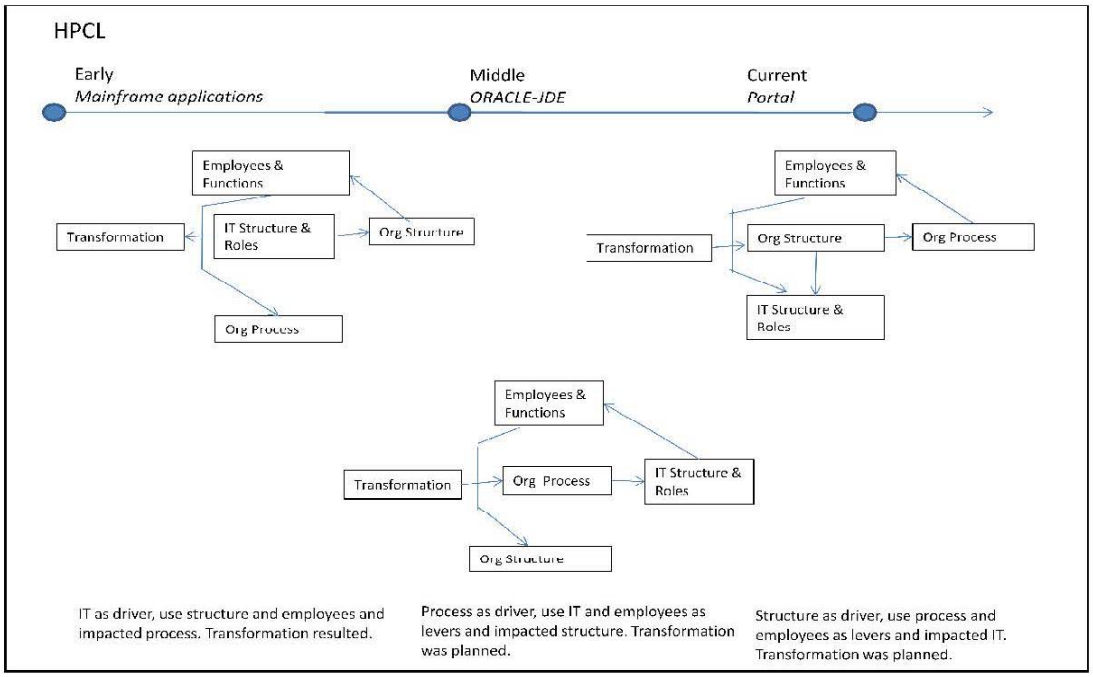


Diagram 6.24 – Business transformation at ERG

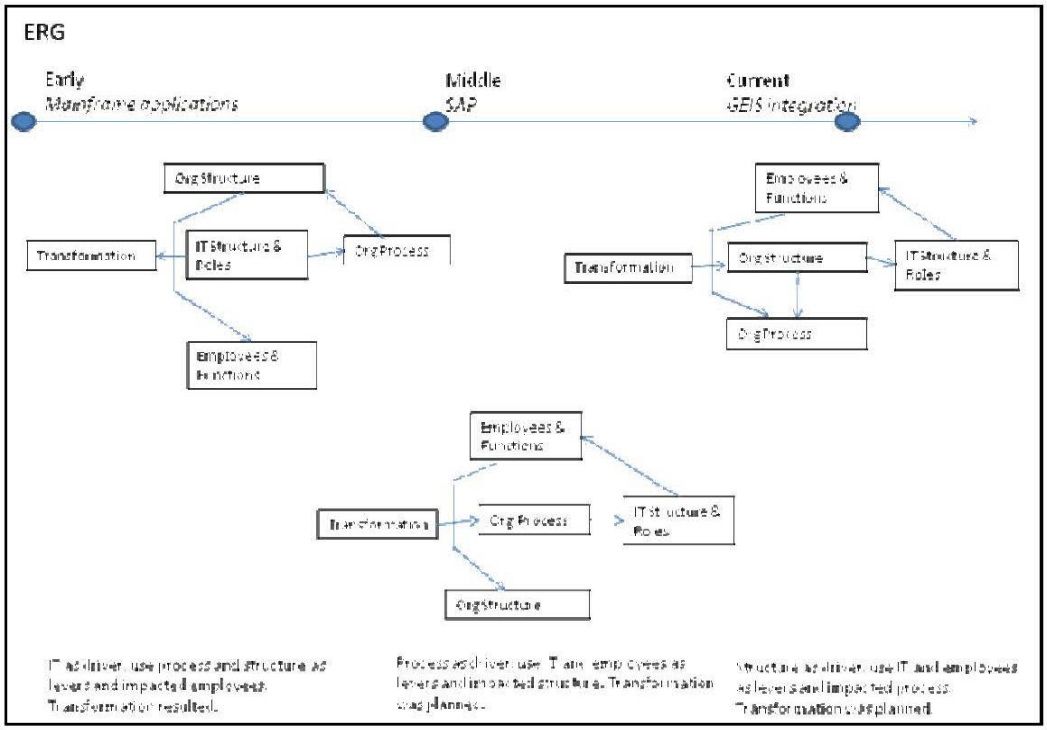
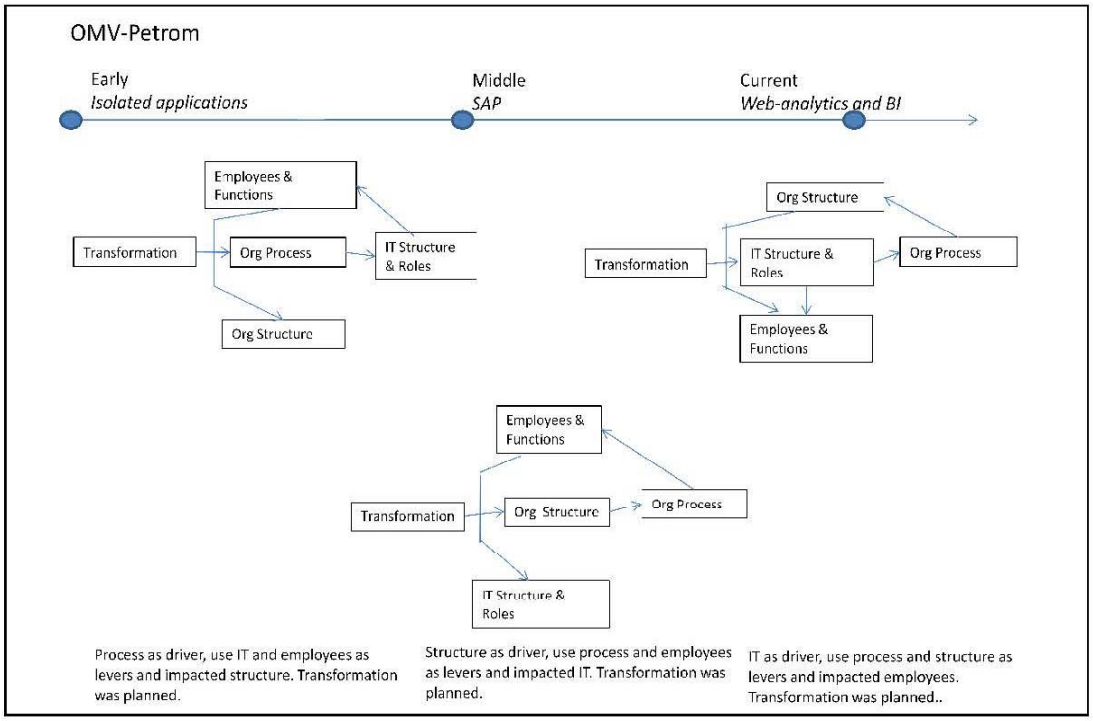


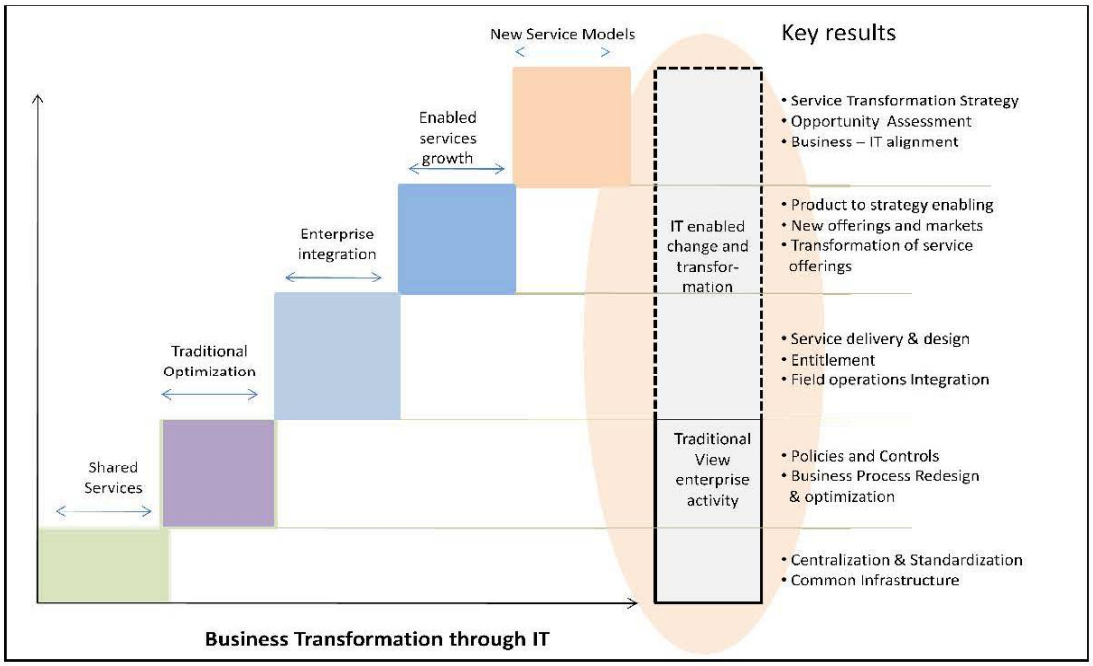
Diagram 6.25 – Business transformation at OMV Petron



Our examination of the cases reveals that though the organization may have planned for transformation, the exact nature of the transformation may not have been known – or even suspected till it manifested itself to the organization. Therefore, an important element in the transformation is the element of control. A plan for transformation may be initiated, but because of the factor of control - or lack of it, the transformation may affect not the planned area but a different set altogether – which may also set the stage for the next driver of transformation to enter the picture. Three of the examined cases – OMV-Petrom, BG and BP managed to control their transformation extremely well. Yet for these firms, the process of transformation was fraught with hiccups. BP, for example, failed to implement their SAP system twice – at a substantial cost – before it finally got it right and achieved the desired results. Yet, these companies proved that however difficult it may be, it is certainly possible to 'control' the transformation of business for a specific industry. If one cannot have control of the entire process, one can at least control the rate of transformation so that unforeseen consequences do not occur. Successful firms can, and do, achieve this.

Clearly, when the level of investment is made in a phased manner, there accrue economic benefits to the company. These are exemplified in the diagram 6.26 below:

Diagram 6.26 – Economic benefits accruing to companies due to phased investments in technology



Once organizations go beyond the phase of traditional (process) optimization, they begin to realize the economic benefits. As they move towards enterprise integration, these benefits increase till technology begins to drive the business model and new sources of revenue emerge in terms of growth of the existing services as well as generation of complementary new services that the company can provide.

Two things are clearly noticeable with respect to the correctly implemented IT – (a) the benefits of correctly implementing IT are quantifiable statistically; and (b) as more and more IT becomes commoditized, the barriers to its implementation are on the decline.

The organizations that have earned gains by IT implementation have focused on 3 primary areas:

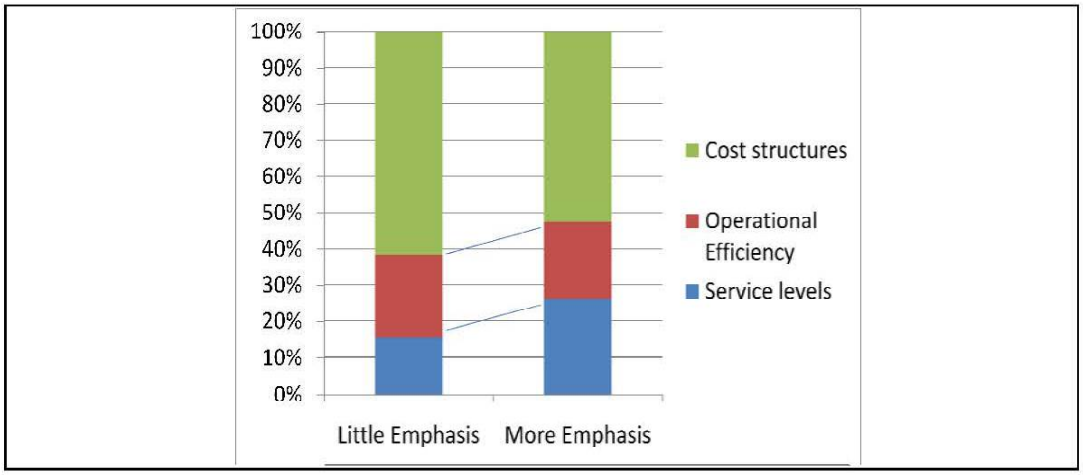
a. Process optimization – using IT to enable end-to end functions across the enterprise as well as reduce the associated costs of processes encompassing those transactions through a direct reduction in the transaction costs.

b. Operational efficiencies – using IT to improve customer experiences through value added services and improved service levels as well as retain customers through service innovation and personalized delivery.

c. Using IT to diversify and create new, associated avenues of business that are complementary to the core competency of the enterprise – at little marginal cost – thus impacting the top line revenue.

These 3 areas are inter-related. The first of these (process optimization) sets the stage for the second (operational efficiencies). The second directly impacts the third area (diversification and growth) - since operations are structured to support diversification strategies for the enterprise. Typically, the organizations that have achieved business transformation do so by defining a baseline cost structure, integrating operational functions across the entire value chain, defining their core competencies and focusing on them, and finally becoming customer centric by integrating operations with all customer facing areas across the enterprise. The organizations that reach the last stage (move towards customer centricity, focus on core competencies and external partnerships) tend to be the most successful.

Diagram 6.27 - Organizations that gave emphasis to IT



Further, it is not enough simply striving to attain the goal through any means necessary. In today's world, products and services are easily replicable due to the commoditization of their enabling technologies and the low barriers to entry for competitors. New scientific innovations sooner or later morph into commercially viable applications, products and enabling-services. These then generate a flux of new businesses and business models that have impact on the economy. Eventually, as their adoption matures and as more and more existing businesses begin to leverage these applications, a number of changes in the very nature of business occur – at the local, national and global levels. In this process, there are winners and losers as well as periods of transformation.

Correct application of IT should be in the areas that would have maximum strategic impact on the business and lead to its transformation - this is the key differentiator of IT user organizations. For the top level executives, failure to navigate through periods of transformation can be catastrophic. To see this compare the Standard and Poor's top 500 list from 1957 to 2007. Only 16 percent of the companies in the list in 1957 exist today. While there may be a variety of causes for this, one key factor that applied to all the surviving companies was the ability to transform their business – by modifying or discarding the old processes, and by embracing the new technology. This required, sometimes, moving into new areas, by leveraging the core capabilities while including complementary offerings as well as managing change within the organization.

Employees, too, have transformed in their roles, functions and expectations.

Traditionally, as shown in the diagram 6.28, the rate of learning new technologies – be it in a personal or professional capacity was fairly acceptable. This is contrasted sharply in today's world where the sheer number of technologies that are vying for the same space has increased exponentially, thus making it difficult for the employees to master them.

Yet, generation after generation is coping with the rapid pace of change – a pace that is ever accelerating. Humans are also being transformed with their environment.

Diagram 6.28 – Acceptable rate of learning new technologies in traditional companies

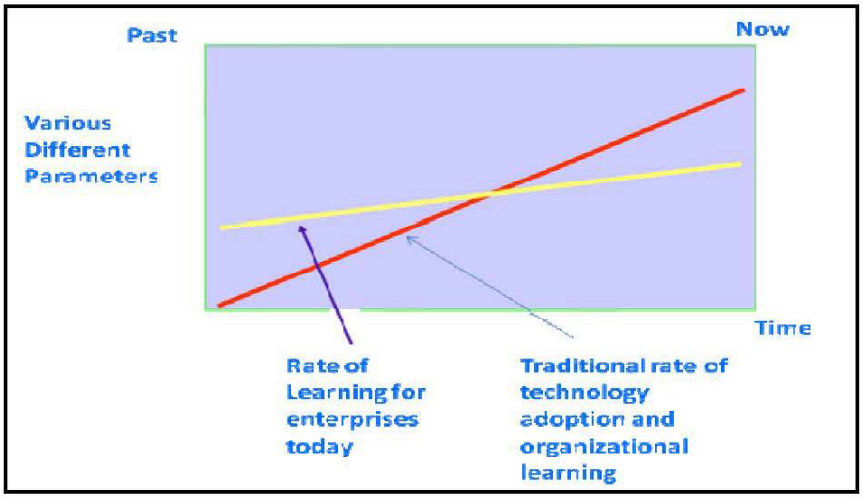
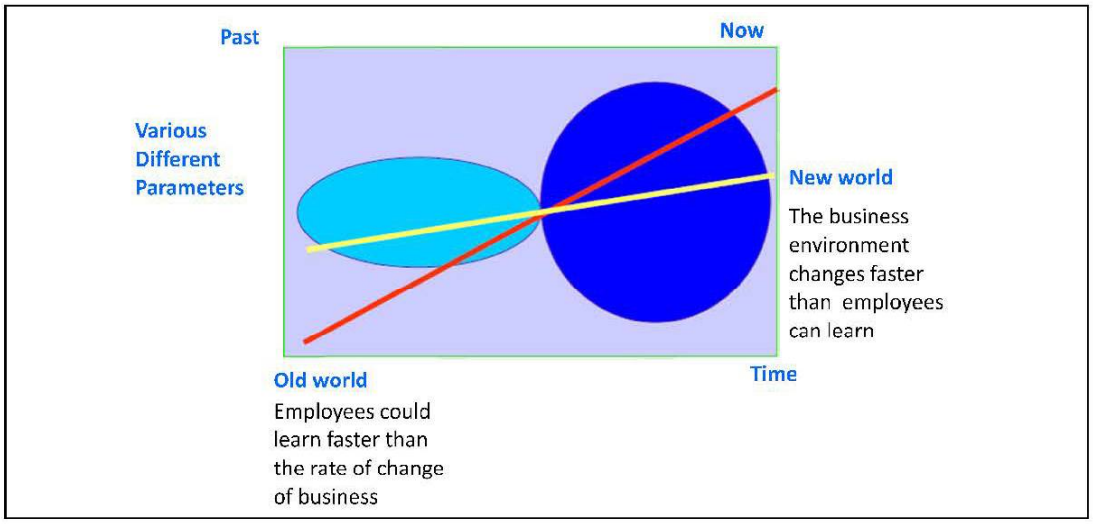
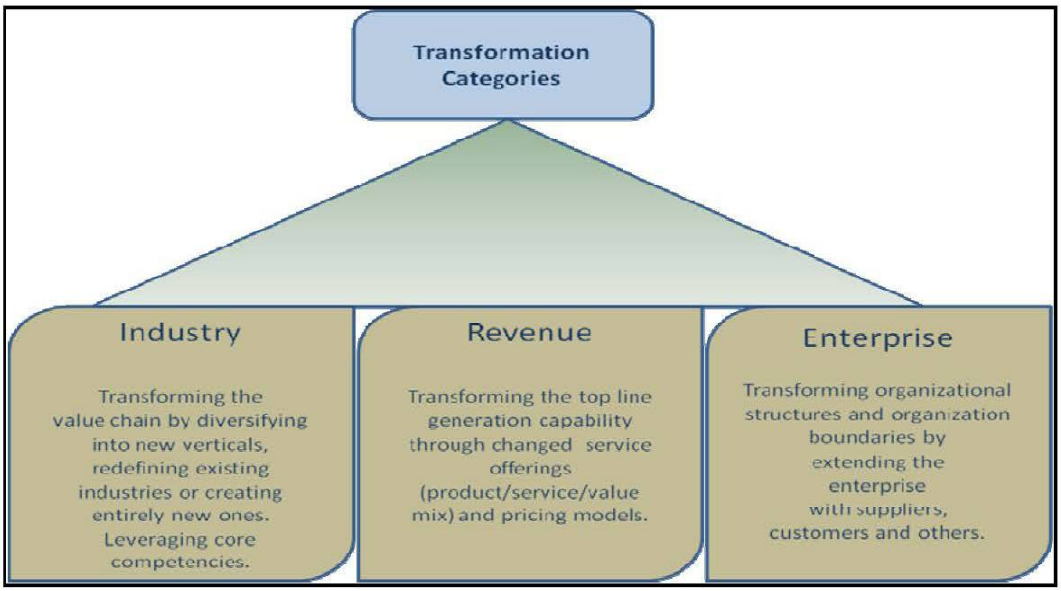


Diagram 6.29 – Comparative ate of learning new technologies in newer companies



Business transformation can be classified into 3 main categories as demonstrated in diagram 6.30 below.

Diagram 6.30 – Categories of transformation



The first (i) of these is by industry – by IT enabling horizontal movement into new industries. A typical example of this is Virgin – which began in the music and retail industries and moved to diverse industries like airlines, railways, beverages, and financial services. Another example is Dell Corporation – which redefined an existing structure by eliminating intermediaries and going directly to the customers. Apple Computers has done the same by delivering music directly to customers via its iTunes software. Thus, entirely new industries can be setup as demonstrated by companies like Google and other online services companies in the last decade. The second (ii) is by revenue – which deals with how companies generate revenues by changing offerings (product/service/value mix) and/or by introducing new pricing models. This dimension leverages customer experience, choices and preferences through leveraging new technologies. A good example of a pricing innovation is Hewlett Packard's strategy of under-pricing printers to sell toner and cartridges. Another example is the DTH and IPTV schemes, offering consumers pay-per-use subscriptions rather than the once prevailing time based rental structure. New pricing models also can be seen in the digitized markets with offerings like music subscriptions and air tickets from the travel portals. The third (iii) is enterprise-wide – involving transforming the structure of the enterprise and redefining organizational boundaries. Here transformations are achieved through integration or

specialization in which organizations focus on the core competencies or high-margin activities and outsource the rest. Transformation also occurs when companies rely on the external collaboration along the value chain, for instance, the airline industry collaborating with hotels to improve the overall travel experience.

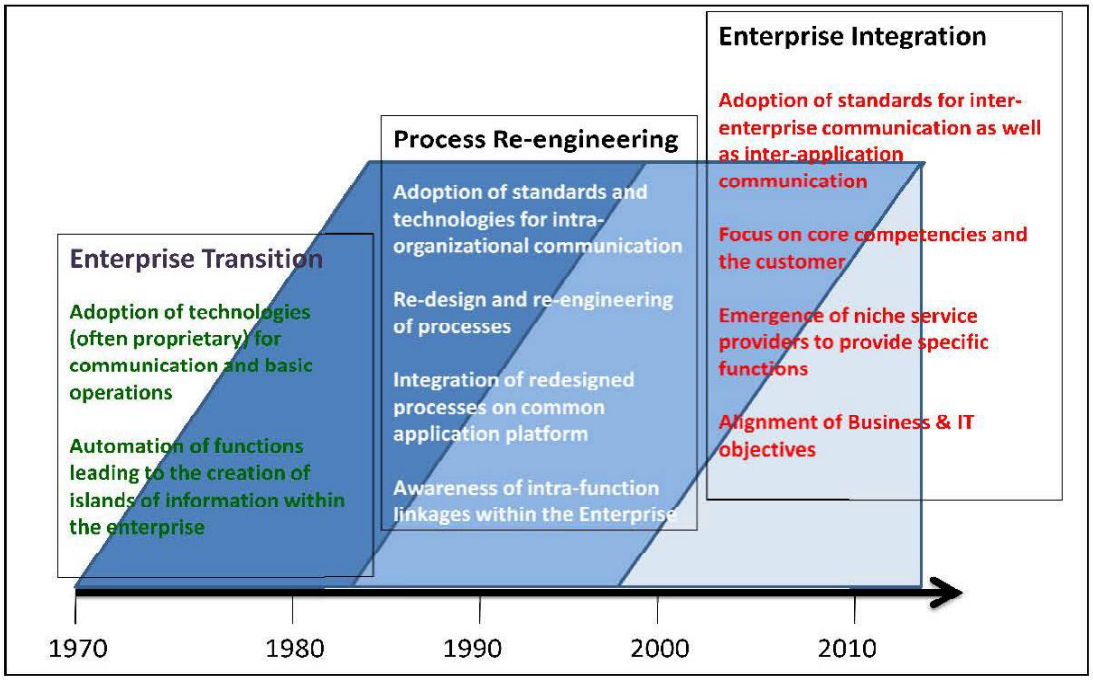
6.1 Degree of IT Adoption

In terms of phases of IT evolution and adoption as shown in diagram 6.31 below, the widespread adoption of standard communication technologies (such as the Web, e-mail and instant messaging) and enterprise software packages (most notably in the areas of customer relationship management and enterprise resource planning) have given firms similar capabilities as well as a similar outlook on their organizations. At the same time, open data standards like XML have made it possible to automate transactions, driving a dramatic increase in flexibility and decrease in transaction costs.

The convergence of these forces has formed what, in effect, is a global standards-based platform – one into which any firm including SMEs can connect thus removing the barriers to entry. This has resulted in the customer becoming a king due to the large number of options being made available to him – be it in terms of utility service providers or airlines. This has created an unprecedented opportunity for businesses to deliver greater value – or lose out to competitors who do.

The steady advance of IT has had a profound impact on the evolution of business designs. Earlier, the firms pursued "internal integration" – silos linked by proprietary processes – in an attempt to drive quality, reduce risk and manage availability by controlling the value chain from end to end. Later, during the 1990s, as technology began to enable more sophisticated links, firms began selectively forming strategic partnerships with specialized providers along the value chain. Most of the organizations examined in this work are in this "strategically partnered" phase today, and for good reason. Working with the specialists confers many benefits. With their inherent scale advantages, such alliances have a direct impact on the bottom line. Further, they bring access to the new markets and sales channels to the partners, making alliances a good way for enterprises to increase top lines through nontraditional sales channels.

Diagram 6.31 – Phases of IT evolution and adoption



There is however a downside to this, as has been shown it in the preceding chapter. For the organizations using proprietary architecture and technologies, systems integration due to such alliances requires heavy investment in terms of cost and management time. Often, the integrated links established with partners are also proprietary, so as the number of partners grows, these costs tend to increase, while strategic responsiveness declines. To avoid such issues, organizations should focus on their specific areas of expertise and establish relationships driven by collaboration, universal connectivity and standardized outsourcing. A good example of this is Apple Computers and their product the iPod – which was the result of a combination of consumer electronics, media and IT to create something truly new. Apple partnered with external manufacturers and used existing, off-the-shelf technologies – such as portable hard drives, liquid crystal displays and rechargeable batteries – packaged them into a well designed package and created the iPod – which is the third highest selling consumer electronic product globally. *(Reuters, May 03, 2007)* The product also spawned a wide array of niche companies making complementary products like ear buds, carrying cases, speakers, remote controls and attachments for recording voices and transmitting music over radio frequencies for the iPod. Organizations that manage to position themselves at the center of

such "networks" can extract economic rent (the difference between what a factor of production is paid and how much it would need to be paid to remain in its current use) besides positioning themselves as setters and maintainers of industry standards. In addition, customer relationships deepen with the move toward services and solutions. With the iPod, Apple leveraged its design skills to target markets beyond its traditional base of computer users. The company is also competing in a fundamentally different market from where it started; rather than Microsoft, its rivals now include music record companies like Sony and Virgin.

The case examination also indicated some possible problems in outsourcing and their associated causes. These are summarized in the following table 6.2:

Table 6.2 – Possible problems in outsourcing and their associated causes

Unexpected transition and management cost
Primary Causes:
Lack of experience and expertise with the task to be performed
Lack of experience with outsourcing models
High cost of changing service provider
Primary Causes:
Proprietary Technology
Small universe of service providers
Scope
Inter-dependence of activities
Service level Agreement amendments
Primary Causes:
Non-performance
Technology discontinuity
Complexity of implementation
Legal issues
Primary Causes:
Measurement problems
Lack of experience of either client or service provider with outsourcing models
Poor cultural fit
Service level decline
Primary Causes:
Inter-dependence of activities
Lack of competence in service provider
Service provider size and financial stability
Measurement problems
Complexity of implementation

Cost escalation
Primary Causes:
Lack of experience or either client or service provider with outsourcing contracts Measurement problems Lack of experience or expertise of service provider with relevant technology
Loss of organizational technology skills
Primary Causes:
Scope of outsourcing Employee involvement in-house Inter-dependence of activities

The examined examples bring to light the fact that the organizations' internal functions undergo a transformation as well. From information silos, firms went to integrated processes. These efforts yielded benefits like:

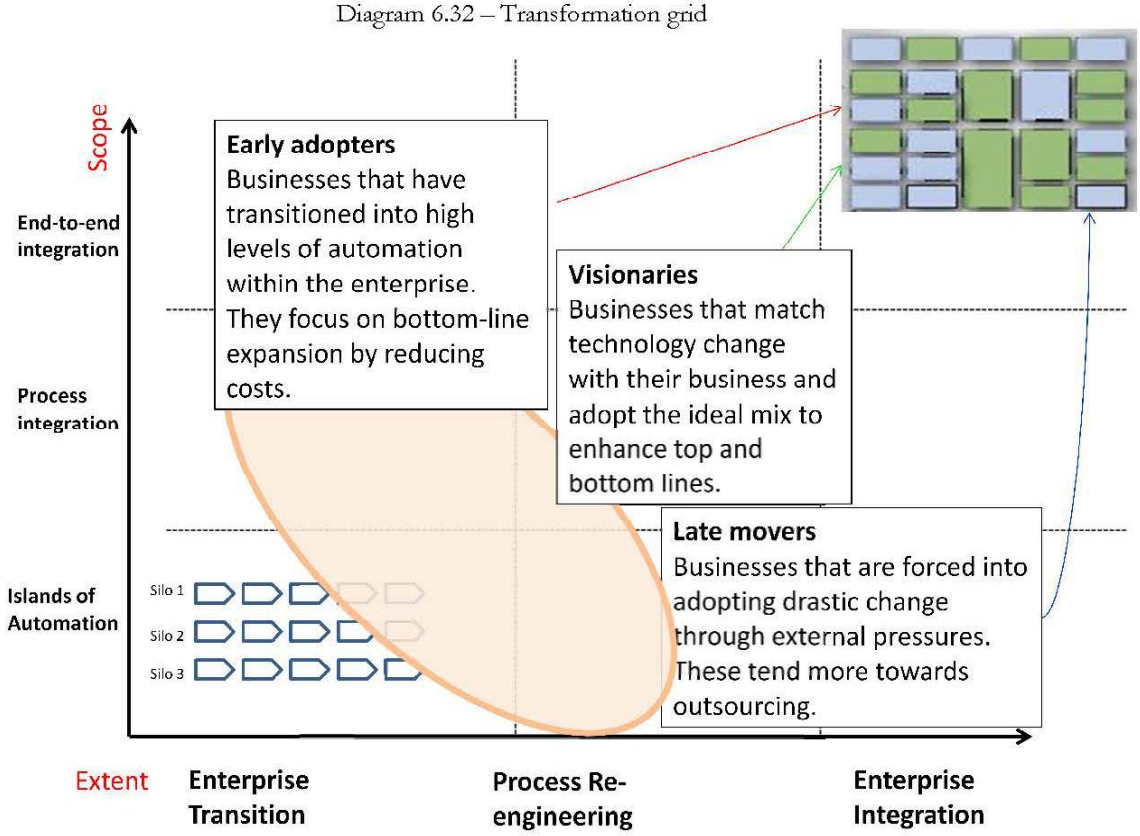
a. the elimination of non-value-added activities
b. removing redundant process steps to reduce waste
c. automation of manual processes to boost speed
d. concentration of the related tasks in central areas to achieve economies of scale
e. relocation of processes to lower-cost geographies

The resulting optimized process design has allowed enterprises to operate more efficiently as well as enabling more people to operate in the cross-organizational teams, business units to share technology costs and risks, and the processes themselves to reap the benefits of improvements in quality and efficiency- often at a lower cost.

Transformation in the companies studied placed all of them in the highlighted area (shown in the diagram 6.32 below). Enterprises can transform themselves by moving towards the north-east region of the graph, which will provide them with the greatest competitive advantage in the marketplace. Firms with a high level of external linkages will reap the rewards of top line growth by virtue of added revenue streams whereas companies with a high level of internal optimization will focus on bottom-line improvements by reducing costs and becoming more flexible. The ideal strategy for companies to follow is to strike a balance between the two, aligning internal and external strategies with the industry trends to move more directly toward the ideal state. Of course, one has to allow for effects of the industry and the effects of

business cycles as well as the organization's resources and management influence on this transformation.

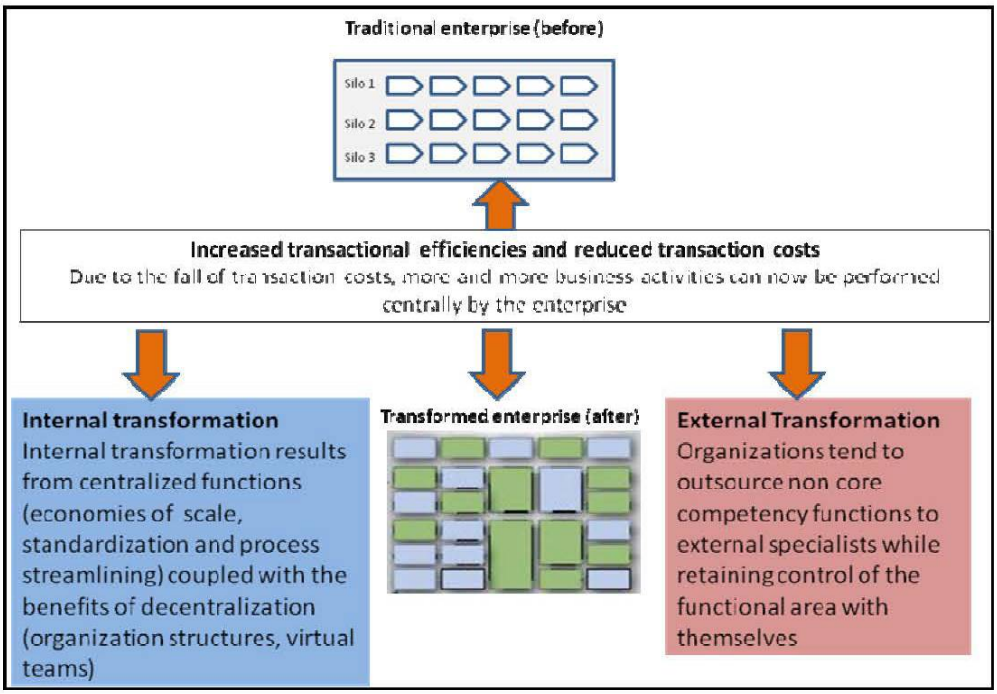
Diagram 6.32 – Transformation grid



Another important aspect that emerges from the case examination is that there are three key drivers for success in today's economy as shown in diagram 6.33 – product / service differentiation, customer responsiveness and operational efficiency. Traditionally, enterprises focused their business models around only one of these drivers – often at the expense of the others. Competing on price, for example, tended to rule out highly differentiated products or top-notch customer service. Such tradeoffs were a practical necessity in doing the business. Barriers of time and distance constrained the ability of companies to integrate internal and external capabilities. IT has changed this paradigm by changing the very nature of doing business. Some of these trends are evident in our case examples. Enterprises are redefining their business models by assembling the best capabilities available in the market. For capabilities that present the greatest competitive position and profit, pools of specialized

capabilities are being created within the structure of their own enterprises. For capabilities that do not provide competitive superiority or critical levers to profitability, relationships are being established with external parties, each of which has the relevant core competency that the organization needs.

Diagram 6.33 – Drivers for success in today's economy



6.2 Transforming profitability

A third aspect that emerges from the case analysis is that effective customer segmentation drives revenue growth through increased ability to meet customers' demands with the greatest impact being on the top line, growing the number of customers, the amount of sales per customer, and the lifetime value of the customer. Effective segmentation also plays a role on the cost front – it serves each customer segment more economically. Thus knowledge about the customer directly impacts profitability and prevents costly marketing mistakes, initiatives with a low return on investment (ROI), or misguided growth plans with limited customer appeal.

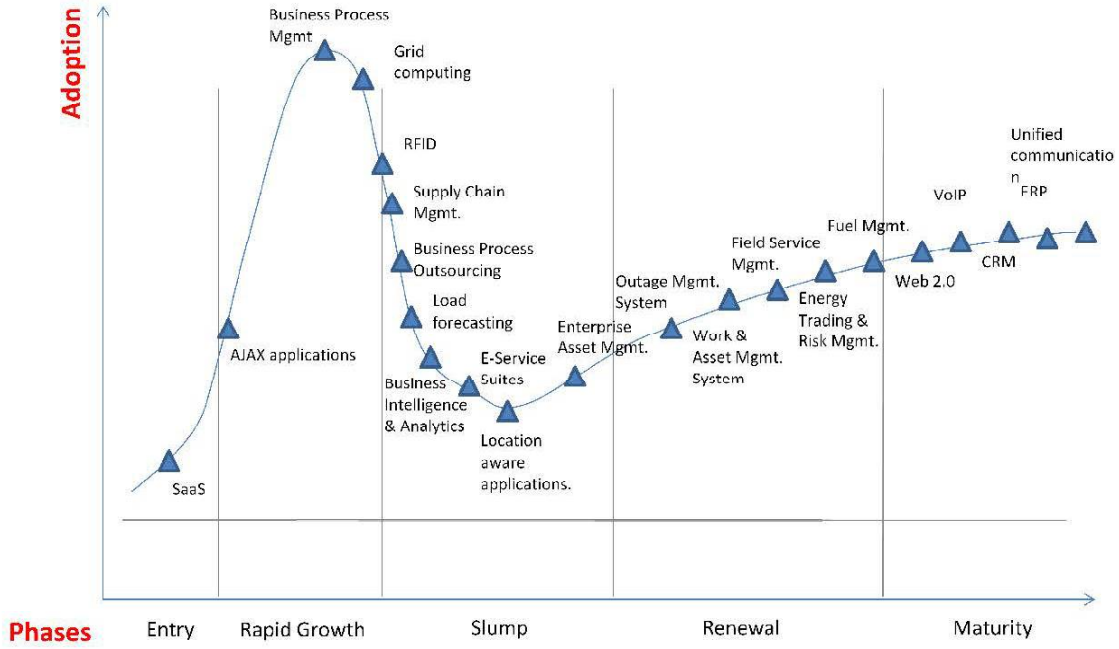
Having a CRM system while being a forward looking step, is not enough unless complemented with marketing and customer analytics applications like business intelligence and data mining. IT enables enterprises to collate data from multiple, disparate sources and generate meaningful analytics in minutes – something that is not possible otherwise. Typical examples include predictive modeling and analytics – modeling of historical data with assumptions for future conditions in order to predict how likely customers and prospects are to conduct themselves in a certain way (for instance, buy a product, or respond to an offer); customer pyramiding that can automatically "tier" customers according to their profitability and value to the company, normally used to identify high-potential customers within each tier to focus on migrating them up the pyramid. RFM and RFA – analysis that quantitatively identifies a company's best customers using recency (R), frequency (F), and monetary (M), how much a customer spends) or average (A, average purchase amount) variables. RFA is especially used by oil retail companies, since the average order amount is significantly different between different customer segments, a number of low value orders and a fairly consistent ordering value.

6.3 Cyclical behavior of technology

The examination of the case examples reveals that the pace of technology alternatives is accelerating – in terms of available alternatives as well as enhancements in the existing technologies. This effectively increases both the breadth and depth of technology choices that organizations have to face today. It has a direct impact on business strategy – since technology cannot be assumed to be constant or given. Expired product support contracts are examples of this – where enterprises are forced to adopt newer generations of operating systems (often accompanied by associated hardware) just to remain covered under support for the product from the principal vendor. Technology follows a cyclical pattern as shown in diagram 6.34 below – with an entry, rapid adoption (growth), slump, renewal, and maturity period. The 'entry' phase is the one in which technology is introduced and a commercial product or service launched. This is followed by a 'rapid adoption' phase in which the technology is adopted by a number of organizations. If the technology fails to deliver benefits it claimed credit for, that's the slump phase. A number of technologies die a natural death in this phase. However, this phase may be followed by a 'renewed interest' period where experiments continue to be done with the technology. Finally, if these experiments succeed, the technology enters the maturity

phase and metamorphoses – often into multiple generations – and gains mass acceptance. This is the stage where the technology actually starts delivering benefits it claimed for itself initially.

Diagram 6.34 – Cyclical behaviour of technology



Unfortunately for organizations, the average life span of this entire cycle is shrinking with more and more technologies vying for a progression towards the maturity and wide acceptance level. Further, in this cycle, the time between the rapid adoption and slump is progressively reducing at a faster rate than the cycle shrink. Organizations therefore need to invest in the technologies relevant in the current context. These are necessary for the enterprise to survive in its environment – by retaining market share, competitive position and pricing structures. However, to retain their position and to grow further, firms must anticipate technology trends and shifts as well. Emerging technologies will allow the company to sustain its growth levels as they often bring newer markets or identification of customer segments. Therefore, over time, companies can ignore the strategic impact of technology only at their peril with revenue losses or industry irrelevance occurring as a consequence of technology shift.

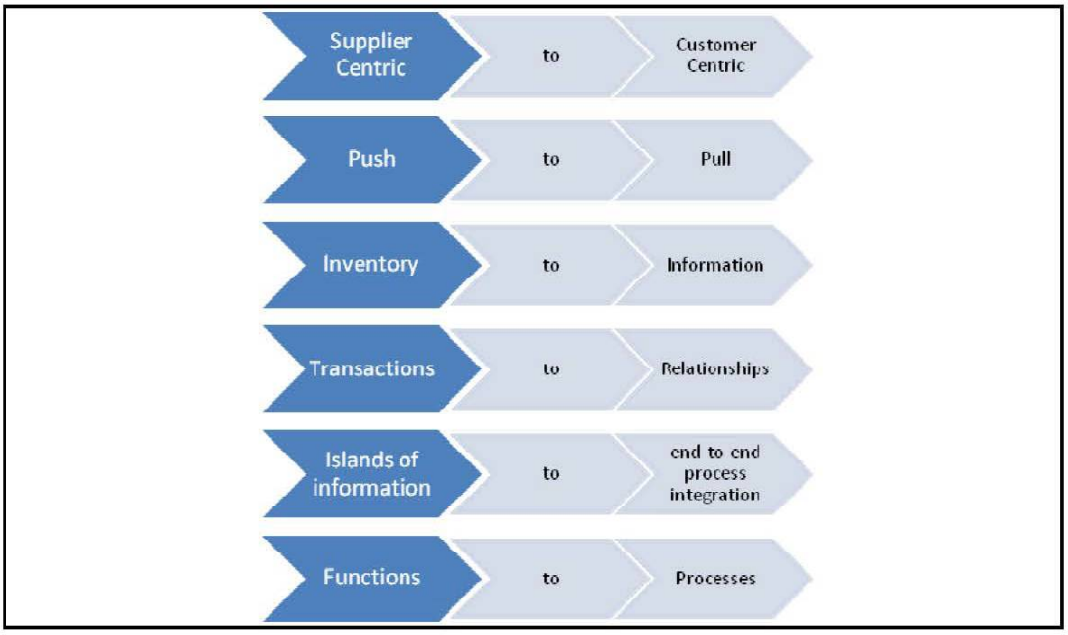
IT enables companies to change the basis of competition. At any point of time, companies in any industry compete on the basis of established performance criteria such as features, price, service levels, and the like. IT enables companies to go beyond these parameters and differentiate themselves through a totally new dimension. Google is a good example of this – it differentiated itself not only on its accuracy and page rank technology, but also on search time. That's why every search on Google shows the time taken for the search. The differentiating factor in this case, besides accuracy and number of pages indexed, is the speed of the search.

IT also enables companies to break the economies of scale paradigm. Traditionally businesses have certain assumptions about scale that guide capital investment decisions, allocation of resources, target market size and selection and entry strategies. Most companies seek to optimize operations within these boundaries. IT can be leveraged to break these rules, for example, to achieve scale advantage where previously none existed. Popular matrimonial website shaadi.com and online auction site eBay are examples of companies that managed to create scale advantages in a global market that was long considered regional and hyper-fragmented.

Furthermore, IT enables companies to develop totally new business models – that could be derivatives of existing business models. Dell Corporation, for example, with its direct-to-consumer model allowed the company to eliminate the middle-man and inventory carrying costs that were characteristic of its competitors. Kingfisher airlines is another example, with their adoption of PDA based roving check-in agents at airports thus eliminating passenger queues and waiting times.

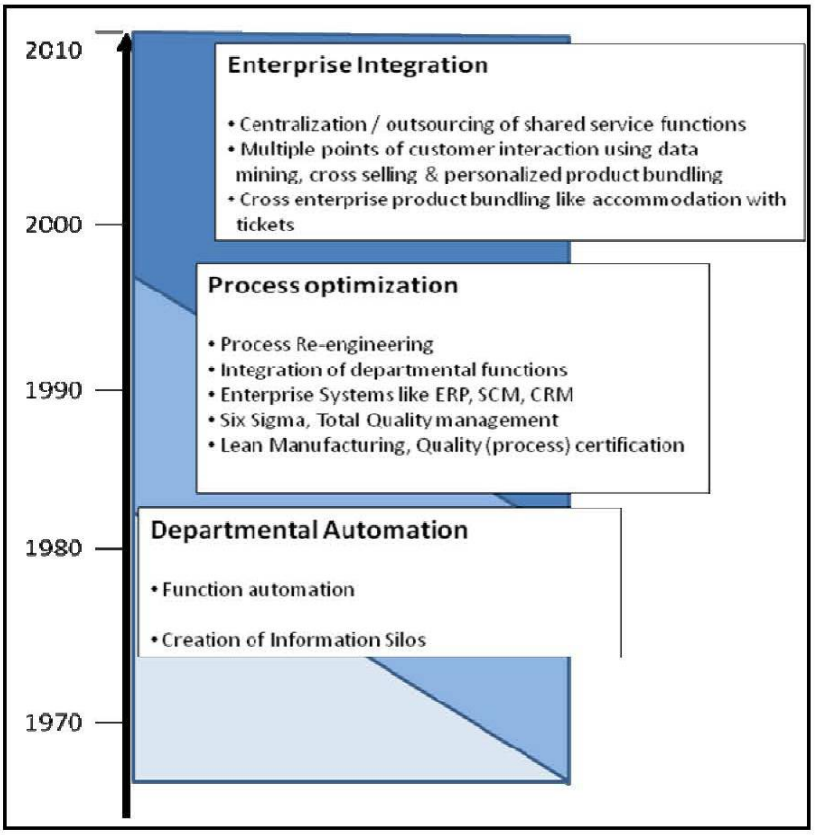
This is shown in the following illustration in diagram 6.35:

Diagram 6.35 – How IT enables companies to adopt new business models



A number of examples can be cited for failure of implementations or IT initiatives – some of which are observed in the examined cases. Notwithstanding this, failure of implementing the systems and initiatives is not the given. Often, the causes of failure stem from the company's own imprecisely defined business functions, project management weaknesses, and architecture stopgaps. And, they can be removed successfully. When enterprise systems work, their benefits are not trivial, considering that they provide an organization-wide system where key operations like human resources, sales, production, logistics and, financials all share updated information housed in the common databases.

Diagram 6.36 – Stages of enterprise transformation over decades

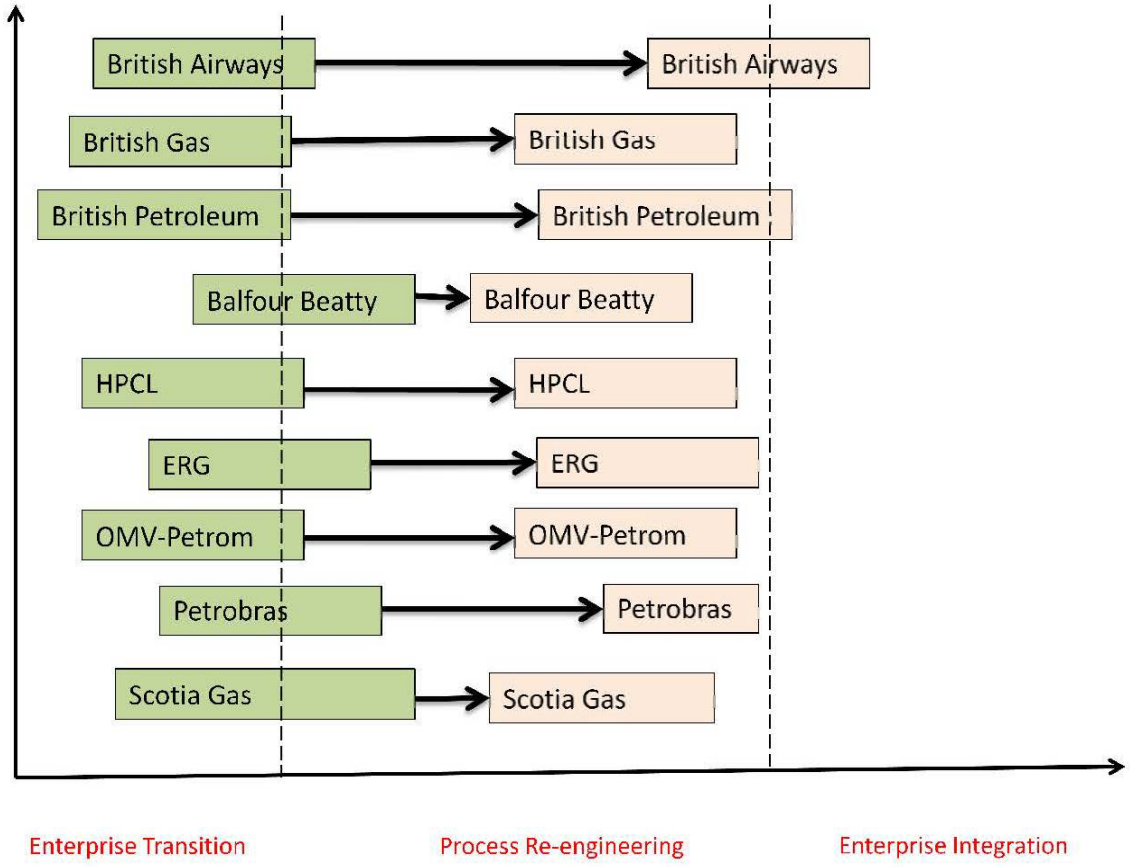


6.4 Degree of transformation in the cases

The case examples studied in this work show that it is possible to plot the movement for the companies considered. Specifically, if one sees the progress each has made, it is apparent that each of these companies started from basic automation and proceeded towards enterprise integration – not just within their own enterprises but also within their industries as well. This fact supports our basic premise that enterprises tend to move towards IT- enabled integration.

Another feature to be observed is that companies in Aviation are more forthcoming in the adoption of technologies than the ones in Oil & Gas or Energy and Utilities. The reason for this seems to be the fact that companies in the aviation space need to interact directly with the consumers of their services at multiple levels whereas the other verticals need such interaction at the 'last mile'.

Diagram 6.37 - Transformation in the case examples



It is also noticeable that of the verticals examined, the BFSI vertical leads the way with telecom and retail following suit; the Chemical and Petroleum industries are wrapping up their process integration stage and the Energy and utilities industry is still struggling with the widespread adoption of unified, streamlined processes.

6.5 Objective 6: Roadmap for consulting companies

I have discussed so far the case analysis and technology maturity assessment of the various verticals. This presents a framework of principles which the consulting companies can use and benefit for mapping services to their client base. Further, the average percentage of revenue accruing from the Energy and Utilities vertical was typically the smallest fraction out of the verticals the consulting company operated in. This was demonstrated equally by TCS, Accenture and CapGemini. This was followed closely by the transportation vertical of which

aviation formed a fraction. This indicates that consulting companies can profit by targeting more clients in these verticals. Last but not the least, the technology horizons that have been indicated should be exploited – especially in emerging areas like smart dust *(Diwan and Bharadwaj)*, RFID and 4D – all of which have implications and extensive uses in these verticals. The principles consulting companies can follows are:

- Design processes in conjunction with the customer
- Get the implementation done as far as possible correctly in the first go
- Implement as far as possible a standards-based solution.
- Implement the same solution across all the enterprise covering all functions and departments.
- Avoid customization of available COTS (commercial off-the-shelf software) to ease the upgrade path and maintenance.

These principles, if applied effectively, are likely to lead to transformation with a high probability of control. Also, they will produce enhanced business and IT alignment that will maximize the probability of controlled transformation further.

6.6 Prorogue

This work synergizes theoretical concepts and concrete evidence to characterize levels of IT-implemented business transformation. Observations help in determining why IT, in spite of its commoditization works wonders in some cases and not so in others. It also seeks to explain the rationale of first mover advantages created by IT that leads to its commoditization. Although this work focuses only on the Energy, Utilities and Aviation verticals, it deifinitely proves causality of transformation through IT. It is likely that some of the IT initiatives deployed in the examined verticals have a vertical focus and may not be so visible / applicable to other industries, or their effects and benefits may not be realized in disparate industry environments. However, most of the examples chosen are sufficiently generic to be applicable across industries. Hence the same effects may be extrapolated to other industries like BFSI and Telecom – which are known to be more advanced on the transformation path. Further, as the analysis is for a period of time, long term sustainability of the transformation is ascertained.

One important question is whether the change patterns, once appreciated, can help consulting firms to implement a transformation for their clients. Businesses, after all, need prescriptive solutions to inform managers about what actions they ought to take, and they need to translate these change patterns, as a diagnostic mechanism, into clear implementation guidelines. For structured problems such as those of IT project management, it is possible to articulate a procedure and course of action, and there may be some 'critical factors' that are identified with hindsight. The perfect transformation encompasses moving from process optimization to dividing the operational business into a series of smaller entities – that work together as a gestalt and interact not only with other entities within the business but also external to the organization. IT enables a common framework governing these entities.

However, for complex process of change, such as a sociopolitical transformation or a strategic change, in which the contexts and conditions ever keep changing, prescriptive instruction is not much useful. This research shows that it is possible to understand the basic nature of the phenomenon, to appreciate the dynamic interplay of relationships and elements, and to identify the constant parts (underlying rules) of the change. With this understanding, a business organization is enabled to navigate through the continuous changes that lead to a further transformation. It is on the strength of this belief that my work sets out to achieve a dynamic understanding of strategic change and its inherent complexity, conflicts and paradoxes so as to appreciate the equilibrium of different paths of change. Armed with this new perspective, businesses may face IT-enabled transformation with more confidence and, at the same time, develop a more informed response to the nature of business transformation.

I believe that my work is another small step towards deepening and sharpening our understanding of the linkage between business transformation and IT and also that it motivates further research in the field. Let me close with Charles Darwin's words –

> *"It is not the strongest of species that survive nor the most intelligent, but the one most responsive to change."*
>
> *--Charles Darwin*