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A TOTAL NETWORK SYSTEM DEVELOPMENT METHOD

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ABSTRACT

A five phases of a revised traditional systems development life cycle with specific activities and evaluation methods in each phase is suggested to develop an enterprise total network system. This total network system unites the Internet, extranet and intranet into one seamless network system for transmitting voice, data and information for the enterprise. It can be utilized as an exceptional powerful information technology strategy to obtain the competitive advantages from both on-line and traditional business operations due to the alignment between the enterprise business strategies and information technology strategies during its entire development process.

INTRODUCTION

With the proliferation of the Web and e-business, the traditional long and short business strategic planning do not work well since the other business is only a click away through the Internet from any customer point of view without any limitation of time and distance. Under this circumstance, an enterprise needs to become a real time and adaptive organization in this fast moving and ever expanding Internet era [3]. This implies that the enterprise business strategy should posses an important characteristic that is immediate responsive not only to its local market but also to the global environment. The information technology is the most important resource and suitable technique to support and facilitate the implementation of the enterprise's immediate responsive business strategy. Therefore, the enterprise must construct a sound information technology strategy that has proper alignment with its immediate responsive business strategy for obtaining the predefined overall enterprise visions.

The network is one of the essential information technology strategies to integrate the enterprise's information systems into one because it is the back bone to connect divisions, employees, suppliers, customers, and other external surroundings for the enterprise. A well designed and properly implemented network system will deliver the accurate data and information to the appropriate individuals and locations in a real time fashion without any delay and error. It is the foundation of the information technology strategy to enable the enterprise to be competitive, fast, flexible, and customer oriented as the major objective of the immediate responsive business strategy. This research project centers on adopting a revised information system life cycle development technology for creating an enterprise total network system to accommodate the immediate responsive business strategy in the current twenty first information age.

LITERATURE RESEARCH

An effective voice and data communication system to support the business process requirements determined by the business strategies is a critical factor to the enterprise success in today's high-speed business world. The comprehension of concepts and relationships between the business strategy, information technology strategy, enterprise network, and information technology sourcing method existed in the professional literatures can establish an enterprise total network system that will well serve the information technology and business strategies for the enterprise.

Business Strategy

Prahalad and Hamel [5, 2] have proposed a corporate wide strategic architecture that is centered on the core competence and core product for the diversified business organization to survive and grow in the global market competition. The creation of this corporate level strategic architecture forces the organization to establish a road map that identifies and commits the necessary physical resources, knowledgeable individuals, and essential technologies for the future core competence development. The ultimate goal of the core competence is to develop a group of core products that have distinct competitive advantages.

In general, the organizational core competence encompasses three fundamental characteristics. First, a core competence has the potential to develop and enter a variety of new businesses. Second, a core competence can produce the merchandise that will generate a considerable amount of benefits to the consumer. Last, a core competence is not easy to be copied by the competitor within a short time period. They deeply believed that the group of top executives should equip with the capability to constantly identify, cultivate, acquire, and exploit core competencies and core products across the strategic business unit boundaries in order to lead the entire organization for the long term success and profitability.

Information Technology Strategy and Network

The information technology strategy includes architecture and infrastructure [4]. The information technology architecture is a clear blueprint of a set of individual computerized information system applications that can accomplish enterprise's goals aimed by the business strategy. The information technology infrastructure translates the blueprint of computerized information system applications into a detail list of functional components including the hardware, software, and data to form an integrated enterprise information system.

A computerized information system application can be classified as one or more of the four categories that include the high potential information system, strategic information system, key operational information system, and support information system [6]. The high potential information system is the innovative usage of the information technology to support the new business opportunity. The strategic information system utilizes the information technology to achieve the business objectives and competitive advantages. The key operational information system is the high quality computerized application to improve the performance of existing business requirements that vary from one business to other. The support information system increases the productivity efficiency of the common business tasks existed in every business.

The computer network system is a very special type of computerized information system applications that can be viewed as a high potential, a strategic, a key operational, or a support information system application depend on its utilization by the enterprise. It is a high potential information system when the enterprise develops an e-business as a new Internet sales channel. It is a support information system when the network is used to conduct electronic meeting for management located in different area. Moreover, it becomes a combination of the four information systems for the enterprise when an electronic value chain is implemented to handle the business workflow among its customer, organization, and supplier. Essentially, a solid enterprise computer network system is the crucial element for supporting other information systems applications to function properly and it has the persistent influence on how the information technology strategy to carry out the business strategy.

In the last decade, a set of more descriptive terminologies has been used to classify an enterprise computer networks in order to reflect their business functions of the computer network [1]. They consist of the Internet, extranet, and intranet. The Internet is the global network of networks that has the potential to connect all computers in the universal regardless the locations. The Internet with its World Wide Web capability and search engine software enables individuals and enterprises not only to access the on line information but also to electronically conduct business. The intranet connects individual employees within the same enterprise. The intranet provides communications and collaborations to increase the productivity within the enterprise. The extranet uses the Internet technology and the public telecommunication systems to link related individuals from different enterprises. The extranet allows the enterprise to securely share some selected data, information, and operations with its suppliers and customers to form an international supply chain for reducing business costs or increasing business profits.

The enterprise clearly needs to build a total network system including the Internet, extranet and intranet to facilitate the operations of its traditional business and e-business to fully capture the potential competitive advantages. This is due to the fact that an enterprise requires an intranet to sustain the constant collaborations among the employees and the efficiency workflow within the traditional business divisions, an extranet for e-business to unite every part of its supply chain and achieve a perfect alliance synergy between the enterprise and its business partners, and the Internet to enable a instantly reach to its prospective customers in the most economical way with a around the clock service everywhere.

Sourcing Information Technology

The off-the-shelf, in-house, and outsourcing are the four different development methods to build the total network system for the enterprise [7]. The off-the-shelf method purchases the network from the network software and hardware companies that develop and/or sell the most common and popular programs and equipments to the general public. The in-house method creates the network as a result of in-house system development efforts by the internal information technology division of the using enterprise. The outsourcing method contracts the entire or partial network development and implementation in term of specific requirements to an external network consulting firm or network vendor. The last one is the combination of the above three.

The off-the-shelf method is suitable for connecting the desktop computers as clients to a server that forms an intranet for the enterprise. The advantages of this method include the high quality, low cost, easy installation, and low risk to meet the business requirements. The disadvantages are lacking some important features and paying some useless features.

The in-house method may be only suitable for the large enterprise since it requires capital investment and total cooperation between its business partners. In addition, it needs a set of different skillful internal information technology staff with a thorough understanding the most current network technology, internal business requirements, and external operations between its partners, security, privacy, and universal culture differences. The advantages of this method comprise the aligning with the technological infrastructure, satisfying the business processes, and safeguarding the enterprise strategies. The disadvantages include cost overrun and obsolete technology usage.

The benefits of outsourcing are reducing costs from costly and outdated technological resources, developing the end product more rapidly, improving network quality and productivity, reducing technological risk, increasing technological flexibility, and implementing the system more rapidly. The short comings consist of rebuilding technological infrastructure, revealing the business secrets to external entities, restructuring business processes, difficulty of reversing the outsource strategy, and losing internal technological competency.

The information technology for developing telecommunication system is in a fast moving and changing industry where today's new invention becomes an obsolete one tomorrow. It is possible but difficult for any enterprise to keep a group of qualified information technology staff with up to date telecommunication technology knowledge. Outsourcing the design and implementation of the total network system to a reputable telecommunication vendor with expertise in the field can achieve the financial and technological advantages.

STRATEGIC ENTERPRISE NETWORK DESIGN METHOD

The traditional systems development life cycle is a suitable development method for creating the enterprise total network system project since it is a structured technique with several phases and build in rigid management control in order to produce a workable end product within its budgeted cost, time constraint, and predefined business process requirements. There are five phases including investigation, analysis, design, implementation, and review. Each phase has to accomplish a specific list of tasks to achieve associated objectives. At the end of each phase, a formal review based upon the business and information technology strategies is conducted to decide the status of the project: starting the next phase, repeating the activities of previous phases, or stopping the entire project.

In the investigation phase, the major activities are selecting vendor, forming project team, understanding the problems of the existing network, and finding the solution of the problems for the existing network. The first and most important activity is to select the most appropriate vendor for the total network system development. The information technology department has to develop a set of criteria to select a suitable telecommunication vendor to carry out the tasks of improving the existing network by solving the current problems or installing a new one. The selection criteria can be any combination of the cost, requirements, expertise, experience, availability, compatibility, adaptability, reputation, etc. A set of end user weighted can be applied to determine the importance of each selection criterion for the final selection score.

The project team should compose of the selected vendor, information technology personnel, and management representatives with decision making authority from every strategic business unit. Several brain storm meetings should be conducted to identify every problem and obstacle of the current voice and data network systems relate to the enhancement of capturing the future expansion and opportunities for the core competence and core product and the usage of the available enterprise resources.

The analysis phase attempts to determine the functional requirements including network type, geographic scope, traffic load, communication flow pattern, future demand, capacity planning, availability consideration, response time, reliability issue, security factor, deadline, cost, other constraints, etc. for the new proposed total network system. Several alternatives for addressing the telecommunication functional requirements in order to solve problems of the current system will be produced for a further evaluation.

The total contribution of each alternative to facilitate core competences and products is accessed in the light of its strengths, weaknesses, and opportunities as a high potential, strategic, key operational, and support information system. The outcome is a set of two dimensional evaluation matrices with each alternative as column heading and each telecommunication functional requirement as row heading. Each intersection cell contains the consensus contribution value determined by the entire project team. The number of evaluation matrices depends on the total number of

business and information technologies strategies to be achieved by the alternative and the relative importance of each strategy. The alternative with the highest total score from all evaluation matrices will be selected as the final optimal choice for the new improved total network system.

In the design phase, the primary result is a set of detailed technical designs for the optimal choice to improve or replace the existing system that is prepared by the vendor. These detailed technical designs are in the forms of maps, diagrams, and narratives. The map and diagram have a top-down relationship that provides both high level and more detailed documentation of the entire total network system. The map is the geographical layout that portrays the functional specifications of the Internet, extranet, and intranet designated by the project. The diagrams illustrate the details of required circuits, connections, protocols, software, hardware, accessories, and other equipments. Every map or diagram is accompanied by a descriptive narrative that depicts every component in terms of name, type, model, version, feature, function, capacity, etc. The vendor should present these documents to the project team in one or several meetings for the final discussions and walkthrough to detect any mistake and other possible enhancements against the business and information strategies.

The implementation phase begins with the preparation of a formal and legal binding agreement or contract that clearly states the total budget, time line, and vendor's responsibilities and services, violation penalty, etc. to ensure the systems performance as expected by the project team. The activities within this phase include creating and ordering the various network components by the vendor; arranging the physical environment by the internal information technology staff; installing and testing the network systems by the vendor; preparing policies, procedures, and manuals by the internal information technology staff and the vendor; performing acceptance test by the internal information technology staff and end user according to the functional requirements determined in the previous analysis phase; training the operational personnel, maintenance staff, and end users by the vendor; and documenting the newly implemented total network system by the internal information technology and the vendor.

The purpose of the systems review phase is the monitoring, evaluating, and modifying of the new operational total network system to make necessary and desirable improvement for assuring the systems performance to sufficiently sustain the business and information strategies. The tasks within the phase comprise creating an auditing team, establishing auditing policy and procedure, conducting the post implementation evaluation, fixing the minor operating problems, and preparing auditing reports. The post implementation evaluation should use the actual network contribution as a high potential, strategic, key operational, and support information system to support core competences and products. This auditing report stating fact findings is evaluated by the appropriate management for a decision reference as fixing a minor network problem or starting a new system development life cycle.

CONCLUSION

A five phases of a revised traditional systems development life cycle with specific activities and evaluation methods in each phase is suggested to develop an enterprise total network system. This total network system unites the Internet, extranet and intranet into one seamless network system for transmitting voice, data and information for the enterprise. It can be utilized as an exceptional powerful information technology strategy to obtain the competitive advantages from both on-line and traditional business operations due to the alignment between the enterprise business strategies and information technology strategies during its entire development process.

REFERENCES

[1] Amor, D. *The E-business (R)evolution*, New Jersey: Prentice Hall, 2002.
[2] Engardio, P. "Business Prophet: How C.K. Prahalad is Changing the Way CEOs Think," *Business Week*, January 22, 2006, 68-73.
[3] Haeckel S. H. & Slywotzky, A. J. "Adaptive Enterprise: Creating and Leading Sense and Respond Organizations", Boston: *Harvard Business School Press*, 1999.
[4] Hay G. & Munoz, R. "Establishing an IT Architecture Strategy", *Information Systems Management*, Summer, 1997.
[5] Prahalad, C.K. & Hamel, G. "The Core Competence of the Corporation", *Harvard Business Review*, May-Jun 1990, PP 79-91.
[6] Ward J. & Griffiths, P. *Strategic Planning for Information Systems*, 3rd John New York: Wiley & Sons, 2003.
[7] Willcocks, L. P. & Lacity, M. C. *Strategic Sourcing of Information Systems: Perspectives and Practices*, Wiley, 1998, 45-78.