2004

Standards, policies and cultural pluralism promoting strategies for achieving competitive advantage supporting the future of Information Technology

Gary D. Clarke

Standards, Policies and Cultural Pluralism Promoting Strategies for Achieving Competitive Advantage Supporting the Future of Information Technology

By

Gary D. Clarke

Thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Information Technology

Rochester Institute of Technology

B. Thomas Golisano College
of
Computing and Information Sciences

May 2004

Rochester Institute of Technology

B. Thomas Golisano College
of
Computing and Information Sciences

Master of Science in Information Technology

Thesis Approval Form

Student Name: Gary D. Clarke

Thesis Title: Standards, Policies and Cultural Pluralism Promoting Strategies for Achieving Competitive Advantage Supporting the Future of Information Technology

Thesis Committee

Name	Signature	Date
Prof. Edward Holden Chair	Edward Holden	5/4/04
Luther Troell, Ph.D. Committee Member	Luther Troell	5/4/04
Milton Cofield, Ph.D Committee Member	Milton Cofield	May 4, 2004

Thesis Reproduction Permission Form

Rochester Institute of Technology

B. Thomas Golisano College of Computing and Information Sciences

Master of Science in Information Technology

Standards, Policies, and Cultural Pluralism Promoting Strategies for Achieving Competitive Advantage Supporting the Future of Information Technology

I, Gary Clarke, hereby grant permission to the Wallace Library of the Rochester Institute of Technology to reproduce my thesis in whole or in part. Any reproduction must not be for commercial use or profit.

Date: May 4, 2004 Signature of Author: Gary D. Clarke

To Oswald and Hermine Clarke

ROCHESTER INSTITUTE OF TECHNOLOGY

ABSTRACT

Standards, Policies, and Cultural Pluralism Promoting Strategies for Achieving Competitive Advantage Supporting the Future of Information Technology

By Gary Clarke

Chairperson of the Supervisory Committee: Professor Ed Holden
Department of Information Technology

As standards and policies in Information Technology continue to develop globally, the Internet is becoming the primary vehicle for worldwide electronic commerce. Various organizations such as the ITU (International Telecommunication Union), GIIC (Global Information Infrastructure Commission), NII (National Information Infrastructure), NIST (National Institute of Standards and Technology), OECD (Organization for Economic Cooperation and Development), IEEE (Institute of Electrical and Electronics Engineers,) and the European Union, to name just a few, have strived to develop standards and policies to promote and protect consumers and organizations that conduct business on the Internet. Many challenges exist, such as computing standards, taxation, security, privacy and currency standards. These challenges must be resolved in order to ensure a level playing field. Strategies in Information Technology have allowed companies and individuals to challenge former ways of conducting business by employing radical technologies based on technological standards promoting global electronic commerce. For a company to position itself to envision radical technology, it must focus on the future. This forward thinking must be a part of a company's corporate culture so that technological opportunism can be developed. Without radical technology, companies do not stand a chance in the information age.

Although radical technologies have promoted technological and strategic opportunism enabling and supporting global electronic commerce, there are non-technological factors, such as cultural pluralism and other human factors that will determine the survivability of a country or company regardless of its technological innovations. These non-technological factors bring to light the notion that technology in and of itself satisfies only a subset of requirements needed for companies and countries to be competitive in the future global marketplace. Various traditional schools of thought on competitive advantage and strategy will be examined as well as the role of standards and open systems in reference to how it will play out in supporting the future of technology. Standards based organizations will establish and set the standards in promoting the methods in which technology will manifest itself. Doing this will support radical technology fostering innovation. Cultural pluralism coupled with these standards will support the future of international commerce and technological innovation because it will draw on new ideas and techniques in research and development from other cultures. The strategic alignment model will be used to internally aligned business with IT in terms of creating synergies as well as creating iterations which will take advantage of multiculturalism. Japan's technological innovations, their use of technology transfer, and their strategies in research and development employing scientists and engineers worldwide, historically has shown that cultural pluralism has allowed them to excel in the technological playing field despite wars and natural disasters. These components will play a more significant role as technology shifts into a new non-technological dimension promoting the future global innovation. The future of technology will rely more on cultural pluralism and less on technology itself. This new wave of technological innovation will occur once the playing field has been set by government involvement, global standards, global access to the internet and it's technologies, and most importantly, corporations and individuals accepting cultural pluralism.

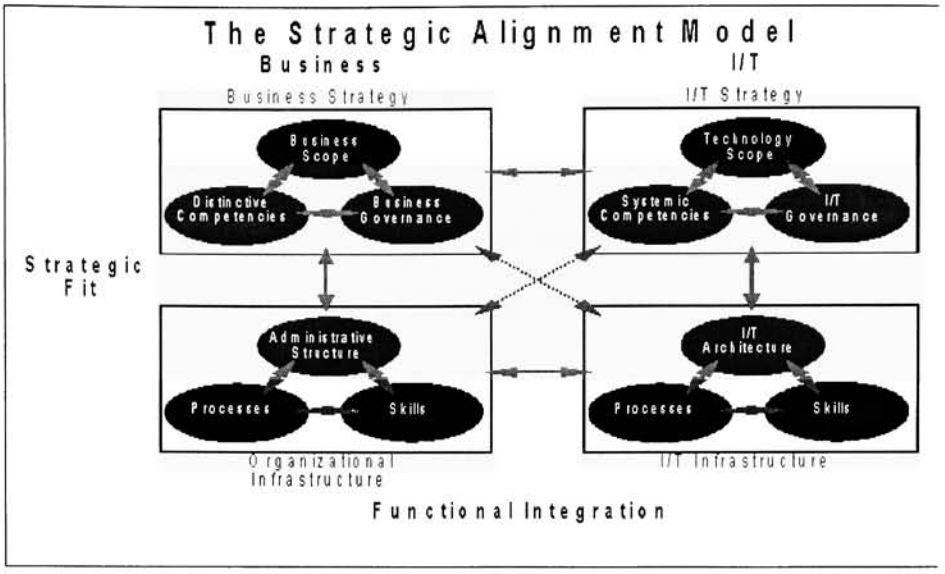
ACKNOWLEDGMENTS

I would like to thank Professor Ed Holden from the Rochester Institute of Technology, for chairing my thesis committee and guiding me along the way as I completed my thesis. I would also like to thank Professor Luther Troell from the Rochester Institute of Technology and Professor Milton Cofield from Carnegie Mellon University for participating on my thesis committee, as well as being instrumental in preparing me for my thesis defense. I would also like to acknowledge Professor Diane Bills for her advice and guidance throughout the process of achieving my master's degree.

Special mention also goes to Sally Parker and Dr. Shekema Hodge for proofreading my thesis for continuity and grammar. Thank you to my friends and colleagues Steve Phillip and Dr. Carlo Williams for advising me on how to defend my thesis. Thank you also to Melissa Navedo for critiquing my thesis defense. To my friends, Kramer Morgenthau, Dr. Julie Fuller, and David Fluellen, for your encouraging words and insight. To my sister Jean and her husband John and the entire Rafferty family for always being there and showing their support. To my parents, Oswald and Hermine Clarke, for showing me at an early age the rewards of hard work.

TABLE OF CONTENTS

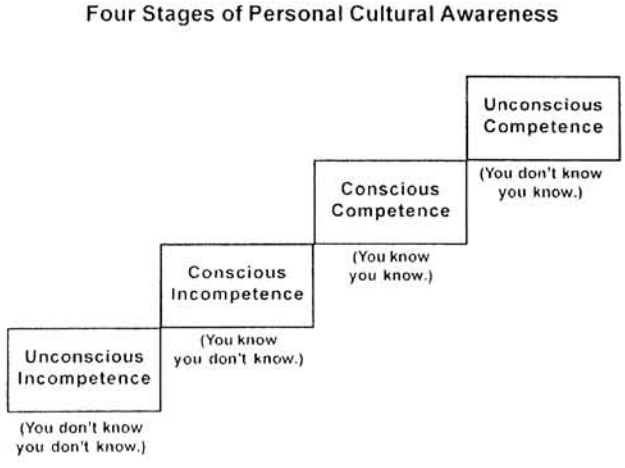
LISTS OF TABLES, CHARTS, ILLUSTRATIONS, ETC



Source: http://hsb.baylor.edu/ramsower/acis/papers/papp.htm

Figure 2

Levels of Consciousness



Source: Dooley, Rebecca. Part 1.

INTRODUCTION

With the emergence of Information Technology, companies have realized that this revolution has been the most significant turning stone of the 20th century and will continue into the 21st century. As technology begins to become ubiquitous within the business environment as well as within the technological environment itself, international commerce is no longer a barrier but a necessity in order for companies to achieve competitive advantage. To do this, companies realize that they need to align themselves internally through strategic alignment and externally through strategic partnerships using cultural pluralism to develop relationships with their foreign counterparts and customers.

In today's technological environment, business is technology and technology is business. Separation of the two will put a company at a disadvantage. Creating standard policies surrounding technology is merely the foundation to establishing a truly global network in which there is a level playing field and there are no boundaries to competition amongst multibillion-dollar companies, individual entrepreneurs, modern, as well as underdeveloped countries. Information technology has allowed small companies to appear large and large companies to appear small.

Establishing global technological standards for commerce can only be carried out by countries willing to contribute to the technological revolution. Privatization as well as government involvement will be key stimulants to achieving global standards. Not only do countries need to establish standards within their own borders, there also needs to be global standards-based groups that work to ensure that countries follow global specific guidelines. These guidelines will ensure that networking protocols foster communications over wide area networks and that commerce is conducted in a secure manner.

With these components in mind, standards organizations must enforce policies that govern technology. These organizations must set the framework for how data will traverse the network. They will define what will be considered "open standards." They must also establish the framework for network security allowing for secured transactions across the network supporting virtual private network (VPN) technologies allowing for Internet Protocol (IP) tunneling eliminating the need to establish dedicated circuits between companies resulting in cost reduction for conducting business. Electronic commerce now becomes a viable tool for conducting business. Companies must now integrate this new way of doing business into their organizational process. This process must become ubiquitous in nature in order to complement these transactions.

Once these standards and policies are followed globally, the door opens for strategic opportunity, stimulating competition. Companies will start to embrace their IT organizations because they will realize that they are the enablers and implementers of technology and the foundation for business interactions. Many companies today perceive their business units as the drivers of revenue and in some cases the drivers that initiate new technology within their companies. Studies on strategic alignment have revealed that top executives often do not recognize their IT department as an enabler or a means to achieving business objectives. (Luftman and Papp, par. 13) In today's world of the Internet and technologies supporting the Internet, Information Technology is a driving force that can enable small "mom and pop" companies and propel them into international powerhouses. Companies such as Federal Express, Canon, NEC and Barnes & Noble will be examined in relation to how they take advantage of technology standards and how cultural pluralism will play into their future in order for them to maintain competitive advantage and strategic opportunities worldwide. A case study involving Western Digital will also be examined that will illustrate how multinational companies need to acknowledge cultural differences in order for internal communication to flourish supporting

strategic alignment promoting technological innovation . Countries such as Japan will also be examined in reference to their ideals surrounding research and development, technology transfer, globalization, and cultural pluralism.

The following chart illustrates the future of technology. Technological and non-technological entities will determine whether or not companies survive in the marketplace. Radical technologies, global standards, and technological opportunism, coupled with theories of cultural pluralism and human factors, will promote new standards for achieving competitive advantage. This shift points out that there is a convergence of technology and non-technology solidifying the future of business and innovation.

Future of business – new ways of competing, new innovations, new standards based on technological and non-technological properties	Technological	- Radical technologies - Global standards Technological innovation and opportunism
	- Non-technological	- Cultural pluralism Human factors

The future of technology will be less reliant on technology itself and more reliant on cultural pluralism and human interaction. This new wave of technological innovation will spawn future business growth. This will occur once the playing field has been set by government involvement, global standards, global access to the internet and its technologies, and most importantly, corporations and individuals accepting cultural pluralism.

Standards Organizations and Policies

The technology arena has grown tremendously due to organizations that have facilitated global standards. These standards have allowed for inter-country commerce to be conducted on the internet paving new grounds for the future where time and space are irrelevant. These organizations have been effective in that they have realized that policies and standards are needed both on the national and international levels in order to be effective.

National and international standards and policies lend themselves to a competitive marketplace. As technology continues to develop globally, the Internet has become the primary vehicle for worldwide electronic commerce. Various organizations such as the ITU (International Telecommunication Union), GIIC (Global Information Infrastructure Commission), NIST (National Institute of Standards and Technology), OECD (Organization for Economic Cooperation and Development), IEEE (Institute of Electrical and Electronics Engineers,) and the European Union are striving to develop standards and policies to promote and protect consumers and organizations that conduct business on the Internet. Many challenges, such as taxation, security, privacy and currency standards, continue to be ironed out to ensure a level playing field. New standards in European currency have been factored into the equation. Information Technology challenges exist worldwide to incorporate the new currency standards into computing systems. The goal of the euro has been to promote stability in European and International trade.

NIST

In promoting global standards for electronic commerce, national organizational bodies must first ensure that there are national standards in place. In the United States, the National Institute of

Standards and Technology (NIST) is responsible for setting security standards and policies that promote data integrity and confidentiality. "NIST is well positioned to help industry to resolve critical technical issues so that diverse electronic commerce applications can be based on a system of widely adopted open standards and measurement methods." ("Fact Sheets From NIST:" NIST's Role in Electronic Commerce). During the Clinton Administration as electronic commerce started becoming an integral component to global commerce, a subset of the NIST was created known as the National Information Infrastructure (NII). In 1994, Dr, Ariti Prabhakar, former NIST Director appointed by former President William Clinton, described the role of the NII as the entity which is responsible for the convergence of a disparate information infrastructure into a "new infrastructure that is transparent and interoperable -- where I, as a user, won't care about where the information came from or how it got to me or how it got translated onto my video screen. What I will care about is the content, the kind of information I am receiving. I will be able to find information as opposed to merely data. And that vision is different than the way technology and information infrastructures have evolved over the last many, many decades or even centuries."(Prabhakar par.3) These ideals that Prabhakar talked about still holds true today but are not as prevalent in regards to the current direction of the NIST.

The NIST under its current director, Arden L. Bement, Jr., reflects a more modern day direction focused on current technological practices and standards that would continue to move electronic commerce along. These practices include:

- Capturing measurements and standards for Electronic Commerce
- Producing data exchange standards
- Establishing time to market standards for manufacturing
- Researching Web usability supporting web-based transactions
- Creating standards for electronic books
- Creating internet technology that would deliver government services
- Improving security surrounding electronic commerce

- Developing standards for biometric-based application development. (Fact Sheets From NIST:" NIST's Role in Electronic Commerce)

Although the NIST is constantly working towards convergence of business and technology, there does not appear to be any connection to cultural aspects of technological development. This disconnect is important to point out in that technological development for the future will rely on multicultural contributions in order to create new innovations based on standards. Globalization trends in research and development will start to take place as the need for new technological ideas increases. This globalization trend will be spawned by the understanding that cultural pluralism stimulates innovation. Organizations such as the International Telecommunications Union reflect a globalized cross cultural organization tasked with developing technologies supporting global commerce.

ITU

As of 2003, The International Telecommunications Union is comprised of 189 member states, 650 sector members and 90 associated members. ("Membership: ITU") This conglomerate of members represents various countries as well as international companies dedicated to the future of technology. The International Telecommunication Union's (ITU) involvement in global electronic commerce is evident in its Electronic Commerce for Developing Countries (EC-DC) project. The objectives of the EC-DC project are: 1) to reduce cost in setting up an electronic commerce service 2) to provide infrastructure development supporting electronic commerce, 3) to provide training and workshops enabling transfer of electronic commerce skills, and 4) to provide assistance "and advise decision-makers to adopt and define national policies to create a favourable environment for the deployment of electronic commerce technologies and to consider electronic commerce as a vital component of the economic and infrastructure development strategy." ("Electronic Commerce for

Developing Countries" par. 4) The EC-DC project of the ITU defines certain guidelines necessary for a host country to take part in the project. These guidelines ensure that participating countries meet legal, logistical, technical, and financial criteria to ensure that there are no issues which may hinder a company from participating. Since the project calls for inter-country interactions the participating countries must have certain levels of clearance amongst each other. The ITU believes that their strategies, utilizing technology, has the potential to enhance lesser developed countries by educating these countries on the potentials of electronic commerce and its relationship to the global economy. The ITU also believes that a country's economic development is based on its technological development. Information technology standards in electronic commerce will stimulate trade with industrialized countries while attracting investments from other foreign countries. These standards will also generate radical technologies that will further enhance global commerce and will support the ongoing development of technology as it transcends into the cultural arena. The ITU realizes that there is still a need to provide basic telecommunications services to the poorest villages in the world. In order to ensure that every nation has equal access to network resources, the ITU had established the "Right to Communicate" initiative. This initiative, according to Dr Pekka Tarjanne, Secretary-General of the International Telecommunication Union, was to be a "global concept for the provision of universal service to people everywhere, from the remotest villages to the most crowded urban cores."(Tarjanne, Dr. Pekka, par. 8)

The ITU has been instrumental in merging the private sector and government agencies world-wide to foster and promote the ideals of global electronic commerce. Their belief in cross-cultural participation in technological advancement is a key concept towards the future of the telecommunications industry. "Both the free flow of information and cultural diversity and pluralism are essential to an inclusive information society." ("The World Summit" par. 9) As technology

traverses geographical and cultural borders technological innovation that once was considered radical now becomes technological standards as a result of cultural pluralism and human factors. To ensure that various countries and cultures are able to participate there needs to be government participation in the process.

GIIC

Government involvement in the Internet should not hinder the development of electronic commerce among individual countries. In *The Death of Distance*, author Francis Cairncross believes that "governments have to go from being restrictive regulators to being active promoters of competition." (Cairncross 13) The United States government believes that internet usage should not be hindered by issues of taxation. On October 16, 2001, the United States House of Representatives supported the passage of H.R. 1552 which states that "the Administration believes that government should be promoting Internet usage and availability, not discouraging it with access taxes and discriminatory taxes." (H.R. 1552 - Internet Tax Nondiscrimination Act) The Internet should be non-regulatory but driven by competition and consumer choices. This will foster free markets as well as natural trends in technological innovation. The United States government believes that in order for the Internet to foster non-regulatory participation, international agreements covering financial, legal, and market access issues need to be implemented. The United States Senate addresses the importance of the internet and electronic commerce in the Millennium Digital Commerce Act which states:

> Electronic commerce can provide consumers and businesses with significant benefits in terms of costs, choice, and convenience. The Administration strongly supports the development of this marketplace and supports legislation that will advance that development, while providing appropriate consumer protection. Many businesses and consumers are still wary of conducting extensive business over the Internet because of the lack of a predictable legal environment governing transactions. Both the Congress and the Administration have been working to address this important potential impediment to commerce." (S. 761 Millennium Digital Commerce Act.)

In 1995, the Global Information Infrastructure Commission (GIIC) was formed to ensure that there was an independent entity made up of technological industry leaders that would facilitate global discussion promoting and supporting technologies that would provide information networks to stimulate "global economic growth, education, and quality of life." (The GIIC Mission Statement) .

The GIIC's involvement in ironing out financial agreements would include deciding whether or not commerce on the Internet is taxed or whether tariffs apply when doing business between countries. The GIIC would address legal issues by facilitating discussions with host countries to determine whether or not electronic commerce could be implemented without violating laws specific to that country. If government action is required in order to accommodate electronic commerce, then the GIIC would advise that country on the necessary steps needed to overcome that hurdle. "The GIIC recognizes different needs and issues raised by the development of electronic commerce in developed and developing economies. Commissioners urged that efforts continue to be taken to proactively promote issues that speed the development of electronic commerce." (Electronic Commerce: Global Information Infrastructure Commission, par 2) The GIIC's involvement with market access issues would entail doing away with laws and telecommunications policies that would hinder a country from participating in Internet commerce. Every country would have equal access to the Internet. The GIIC would be tasked with setting principles and policies that would stimulate international talks affording equal access across the globe. They would also be responsible for instilling patent and trademark guidelines to protect both sellers and buyers from fraud and piracy. Once international access is in place, security measures would be implemented, instilling the notion of secure electronic transactions throughout the Internet. These secure transactions must also occur

within countries that are not as technologically developed. The GIIC's task will be to develop solutions for providing Internet accessibility and security to these countries.

From a high-level perspective, the GIIC recognizes that information is the key to driving a nation's economy. Devising a secure method of transferring this information is essential to the ongoing development of a country. Once security is in place, currency standards will enhance the business relationships between these countries by providing a common monetary note, eliminating exchange rates. In this phase, the euro currency will help in achieving this commonality.

The euro, as a standard, was an important step in standardizing European trade and commerce. European economical parallelism promoted by the Werner Plan is the "simultaneous progress in the field of coordination of economic policy and of monetary cooperation."(Wortmann 129) This plan enacted by the European Union in 1973 instilled the notion that monetary synergies would need to occur in order to streamline the European economy. Subsequently, this plan complemented other plans in establishing the euro, promoting standards for European commerce.

As of April 2003, there were 15 member countries which formed the European Union of which 12 members countries have already converted to the euro currency. Other organizations such as the United Nations' International Telecommunication Union are working with the GIIC in ensuring that future technological changes are incorporated into existing worldwide networks.

OECD

The Organization for Economic Cooperation and Development (OECD) comprises thirty member countries with the common goal of formalizing and standardized social and economic

policies. "The OECD is at the forefront of efforts to understand and help governments respond to new challenges such as sustainable development, electronic commerce and biotechnology." (Overview of the OECD. Par. 5) The OECD will take issues such as taxation and formulate processes that would enable countries to conduct commerce by leveling the playing field. One of the main visions of the OECD is its stance pertaining to the world economy and how electronic commerce plays a significant role in this vision. "Electronic commerce is a central element in the OECD's vision of the potential that our networked world holds for sustainable economic growth, more and better jobs, expanding world trade, and improved social conditions." ("Building Partnerships for Progress: Electronic Commerce" par. 1.) This is important to consider: globalization may not appeal to all countries because there is a potential for internal markets to be affected by global commerce. Taxation becomes an issue when commerce is conducted between various countries.

When commerce takes place across the Internet, ideas and issues surrounding geographic boundaries become nebulous. Electronic commerce differs from traditional commerce in that transactions are conducted primarily on a digital level. Moving data from point A to point B does not require physical items to cross international boundaries. Electronic commerce is challenging in that transactions are more direct and are not subject to the same laws that govern conventional commerce. At the Ottawa conference in October 1998, the OECD "agreed that the taxation principles [that] guide governments in relation to conventional commerce should also guide them in relation to electronic commerce." (Ericson, Ron, par. 6) The OECD realized that taxing businesses and consumers would be a task within itself. After the Ottawa meeting, a follow-up meeting took place in Turku, Finland, to debate the issues of taxation between businesses and tax authorities. Five key principles of taxation were formulated from those debates. Taxation of electronic commerce should be neutral, efficient, certain and simplistic, effective and fair, and flexible. (Sanderson, Christine)

Establishing a single currency will allow these five traits to be easily integrated into taxation policies surrounding electronic commerce. The European Union's treaties and policies establishing the euro will ensure that these traits are met.

IEEE

The Institute of Electrical and Electronics Engineers, Inc (IEEE), founded in 1884, is an international standards-based organization made up of 150 countries and 380,000 individuals. "Through its members, the IEEE is a leading authority in technical areas ranging from computer engineering, biomedical technology and telecommunications, to electric power, aerospace and consumer electronics, among others." ("About the IEEE," par. 2) The IEEE currently has about 900 standards with another 700 standards still in development. From a technological perspective, these standards help to ensure that there are commonalities as it pertains to information technology. For example, network protocol standards used for wired Ethernet local area networks (IEEE 802.3), wireless local area networks (IEEE 802.11), or wireless personal area networks (IEEE 802.15.1) which is a part of the Bluetooth specification defining the lower transport layers. ("IEEE On-Line") This ensures that electronic communications are guaranteed amongst disparate countries fostering technological innovation.

The IEEE standards organization is a key component to the future of technological development not only because it's strong representation of industries globally but also because of inherent nature which combines technology with cultural diversity. This element will be the future of global technological innovation because greater emphasis in development will shift towards a non-technological entity which will already be embedded within the IEEE.

Freedom of Information Act

Government involvement is necessary to ensure that information is freely disseminated to the public. As the United States government placed greater emphasis on the importance of information technology, they wanted to ensure that the public also benefited from this technology by implementing the Electronic Freedom of Information Act of 1996 which augmented the Freedom of Information Act (FOIA) by realizing that the digital domain was the wave of the future. The national government ensured that an existing act would be augmented to emphasize the importance of electronic access to information. The Freedom of Information Act is an example of an Act that was modified to take into account the emergence of technology and the importance of government participation in ensuring that electronic information is made accessible to the public.

The Freedom of Information Act sets guidelines for disseminating information to the public. The guidelines for each agency must be published in the Federal Registry. The registry contains descriptions as to where, how, and to whom the public can make requests for information. The Federal Registry also contains application descriptions, procedures, and fees that must be paid in order to receive information. The FOIA also contains nine exemptions, which deny certain information to the public. These exemptions, if not interpreted uniformly, can be a hindrance to information access. Other acts, such as the National Security Act of 1959 and the Privacy Act of 1974, overrule information that may be accessed through the Freedom of Information Act, thus creating controversy and difficulties in interpreting language.

The Electronic Freedom of Information Act Amendments of 1996 added another dimension to the FOIA by allowing electronic access to "reading room" materials published by various federal agencies. This includes agency documents that are not published under the act but are made accessible

to the public. "Reading room" material can be characterized as documents "made available for public inspection and copying in agency reading rooms."(Freedom of Information Act Guide, May 2002: FOIA READING ROOMS." par. 1) The Electronic Freedom of Information Act Amendments of 1996 stipulates that documents created on or after November 1, 1996, must be made available to the public electronically, followed by electronic indexing by December 31, 1999.

Two other provisions of the E-FOIA Amendments of 1996 ensure for increased access to information and timely response to requests. Increased access means publishing agency staff manuals, opinions, reference guides, and previously released records. The agencies must make a reasonable effort to format the documents in a manner suitable to the requester. This would entail making documents accessible via digital format. Timely responses entail implementing a multi-track process that ensure that simple as well as complex requests from the public does not create a backlog and that it "expedites processing time in circumstances of compelling need." (Your Expanded Rights Under the Electronic FOIA Amendments of 1996 par. 2) These provisions work hand in hand with today's technologically enabled society to enhance information access.

The Freedom of Information Act also restricts information access to the public. These exemptions are put in place in order to uphold and maintain national security, foreign policy, and rights to privacy. Statutes are also enacted that forbid disclosure of certain information to protect an individual's right to privacy. Trade secrets and commercial and financial information may also be exempt from disclosure. Certain law enforcement information may be exempt to protect individuals involved in investigations. Some geological and geophysical information may also be exempt, such as wells and maps. The FOIA also excludes information pertaining to the president and vice president of the United States, senators and congressmen. This may have both a positive and negative effect in

that the people of the United States may not be privy to vital information about their representatives and thus re-elect them into office. The FOIA's exclusion of information pertaining to elected officials in the Executive Branch may have a positive effect in that it may strengthen national security in order to enforce foreign policy.

Summary

Standards organizations solidify the playing field for international commerce to flourish. These entities ensure that the technological and non-technological arenas are in place paving the way for the future of business. It is evident that there needs to be organizations that ensure that countries are able to take advantage of technology regardless of their economic limitations. The advantages of these international organizations is that they are a conglomerate of various cultures working together to ensure the future of technology. As these organizations ensure that lesser developed countries partake in the technological revolution, they also rally the various countries to embrace the various cultures that are needed in order to promote future technological innovation. It is evident that national and international organizations are required to establish guidelines both domestically and internationally. National groups such as the NIST establish domestic security parameters for electronic commerce and devise systems to capture or measure the use of electronic commerce. Although groups like the NIST seem to focus more on the technology, there are international organizations such as the ITU and the OECD which not only focuses on technology but also on the cultural aspect of technology and how it will have an impact on the future.

Government involvement in establishing acts or laws to foster electronic information is essential to the ongoing growth of a country. The Electronic Freedom of Information Act of 1996 is an example of government realizing the importance of information technology and amending existing

laws to accommodate future technological growth. Governments in foreign countries will need to make similar changes to their laws in order to accommodate future technological growth. Canada's Personal Information Protection and Electronic Documents Act of 2000 was designed to promote and protect electronic information. This act also amended existed Canadian acts: the Canada Evidence Act, the Statutory Instruments Act and the Statute Revision Act ("Personal Information Protection") Australia's amendments to their Freedom of Information Act 2002 established provisions that extended their original Freedom of Information Act of 1982 protecting the public from accessing certain types of "offensive" information by use of the internet while promoting other types of personal and government related documents as long as they met predefined classifications for acceptable public documents. ("Amendments to FOI Act") The Freedom of Information global survey that was published in September of 2003 lists approximately 53 countries that have actively engaged in acts and amendments which support access to information both electronically and in print format. (Banisar)

Standards organizations promote formation of smaller interests groups such as the Bluetooth SIG (special interest group) which is a private interest trade association promoting wireless technology based upon standards set by such organizations as the IEEE as well as other standards based organizations. The Bluetooth SIG is "comprised of leaders in the telecommunications, computing, automotive, industrial automation and network industries that is driving the development of *Bluetooth* wireless technology." ("About the SIG") The member companies that comprise the Bluetooth SIG are a conglomerate of international companies diversified by cultural background. Standards organizations and diversity has shown to be a strong foundation for the future of technological advancement.

Open Systems and Standards

Technological synergies pave the way for the future of business. These technological synergies will satisfy a subset of requirements needed to link both the technological and non-technological entities needed to promote radical technologies ensuring equal competition in the global marketplace. Eliminating proprietary systems and establishing open systems and standards level the technological playing field so that all countries involved share a common foundation for economical growth.

Negroponte – Elimination of Proprietary Systems

In order to achieve a decentralized computing architecture, there must be standards that allow for devices to communicate with each other. As wireless technology develops, decentralized computing will take on a very personal or perhaps wearable nature. The Internet itself reflects a truly decentralized network. The Internet is a web of computers, with no one computer being the main computer. The more computers attached to the Internet, the greater the resources. The driving force behind the Internet is not in the hands of any one government or people but a collaboration of efforts from all aspects of life. This collaborative effort is what makes the Internet unique. Because humans by nature are nomadic, it makes sense to design computing to take into account these natural tendencies.

In Nicholas Negroponte's book *Being Digital*, he discusses ideas that have already made an impact on today's society. Negroponte looks at the physical world of computing realizing that there is not only a necessary and inevitable transformation from atoms to bits, but also a transformation from an unnatural to a natural interaction with technology. "Like a force of nature, the digital age cannot be denied or stopped."(Negroponte, Nicholas. "The Digital Revolution: Reasons for Optimism" 68) Although Negroponte discusses technology throughout his book, the reader realizes that the author is really discussing the evolution of human existence. In an e-mail interview, Jeffrey Seglin asked

Negroponte how he thought people would spend their free time in the next five years. Negroponte responded by saying, "The divide between work and play will shrink. More people are likely to find their work and their passion to be the same or, at least, closer. In that sense, people will spend more time on Greek islands and more hours per week doing what they love, called work." (Seglin, Jeffrey L. "E-mail With." par. 11) This metamorphosis, according to Negroponte, will come in the form of "technologies that free one of space and time."(Seglin, Jeffrey L. "E-mail With." par. 14) It will also free one of cultural boundaries leading to a truly borderless system of global innovation stimulating radical technological and innovation.

Negroponte believes that technology will inevitably "free one of space and time," becoming ubiquitous in nature as it applies to human life. To effectively apply these technologies to human life, there must be an understanding of the human psyche. The main points Negroponte addresses in *Being Digital* are: 1) the transformation from atoms to bits, 2) the Negroponte Switch or "trading places," 3) the idea of open systems, 4) the social and political impact and consequence of a digital era, 5) the idea of value-added information, 6) interconnected ubiquitous computing systems, 7) the transformation to human-like computing, 8) decentralized computing, and 9) the problems with a digital environment. Within the next seven to fifteen years, these big ideas will collectively alter the way humans function.

Negroponte discusses the ideas of an open system as a means to competition using one's mind—as opposed to locking out the competition through proprietary means. Negroponte believes that once technological standards are agreed upon, the means to gaining competitive advantage will be based solely on the desire to deliver innovative services and products.

The big ideas behind *Being Digital* will transform the world into a new era of human-like computing where the computer is nowhere but everywhere. The ideas of ubiquitous, interconnected, human-like systems will allow for intelligent systems to interact with the human species in ways that are as natural as interacting with another human. Negroponte's *Being Digital* represents the beginning of the computer revolution. "Like a force of nature, the digital age cannot be denied or stopped. It has four very powerful qualities that will result in its ultimate triumph: decentralizing, globalizing, harmonizing, and empowering."(Negroponte, Nicholas. "Epilogue: An Age of Optimism." 229) Information will transcend the boundaries of time. As technology develops, humans will increase their understanding of human nature. Designing systems that are human-like will require in-depth studies into the human mind. Never before has human nature played such an integral part in the digital age.

Cerf – TCPIP Protocol Standards

Vinton Cerf, the founder of the underlying network protocol for the Internet, believes that interoperability is the key to application possibilities. The way to achieve interoperability is to establish open standards. When Cerf developed the protocol known as TCP/IP (Transmission Control Protocol/Internet Protocol), he had in mind a system whereby data of any sort could travel over a standard or common protocol. His motto: "IP on Everything" (Hariani 7) reflected the notion of an open standard that would facilitate the transfer of any sort of information.

Cerf discusses telephony, video, and radio services traveling over the Internet. He also delves into Internet technology traveling over the television, radio and satellite. Cerf believes that as Internet technology continues to develop, paper may become a specialty item. Open standards will pave the way to allowing more appliances and applications to take advantage of the Internet. The future will

allow devices to interact with each other because they will all be based on a common underlying protocol.

Cerf, like Negroponte, identifies the fact that there are shifts that take place that transcends from an unnatural to a natural state of computing and from proprietary systems to non-propriety systems. The new shift will emphasize a migration from technological to non-technological forces promoting innovation and competition.

Gilder – Microcosm to telecosm shift: CPU to the network

The convergence of the laws of the microcosm and the telecosm embraces and supports the developments in bandwidth technology, microprocessor technology, and computer programming. "This law ordains that the value and performance of a network rise apace with the square of the increase in the number and power of computers linked on it. As the forces fuse, the world of computers and communications can ride an exponential rocket." (Gilder, George. "Mike Milken and the two trillion dollar opportunity", par. 25) The telecosm and the microcosm will spawn worldwide communications and develop global economic growth as these laws become unified and less distinguishable. George Gilder notes that "the convergence of microcosm and telecosm in an array of multimedia industries—from personal intelligent communicators to video teleputers to digital films and publishing—is now the driving force of world economic growth."[2] (Gilder, George. "The New Rules of Wireless." Par. 5) Fibersphere and the atmosphere will dominate the world of computer communications and become the network. Java's open standards will allow it to perform effectively over the Fibersphere or atmosphere, facilitating communications among various disparate systems. CPU technology will continue to flourish because it will also enhance Java processing. Java programming, CPU technology, and wired and wireless bandwidth technology are the driving forces

that will ultimately ensure the convergence of the microcosm with the telecosm, fostering new technological innovations. Gilder's convergence theories support a technological shift as technology matures globally.

Moore's Law about the CPU

In 1965, Gordon Moore made a prediction that the power of the transistor will double approximately every 18 months. "Intel expects that it will continue at least through the end of this decade." ("Moore's Law: Overview") Moore's Law is the driving force behind CPU technology today. As CPUs become faster and faster, applications will demand more and more of their resources. The same can be said for applications. The more sophisticated an application becomes, the more CPU processing power is needed. Moore's Law is the result of application and CPU demands. Once Moore's Law has reached its technological threshold at the end of this decade, it will continue to thrive on a new dimension which will include a non-technological entity manifesting itself in yet another shift from the technological into the non-technological arena. This shift will support the future of business. But before this new shift is reached, there will be a dimension of radical technology which will occur in conjunction to the non-technological shift.

Summary

Open System and Standards and the various bodies that create or support these standards are essential to the future of technological innovation. Negroponte's ideals of eliminating proprietary systems and the development of TCPIP by Cerf, have allowed current technologies to be ubiquitous in the business and consumer environments. As research and development in information technology begins to reach its threshold, there will be a shift from purely technological innovation to innovation coupled with cultural pluralism. This will be evident in the emphasis that will be placed on

globalization and multiculturalism. Once companies and various countries start placing greater emphasis in this realm, there will be another resurgence of new radical technologies spawning a new technological revolution.

Competitive Advantage and Strategy

A company's strategy should be the foundation for achieving competitive advantage. Many companies overlook certain elements which are important to achieving this. One of the most important elements today is a non-technological component. Organizational diversity creates a dimension which plays on cultural pluralism. Race for Opportunity (RFO), a United Kingdom (UK) based organization promotes the ideals that race and diversity should be on the agenda for businesses not only based in the UK but globally.

> "Customers want to be served by a company and a workforce they can identify with. So being mainly white and male is obviously limiting, at a time when the buying power of women and ethnic minorities is rising. Almost 40% of the 500 companies surveyed said diversity initiatives had led to improved customer satisfaction and retention, while a similar amount said productivity had increased. And there is a positive impact on creativity when there are differing views and cultures in the mix." (Mazur, par. 9)

Before these ideals came to fruition, there were other viewpoints on achieving competitive advantage and strategy based more on traditional marketing strategies and technology placing less emphasis on culture and diversity.

Various Traditional Viewpoints: Downes and Porter

As in the past, strategy and competitive advantage are key components important to the survival of businesses today. Michael Porter's article, "What is Strategy?" defines strategy and how it is used to foster competitive advantage. With the emergence of information technology, strategy and

competitive advantage remain essential formulas for growth and economic prosperity. Information technology has enhanced the way companies do business today by introducing new ways of doing business. On the other hand, it has complimented the traditional means of business enterprise. Digitalization, globalization, and deregulation, although new to business, have not entirely changed the way business is conducted but have added new dimensions to it. Traditional strategies and competitive structures have remained in place as a means to keep an organization's goals and future direction in alignment with the overall vision. "Competitive advantage, according to Mr. Porter, requires sustainable leverage over the 'Five Forces'--buyers, suppliers, competitors, new entrants, and substitutes." (Downes, Larry, par. 3.) According to Larry Downes, digitization, globalization, and deregulation "are overwhelming the traditional five."(Downes, Larry, par. 5) In order to look at "whether Porter's thinking about strategy and competitive advantage is still valid given today's IT enriched world," strategic and competitive advantage must first be defined. The three new forces: digitalization, globalization, and deregulation must also be examined as they relate to strategy and competitive advantage. As Porter's Five Forces and Downes' three New Forces are examined, it will be evident that information technology has not invalidated Porter's thinking but has added a new dimension to the ways in which companies are conducting business.

Competitive Advantage

A contributing factor to competitive advantage is defined by strategic fit. This is the notion that everything matters in a corporation and that each individual part is a component of the whole. First, each goal accomplished or task performed must be in alignment with every other goal or task performed. Once this has been established, then it is important that all tasks and goals collectively are in alignment with the company's strategic direction as a whole. In other words each part must be in alignment with each other part and when combined are aligned to the company's strategic direction

and goals. Performing one activity optimally will cause another activity to appreciate the benefits, such as lowered costs. Porter also believes that the opposite also holds true. If an activity is not performed to the best of the ability of a person or department, the cost to perform other activities can be adversely affected. In other words, activities should reinforce each other. "Fit locks out imitators by creating a chain that is as strong as its strongest link."(Porter, "What is Strategy" 70) Porter breaks fit into three orders. First, fit must have simple consistency across the board in relation to strategic goals. Second, "activities are reinforcing." This means that the activities of a particular company, especially from a marketing standpoint, must stimulate the buyer into making that purchase. Finally, "optimization of efforts" must be employed to make sure that there are no redundant tasks being performed and that information is flowing efficiently among the groups performing activities. The basis of competitive advantage is achieved when all forms of fit are in place to achieve a collective goal. Carrying out these goals to achieve competitive advantage must be attacked with confidence and tact by upper management. Often "employees fail to identify with corporate goals or involve themselves deeply in the work of becoming more competitive."(Hamel and Prahalad "Strategic Intent" 75) Intra-company relations must be optimal in order to achieve goals. The less hierarchy in a company, the easier it is for employees to feel empowered and to effectively carry out the activities of a corporation to achieve competitive advantage.

Once competitive advantage is achieved, sustaining it is all too important. Companies who try to imitate certain aspects or activities of a competing company "will get little benefit from imitation unless they successfully match the whole system."(Porter, "What is Strategy" 74) It is probably better for a company to devise its own system of activities than to try to imitate an existing system. This would allow for a company to develop its own skills, activities, idiosyncrasies, and strategies.

Strategy

As companies develop activities to establish competitive advantage, they strengthen their strategies. Porter believes that strategy is enhanced when companies employ unique activities. Being different is one of the characteristics for implementing strategy chosen by Ikea Furniture. This company has secured its position by being different from other companies in the same industry. According to Porter, strategic positioning is characterized by three distinct sources: 1) variety-based positioning, 2) needs-based positioning, and 3) accessed-based positioning.

Variety-based position is designed to meet only a subset of a customer's needs. This is effective in that a company can focus all its strategies on a particular service rather than multiple services. Usually its services are superior to other companies that try to engage in too many services and thus dilute their organizational focus. Two examples of variety-based positioning can be seen in an automobile glass repair shop or in a company such as Jiffy Lube. The service that are provided are very focused on repairing glass or replacing automotive oil which establishes these company's core competencies narrowing there scope allowing them to excel in these particular arenas respectively.

Needs-based positioning "arises when there are groups of customers with differing needs, and when a tailored set of activities can serve those needs best." (Porter and Millar "How Information Gives You Competitive Advantage" 150) Ikea's strategy is to be able to fully furnish a home at a reasonable price. Its merchandise costs less than that of their competitors. They have minimal sales people on the floor and a do-it yourself philosophy for ordering merchandise. Electronic kiosks are positioned throughout the store for customers to check inventory, order merchandise, and pay electronically for the merchandise, which is usually waiting for the customer at the door minutes after payment is made.

Accessed-based positioning consists of aligning one's strategy in such a way that customers are accessed through different means of marketing strategies. According to Porter, access-based positioning "can be a function of customer geography or customer scale – or anything that requires a different set of activities to reach customers in the best way."(Porter, Michael E. "What is Strategy" 67)

Trade-offs

Another component of strategy is the notion of trade-offs. Porter believes that trade-offs are needed to develop a strong strategic plan. Trade-offs allow a company to shed products that may take away from its main focus. A company that tries to cater to all of the people all of the time will find that its focus diverts in a way that causes more financial loss than gain. A glass company, for example, may focus solely on automobile glass instead of storefront glass. All its marketing and internal activities are now focused on creating the best automobile glass possible. Consumers are more likely to go to an automobile glass repair shop with the notion that quality will be far superior than if they were to go to a general-purpose shop.

As competitive advantage and strategy begin to interact with IT, Porter's concepts still hold true in this modern society. Information technology has allowed businesses to be more effective in strategic planning, marketing, and fostering of new ideas in achieving competitive advantage.

Information Technology and Its Role in Porter's Thinking

Digitization, globalization, and deregulation, according to Larry Downes, are changing the way Porter's ideas of competitive advantage and strategy are viewed. Downes believes that Porter's

thoughts are outdated and do not apply to today's business environment. Instead, Downes' three New Forces complement, as well as augment, Porter's ideas. Information technology allows a company to reach a greater audience, thus enhancing market share. IT enables companies to use different avenues to reach the consumer. It does not diminish any of Porter's "Five Forces" or theories of competitive advantage and strategy. By augmenting Porter's ideas of competitive advantage, the notion of core competencies within an organization are established.

Core competencies can be viewed as "the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technology." (Hamel and Prahalad "Core Competence" 82) Core competencies and competitive advantage develop over time, making them more and more difficult for outside companies to emulate. This goes back to Porter's notions of strategy. Companies must develop their own unique styles of doing business in order to develop their strategy. They must also be ready to make trade-offs in order to maintain those core competencies. These trade-offs may emerge as business transformations or re-engineering efforts occur.

Re-engineering a business using information technology allows for enhancements of the existing business. Dr. William H. Davidson, associate professor in the school of business at the University of Southern California, indicates that systematic gains in business hinge on information technology based capabilities. Based on his research supported by IBM's Advanced Business Institute, Davidson points out that these new capabilities have the potential of redefining a company's core competencies. According to Davidson's statements in *Beyond Re-Engineering: The Three Phases of Business Transformation,* he identifies three phases of a business transformation. The first phase introduces automation of a company's existing activities. The second phase builds on the first and includes

focusing on products and customer services. And the third takes phase one a step further by taking initiatives in the first phase and developing core competencies. For the three phases to be effective, "tactics to reduce or eliminate sources of resistance are a central issue for business leaders intent on pursuing transformation programs." (Davidson 498) These pools of resistance may come in the form of employees not willing to accept change at the workplace. Business transformation and re-engineering extend from Porter's ideas of strategy in that these concepts develop competitive advantage and enhance strategic initiatives on a new level.

Enabling business transformation by implementing IT-based solutions alone does not necessarily produce strategic and competitive advantage. Depending on how information is used determines whether a company will develop a strategic and competitive advantage. If not used carefully, IT has the potential to hurt a company by allowing consumers access to pricing information, which can be compared to rival companies. This can be seen when shopping for airline rates. The consumer will shop around for the best prices available, which may cause one airline to lose money and another to gain.

Physical and Virtual

Porter discusses activities as they relate to both physical and IT-based components. "The physical component includes all the physical tasks required to perform the activity. The information processing component encompasses the steps required to capture, manipulate, and channel the data necessary to perform the activity." (Porter and Millar "How Information Gives You Competitive Advantage" 152) Every value activity has both a physical and information-processing component. This information-processing component can be compared to what Jeffrey Rayport calls marketspace. Rayport, one of the leading pioneers in digital strategy and electronic commerce, describes

marketspace as "a virtual realm where products and services exist as digital information and can be delivered through information-based channels." (Rayport.and Sviokla. 1995. 75) Examples of this are seen in ATMs (automatic teller machines) or voice mail systems. Both systems have transformed physical elements into informational elements. Porter realizes that IT does not and cannot encapsulate all components of a business. He also realizes the importance of IT to the advancement of a company's strategic and competitive advantage. IT allows a company to pursue competitive advantage on different planes producing new strategies as well as new products. Information technology does not change the foundation or core meaning of competitive advantage but adds a new dimension. It is imperative that companies "carefully examine what they are offering, how they are offering it, and what enables the transaction to occur. Then they must decide which mix and emphasis will best serve their purpose." (Rayport and Sviokla 1994. 149) The vision of a company must always be at the foreground when making decisions related to IT. "Management's challenge is to continually adapt the organizational and technological capabilities to be in dynamic alignment with the chosen business vision."(Venkatraman 86) Information technology does not drive the direction of a company. A company's vision should dictate the way IT is used within the organization.

Implementing IT within an organization affects the way a company continues doing business based on what that company does as well as the expectations of the customer. Although bookstores such as Barnes & Noble have implemented the purchase of books over the Internet, there is still the need and desire of book buyers to go to a bricks-and-mortar store to browse the shelves and take in the atmosphere of the bookstore. These human senses cannot be achieved by visiting Barnes & Noble on the World Wide Web. IT has enabled the bookstore to sell books 24 hours a day. It has also opened up Barnes & Noble to world-wide competition through deregulatory efforts. Digitization has allowed Barnes & Noble to gather important marketing information about its customers. This

information can now be used to enhance strategic opportunities and enhance competitive advantage. Information, according to Philip Evans, senior vice president of the Boston Consulting Group, "is the glue that holds together the structure of all businesses. A company's value chain consists of all the activities it performs to design, produce, market, deliver, and support its product."(Evans and Wurster 72) The banking industry's value chain has been affected even more by the emergence of IT. Direct deposit, on-line banking software, ATMs, and customer service telephone lines have replaced the face-to-face interactions that once took place between banking personnel and customers. The outcome of IT from the customer standpoint is the ability to shop around for competitive rates. From a banking perspective, IT has forced banking institutions to come up with new strategies to establish competitive advantage, such as virtual customer relationships or "space-based relationships" (Rayport and Sviokla, 1995 p. 80) using the World Wide Web.

Strategic Alignment

Strategically aligning a business is a key component to the success of that business. Internal synergies needed to be established between the business sector and the IT sector of an organization. Core competencies need to be reinforced so that all employees are aware of a company's overall service offerings. Strategic alignment is a complex task for many companies since traditionally, the business sector usually drove the direction of the IT departments. The strategic alignment model which was developed by N. Venkatraman and J.C. Henderson, looks at how business and IT interact.

The Strategic Alignment Model's top levels reflect the strategic and external levels, while the bottom levels reflect the operational and internal levels. In order to place this framework into perspective each component of the operational level must correlate to a particular division or workgroup within an organization. These groups may overlap or be sub-components of a particular

workgroup. The objectives of the strategic level (top row) must be defined in order to determine the strategic direction of the company.

There are four quadrants which make up the Strategic Alignment Model: 1) business strategy, 2) IT strategy, 3) organizational infrastructure and processes, and 4) IT infrastructure and processes. There are four dominant alignment perspectives: 1) strategy execution, 2) technology potential, 3) competitive potential, and 4) service level. (Luftman and Papp "Business and I/T Strategic Alignment.") These perspectives are used to align the internal as well as the external approaches to system development integration, and implementation.

Strategic Alignment Model and Federal Express

Federal Express, a company built on express package delivery services and electronic commerce services using IT- enabled processes, started in April of 1973 at an abandoned portion of the Memphis International Airport in Tennessee. Federal Express is now the world's largest delivery service with 2003 revenues of over $22.5 billion and a net income of $830 million. Still based in Memphis, the company employs more than 219,000 around the world. Federal Express operates 638 aircrafts and 70,000 vehicles serving more than 215 countries separated into four international regions: Asia-Pacific, Canada, Europe/Middle East/Africa, and Latin America-Caribbean. FedEx's current chairman, president and chief executive officer is Frederick W. Smith. The senior vice president and chief information officer is Robert B. Carter.("About FedEx;" FedEx Executive Bios") FDX Corporation is a family of companies which includes FedEx Express, FedEx Ground, FedEx Freight, FedEx Custom Critical, FedEx Trade Networks, FedEx Supply Chain Services, and FedEx Services.

FedEx offers services that are categorized as domestic, international, worldwide logistics, and value-added services. Value-added services include U.S. Government Shipping, FedEx Virtual Order, Dangerous Goods Seminars, FedEx First Overnight, FedEx International First, FedEx AsiaOne, electronic commerce connections, and on-line invoice adjustment services.

Information technology has enabled companies like Federal Express to take their businesses to another level. FedEx has moved from a company that once transported only physical packages to a company that also transports data through the use of IT-enabled processes. IT developments have enabled FedEx to compete against incumbents such as United Parcel Service (UPS), which was founded in 1907. Strategic initiatives that enabled FedEx to acquire RPS also contributed to FedEx's ability to compete with UPS, especially for ground shipments. RPS' business was in alignment with the initiatives of FedEx, which made this marriage a perfect fit for FedEx. Other issues such as the 1997 UPS strike took once loyal customers away from UPS and introduced them to FedEx. Fear of another UPS strike had diminished customer loyalty at UPS. Electronic commerce initiatives have given FedEx an added advantage in the marketplace by providing a vehicle for online purchasing and online package tracking for its customers. Such initiatives have also afforded FedEx a truly global presence by providing full customer services regardless of geographic location. "This is business networking in action. It is also technology and it is also people."(Luftman, Jerry N. 157) FedEx's ability to combine technology with people from all over the globe has catapulted the company into a profitable institution. Top executives at FedEx do not see themselves solely as a package delivery business, corporation, or airline, but a network. FedEx's excellent customer service approach has allowed it to build customer confidence through quality and service. These components, according to Jerry Luftman, author of *Competing in the Information Age* "are competitive necessities in the globally driven marketplace." (Luftman, Jerry N. 169)

The realization that information systems and technology would be a deciding factor to the survival of FedEx gave the company a headstart in the package delivery arena. "Smith figured out two decades ago that FedEx was in the information business, so he stressed that knowledge about cargo's origin, present whereabouts, destination, estimated time of arrival, price, and cost of shipment was as important as its safe delivery. He has therefore insisted that a network of state-of-the-art information systems – a sophisticated melange of laser scanners, bar codes, software, and electronic connections – be erected alongside the air and vehicle networks." (Grant, Linda 158) Smith recognized early on that the synergy between the physical and virtual world would contribute to the company's overall vision and success. He knew that when he started FedEx, he would have to compete with UPS, a company that had been in existence for more than 60 years. He knew that IT would give him that competitive advantage and strategic opportunity. As Smith studied the emerging technologies of the time, he kept "telling his new employees that FedEx's success would be built on a bedrock of mobile computers, package tracking systems, and sophisticated databases." (Lappin, Todd, par .15) This system evolved into FedEx's proprietary network called Cosmos. In designing the system, FedEx had in mind that the data about a particular package was just as important as the package itself. This philosophy allowed FedEx to perform at an on-time delivery rate of 99 percent. The data that was collected also enabled FedEx to draw some conclusions about its customers so that the firm would not only be able to improve its shipping and tracking system, but also to improve customer service. In "How Information Gives You Competitive Advantage," Michael Porter discusses how information affects competition in three ways: "1) It changes industry structure and, in so doing, alters the rules of competition. 2) It creates competitive advantage by giving companies new ways to outperform their rivals. 3) It spawns whole new businesses, often from within a company's existing operations." (Porter

and Millar. "*How Information Gives You Competitive Advantage.*" 150) FedEx has been able to implement all three of Porter's points by integrating IT into its infrastructure.

Logistics has allowed FedEx to change the industry structure by introducing product management. Integrating logistics was evident in FedEx's alliance with RPS. Companies tend to form agreements with other vendors or third parties in order to add value to their current services. Integrating IT into this mixture adds a new dimension to logistics. By implementing information technology tools to automate logistics, new customer-focused initiatives can be spawned, altering the rules of competition.

Porter's second point on establishing competitive advantage can be seen in FedEx's network implementation for the purpose of increasing accuracy in delivery services to its customers. FedEx can now compete with companies like UPS by setting delivery promises and keeping them. Based on this, customer loyalties shifted to the most efficient package delivery service. FedEx took this a step further by allowing its customers to track their packages directly from the Internet from the point of pickup to the point of receipt. The ability to track a package became important to customers as the Internet and the World-Wide Web started to become household tools. FedEx's business software, BusinessLink, had also contributed to competitive advantage by taking advantage of the World Wide Web, electronic commerce, and virtual storefronts. The logistics-based software enabled "non-store retailers to sell on the web with lower costs, greater product variety, and better customer service." (Lappin, Todd. par. 47)

Porter's third point is evident in FedEx's establishment of its subsidiary FedEx Supply Chain Services formerly known as FedEx Global Logistics. . "With the success of Cosmos, FedEx has leveraged its talent for information management to spin off a subsidiary called FedEx Logistics, specializing in managing inventory flows and worldwide distribution." (Lappin, Todd. par 30) In establishing FedEx Logistics, FedEx was able to establish a strategic alliance with companies such as Laura Ashley to provide distribution, order fulfillment, inventory management, and packing and shipping services to the fashion retailer. This strategic alliance ensures that all mail order merchandise purchased from Laura Ashley is delivered by FedEx.

Advances in IT and the Internet have given FedEx enough ground to compete with already established companies such as UPS. It has allowed third-party clients, vendors, and customers access to their network by creating tools that allow direct interaction between companies to optimize delivery services. Without these new innovations, FedEx may not have been able to last this long. As technology shifts and new strategic opportunities arise, FedEx must evaluate its current business goals and initiatives by using such tools at the Strategic Alignment Model taking into consideration diversity and standards as key components to strategic opportunity.

Diversity at FedEx

Federal Express has realized that diversity within the company is important to their survivability because it models their customer base allowing them to function efficiently in all the countries they service. "The FedEx family believes that, to meet the needs of a diverse customer base, we must reflect diversity within our organization. The variety of cultures in our employment ranks enables us to better understand the needs of our employees and maintain an inclusive environment." (Diversity at FedEx) Cultural pluralism is a key component of Federal Express because it emphasizes

that cultural differences add a new dimension allowing for strategic opportunities. These opportunities can only be achieved by people who are familiar with the local customs of each country and the specific cultural characteristics that define that country.

Standards at FedEx

When UPS went on strike in 1997, FedEx took over an addition 9.5 million packages that had to be delivered worldwide. During this time FedEx was re-applying for the ISO 9001 registration which was the international standards for Quality Management and Assurance. These standards were important to FedEx in that "The ISO 9000 quality standards were developed by the International Organization for Standardization in Geneva to promote and facilitate international trade." ("FedEx Archives: 1997 Press Releases.") These quality standards, according to FedEx had provided them with competitive advantage in that it ensured that their systems were internationally compliant allowing for a standardized approach to conducting business worldwide. "As global trade continues to grow, the commitment to quality standards that our ISO 9001 re-certification represents will further set FedEx apart from its competitors." ("FedEx Archives: 1997 Press Releases.")

Standards are important not only to FedEx in that they promote a level playing field for technology and quality promoting competition by standardizing measurements that become the foundation for innovation and creativity. "By continuously applying new technologies to its business, and eventually offering these technologies to its customers, FedEx has often leapfrogged past the rest of the industry." ("The FedEx Impact") This technology transfer is important to note in that it commercializes technologies that promote new opportunities, jobs and products. ("About NTTC")

Strategic Alignment Model and FedEx's Future Position

FedEx's future position will hinge on the firm's ability to consistently use the Strategic Alignment Model to best identify internal strategic fit. The concepts of "time and space" must be examined cohesively instead of individually. The future of logistics depends on the fact that time and space are unified elements that enhance logistics. International logistics allows companies like FedEx to effectively carry out their services globally. "Globalization is the ability to do business anyplace, as opposed to being obsessed with which functions are centralized and which are decentralized. To be an anyplace company, it is necessary to be able to communicate efficiently and effectively." (Luftman, Jerry N. 121). The Strategic Alignment Model with respect to FedEx's future position in the marketplace will hinge on various fusions of perspectives in order to achieve market dominance. As IT becomes more and more accepted into corporations that compete directly with FedEx, different perspectives must be fused in order to achieve flexibility in devising business strategies and aligning business goals. To continue to be competitive in the global marketplace, strategic alignment must consistently be addressed due to the ever-changing nature of IT. As IT becomes a ubiquitous part of FedEx, business and IT strategy initiatives become more and more seamless in nature. FedEx has been successful in realizing the power of IT from the beginning. The fact that FedEx is a newer company also enables the company to move faster using emerging technologies.

Information technology by itself does not necessarily allow a company to prosper economically. Having a common corporate goal and strategy – defined by strategic fit, will ensure that a company uses its internal and external domains by identifying areas that can drive business initiatives to affect business growth. Doing this will entail actively using such tools as the Strategic Alignment

Model to achieve internal business and technological synergies. Incorporating non-technological strategies such as cultural pluralism will diversify the talent base and spawn new and creative ideas. FedEx continues to thrive as a company due to its affiliation with multinational companies, its culturally diverse workplace, and its drive towards better technology. Utilizing technology transfer to help move new technology into the hands of their customers will continue to ensure that FedEx maintains good customer relationships internationally. Standards, strategy, diversity and technology, will continue to establish FedEx as a leading innovator in the areas of package delivery.

Privatization and Liberalization

Privatization and liberalization will serve the needs of developing countries striving for technological parity through technology transfer. Although this statement may be true on one hand, government sponsorship and support is also necessary. Technological growth in Japan is a perfect example of the melding of the public and private sectors in achieving technological parity. For countries to take advantage of the ever-changing pace in global technology, they must first define the government's role in order to exercise free enterprise. Countries that enable and promote technology within the private sector are most likely to be on the forefront of technology when it comes to creativity, innovation, and financial growth. The governmental infrastructure must also understand the importance of technology as it relates to global commerce and competition. Government must do its best to ensure that proper funding is in place to promote private sector research and development. Countries such as Japan have taken this approach despite numerous setbacks during the 20th century.

The United States and Japan have benefited tremendously from privatization and liberalization. Japan is an interesting example of a country that has experienced technological growth despite suffering setbacks such as World War II and natural disasters that have temporarily crippled

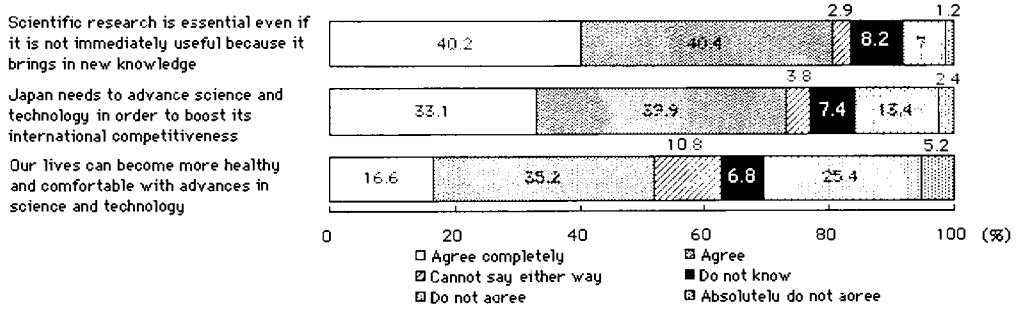
their economy. Why have the Japanese been so successful in recovering from these disasters? Not only have they imported technology from the United States and Europe, they have managed to align their infrastructure to form common goals. In 1996 Japan's technological goals were to invest twice as much in research and development by the year 2000. These goals support not only competition at the local level, they also support cultural pluralism and the realization that technology for the future will rely on multinational involvement. "These changes are the latest attempt to infuse creativity into Japan through measures such as ending lifetime employment for some researchers, establishing open competitions for funding, expanding the number of foreign researchers, and upgrading university and national laboratory facilities" (Yoshida, par. 3)

Japan's on going advancements in the technological arena are also due in part to Asia's integration. "In 1993, for example, 47 percent of Japan's technology exports went to Asia, far outpacing the 30 percent going to the United States. In the same year, 12 times more Asian than American scientists and engineers came to Japan. The gap continues to widen and will make the United States much less the focus of Japanese S&T (Science and Technology)." (Heaton, par. 15) Historically speaking, Japan was the first non-Western country to achieve industrial parity with the United States. It was only inevitable that technological parity would soon follow. The Japanese government contributed to the achievement of technological parity in three ways: First, it helped negotiate the terms of the technology importation with foreign companies. (The competition among Japanese firms to obtain technology was so intense that the royalty rates would otherwise have skyrocketed.) Second, it introduced preferential tax measures to encourage technology importation. Third, it restricted the market access of foreign companies by formal and informal means. A domestic firm with a license to use foreign technology therefore had little foreign competition and usually was

able to earn high (monopoly) profits. (Dekle, par. 4) These three components have changed Japan's technological, economical, and political outlook since the Second World War.

Institutional, private, and international research are key components to the ongoing advancement of the Japanese people. The Japanese have realized that research that does not yield immediate results is still necessary in that it brings about new knowledge. In a public opinion poll on science, technology, and society from the Japanese prime minister's office, statistics conclude that the majority of the Japanese people polled support the ongoing research and development conducted by their government and private sectors for increasing and improving competitiveness, overall health, and lifestyle. The statistics are as follows:

Figure 1 (1) Public opinion: Opinions about science and technology



Source: Prime Minister's Office, "Public Opinion Survey on Science and Technology and Society" (February 1995 survey)

("Attitudes of the Japanese People"

The graph suggests that at least 80.6% of the people surveyed in Japan agree that scientific research is necessary; at least 73% believe that international competitiveness is at the forefront of Japanese

culture, and at least 51.8% believe that a healthy and comfortable society will develop out of technological achievements. ("Attitudes of the Japanese People.")

Technology Transfer

The Japanese have realized that the university structure is one of the best sources of private R&D that will eventually transfer its knowledge and findings into the public domain as well as East Asia. According to Professor Katsuyo Tamai from the Research Center for Advanced Science and Technology (RCAST) of the University of Tokyo, there are 3 reasons for technology transfer in Japan:

- Accountability of the universities by Japanese taxpayers
- Increase competition amongst Japanese universities
- Importance of university based technological innovation (Tamai, Katsuya 113-114)

Technology transfer strengthens collaboration thus augmenting innovation. As a result of this belief the Center for Advanced Science and Technology Incubation was founded in 1998 to promote technology transfer. (Tamai, Katsuya. 114) Japan firmly believes that private investments in East Asian (South Korea, Taiwan, Hong Kong, Singapore, Thailand, and Malaysia) will benefit the recipient country as well as the host company. Technological transfer also is dependent on the recipient country's political and economic condition. The desire for a stable political and economic position in East Asia will facilitate the transfer of technological ideas throughout the region.

Technological parity can be achieved as long as the government fully understands the need for privatization and liberalization. The government must promote technological R&D as well as allow the private sector to lead the way. Japan's ideologies in technology transfer have allowed it to advance domestically. It has also allowed East Asia to benefit from advancements in technology. Although this technology transfer is a subset of a mechanism to promote global technology transfer, it has

supported the understanding that technological growth is reliant on other countries involvement. Companies such as The Japan Technology Group has taken technology transfer a step further by not only supporting technology transfer within the Pacific Rim but also between Japan and the United States. (Japan Technology Group, Inc.)

Summary

Information technology enriches today's society by introducing new ways of computing for both companies and consumers. Strategic alignments are formulated within companies and strategic alliances are formulated between companies to combine resources in offering better products and to enhance competitive advantage. IT allows small companies to expand globally to achieve world-wide presence. Virtual shopping arenas are established, and new ideas and products are spawned. Downes' three New Forces have not invalidated Porter's Five Forces but rather enhanced his ideas by bringing new avenues to achieving competitive advantage. It is also evident that Porter's ideals are more traditional while Downes takes a more holistic view taking into consideration a globalized and deregulated environment as the future of technology hinges on diversity and cultural pluralism.

The use of IT alone does not guarantee economic prosperity. Management must be open to change and have strong leadership roles within the organization to ensure employee buy-in. Trade-offs will ensure that a company's strategies are aligned with corporate goals. A company compromises its positioning when it focuses on too many products. Although IT has now added a virtual dimension to the organization, the physical and human aspects of business are still evident and must not be overlooked or ignored. Race and diversity create competitive advantage by promoting creative and new ways of thinking by taking into consideration ideas that are radically different which may be inherent to a particular cultural group. Race and diversity are also important to competitive advantage

in that localizing ones marketing and sales strategies will be geared towards the country or people which are being targeted. This will be evident in looking at Xerox's Eastern European sales organization and how it experienced an 80 per cent sales increase within a year after realizing that race and diversity can be key components to localizing sales strategies. Cultural diversity becomes more and more evident as technology moves from the private sector into the public domain as more emphasis is placed on engaging in diversifying R&D on a global scale. Today's IT-enriched world has afforded new outlooks and ideas in developing strategic opportunities and competitive advantage on a global scale.

Cultural Pluralism and the Future of Technology

As organizational boundaries continue to expand through technology, the business organization is no longer constrained by time zones, location, and racial or cultural composition. Companies that start to understand the full impact of this changing world will be able to take advantage of strategic opportunities to attain competitive advantage in the marketplace. Competitive advantage through cultural pluralism can be attained when an organization realizes that diversity is important not only to achieving a personal understanding of universal differences among people, but also to the changing environment that has been accelerated through the wide growth of the Internet.

Terms such as cultural diversity and awareness are heard constantly in the organizational environment. Although on the surface these ideas may address the ideology of cultural acceptance and awareness within a company, they are nevertheless also crucial to the ongoing development and growth of a company as geographical barriers continue to diminish. According to George Stickel, author of *Cultural Pluralism and the Schools: Theoretical Implications for the Promotion of Cultural Pluralism,* the "development of the value of cultural pluralism is dependent upon the development of both a

comprehensive theory of cultural pluralism and a model of cultural transmission which focus on the breadth, depth, and changes of ethnic groups within society." (Stickel, par. 1) For cultural pluralism to succeed within the organization and to be a viable tool in society, models and theories must be developed taking into consideration how technology has broken down geographical boundaries which at one time was a barrier to cultural understanding.

Companies and organizations are made up of individuals with different backgrounds, interests, and cultures. Today these organizations are becoming more reflective of the real world. Currently, cultural diversity is more prevalent in the larger cities. This is also mirrored in organizations within those cities. Smaller cities are beginning to see an influx of various cultures and races thus resulting in an increase in cultural diversity within the workplace. Cultural pluralism – "the idea that people's separate identities should be maintained and accepted by others as they work alongside each other" (Greenberg and Baron "The Shifting Demographics" 45) is a concept that will be explored in relationship to technological globalization and fundamental shifts in ideologies. When fully recognized and appreciated, cultural pluralism enables companies not only to achieve strategic opportunity and competitive advantage in the marketplace but also affords employees a new and enriched working environment setting the roadmap for the future of technology. This non-technological component recognizes that diversity is the foundation for radical technology and future innovation.

Cultural pluralism is important not only to the organizational structure, but it is also a contributing aspect to the personal growth of the individuals who work within these organizations. It supports the understanding of diversity among customers, vendors, and employees. Having a diverse workforce improves employee performance. "Not only is performance influenced by the presence of others, but by the group's racial/ethnic diversity." (Greenberg and Baron "Group Dynamics" 283)

Workplace diversity is also a tool that companies use to make strategic plans for the direction of a company. From a shareholder's perspective, a diverse workplace environment may promote international interest by promoting a heterogeneous ethnic and racial environment thus contributing to a company's exposure in the marketplace, resulting in a positive financial outlook. "Negotiating, selling, marketing, and delivering customer service across cultural lines is imperative if we are to succeed internationally or even here at home in our increasingly diverse marketplace." (Schwartz 174) Being able to adjust to the changing cultural environment may be the factor that allows a company to achieve competitive advantage and strategic opportunity.

Cultural pluralism also has its challenges. In an environment that is culturally diverse, there may be initial communication hurdles to overcome. Where the workforce is homogenous, cultural communications issues may be non-existent allowing for fewer obstacles. Although this may be true, cross-cultural groups tend to overcome these obstacles. In the long run they operate as efficiently or more efficiently than the homogenous workgroups. Also, the cross-cultural groups tend to develop standards for interaction with other cultures. This is significant in that these standards can also be transferred outside the organization, promoting global multicultural interaction. To overcome the challenges facing cultural pluralism, there are conditions that an organization must fulfill in order to achieve a strategic and competitive stronghold in the global marketplace.

Four Conditions of Cultural Pluralism

Cultural pluralism is not a concept that can be easily accepted and practiced by an organization. In order for an organization to develop awareness, understanding, and acceptance of diverse cultures there are conditions that must be fulfilled in order to achieve these goals. "Four conditions must be met for cultural pluralism to thrive: (1) cultural diversity must be present within society; (2) interaction

must exist between and among groups; (3) co-existing groups must share approximately equal political, economic, and educational opportunity; and (4) society must value cultural diversity." (Stickel, par. 1) The first condition is significant in that diversity must first be present within the organization before all other conditions can be met. To achieve the first condition, an organization must realize the importance of a culturally diverse workplace. This is challenging in that many organizations have diversity issues especially in the higher ranks and positions. It is also challenging because not all organizations are located in large metropolitan areas where diversity is more prevalent.

Once the first condition is met, the second condition can be fulfilled. Organizations attempt to fulfill this condition by employing diversity training workshops within an organization in order to foster awareness and dialogue between the disparate groups. Once diversity training is employed effectively, inter-group interactions can be fostered. Even though a group may be diverse in nature, it is important that the group realize this diversity. In a case study conducted by Rebecca Dooley, involving Western Digital, a multinational company based in Lake Forest, California with manufacturing facilities in Malaysia and Thailand, cultural differences affected interaction between the Malaysian constituency and the American constituency. It was apparent that although they realized these differences, interaction between the two groups were adversely different based on their respective cultural norms. Dooley discussed various "levels of consciousness" when it came to cross cultural interactions. (Dooley) These differences stemmed from cultural interactions while conducting business. The following example from Dooley illustrates these levels of consciousness that supports the notion that mere multicultural interactions does not necessarily mean that the various groups automatically acknowledge the differences between the groups.

> The example of an American male meeting an ethnic Malay woman for the first time in a business context illustrates this learning process.

Unconscious Incompetence The American attempts to shake the hand of an ethnic Malay woman, who recoils nervously.

Conscious Incompetence After a few times of experiencing very awkward moments, the American becomes aware there is something generally wrong with the attempted gesture.

Conscious Competence The American finds out that Muslim Malay women prefer not to shake a man's hand because of religious beliefs, and consciously withholds the handshake.

Unconscious Competence - After many months, the American is fully adapted at an unconscious level. He is further able to assess each situation and determine automatically whether to shake the hand of an ethnic Malay woman or not. "Unconscious competence" also includes what we know about our own culture but don't realize what we know. (Dooley, part 1)

These differences must be acknowledged first in order to develop a protocol of communications. Once communications is established then creative interactions can flourish. Dooley's ideals surrounding "levels of consciousness" supports the premise of cultural pluralism and emphasizes the fact that by merely working with someone from another country or culture does not automatically guarantee that business interactions or interactions pertaining to research and development are enhanced unless there is first an acknowledgment and acceptance of these differences. "Unconscious competence" was achieved after months of interactions that could have been overcome sooner if both cultures realized their differences initially. This would have allowed them to interact efficiently and effectively a lot sooner. Therefore cross-cultural teams are not inherently integrated, and therefore do not guarantee that creativity and innovation are spawned. These differences should be pointed out so they can be addressed. Once this has been accomplished, communications barriers can be overcome and effective interactions can be achieved.

The third condition of cultural pluralism supports the notion that various groups within the organization must be afforded equal opportunities. These rights ensure that no one particular group

has an advantage over another and there are no feelings of favoritism. Equal rights and opportunities also contribute to an employee's positive feelings about the company and instill a feeling of ownership thus promoting employee loyalty.

The fourth condition that supports cultural pluralism relies on society's acceptance and values placed on cultural diversity. These values are most effective when instilled at an early age in the development cycle of an individual. Unfortunately these values are sometimes never taught which in the long run may be detrimental to radical technologies because there is never any common form of communications or cultural acceptance to establish a foundation to cultural pluralism.

In 2001, Dr. Birgit Poniatowski, Academic Programme Offiicer at the United Nations University discussed ways in which cultures could participate in cultural pluralism:

- Cultural Pluralism is possible only if members of different cultural groups – within a local community, a nation state, or on the global level – have equal chances to reflect their preferences in political, social and economic decision-making.
- To meaningfully do so, every person has to be able to satisfy her or his basic needs – food, shelter etc. This is where the promotion of cultural pluralism links to human development with both a necessary condition to attain the other.
- Every person should be able to gain access to all relevant information needed for effective participation in society. (Poniatowski 2)

Poniatowski further points out that globalization increases cultural awareness and sensitivity and that there needs to be political as well as civilian actors involved that will promote these new ideals of cultural pluralism and its effect on technology moving forward.

Australia: A Case Study in Cultural Pluralism

Australia is a continent located in the South Pacific Ocean with a population of approximately 19 million people. The size of Australia can be compared to the size of the 48 contiguous states of the

United States of America ("Australia: The World Factbook") The cultural makeup of Australia is comprised of descendants from China during the 1850s on account of the gold rush, the United Kingdom, and Asia. The entire Australian population represents approximately 160 countries. (Wilkinson) The indigenous Australians otherwise known as Aborigines comprise about 2 per cent of the Australian population. ("The Face of a Nation")

Studies on cultural pluralism and its impact on Australian society were conducted yielding evidence that a multicultural environment not only affords its members a feeling of belonging but also promotes internal and external marketing opportunities resulting in a more stable economy. The results of this case study indirectly support the ideals that cultural pluralism is the future of technological innovation and strategic opportunity. Various companies adapted their marketing strategies to take into account cultural diversity resulting in increased sales domestically and internationally. The case study conducted by Ian Wilkinson and Constant Chen, examined multiculturalism domestically, and internationally. The following chart on "The Three Components of Multicultural Markets" illustrates the interconnectivity that comes into play examining multiculturalism and the resources associated with it.

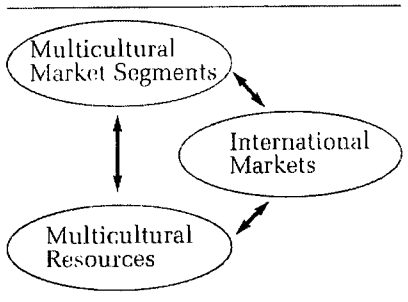


Figure 1.
The Three Components of Multicultural Marketing

(Wilkinson)

Wilkinson points out that the 2 way arrows connecting Multicultural Market Segments and International Markets illustrates the relationship that domestic multiculturalism has on international multiculturalism and visa versa. It also illustrates how the diverse cultural makeup of Australia is a

reflective microcosm of the real world. Wilkinson and Cheng also took into consideration multicultural resources which "refers primarily to the skills and resources of its multicultural workforce but also to other resources that have resulted from the multicultural heritage, such as cultural knowledge and understanding, ethnic organizations and institutions, material artifacts such as churches and mosques, and international links and bonds." (Wilkinson). Wilkinson's chart on "The Three Components of Multicultural Markets" above focuses on products and services as opposed to technological innovation and research and development, but similarities can be concluded from comparing the two. The technology and the products and services industries share similar principals such as the need for government involvement, global standards, and cultural diversity.

The results of Wilkinson's case study on diversity showed that many industries such as health care, banking, telecommunications, and media, realized that diversity was the key to prosperity domestically and internationally. Special Broadcasting System (SBS), NSW State Department of Fair Trade, Global One, Advance Bank, Korean Community Credit Union, and the National Australia Bank, just to name a few, had developed strategies which directly took into consideration the cultural makeup of the country winning various awards for their efforts in aligning their business strategies with the cultural makeup of the country. The study also points out that not all attempts at aligning one's business with culture guarantees success. Oftentimes migrants living in a host country tend to start adapting to a new culture while at the same time diluting cultural traits from their country of origin. This is known as the "melting pot" metaphor whereby cultures start to melt into one and there are less and less traits of individual countries of origin. Cultural Pluralism is more like the "salad bowl" metaphor whereby each country is represented but does not loose its individuality. (Bhattacharya and Groznik) As Wilkinson points out, "second- and third-generation migrant families become assimilated into the local culture while helping shape it. Therefore, they take on different characteristics than those

of people in their country of origin." (Wilkinson) This explanation indicates that there are challenges to cultural pluralism when cultural identify starts to become diluted.

Wilkinson observers that in order for an international business to become successful, business leaders need to recognize diversity as a benefit, and train their employees in recognizing and appreciating multiculturalism. "Firms that can cope well with cultural diversity at home should be able to cope with it abroad." (Wilkinson).

Western Digital: A Case Study in Diversity

Western Digital, a leading manufacturer of computer hard drives based in Lake Forester, California was founded in 1970 employing approximately 10,000 people worldwide with manufacturing facilities located in Malaysia and Thailand. Western Digital's revenues for 2003 were $2.7 billion of which $135 million was devoted to research and development. ("Annual Report and Form 10K") Western Digital was also ranked fourth as Best Employer in Asia in 2001 (Dooley, part 2) based on human resource practices, employee surveys, executive interviews and employee assessment.

A case study was conducted at Western Digital by Rebecca Dooley examining cultural differences within Malaysia (Malay, Chinese, and Indian) with their western counterparts in America. Her findings indicated that there were cultural differences and misconceptions not only within the Malaysian cultures but also between the Malaysians and Americans. A "Global Intercultural Leadership" workshop was conducted in order to achieve certain goals. These goals were to:

> 1)Gain immediate practical insight into each culture by comparing group-reported cultural values, examining assumptions and misunderstandings in daily interactions, and observing effects of stereotyping in the work place;

2) Understand cross-cultural behavior in the workplace within a research framework of five dimensions;

3) Surface effects of organizational structure on individuals and groups in a multicultural environment;

4) Identify and recommend practical management strategies for increasing collaboration and productivity at the Malaysian facility;

5) Practice emotional intelligence skills in a cross-cultural, high stress environment (Dooley, part.2)

From the workshop, significant cultural differences were discovered such as their misconceptions of each others culture, their styles of interaction with upper management, and their values placed on collectivism versus individualism. One of the main exercises that were conducted was to place like cultures into homogenous groups. "Groups reported that while communication was easier, the homogeneous teams would be less able to come up with creative ideas, not adapt to changes easily, and display more ethnocentric behaviors towards those unlike themselves." (Dooley, part 2) These findings support the premise that creativity and innovation is far more stimulated when there is a mix of cultures and genders working together on a team. Cultural diversity enhances technological innovation especially when there is an awareness of cultural differences. Tom McDorman, Western Digital's managing director, pointed out that education of his employees resulted in a 20% increase in productivity in 2000. (Dooley, part 2) The results of this exercise illustrates that cultural pluralism on a large scale can be used as a way to improve creativity and innovation promoting radical technologies as long as individuals are aware of cultural differences and are apt to accept these differences as a means to productivity.

Problems at Xerox: Eastern Europe

Xerox Corporation based in Stamford, Connecticut is a $15.7 billion dollar company with 61,500 employees world-wide specializing in document management and technology. ("About Xerox.") In 1993, Xerox Corporation had been loosing market position in 10 Eastern European countries due to competition, lack of knowledge for equipment demands, lack of knowledge of cultural differences, and lack of a good marketing strategy that took these cultural differences into consideration. Although Xerox as a company did not fail, their Eastern European sales organization was loosing ground and would continue to loose ground unless something was done to fix this problem. Xerox hired Aspen, a business communications agency, to analyze their sales and marketing data, and to fix the problems they were having in Eastern Europe. Aspen needed to be successful in all 10 countries using cultural and language strategies specific to each country. As a result of their research, Aspen developed advertising campaigns that were localized. They realized that translating American advertisements into the local language of each of the Eastern European countries would not be an effective way to market because each culture had its own characteristics. They implemented training programs for the various Eastern European sales managers on cultural differences and how to appreciate the diversity between the various countries. They also trained the managers how to best manage these differences to increase sales.

It was noted that "the success of the campaign, from advertising through to Xerox branding, was one factor that led to Xerox achieving an 80 per cent sales growth in almost every European country in 1994." (Parker) It is also important to note that the sales growth was also sparked by economic growth, and an increase in Xerox dealers. There is a possibility that Xerox would have continued to loose in sales if they had not employed Aspen to examine their marketing data and implement strategies that were focused on individual cultural characteristics. From this case study,

ideologies surrounding cultural pluralism appeared to be a major contributing factor to Xerox's sales increase in Eastern Europe.

This case study looks at sales and marketing strategies and how cultural pluralism plays a key component in understanding and appreciating diversity. It also examines strategies that were put into place once these differences were appreciated which caused an increase in Xerox sales throughout Eastern Europe. Just as cultural pluralism plays a key role in sales strategies, it can easily be applied to technology in that cultural pluralism brings awareness of differences and utilizes these differences to augment creativity supporting global innovation.

The Rise and Fall of HyperNet

In 1991 HyperNet, a Japanese internet service provider opened its doors. The firm's chief executive officer Yuichiro Itakura wrote an autobiography detailing the rise and fall of this company. His book detailed the process that transpired including negotiations with major Japanese banks, venture capitalist firms, and securities firms in order to secure a strong footing for the company's future. Three years after HyperNet opened its doors Itakura managed to attain backing from Japan's leading venture capital firm JAFCO followed by one of Japan's largest banks, Sumitomo, followed by other Japanese banks. By 1996 HyperNet had been quite aggressive allowing them to win the New Business Award which opened doors to potential partnerships with Microsoft and other large organizations. Unbeknownst to HyperNet and Itakura, their downfall would be around the corner. The initial problems they had were technical in nature but initial foreign investment could have saved this company but Japanese business culture during this period focused on nationalist ideals which did not promote foreign investment.

By December of 1997, HyperNet closed its doors after filing for bankruptcy. The issues that led to HyperNet's downfall started as technical problems in their teleconferencing systems causing them to apply for new loans in order to fix the problems. Sumitomo refused to grant HyperNet another loan. Other banks followed suit. "The main reason was the heavy pressure lenders faced from Japanese financial authorities and markets to rid their portfolios of bad loans." (Komago) Japanese business practices also contributed to HyperNet's downfall. The ideals of "yokonarabi", which means "lining up side by side", was the notion that Japanese businesses align themselves following each others direction. This practice "helps create a bubble effect that can eventually lead to large-scale failures." (Komago) Realizing this practice, the Japanese government formed the Competitive Industry Council in hopes of enacting new business policies geared at fostering different ways of stimulating business.

Itakura had been quite successful in raising funds within Japan causing him to ignore foreign investment potential. "As Itakura himself noted in an interview, his company's fate might have been different if he had raised funds abroad." (Komago). Itakura acknowledged that foreign direct investment, which many Japanese companies started engaging in by 1998, may have brought them out of bankruptcy. This would have saved the company because Japanese business culture was a contributing factor to HyperNet's downfall whereas foreign investors would not have been influenced by business practices within Japan.

This case study illustrates that diversity can be a determining factor to a company's survival. Ideologies surrounding diversity and multiculturalism play a significant role in the technological arena in that it does not restrict innovation and creativity but enhances it. Individual cultural characteristics may sometimes hinder domestic progress resulting in catastrophic results as in the case of HyperNet.

Radical Technology

In James Utterback's book, *Mastering the Dynamics of Innovation,* he points out that when established companies disregard radical technologies, they stand the chance of losing financial and market dominance. "The result of this reluctance to adopt successful new technologies has been a change of leadership at breakpoints in technology." (Utterback 180) To effectively integrate e-commerce into a company's infrastructure, current face-to-face business relationships and strategies must not be abandoned but enhanced to incorporate new technological strategies. Evan I. Schwartz, author of *Webonics*, writes that when a company integrates Internet technology, "it must recognize three key changes in the terrain: First, the computer network serves as the infrastructure, not buildings and other brick-and-mortal real estate. Second, the computer screen simulates face to face contact. Third, people trade information instead of physical goods." (Schwartz 174) With the integration of e-commerce into the organization, certain advantages and disadvantages unfold that affect both sellers and buyers.

Canon

An example of radical technology came into play in 1985 with the Canon personal fax machines contact sensor project which was a significant departure from their standard existing technologies. Their early innovation in the personal fax machine was seen in their CSI fax machine which was more expensive than the competition. Canon realized this and employed radical technologies to develop the CSII. Employing radical technologies did not come without a price because it required utilizing unproven technologies, a new production line, and it presented a great financial risk to the company.

Canon's corporate philosophy played a significant role in their survivability even though they were taking great risks employing radical technology. "Kyosei" Canon's corporate philosophy supported a number of non-technological barriers. It promoted 1) environmental responsibilities, 2) respect for other company's technologies, and 3) respect of country of origin in the development of technology. It also responded to problems of globalization.

The definition of Kyosei is:

> 'All people, regardless of race, religion or culture, harmoniously living and working together into the future.' Unfortunately, the presence of imbalance in our world -in areas such as trade, income levels and the environment- hinders the achievement of *kyosei*. Addressing these imbalances is an ongoing mission, and Canon is doing its part by actively pursuing *kyosei*. True global companies must foster good relations, not only with their customers and the communities in which they operate, but also with nations and the environment. They must also bear the responsibility for the impact of their activities on society. For this reason, Canon's goal is to contribute to the prosperity of the world and the happiness of humanity, which will lead to continuing growth and bring the world closer to achieving *kyosei*. ("Corporate Philosophy – Kyosei")

Kyosei lends awareness to environmental concerns which has allowed Canon to experience a cost savings of 30 billion yen in 1990 because it promoted innovation in manufacturing strategies that changed their production methods making them more environmentally friendly. "In production, for example, the innovative shift from conveyor-based processes to the use of a cell production method increased efficiency, leading to a cost saving of 30 billion yen through reduced inventory and saving of space."("Kyosei" par. 24) Also, landfill volumes and water consumption were cut by 17% and 9.3% respectively on account of environmental awareness and concern which are rooted in Canon's philosophies of Kyosei.("Kyosei." par.28) Canon's philosophies also allowed them to become ISO 14001 certified which is "a three-pronged approach to meeting the needs of business, industry, governments and consumers in the field of the environment".(" ISO and the Environment") The

philosophy or Kyosei supports the notion that the future of business is not in fact based solely on technological innovations but also on humanitarian beliefs in cultural pluralism and human interaction.

Globalization Trends

In order for cultural pluralism and human interaction to flourish, corporate strategies such as strategic alignment play a role in competitive advantage if the technological aspect of an industry is represented at the higher levels such as in the board rooms. In addition, globalizing research and development will also play a significant role in the future of technology. Japan has realized that in order for them to remain a strong force in the area of technology, they will have to diversify their development teams by strategically placing research and development (R&D) in various countries employing technologists from that host country. "One change that Japanese companies have made, and will continue to make, in their R&D organizations is to expand beyond their national borders and tap R&D talents throughout the world. NEC believes such alliances are important because the increasing sophistication of technology and the growing scale of development projects mean that R&D becomes more difficult to handle alone, and because standardization is of growing importance and by its nature requires alliances." (Perry, par. 9) NEC's slogan 'Empowered by Innovation' depicts their corporate culture which embraces diversity and cultural pluralism as a means to a new technological revolution. This new approach does have its challenges in that it requires that there is a common way of communicating and that the developers in these foreign countries share the same philosophical ideologies of the primary company.

NEC

Nippon Electric Company, Ltd (NEC) was founded by Kunihiko Iwadare in 1899 and was a joint venture with Western Electric Company of the United States. As of December 31, 2003, NEC's

capital was 330.0 billion yen. ("Corporate Overview: About NEC") Like many businesses today, NEC is faced with severe financial loss. Despite these losses, they have undergone internal reform in order to remain a solvent company. These reforms entailed dividing the company in such a way to be a variety-based company by limiting their scope of products and specializing in areas that are core to their business. These business domains are: Integrated IT/Network Solutions, and Semiconductor Solutions. Doing this allows them to strategically align their business maximizing on their core competencies. ("Annual Report 2003")

Other measures they have taken to reduce cost and align their business included utilizing open standards for research and development, using standard electronic components to manufacture computer equipment, and utilizing the internet for electronic procurement. ("Annual Report 2003")

Technological Advancement through Multiculturalism: Japan

The Japanese have been a technological powerhouse from the late 19th century continuing into the 21st century. The Japanese had engaged in strategic alliances with foreign countries that allowed them not only to be competitive within their own country but throughout the world. During the early part of the 20th century, 3 Japanese companies forged alliances with foreign countries. Shibaura Corporation (Toshiba), Mitsubishi Electronics, and Fuji Electric of Japan joined forces with General Electric of the United States, Westinghouse of the United States, and Siemens of Germany respectively. These alliances overall had a positive impact not only on technological advancement but also on cultural relationships despite the two World Wars that would follow alienating Japan from Germany in World War I and Japan from the United States in Word War II. Technology transfer would occur with the United States and Europe following World War II which enabled Japan "to catch up with technology on thermal power plant apparatuses and others."(Okita, par. 13)

Historically, these alliances accelerated the development in science and technology by promoting a competitive nature throughout the world which is evident in Japanese history:

> Tsuneo Mitsui, who is the chairman of the History Committee of Electrical Engineering in the IEEJ, classified the significance of learning the history of technology into five (5) categories: (1) Accumulation and succession of technology, (2) Widening the range of vision, (3) Great performance of technology leaders in the past, (4) Excavation of new issues in technology fields, and (5) Relation between technology and culture & human beings. (Okita, par .14)

Realizing that cultural and human interaction with the rest of the world was a determining factor to the future of technology is significant in that the Japanese have accelerated at a phenomenal rate in being a significant contributor to the technological revolution despite wars and natural disasters. By being involved with the rest of the world, especially in the areas of research and development, the Japanese have taken full advantage of technologies from other countries.

Summary

Technology has had a tremendous impact on the way society interacts. The Internet has put an end to geographic boundaries, allowing for electronic commerce to permeate society and promote ubiquitous computing interactions that have had a positive economical impact on cultures and nations. Technology coupled with cultural pluralism within an organization promotes and supports competitive advantage and strategic opportunities. By employing culturally diverse individuals, the organization becomes a reflective microcosm of the real world as examined through the multicultural aspects of Australia. With technology such as the Internet in place, companies are able to conduct business with foreign governments and countries more effectively because the organization already contains individuals that are better suited in relating to these foreign entities in their native manner. This eliminates any cultural disparity in conducting business.

Technology has also allowed the organization to be introduced to various cultures. Technology trivializes time and distance, thus promoting global communications. As global communications increase, universal economic equality begins to germinate. Organizations such as the Global Information Infrastructure Commission (GIIC) promote technology with the intent that all citizens are afforded equal opportunity and access. Their common objective is to work with foreign governments to promote ongoing technological advancements supporting electronic commerce to ensure that all countries have an equal opportunity to participate in the global marketplace. Cultural pluralism coupled with the globalization of technology contributes to competitive advantage and strategic opportunities within the organization.

History has also shown that technological growth occurs rapidly when various countries participate to form strategic alliances. Japan's technological growth points not only towards technology transfer as a means of sharing technology between the private and public sectors but also towards cultural and human perspectives which form strong global alliances. The Xerox and HyperNet case studies illustrate how important cultural pluralism and foreign investments can be to a company and if appreciated and acted upon in a timely fashion could turn a company around.

The four conditions of cultural pluralism bring to light the importance of diversity and the benefits to research and development and technological innovation. Case studies on Western Digital illustrate that diversity in and of itself does not guarantee that a company will benefit from diversity but that awareness needs to be brought to the attention of the employees and accepted as a means to productivity and prosperity in a global marketplace. This case study also shows that a diverse workforce spawns creativity. Canon's corporate philosophy of Kyosei supports this notion as well.

Case studies on various industries in Australia show that multiculturalism offers strategic opportunity both domestically and internationally.

Conclusion

Standards and policies in global electronic commerce are essential to the ongoing trend in information technology. As Nicolas Negroponte pointed out; "Like a force of nature, the digital age cannot be denied or stopped. It has four very powerful qualities that will result in its ultimate triumph: decentralizing, globalizing, harmonizing, and empowering." (Negroponte, "Epilogue: An Age of Optimism" 229) Global electronic commerce has the characteristics of these four components. Standards organizations must continue to promote the traits found in the digital age by supporting the market through implementation of policies and standards that integrate and support foreign investment and trade. This constitutes the foundation for cultural pluralism. Practices in cultural pluralism will further the information age by homogenizing disparate techniques in research and development which is evident in examining Japanese practices in technology transfer as well as their integration of research and development from various countries taking full advantage of diversity. This practice has not only allowed Japan to recover from setbacks in the 20th century, but it has also allowed them to be a major contributor to the future of technology. Decentralization of research and development will take into consideration the various cultures that will develop the technologies of the future. Since the Internet has allowed various countries to take part in technology and commerce, it has, by its very nature, contributed to globalization trends resulting in a wide array of diverse viewpoints stimulating technological creativity and innovation.

In looking at the various groups and standards organizations, one is able to notice that their roles and policies overlap. The reason for this overlap stems from the fact that many of these

organizations interact with each other on various levels, thus resulting in shared views and policies surrounding technology.

The need for standards organizations is evident in the establishment of the Internet and the euro for example. As this new currency continues to integrate into the world market, other countries will follow suit, establishing common currencies to promote and encourage global commerce. Standards surrounding the Internet have allowed disparate networks to communicate with each other and have provided the perfect platform on which to conduct international transactions. These standards organizations must be aware that too much control can also hinder creativity and innovation. There must be a balance of power that allows the industry to take charge and develop new standards for the global marketplace. "Not until the middle of the next [21st] century will it be quite clear what the broadest impacts of new communications have been. The effects will be felt in four main areas: commerce and the shape of the company, the economy, society and culture, and government and political process." (Cairncross 23) Then we will see the harmonizing effects of policies and standards promoting global electronic commerce.

Standards organizations play a major role in the contribution to cultural pluralism. Although these organizations focus more so on establishing standards and policies, they harmonize systems that interconnect countries regardless of their technological levels. Cerf and his development of TCP/IP as a standard for the internet have gone way beyond just the scientific realm of computers and networks. Moore's Law about the CPU will see yet another spike in the future as cultural pluralism plays into the equation as it introduces new methodologies promoting radical innovation in CPU technology. It is evident that culture and diversity will generate creativity and innovation that will

significantly contribute to the next wave of CPU technology. Gilder's ideas on technological shifts will be heightened when research and development emphasizes the non-technological realm.

Strategies surrounding competitive advantage and the various viewpoints from Larry Downes, and Michael Porter, along with the strategic alignment model developed by N. Venkatraman, and J.C. Henderson, build upon the standards that have been established by the various global organizations. These components reflect information technology of today. The future of technological innovation will add another dimension to these ideals and standards by introducing a component based not on technology alone, but on the human experience characterized in what has been seen in Japanese technological advancement during the 20th century. Cultural pluralism will play a major role as technology continues to develop taking full advantage of the distinct differences in research and development techniques which are as diverse as the people engaged in the actual R&D. This diversity will be a key component that will drive global innovation empowering all countries to contribute to the ongoing development of new technologies promoting strategies for achieving competitive advantage supporting the future of information technology.

Bibliography

"About FedEx:." FedEx Executive Bios. http://www.fedex.com/us/about/overview/people/bios.html?link=4. Accessed 25 December, 2003.

"About the IEEE." IEEE. http://www.ieee.org/portal/index.jsp?pageID=corp_level1&path=about&file=index.xml&xsl=generic.xsl. Accessed 03 January, 2004.

"About NTTC" National Technology Transfer Center. http://www.nttc.edu/aboutnttc/default.asp. Accessed 21 March 2004.

"About the SIG." The Official Bluetooth Website. http://www.bluetooth.com/about/. Accessed 19 January, 2004.

"About Xerox." Xerox – USA. http://www.xerox.com/go/xrx/template/009.jsp?view=About%20Xerox&Xcntry=USA&Xlang=en_US. Accessed 22 February 2004.

"Amendments to FOI Act: Communications Legislation Amendment Bill (No. 1) 2002" Electronic Frontiers Australia. http://www.efa.org.au/FOI/clabill2002/. Accessed 20 March 2004.

"Annual Report 2003" NEC Corporation: To Our Shareholders. http://www.nec.co.jp/ir/en/library/annual/2003/pdf/ar03-02.pdf . Dated 19 June, 2003. Accessed 23 December, 2003.

"Annual Report and Form 10K: 2003" Western Digital. http://www.wdc.com/en/library/company/annual03.pdf. Accessed 09 February, 2004.

"Attitudes of the Japanese People With Regard to Science and Technology." Annual Report on the Promotion of Science and Technology 1998 (Summary) http://www.mext.go.jp/english/news/1998/06/980626e.htm. Accessed 26 December, 2003

"Australia: The World Factbook." CIA – The World Factbook. http://www.odci.gov/cia/publications/factbook/geos/as.html. Accessed 14 February, 2004.

Banisar, David. "The www.freedominfo.org Global Survey::Freedom of Information and Access to Government Record Laws Around the World. 28 September 2003" http://www.freedominfo.org/survey/survey2003.pdf. Accessed 20 March 2004.

Bhattacharya, Utpal and Peter Goznik. "Melting Pot or Salad Bowl: Some Evidence from U.S. Investments Abroad." http://www.bus.indiana.edu/Finance/ancestry.pdf. Accessed 21 March 2004.

"Building Partnerships for Progress: Electronic Commerce" Organization for Economic Co-operation and Development. http://www.oecd.org/topic/0,2686,en_2649_37441_1_1_1_1_37441,00.html. Accessed 24 December, 2003.

Cairncross, Francis. *The Death of Distance.* Boston, Massachusetts: Harvard Business School Press, 1997.

"Corporate Overview: About NEC." http://www.nec.co.jp/profile/en/index.html. Accessed 21 March 2004.

"Corporate Philosophy – Kyosei." About Canon. http://www.canon.com/about/philosophy. Accessed 21 November, 2003.

Davidson, W.H. *Beyond Re-engineering:The Three Phases of Business Transformation.* IBM Systems Journal. Vol. 32 No. 1., 1993. P. 78. Reprint: Vol. 38 No. 2&3, 1999.

Dekle, Robert. "Technology and Industrial Development in Japan: Building Capabilities by Learning, Innovation, and Public Policy." *Finance & Development.* Washington, Mar 1998. P.55. Accessed through the ABI Inform Database, Rochester Institute of Technology, 25 December, 2003.

"Diversity at FedEx." Fed Ex Shipsmart eNews. http://www.fedex.com/us/careers/diversity/. Accessed 21 March 2004.

Dooley, Rebecca. "Four cultures, one company: Achieving corporate excellence through working cultural complexity (part 1)." Organization Development Journal. Chesterland: Spring 2003. Vol. 21, Iss. 1; pg. 56. Accessed through ABI Inform Database, Rochester Institute of Technology, 04 February, 2004.

Dooley, Rebecca. "Four cultures, one company: Achieving corporate excellence through working cultural complexity (part 2)." Organization Development Journal. Chesterland: Summer 2003. Vol. 21, Iss. 2; pg. 52. Accessed through ABI Inform Database, Rochester Institute of Technology, 09 February, 2004.

Downes, Larry. *Beyond Porter.* Context Magazine. Fall, 1997.

"Electronic Commerce for Developing Countries" *International Telecommunication Union.* http://www.itu.int/ITU-D/bdtint/vap/brochures/2000/ecdc.html. Accessed 13 December, 2003.

"Electronic Commerce" Global Information Infrastructure Commission. http://www.giic.org/focus/ecommerce/. Accessed 14 December, 2003.

Ericson, Ron. "Net Taxation is a Global Issue." *Upside.* Foster City, Feb 1999. Accessed through ABI Inform database: RIT, 24 December, 2003.

Evans, Philip B. and Thomas S. Wurster. *Strategy and The New Economics of Information.* Harvard Business Review: September-October 1997.

"Fact Sheets From NIST:" NIST's Role in Electronic Commerce. http://www.nist.gov/public_affairs/factsheet/ecommerce.htm. Accessed 19-December, 2003.

"FedEx Archives: 1997 Press Releases." About FedEx. http://fedex.com/us/about/news/pressreleases/archives/pressrelease505344.html. Accessed 21 March 2004.

"Freedom of Information Act Guide, May 2002: FOIA Reading Rooms." FOIA Guide, 2002 Edition. http://www.usdoj.gov/oip/readingroom.htm. Accessed 24 December, 2003.

Gilder, George. "Mike Milken and the two trillion dollar opportunity." *Telecosm.* http://www.seas.upenn.edu/~gaj1/trilgg.html. Dated 1996. Accessed 24 December, 2003.

Gilder, George. "The New Rules of Wireless." *Telecosm.* Forbes ASAP: New York. March 23, 1993. http://www.seas.upenn.edu/~gaj1/wireless.html. Accessed 24 Decmeber, 2003..

Grant, Linda. "Why FedEx is Flying High." *Fortune.* November 10, 1997.

Greenberg, Jerald and Robert A. Baron. "The Shifting Demographics of the Workplace: Trends Toward Diversity." *Behavior in Organizations.* New Jersey: Prentice Hall, 1997.

Greenberg, Jerald and Robert A. Baron. "Group Dynamics and Teamwork." *Behavior in Organizations.* New Jersey: Prentice Hall, 1997. .

Hamel, Gary, and C.K. Prahalad. *Core Competence of the Corporation.* Harvard Business Review: May-June, 1990.

Hamel, Gary, and C.K. Prahalad. *Strategic Intent.* Harvard Business Review: May-June, 1989.

Hariani, Jay. "A Brief Biography of Vincent Cerf." Dated 22-March-01. http://www.computinghistorymuseum.org/teaching/papers/biography/vint%20cerf%20bio%20paper.pdf. Accessed 28 December, 2003.

Heaton, George R. Jr. "Engaging an Independent Japan" Issues in Science and Technology Online. Summer 1997. http://www.nap.edu/issues/13.4/heaton.htm. Accessed 25 December, 2003.

"H.R. 1552 - Internet Tax Nondiscrimination Act." Office of Manangement and Budget: The Executive Office of the President. http://www.whitehouse.gov/omb/legislative/sap/107-1/HR1552-h.html. Accessed 14 December, 2003.

"IEEE On-Line Catalog and Store" http://shop.ieee.org/store/search.asp#Standard. Accessed 20 January 2004.

" ISO and the Environment" International Organization for Standardization. http://www.iso.ch/iso/en/iso9000-14000/basics/basics14000/basics14000_1.html. Accessed 21 March 2004.

Japan Technology Group, Inc. http://www.japantechnologygroup.com/index.htm. Accessed 24 December, 2003.

Komago, Shigero. "A Man Who Shouldn't Be a CEO: Why My Company Failed." (Book Review) Foreign Policy, Fall 1999 p141. Accessed through Business and Company Resource Center: RIT, 27 February 2004.

"Kyosei – A Worldwide View" Dubai Internet City Visions 2004: Canon. http://www.cpilive.net/news_ver2/guides_2004/dic_visions/canon.htm. Accessed 21 March 2004.

Lappin, Todd. "The Airline of the Internet." *Wired Magazine.* December 1996. http://www.wired.com/wired/archive/4.12/ffedex_pr.html. Accessed 25 December, 2003.

Luftman, Jerry N. "Do You Need an IT Strategy." *Competing in the Information Age.* New York: Oxford University Press. 1996.

Luftman, Jeffrey N. and Raymond Papp, Ph.D. "Business and I/T Strategic Alignment: New Perspectives and Assessments" Fusion Perspectives in Alignment. http://hsb.baylor.edu/ramsower/acis/papers/papp.htm. Accessed 02 January, 2004.

Mazur, Laura, "Diversity is the key to reaching wider audience." *Marketing* :United Kingdom. Accessed through ABI Inform database: RIT, Accessed 5 December, 2003.

"Membership: ITU." International Telecommunications Union. http://www.itu.int/members/index.html. Accessed 29 December, 2003.

"Moore's Law:Overview" Intel Research - Silicon. http://www.intel.com/research/silicon/mooreslaw.htm. Accessed 21 November, 2003.

Negroponte, Nicholas. "Epilogue:An Age of Optimism." *Being Digital.* New York: Alfred A. Knopf, 1996.

Negroponte, Nicholas. "The Digital Revolution: Reasons for Optimism." *The Futurist.* Washington; Nov 1995.

Okita, Yuji. "History of Technology and the Changing Era." http://www.ieee.org/organizations/history_center/Singapore/okita.html. Accessed 06 January, 2004.

"Overview of the OECD: What is it? History? Who does what? Structure of the organisation?." *Organization for Economic Co-operation and Development.* http://www.oecd.org/document/18/0,2340,en_2649_201185_2068050_1_1_1_1,00.html. Accessed 24 December 2003.

Parker, Daney. "The X Files." Marketing Week. London: Mar 8, 1996. Vol. 18, Iss. 49; pg. 73, 2 pgs. ABI Inform Database. Accessed 24 February 2004.

Perry, Tekla S. "Structure of Japanese R&D holds despite yen cuts" Research Technology Management. Washington: May/Jun 1994. Vol. 37, Iss. 3; pg. 3, 2 pgs ABI Inform Database. Accessed 23 December 2003.

"Personal Information Protection and Electronic Documents Act" http://laws.justice.gc.ca/en/P-8.6/text.html. Accessed 20 February 2004.

Poniatowski, Dr. Birgit. "The Future of Cultures: Challenges and Opportunities for Cultural Diversity." http://www.unu.edu/hq/japanese/gs-j/gs2001j/okinawa3/poniatowski-full-e.pdf. Accessed 29 December, 2003.

Porter, Michael E. *What is Strategy.* Harvard Business Review: November-December, 1996.

Porter, Michael E., and Victor E. Millar. *How Information Gives You Competitive Advantage.* Harvard Business Review: July-August 1985.

Prabhakar, Dr. Ariti."IEEE Symposium on the NII." *National Institute of Technology and Standards.* http://www.nist.gov/speeches/jun94/ieee.html. Accessed 07 December, 2003.

Rayport, Jeffrey F. and John J. Sviokla. *Exploiting The Virtual Value Chain.* Harvard Business Review: November-December 1995.

Rayport, Jeffrey F. and John J. Sviokla. *Managing in The Marketspace.* Harvard Business Review: November-December 1994.

"S. 761 - Millennium Digital Commerce Act." Office of Manangement and Budget: The Executive Office of the President. http://www.whitehouse.gov/omb/legislative/sap/106-1/S761-s.html. Accessed 14 December, 2003.

Sanderson, Christine. "Taxing a Borderless World." *International Tax Review.* London, Dec 1998/Jan 1999. Accessed through ABI Inform Database: RIT 25-December, 2003.

Schwartz, Evan I. "From Marketplace to Marketspace." *Webonics.* New York, NY: Broadway Books, 1997.

Seglin, Jeffrey L. "E-mail With. . .Nicholas Negroponte." *Inc. Magazine.* http://www.inc.com/magazine/19940615/3279.html. 1994. Accessed 25 December, 2003.

Stickel, George W. "Cultural Pluralism and the Schools: Theoretical Implications for the Promotion of Cultural Pluralism." Paper presented at the Annual Conference of the American Association of Colleges for Teacher Education, Washington, DC, February 15, 1987. http://www.msue.msu.edu/msue/imp/moddp/11180282.html. Accessed 07 December, 2003.

Tamai, Katsuya. "The University office of Technology Transfter: Japan." http://www.law.washington.edu/casrip/Symposium/Number5/pub5atcl13.pdf. Dated 1999. Accessed 24 December, 2003.

Tarjanne, Dr. Pekka. "US$20 million agreement signed between the ITU and Argentina" *International Telecommunication Union.* http://www.itu.int/newsarchive/press_releases/1998/27.html. Dated 18 September, 1998. Accessed 14 December, 2003.

"The Face of a Nation." Australian Population. http://goaustralia.about.com/cs/people/a/austpopulation.htm. Accessed 21 March 2004.

"The FedEx Impact on the Transportation/Logistics Industry" About FedEx. http://fedex.com/us/about/overview/economy/industryimpact.html?link=4. Accessed 21 March 2004.

"The GIIC Mission Statement" Global Information Infrastructure Commission. http://www.giic.org/about/. Accessed 14 December, 2003.

"The World Summit, press freedom and diversity of content." *World Summit on the Information Society: Geneva 2003-Tunis 2005.*. http://www.itu.int/wsis/newsroom/fact/docs/pressfreedom_content.doc. Accessed 14 December, 2003.

Utterback, James M. " The Creative Power of Technology in Process Innovation." Mastering the Dynamics of Innovation. *Boston, MA: Harvard Business School Press, 1994.*

Venkatraman, N. *IT-Enabled Business Transformation: From Automation to Business Scope Redefinition.* Sloan Management Review/Winter 1994.

Wilkinson, Ian F. and Constant Cheng. "Perspectives: Multicultural marketing in Australia: Synergy in diversity." Journal of International Marketing. Chicago: 1999. Vol. 7, Iss. 3; p. 106 (20 pages). Accessed through ABI Inform database: RIT, 14 February, 2004.

Wortmann, Herman R. "A Comment on European Monetary Integration." *Europe and the Evolution of the International Monetary System.* Geneva: A. W. Sijthoff –Leiden, 1973.

"Your Expanded Rights Under the Electronic FOIA Amendments of 1996" Cipherwar: CIA Freodome of Information Act. http://www.cipherwar.com/info/tools/cia_foia.htm. Accessed 25 December, 2003.

Yoshida, Phyliss Genther. "Japan pursues creative science/technology." Research Technology Management. Washington: Nov/Dec 1996. Accessed through ABI Inform database: RIT, 24 December, 2003.

Vita

GARY D. CLARKE

EDUCATION

ROCHESTER INSTITUTE OF TECHNOLOGY, NEW YORK.
Master's Degree in Information Technology, expected 2004.

UNIVERSITY OF ROCHESTER, ROCHESTER, NEW YORK.
B.A. in Political Science, Minor in History, 1989.

ST. ANDREW'S SCHOOL, MIDDLETOWN, DELAWARE, *1985.*

EXPERIENCE

GLOBAL INFORMATION SYSTEMS, GLOBAL CROSSING – ROCHESTER, NEW YORK
Manager- Web Services, 9/2000 – present.
Managed the Global Crossing internet/intranet infrastructure and web applications development teams. Responsibilities included leading the team in designing the internal and external web hosting environment. Responsible for performance and financial management of the team. Interfaced with global and regional teams to insure goals and objectives were in alignment with the core services strategies and directions. Approved projects in accordance with global business strategies and objectives. Assigned team members to projects and developed timelines for completion. Implemented high availability solutions for both the intranet and internet sites. Successfully migrated the corporate web site from a third party hosting company to Global Crossing's hosting platform. Interfaced with the Marketing and Corporate Communications team to support their web publishing needs. Developed standards and procedures for web server support and publishing guidelines. Worked with team to provide daily support for the Global Crossing web environment.

FRONTIER INFORMATION TECHNOLOGIES (GLOBAL CROSSING) ROCHESTER, NEW YORK.
Senior Network Computing Analyst, 4/97 – present.
Implemented enterprise-wide computing standards and support structure for the Windows NT operating environment. Installed and implemented Novell and Windows NT Web Servers for internal customers. Led project to implement NDS for NT across the corporate enterprise. Established and documented corporate standards for Netscape Communicator and Internet Explorer. Designed Netscape Communicator build utilizing Netscape's Mission Control, HP Basic and javascript programming for corporate-wide messaging conversion project. Evaluated, recommended, and implemented corporate staffing resume database tracking system. Implemented DSL qualification tool utilizing the web

for internal and external customer access. Implemented mainframe reporting tool utilizing a web server. Developed software distribution process for Frontier's sales organization. Situation Manager to stabilize Exchange/Window NT environment.

FRONTIER INFORMATION TECHNOLOGIES - ROCHESTER, NEW YORK.
Customer Support Field Representative, 7/95 – 4/97.
Provided consultation in integration of corporate standard hardware and software at customer sites. Diagnosed desktop and network related problems and executed solutions. Installed and configured desktop hardware, operating systems, network printers, and peripherals. Tested and configured desktop video-conferencing computers for ISDN and Switched-56 access. Responsible for project planning, implementation and management. Participated in new hire interviews, orientation and training. Educated customers in services, processes and applications available to them.

ENTEX INFORMATION SERVICES - ROCHESTER, NEW YORK.
Customer Engineer, 1/95 7/95.
Solution Line Communications Team.
Provided computer technical support to Eastman Kodak Company and Monroe County government. Troubleshooted Dos, Windows, hardware, communications, network, and mainframe problems. Drafted technical script to be used by technicians to provide customers with internet access. Prepared internet educational pamphlet for Eastman Kodak Company. Managed Solution Line Novell network. Wrote script files to perform mainframe to PC file transfers. Evaluated pre-released software for bugs.

SALEM TECHNICAL - ROCHESTER, NEW YORK.
Customer Engineer - Contractor, 9/94 1/95
ENTEX Information Services - Solution Line Communications Team.
Provided computer technical support to Eastman Kodak Company and Monroe County government. Troubleshooted Dos, Windows, hardware, communications, network, and mainframe problems. Researched computer related problems for customers. Tested new software prior to general distribution.

ANALYST INTERNATIONAL CORPORATION - ROCHESTER, NEW YORK.
Systems Consultant, 4/94 -8/94.
Eastman Kodak Company - Information Technologist.
Project Horizon: Traveled to various U.S. cities to facilitate corporate training of Kodak sales force and coordinated the setup and breakdown of the training facilities. Answered technical questions pertaining to computer hardware, off-the-shelf software and Kodak proprietary software. Tested Kodak software and provided feedback to the developers. Prepared conversion data for national distribution. Troubleshooted and repaired malfunctioning computers. Configured computers for Banyan Vines, ethernet, and token ring networks. Wrote batch files that were distributed nationwide to Horizon team to compress and backup territory data.

ROY W. KING ESQ., P.C., ROCHESTER, NEW YORK.
Systems Administrator/Billing Coordinator, 9/89 to 4/94.
Designed financial reports utilizing Lotus 1-2-3 graphs, macros, and spreadsheets. Managed client and office bank accounts. Prepared court assignment vouchers for county, state and federal reimbursements. Initiated small claims actions and collection proceedings. Installed and configured system software. Trained employees to use computer programs. Assisted with all computer related problems and questions. Contacted computer vendors to gather information on new products.

CAREER DEVELOPMENT

Information Technology master's degree program, Fall '96 - present – RIT.
Microsoft Certified Systems Engineer (MCSE) – Windows 2000, 1/01
Project Management Training, Winter '98 – George Washington University.
Data Communications Certificate, Spring '96 - Rochester Institute of Technology.
Notary Public, New York State.

SKILLS

Computer:

- Windows 2000 Advanced Server/Professional, Active Directory, Microsoft Sharepoint Portal Server, Windows NT Server/Workstation, Novell Netware, Sun Solaris 2.8, Linux Red Hat, Netscape and iPlanet web servers, Microsoft Internet Information Server (IIS), Apache web servers, Microsoft SQL Server 7.0/2000, Netscape Mission Control, Windows '98, '95, UNIX, TCP/IP, DNS, DHCP, Microsoft Office, Netscape, Internet Explorer, HTML, ASP, Javascript, CGI, FrontPage server extensions and client.
- Installation of computer peripherals including physical drives (floppy, CD-ROM, and tape), internal boards (modem, network, sound, video), and RAM.

PERSONAL INTERESTS

Music, traveling, computers, reading,, fitness.