Info Tech Talk

A Newsletter on Enabling Information Technologies by the IRMC Information Operations and Technology Department

The Art of Writing ---
With an Intelligent Agent at Your Side

By Steve Knode and James Kasprzak

"….the core creative process of writing is being circumscribed by intelligent software which can provide a surprisingly large degree of assistance with some of the more mundane tasks."

Several recent "intelligent agent" applications alter the way in which writing is accomplished and/or judged. These are software packages which help a writer research, select and format material. Further, when the writing is complete, there are other software assistants which will judge the document for originality, accuracy and correctness. Although there are many types of such "Intelligent Agents", for convenience, we will distinguish four types. A brief summary of some of these agents follows:

Information Gathering: Search engines have enhanced the way in which information is located for possible inclusion in documents, but they bring problems of their own. Search engines are notoriously indiscriminate in their findings, often returning more useless hits than useful ones. Today, some of the newer intelligent agent based search engines offer to provide a much more focused investigation capability.

One such agent, **Infolab Assistant** (aka Watson) (http://watson. big-chalk.com) promises to assist you in your research as you write! By "watching" what you write, **Infolab**

Assistant automatically begins to search for information from various sources (web, internal, library and proprietary) to find focused items for potential inclusion. Not only providing initial information, **Infolab Assistant** also observes what you choose from its list and enhances the search, making it more focused in the links provided. A research project at Northwestern University, **Infolab Assistant** is currently in beta, free for use.

Another agent which can assist in the information gathering role is **Endnote** (http://www. endnote.com). Endnote will automatically check library databases (part of the "hidden" web) and develop a bibliography on a particular subject. With hundreds of libraries available, **Endnote** can build quite an extensive bibliography and place it automatically into a word document with the links properly formatted into bibliographical format. **Endnote** offers a free trial period of use, then a onetime fee for further use.

A third information gathering agent is **Questia** (http://www. questia.com). **Questia** maintains an extensive online digital library. Real-time searches of

Rudolph W. Giuliani: Leadership in Difficult Times

By Professor Les Pang

Former Mayor of New York City, Rudolph W. Giuliani spoke at two recent technology-oriented conferences.

During the e-Learning Conference, he discussed the qualities of effective leaders. He started by outlining the five most important lessons for a leader:

Philosophy or Belief – A leader needs to have a philosophy or belief to follow. The leader must internalize it and properly communicate it to the organization. It must be considered in all decisions made.

Courage – Courage does not mean lack of fear. When facing an ordeal, it is natural to be initially fearful. Courage means to overcome and manage that fear and do exactly what you were trained to do. He cited the example of the New York firefighters who were first shocked at the disaster but overcame their initial fear and did what they needed to do.

Relentless Preparation – A leader must continually prepare for all potential events. He mentioned table simulations where he brought together his entire staff and department heads to discuss potential scenarios and how to deal with them.

Teamwork – A leader must surround him or herself with a diverse team. If the leader is one who tends to ponder, the team must be an aggressive group of people. If the leader is a go-getter, the team must produce a calming effect. This requires reflection on the leader to determine what type of leader he or she is.

Communication - What is the best test of an effective leader? His answer was whether or not your people come to you for help.

During the question-and-answer period, he made the following points:

Many answers can be found in books. Mayor Giuliani is an avid reader. He recalls looking for a way to describe the devastation of 9/11. He first thought of Pearl Harbor but decided against it because it was a military operation with limited civilian casualties. After much reading, he came across Winston Churchill's book and chose to compare the tragic events with the Battle of Britain.

People work more effectively when they are doing something they believe in. He said that this is something he had in common with Jack Welch, the former General Electric CEO.

Appreciate the fact that you are alive. Contribute to and enjoy life!

During the E-Gov 2002 Conference held in June, he stated that technology helped him in fighting crime. Crime data was posted on computerized maps and plotted by time of day and by precinct. These maps showed not only clusters of high crime areas but an idea of when they occurred. This helped the police establish strategies for responding to criminal behavior. It also assisted in identifying where funding resources were to be allocated and ensuring accountability by the precinct chiefs and the mayor.

This technology was also used successfully to run the jail system more efficiently and effectively and to transition their welfare offices to job centers. Welfare offices were evaluated not by the number of people receiving welfare but the number of jobs created.

Technology in the Home

By Ed Campbell, Information Highway and ICAF Student

Background

The tools and practices provided by the technological revolution are visible in all facets of the work and educational environments of today. Where most adults probably didn't even know how to turn on a computer a mere 10 years ago, one would be hard pressed to find a desk in any business environment without a monitor and keyboard sitting on top.

As an illustration, in 1990 an estimated 21 million personal computers were sold worldwide, in 1998 the number increased to 93 million. The speed of transition to the information age has been blinding and doesn't show signs of slowing down. On the contrary, the conduits of information transfer and communication are widening rapidly and the speed with which each transaction occurs is seemingly limited only by imagination.

While these capabilities are considered standards in the school and workplace today, their influence on the average home has been lagging, but this too is on the threshold of dramatic change. Again looking back 10 years, we were all amazed that the push of a button could open our garage door, but now that same button will do far more than that. Not only will it open your garage door, it will turn on your lights, heating or air conditioning, and even start your oven.

Similarly to the explosion in communications capabilities, technology in the home is poised to make an equally significant impact on the routine of our daily lives. While it is doubtful that we are witnessing the dawn of "The Jetsons" age with Rosie the Robot providing all required domestic services in the home, the technology available today far eclipses the capabilities of the "clap on", "clap off" systems offered the homeowner a decade ago.

The Internet

The Internet has provided an opportunity for unlimited information at the fingertips of any computer operator. Perhaps more importantly it has provided a convenience factor for services such as on-line shopping, banking, travel arrangements, etc., never previously available to the average family.

Where once the use of a computer was seen as threatening and resisted by American society, it is now being embraced as a standard in the home of today. Earlier data shows that nearly half of all American households now use the Internet and over 700 new households are being connected every hour."

The Internet not only provides access to information and services, today it can be used to completely control the lighting, appliances, security and heating/air conditioning systems in your home from virtually any location and at any time. With the proper server and an "always on" internet connection, companies such as "Echelon" (www.echelon.com) are providing the capability to monitor and change these home functions via a common internet menu from a standard browser.

The implications for utilization of remote home systems such as these are limitless and afford the homeowner much greater flexibility while on travel or for energy saving initiatives on a daily basis.

This particular system also includes user friendly HTML web pages created to represent the layout of the home and associated monitor and control points affording the operator the capability to view rooms individually and control applications on a room by room basis.

Technology in the Home (cont.)

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The cost of this system, including optional video cameras, is approximately $4,000 not including labor for installation. This is certainly not a prohibitive figure for an average middle class homeowner.

These advances in technology are not escaping the attention or imagination of appliance manufacturers. At the 2000 Consumer Electronics Show, Sun Microsystems, (www.sun.com), introduced a new concept refrigerator containing a web panel that affords Internet access allowing the consumer to browse recipes on line and with the touch of a button convert the recipe into a shopping list. The refrigerator will have a built in grocery scanner and will automatically inventory the contents of the refrigerator for the requisite items. The missing items can automatically be transmitted to an on line shopping service which will deliver the groceries right to your door.

This is a coordinated project with Cisco Systems who have developed the home "Gateway Server" which conceptually will serve as the coordination agent for the whole home. Additional capabilities include:

- TV that automatically downloads a week's worth of favorite television programming.

- Lawn sprinklers that "talk" to the weather channel to determine optimum lawn and shrub watering schedules.
- Discounts from utility dealers by allowing them to manage your appliance usage during peak periods.

- Home monitoring services for the elderly.

- Take "private" cooking lessons with your favorite chef in your own kitchen.

The possibilities are literally limitless and this technology already exists today.

New Construction

Homebuilders are also seeing the opening of new markets featuring the "wired" home which will have all the requisite wiring and cable for complete Internet connectivity throughout the entire house during construction.

General Electric (GE), Microsoft and Smart LLC are teaming up to provide "Smart" home installation packages to builders that will allow the technology to be built in to the house, thereby sparing the installation and modification costs to the homebuyer at a later date. A listing of products available to builders can be seen at the GE-Smart web site: www.GE-SMART.com/.

These "Smart" home technologies also retain the ability to autonomously repair problems within the home while the homeowner is away or at work. Refrigerators are able to run complete self-diagnostic tests and then contact a service to come to the home and repair the affected component. Of course this is all done while the homeowner monitors the event from the workplace at his/her PC via the smart home video capabilities.

This technology is finding it's way onto college campuses as well. At MIT, dormitory students receive e-mail alerts from Maytag that their washing or drying cycles are complete. Students can even go online to see if a washer or dryer is available before coming downstairs only to find the laundry room filled to capacity. This serves to illustrate the myriad of possibilities this technology can facilitate, and the public interest is responding. Sales of smart home technology are projected to reach $4.5 billion by 2005 as compared to $298 million in 2002.

(Continued from page 4)

Homes that offer digital video, voice and data systems are know as category (CAT) 5 homes and there are a multitude of electronics companies coming on line to provide the requisite hardware and software. The behind the wall integration of the MASCO Home of the Year includes some pretty serious technological innovations. The system runs to 30 ports throughout the house, each of which offers two Cat 5 lines, two coaxial cables for closed circuit video, and one fiber optic line.

While extensive wiring such as this may seem a bit like overkill, according to Pat Hagan of Hagan and Hamilton Custom Home Builders, "You need to wire new homes 15 years into the future. With the way technology is advancing, even if homeowners don't need the wiring right now, chances are they will within the next few years." A further description of the technologies inherent in these smart homes can be seen on the Chesapeake Home Builder web site; www.cheshome.com.

Outdoors

The technologies being developed for the home have not been overlooked by the lawn and garden crowd. Technology now exists to eliminate one of the more burdensome chores of homeownership – lawn mowing. This may be one of the first tangible links to "The Jetsons" as we remember it from our youth.

A company known as Friendly Machines, (www. friendlymachines.com), has developed an automated lawn mowing machine that completely removes the burden of summer lawn mowing. All that is required of the operator is to put it on the lawn and press the "GO" button. The machine is basically a computer on wheels and comes complete with a full self-diagnostic capability. It will mow along fences and per-

form edging operations as well. Similarly to the smart home technologies, this device is ideal for physically challenged homeowners who wish to maintain their independence. Additionally it is environmentally friendly with no emissions and it mulches all lawn trimmings which eliminates yard waste problems. The cost of the "Robo Mower" is approximately $570 including delivery charges.

Gadgets

One of the more intriguing "gadgets" emerging from the home convenience technology market is a product from Sony which enables mobile e-mail, television, internet and DVD capability on a portable tablet the size of a placemat. It is called the "Airboard" and it is being billed as the "Walkman of the Information Age."

This device enables the consumer to use Internet functions or watch television literally from anywhere in the home. It is not capable of serious computing, but is ideal for video or e-mail functions. Presently it does have a limitation of distance from its base station (approximately 30 meters), but that will improve over time. Sony is getting competition for the device from Hitachi and Honeywell, but they have seemingly gotten to market first with the concept. To learn more about the device, visit the time web site: www.time.com. This link will take you directly to the subject article.

Summary

Perhaps the age of "The Jetsons" is not completely within view, but the explosive technology advances of the past decade have eclipsed those of the entire last century and if

Technology in the Home (cont.)

this rate continues, the next 10 years will likely bring further advances presently beyond the average consumer's imagination. A decade ago, who would have thought of one day being able to call your house from your computer or cell phone and order thermostat and appliance operation? It all seems beyond belief for the average homeowner to be enabled with such technological advances, yet they are already here, and just as we initially resisted the personal computer, these technologies will one

day be as commonplace as e-mail has become.

Walt Disney had a vision for the futuristic city when he first conceived his idea for Epcot:

"He foresaw a master-planned community of 20,000 that was perfectly zoned into three concentric rings encircling a round city center. Low-density housing characterized the outermost ring, where residents dwelled in futuristic homes that would perpetually be

remodeled to incorporate the latest technology."

While Disney's complete vision for rural utopia has not developed even 35 years after his death, it's safe to say that the components of his dream are now starting to emerge. Technology for the home is developing at a rapid pace and the push button home is hazily coming into view.

The limitations for future developments are simply a function of the limits of our imagination...

Rudolph W. Giuliani: Leadership in Difficult Times (cont.)
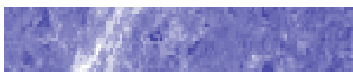
Virtual agencies were created in which several agencies pooled their staff and resources to address a certain type of constituent.

He discussed the many e-Government initiative undertaken by the Mayor's office. He mentioned how virtual agencies were created in which several agencies pooled their staff and resources to address a certain type of constituent.

He cited the example of applying for a building permit. Normally, it involved 12 agencies but by placing the process on the web it appeared that there was only one agency.

Two key benefits he cited were the improvement in efficiency and effectiveness in the government delivery process and it made the government more accountable.

For example, how well the government accomplished its business was posted on the web.

His final thought was that he could not have predicted the overwhelming response of the American people to the 9/11 tragedy.

The Art of Writing --- With an Intelligent Agent at Your Side

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these documents for a particular topic will return the actual text which refers to the topic. This text can be copied to the clipboard, then inserted into a paper (also, properly formatted and footnoted) automatically. The **Questia** service is fee-based, depending on usage.

Information Filtering: Information often is discovered in larger quantities than can be digested. A focused search reduces the number of hits or documents to examine, but does nothing to reduce the size of an individual document. One tool to get a quick summary of virtually any document instantly is a document summarizer agent.

One such agent which does a credible job is **Copernic Summarizer** (http://www.copernic.com). The summarizer agent will summarize any document into a size the user can specify (e.g., 100 words, 500 words, 25%, 50%, etc.). By having this instant summary of the document being examined, a quick first look at the document can assist in deciding whether to read further and consider it as source material. **Copernic Summarizer** has a free trial version and a purchased version.

Document Grading: What about the other side of writing—reading and evaluating written text? Until now grading writing has been almost entirely a function accomplished by humans, especially for essays dealing with complex subjects. However, agent-based systems are now emerging which can grade essays as well as humans. One such product, **Intelligent Essay Assessor** (http://www. knowl-edge-technologies. com/) seems to have attained a level of expertise in grading assignments that rivals human graders. According to its designers, the software is able to grade even free-form, creative essays as accurately as human graders. Evidence to support the contentions is available at the website. The advantages of such a tool are obvious, including

cost, speed of grading and consistency of grading. Partners and users of the program include the Army Research Institute, U.S. Army TRADOC, Yale University, Air Command and Staff College, and the Department of Education. Contact the company for pricing for the **Intelligent Essay Assessor.**

Plagiarism Detection: Detecting plagiarism has always been a difficult task, but the Internet environment has made it even more so. The ease with which plagiarism can be accomplished needs to be matched with a comparable ease for detection to insure academic standards. According to a recent article in the T.H.E. Journal (http://www.thejournal. com/magazine/vault/A3724.cfm), detecting plagiarism has become a much greater challenge in the age of the World Wide Web. Several tools exist to assist in the detection of plagiarism, including the **Essay Verification Engine, EVE2** (http://www.canexus.com/eve/index.shtml). **EVE2** checks the www for sources of potential plagiarism and compares them to the submitted paper. Files which are found to contain plagiarism are annotated with the sources of the plagiarized information to make the identification straightforward. **EVE2** has a free 15 day trial version. The purchased version has a onetime cost of $20.00.

As we can see, intelligent agents don't do the creative work of new composition. They don't do the analysis of material and synthesis of new concepts. There aren't any Steven King intelligent agents (yet). Nonetheless, the core creative process of writing is being circumscribed by intelligent software which can provide a surprisingly large degree of assistance with some of the more mundane tasks.

With more advanced software on the way, we can speculate that within a few years writing school research papers may be very much different from what it is today.

The Profession of Enterprise Architect (2 of 2 parts)
By Carolyn Strano, Professor of Systems Management

This is the continuation of an article published in the Spring 2002 edition of Info Tech Talk. It explores the need for establishing the profession of enterprise architect as a discipline to add consistency and rigor to the act of developing, maintaining, and implementing enterprise architectures.

Although the task of managing an enterprise architecture is extremely challenging and complex, there is no clearly defined or certified profession to perform this vital function nor is there a concentration of study in higher education that prepares one for entrance into such a profession.

Public Image

Another factor that differentiates a professional from a non-professional is one of public image. A review of the current status of the profession indicates that the architect faces many problems resulting from a combination of forces such as recession, unemployment, a shift in the architect's role on the building team, and changes in the supply and demand of architectural services. Fischer suggests that architects may be able to benefit from the lessons learned by other professions such as law, medicine, and engineering that faced similar problems and used different tactics for addressing them. He notes that changes are occurring in the structure of architectural firms and the scope of their services as well as the goals of graduates and the careers that they are pursuing. These changes must be reflected in the profession's accrediting and licensing boards, professional associations, schools, and even magazines and journals. Davidson suggests that it is the image of the architect that needs to be improved through the effective use of media coverage.

He comments that architects could use celebrity status to bring commissions to a level of distinguished design that could benefit the public as well as the profession as a whole.

Hannay summarizes the factual findings reported in the book on the professional conduct of architects and their practices. This work shared the responses of 610 private practice principals to a 171-question survey that examines changes in the architecture profession. It suggests that a one-person architectural practice may be the format of the future due to the progress of information technology. The opinion of those surveyed would indicate that there is an over-focus on globalising trends.

Although the literature suggests that the public image of the traditional architect could be improved, there is at least some image. In the case of the enterprise architect there really is no public image because there is no recognized profession. Although the work performed by enterprise architects has significant impact the public do no recognize the contribution.

Professional Organizations

The question that has raised controversy throughout history is how affiliation with a critical mass impacts the status of a profession. Some would argue that professionalism is a collective effort requiring organization and cooperation. While others feel that organizations may restrict access to occupations and that natural ability rather than birth, education, or wealth should constitute the criterion for admission to the professions. In 1836 a small group of architects created the American Institution of Architects for the purpose of promoting rigorous but impartial standards based on architectural science. Members were tested on their expertise in architectural history, principles of design and composition, principles of construction, the nature and property of materials, and professional etiquette. This formed the basis for the first licensing examination. The Institution however never gained popular support and soon collapsed. In 1857 the American Institute of Architects (AIA) was established to support all branches of arts and science pertaining to architecture. The membership qualifications and standards were not explicit until 1869 when members were required to be in "honorable practice" meaning that they refused bribes from builders or suppliers. Unlike the American Institution of Architects, the AIA placed as much emphasis on art as it did on the sciences.

The Western Association of Architects (WAA) was established in 1884 and was run by its members rather than a board of trustees as in the case of the AIA. The WAA was based more on practice than theory and required client testimonials as consideration for membership. WAA and AIA did hold common views on several issues and in 1889 they consolidated into a single organization, called the AIA.

It is certainly evident that the formation of the professional organizations has influenced the profession of architects. Currently I am aware of no sanctioned professional organization of enterprise architects, perhaps because there is no such profession in existence. However there have been conferences, seminars, and functional working group meetings of persons with shared interests in the work of enterprise architecture. These groups share many of the same concerns that I see expressed by the professional architect organizations. Undoubtedly these interest groups will influence the evolution of the enterprise architecture profession.

Complexity

A final area of consideration in a profession is its level of complexity in terms of the depth and breadth of knowledge required to be proficient in the occupation. In a holistic bibliography that integrates the various dimensions of suburbs, Varangu draws attention to the value of different perspectives. He provides a comprehensive literature review of about 1,500 references sorted into fifty categories. This holistic approach concentrates on the parts within the context of the whole rather than concentrating on the largest whole without considering the parts. It requires shifting back and forth between the general and the specific. It is noted that planners cannot assume to be neutral parties. The traditional approach to planning assumes that all issues are identifiable, that identified problems can be analyzed by using simple models, and that all outcomes can be anticipated.

However once the public is invited to participate in the process the results are no longer predicable and the process becomes much more complex. A cross-disciplinary approach adds understanding to suburban issues by isolating the social, economic, political, or psychological dimensions of the issues. This research could easily have been discussing the complexity of enterprise architecture as it too represents the composite of many perspectives and foci.

Activities that exhibit high levels of complexity normally require higher levels of learning to acquire the ability to think critically within the construct of the discipline. These characteristics may differentiate the trade or craft from the profession. Whereas the craftsman becomes highly skilled in one or more aspects of practice, the professional broadens his/her capabilities to include an indefinite set of variable conditions and circumstances. The professional should have honed the skill of applying the correct theory to the appropriate circumstance as required; whereas the craftsmen is normally better equipped than the professional to actually perform the work required. The professional must know enough to do or supervise the work of those doing the *right things*, while those skilled in a trade are experts at *doing things right*.

Merging of Traditional and Enterprise Architecture

With the growing demand for highly realistic three-dimensional games, there is a growing demand for architects. Game manufacturers are offering highly competitive

salaries resulting in many young architects "abandoning traditional design careers to ply their skills in the more remunerative and free-wheeling fields of computer games and film special effects."

As professional architects are lured to the virtual world it becomes evident that these skills could be applied to any systems approach. An enterprise architecture is a very high description of the business and technical relationships As these descriptions are decomposed into lower levels of detail they become high level design specifications which serve to direct the actual implementation into a complex set of interdependent systems. This is not unlike the series of blueprints that are derived from the ball park drawings of a "brick and motar" architecture. Is it not then feasible that the skill applied to one occupation could easily translate into utility in the other? It appears to me that it is entirely realistic that these two professions could merge into one with specialization in the area of practice.

Conclusion

This article has presented a cursory review of the history of traditional architecture as a profession. Based on the review of the literature I organized the findings into a set of categories. This is not intended to be a comprehensive or in -depth study of architecture. Rather it explores the evolution of the established profession in an effort to apply the lessons learned to the progress of the emerging profession of enterprise architect.

The literature review proved to be

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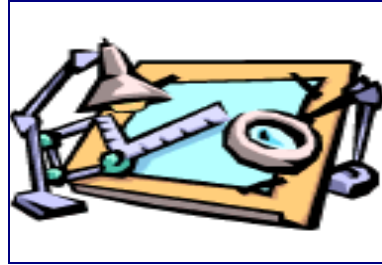
The Profession of Enterprise Architect (cont.)

very enlightening in that I discovered there truly are many similarities in the two professions and the traditional architect profession is perhaps not as well established as I had perceived it to be. Although it is licensed and certified as a profession, there continue to be many strong differences in expert opinions about exactly what role the profession plays in the construction industry and likewise what the focus in education should be in preparing perspective architects for entry level into the profession. Its impact on society and public image are equally controversial.

The findings of this review have identified numerous opportunities for additional research to provide depth to any of the categories examined in the study. It would be premature to formulate any conclusions based on the lim-

ited scope of this research. However I would suggest that the findings support the notion that the profession of enterprise architect is actually an extension of the already existing profession of traditional architect. Further research would be required to substantiate this proposition but I found nothing in my research that would significantly challenge this presumption.

This article is intended to be exploratory in nature and is limited in both depth and scope. However one very impressive finding was that as I reviewed the literature discussing traditional architecture, in most cases it was difficult to tell that I was not reading about enterprise architecture. The likeness was absolutely astonishing. Based on this finding, I am encouraged that further study of this established architecture pro-

fession can be directly applied to advancing the development of the emerging discipline of enterprise architecture.

The future of each profession may in fact be better defined through a study of the evolution of the existing profession as it pertains to enterprise architecture because in better understanding how the components of an enterprise inter-relate the infrastructure including structures are better planned to support those needs. Only then can the infrastructure support rather than constrain the strategy.

The Next Step for the World Wide Web
By Joseph S. Ward, Lt Col, USAF
Information Highway and ICAF Student

Introduction

The industrial revolution was clearly the catalyst for sustained economic growth in the United States eventually leading to the US designation as a global super power. The ongoing information revolution has allowed the US to maintain its position as the world's preeminent economic and military power. The advent of Tim Berners-Lee's World Wide Web helped fuel unprecedented US growth in productivity during the 1990s, especially during the second half of the decade.

A fundamental shift took place in corporate America during the 1990s. The basic formula for increasing productivity added a new variable. Prior to this past decade, economic output was a function of three input variables: land, labor, and capital. An increase in one of these key input variables could increase a company's output. So, what changed? Establishment of the World Wide Web added knowledge sharing/ transfer as a new critical component to the productivity equation. Those companies able to share and transfer knowledge quickly gain a competitive advantage. "In the global economy, knowledge work and knowledge workers are the primary sources of economic growth— for individual firms and for nations. Thus, in the 21st century, the ability to build, share and leverage knowledge will replace the ownership and/or control of assets as a primary source of competitive advantage." As a result, companies now must be able to adapt to and embrace change. The 1990s are now behind us so the focus of this paper will be on what lies ahead as we enter the "dawn of the a new century" in the information technology arena.

The Next Step

The World Wide Web provides a fantastic venue for *humans* to share knowledge. As previously stated, this ability to share knowledge was the catalyst for substantial gains in productivity throughout this past decade. Today, US economic growth has been slow and some argue the US is now in a mild recession. Perhaps the US has maximized productivity gains resulting from the advent of the World Wide Web. So,

what is being done to take the next step beyond the World Wide Web in the hope of fueling a new period of sustained productivity?

A Smarter Web

Tim Berners-Lee is looking to the future of information technology with his project to lead construction of the *Semantic Web*. So, what exactly is the Semantic Web and what does it do? First, the Semantic Web is not an entirely new web but more of an extension of the existing World Wide Web to better enable computers and people work together. The World Wide Web was primarily designed to display data and images for human consumption. The Semantic Web looks to add meaning through the use of extensible markup language (XML) so that computers can talk to computers, "the Internet must change from a system designed to display data to humans into a system designed to deliver information to machines." "Today's World Wide Web is fundamentally a publishing medium—a place to store images and text. Adding semantics will radically change the nature of the Web—from a place where information is merely displayed to one where it is interpreted, exchanged and processed." Adding semantics to the Web could pave the way for the next generation of personal assistants, *intelligent agents*. "The real power of the Semantic Web will be realized when people create many programs that collect Web content from diverse sources, process the information and exchange the results with other programs. The effectiveness of such software agents will increase exponentially as more machine-readable Web content and automated services (including other agents) become available. The Semantic Web promotes this synergy: even agents that were not expressly designed to work together can transfer data among themselves when the data come with semantics." The Semantic Web could bring about the next revolution in information technology by providing a language and a medium to facilitate the use of *intelligent agents*. "If properly designed, the Semantic Web can assist the evolution of human knowledge as a whole. This structure will open up the knowledge and workings of humankind to

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The Next Step for the World Wide Web (cont.)

meaningful analysis by software agents, providing a new class of tools by which we can live, work and learn together."

Bringing New Meaning to: "I'll have my agent get in touch with your agent."

So how will the creation of the Semantic Web and the birth of a new generation of intelligent agents fuel productivity gains? Humans are limited in the amount of work they can perform. There are only 24 hours in a day. Humans can only work about 12 hours a day for a sustained period of time before suffering from "burn out". However, intelligent agents will be able to work 24 hours a day, seven days a week! "We need technologies such as computer agents that can work as our assistants; work on assignments that we give to them; accomplish many of those daily repetitive tasks; automate and seek information; make decisions; and do work on our behalf. Computer agents may not usher in the golden age of leisure, but they will help us to be more productive, manage our information more effectively, and move towards a higher level of automation with the computers that we use. They will help our companies and the global economy gain wealth by automating many time-based functions and by working for us twenty-four hours a day." They are being developed to take on tasks and responsibilities traditionally performed by humans. What this means is that humans will have more "free" time to devote their attention to the critical competencies of their business. Yes, intelligent agents could very well be the magic elixir to bring on yet another period of sustained economic growth and productivity gains.

Researchers have begun developing the first wave of intelligent agents but the technology is relatively raw. "Software agents today are living in a fairly barren wilderness. The standards that they require to be accepted are still evolving. We might describe them as being the first generation." Tomorrow's intelligent agents will impact virtually every aspect of our daily lives. The possibilities are limitless with the advent of the Semantic Web because intelligent agents will be able to converse with other intelligent agents. In the area of commerce, intelligent agents will be able to search the Web for the best price on a given product we want to purchase. It will be able to arrange for shipping and financing for the purchase. Intelligent agents will have some degree of being able to act independently. "Many researches believe autonomous agents will be a part of most business systems in the next five to 10 years. IBM researches foresee broad use of agent software in E-commerce. We're creating a new economic species that will be created partly in our image, but significantly different from humans. Software agents will become players in the economy." In addition to serving as shopping assistants for humans, agents will bring business-to-business e-commerce to the next level. Intelligent agents will be able to make large business transactions through the Internet.

Summary/Conclusion

"Agents will enable companies to automate a whole new set of tasks that currently require human action. By doing so, they will enable companies to limit costs and drive margins down. This result will make companies more efficient and profitable, and those companies that deploy agents rapidly will have the competitive advantage over those that do not."

"In the emerging economic landscape, competitive advantage must be recreated every day. To do so, companies must focus on creating and mobilizing knowledge faster and more efficiently than competitors – and not get stuck in the mechanics of measuring the worth of what they already know."

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