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Info Tech Talk

A Newsletter on Enabling Information Technologies by the IRMC E-Government and Technology Department

Reflections on Emerging Technologies

By Paul Flanagan and John Feeney

Inside this issue:

In the future, technology can personalize education. These technologies may allow individuals to customize their interests and their abilities within their schools and courses of study.

Professors Paul Flanagan and John Feeney attended the Technology Review Emerging Technologies Conference at the Massachusetts Institute of Technology in September. Here are their observations:

Since the 1940's computers have been a part of the technology landscape. As of 2003 computers have progressed to the point where they are highly interactive, rapidly decreasing in cost, and rapidly increasing performance. This is evident in the fact that "surfing the internet" and e-mail are so pervasive. Also, by the vast numbers of people who feel the need to carry at least one or in many cases several different types of devices – e.g., laptop, cell phone, PDA, pager, etc., with them on an on-going basis. There have been many attempts to combine the functionality of these devices but as of yet no 'universal' computing platform has emerged. However, the need to have all devices easily communicate with each other is emerging. There is no reason to think that this is the end-state, so the question is what is next?

Projections into the future are difficult to do and only remembered when they are wrong, therefore, against all sound thinking we have tried to synthesize at least some projections into the future of Information Technology. Here they are:

1. Computers will be small in size but planetary in reach.
2. Computers will evolve from interactive to proactive.
3. The underlying technology will be "hidden" from the people using it.
4. Individuals and companies will "pay" for the information services they use!

Let us look at these projections in more detail.

Computers will be small in size but planetary in reach. Nanotechnologies will change what traditionally has been considered a 'computer'. Nanofabrication techniques will continue the progress in shrinking the size, shrinking power requirements, and shrinking the cost while increasing the reliability and performance of computing platforms. Therefore, it will be inexpensive enough to spread these computers throughout a factory, agricultural field, battlefield, or any area where information gathering at very fine granularity needs to be accomplished.

For example, in agriculture, a farmer is concerned about a crop in a field, but not each individual plant in the field. However, with a low cost sophisticated array of sensors each individual plant can be monitored. This information can be relayed to other units serving to identify, fix the location, and record environmental conditions of individual plants as well as aggregating information and communicate to other equipment. With this information accurate amounts of water, fertilizer, and insecticides can be judiciously applied. The net result would be significant since each plant only receives what

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The Role of Enterprise Architecture in e-Government

By Carolyn Strano

Background

The e-Government Act that President Bush signed into law on December 17, 2002 is intended to provide more effective and efficient government services to citizens and businesses of the United States of America. If properly enacted, it should encourage interagency information technology initiatives that consolidate unnecessarily redundant systems, decrease paperwork, increase productivity, and save money. This is a big step towards meeting the current administration's agenda to run government like a business. One major factor that is critical to the success of meeting the intent of this law is the federal enterprise architecture.

The federal government's proposed 2004 information technology budget is $59 billion dollars. This budget is traditionally appropriated on an agency-by-agency basis with little regard to the "big picture" of government as a whole and how the citizens and businesses are better served by these expenditures. Although no one would take exception to the concept of making government more efficient and effective, it is much harder to reach agreement on the details of how this is accomplished. Today, funds are appropriated based on individual business cases that describe how a specific technology meets a specific need. However, in an enterprise as large as the federal government, this process allows inefficiencies because each individual agency may in fact require numerous services that are similar if not the same as other agencies. For example, every agency may have a requirement to process travel for personnel and there may be few if any unique requirements with this capability. However, in the absence of an enterprise system that meets this capability, each organization may develop its own system that accomplishes basically the same set of functions. It is not difficult to recognize the potential for tremendous savings by reducing such inefficiencies.

Of even greater importance, however, is the realization that government could be more effective if existing information was better shared across departments and agencies. This became painfully evident following the terrorist attacks of September 11th, 2001. Faced with the challenge of protecting the homeland from terrorist activity, it is critical to equip each level of government and functional area with the most current and accurate information available. Currently, this is not easily accomplished because the business processes and technologies in use are often incompatible. It is often difficult to even relate the technology with the accomplishment of a particular function or activity.

The purpose of the enterprise architecture is to explicitly describe these relationships. It can be used to make better trade-off decisions because it helps to align the infrastructure with the strategic direction of the enterprise. In accordance with the defined scope of the enterprise, these explicit descriptions of key interrelationships may cut across organizational, functional, and geographic boundaries, both vertically and horizontally. The optimal abstraction of detailed requirements enables the enterprise architecture to provide the flexibility needed to be responsive to change at the same time that it provides the level of detail needed to meet the mission objectives of the enterprise. The challenge, however, with using powerful tools of this magnitude is that it is only as effective as the skills of those using the tool. It takes time and practice to develop such skills and in the case of enterprise architecture, it is currently an immature discipline.

Although there is generally awareness that it plays a key role in the success of e-government, there are few individuals experienced sufficiently in applying the discipline to reap the benefits. Little research has been conducted that clearly differentiates the critical success factors required to develop, maintain, and implement enterprise architecture effectively nor are there empirical studies that measure the performance of the enterprise architecture in terms of improving the performance of the enterprise.

Although enterprise architecture potentially plays a key role in the efficiency and effectiveness of any enterprise, this article will specifically examine its role for those enterprises that are applying or attempting to apply e-government. Its importance is amplified in e-government because of added complexities due to increased interdependencies. Within a single organizational silo, it may be possible to provide effective service in the absence of architecture because the domain is well known and understood by those providing the service. However, as the individual silos begin to partner with other silos to provide common services, it is much harder to meet the expectations of the various stakeholders and customers, without a shared, common vision of the strategic direction of the enterprise. Providing an explicitly described, shared strategic direction is the role that the enterprise architecture serves. Without it, there is really not one enterprise but rather several separate enterprises kluged together in a less than optimal manner. The architecture provides a mechanism to enable transformation of the enterprise from its current state to a desired state that meets the needs of tomorrow.

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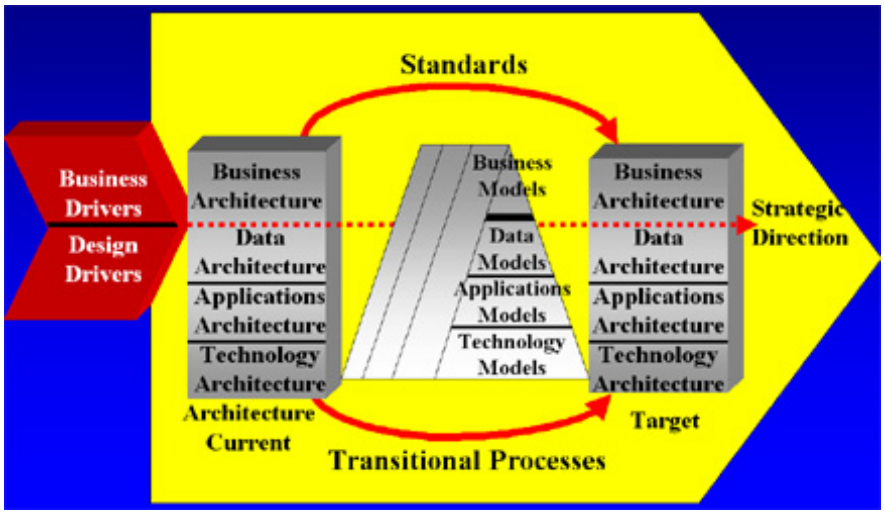
Problem

The balancing act of trading off how tax dollars are spent and what services are required to meet the expectations of the majority of the citizens and businesses served is extremely complex. There are many political, operational, economic, and technical considerations and often several of these are conflicting. It is extremely difficult to fully understand the impact of a single change to any part of the enterprise in terms of its holistic impact to the effectiveness of the total enterprise. It is necessary to be able to clearly understand the interrelationships of the operations and supporting technology and then conduct detailed analysis in order to determine the economic and political impacts to the enterprise performance outcomes that result from any changes to the current structure. If e-government was to succeed, it was realized that a mechanism was needed to facilitate cross-agency analysis and improvement. There had to be a tool to support government executives as they analyzed the strategic direction of the Federal business operations so that they could better understand the strengths, weaknesses, opportunities, and threats. In the absence of such a tool, there would be no mechanism for assessing the impacts of systems changes to the overall performance outcomes of the Federal government as a whole. In other words, how would one know if the application of a new process or a new system improved the service to a citizen, business, other government organization, or employee? What accountability would there be for investment decisions? How could one determine if future strategies were in line with future expectations, forecasts and predications for needed services? How could the government function as one symphony rather than as individual musicians? What could be used as a common sheet of music with which to focus the executives and all of the government employees so that the government services would be more effective to all stakeholders?



Federal Enterprise Architecture Framework - Level III

Role of Enterprise Architecture with e-Government

The Federal Enterprise Architecture Program Management Office was created in February 2002 to begin developing a comprehensive, business-driven blueprint for modernizing the Federal government. The architecture is considered to be a cornerstone to the success of e-government. It is being constructed through a series of reference models designed to facilitate cross-agency collaboration for improvement. The Performance Reference Model provides common outcome and output measures of performance throughout the federal government. It articulates the linkage between internal business components and customer-centric outcomes. The Business Reference Model describes the federal governments' lines of business independent of the agencies performing the actual functions. It identifies three high level views of operations: services to citizens, support delivery of services, and internal operations and infrastructure. The Data and Information Reference Model is intended to describe the data and information that support the business line operations. The Service Component Reference Model (formerly referred to as the application-capability reference model) describes the systems required to manipulate the data into information that serves the lines of business. Lastly the Technical Reference Model describes the technology required to support the services described in the service reference model.

The Federal Enterprise Architecture Working Group sponsored by the Chief Information Officer Council provides additional e-government enterprise architecture guidance. This guidance identifies a core set of e-government architectural concepts and pragmatic examples for e-government initiatives across the Federal Government. It describes the relationship of the Federal Enterprise Architecture with the previously published documents including the Federal Enterprise Architecture Framework Version 1.1, the Architecture Alignment and Assessment Guide, and the Practical Guide to Federal Enterprise Architecture. "The framework promotes shared development for common Federal processes, interoperability, and sharing of information among the Agencies of the Federal Government and other Governmental entities." The alignment and assessment guide provides an introductory overview to the integration of enterprise architecture with the Information Technology (IT) Capital Planning process. The practical guide is intended to assist agencies in defining, maintaining, and implementing enterprise architectures by providing a disciplined and rigorous approach to enterprise architecture management. The Federal Enterprise Architecture reference models provide the scaffolding upon which the federal architecture can be developed using the segment approach described in the framework.

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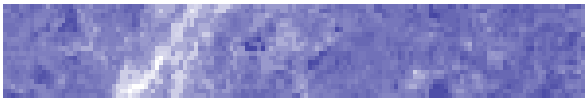
The Role of Enterprise Architecture in e-Government (Cont.)



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The architecture is considered to be a cornerstone to the success of E-Government.

The framework, as depicted in the figure on the previous page, provides a business and design view of both the current and desired architecture. When an external driver results in a change in the strategic direction of the enterprise (e.g., the arrow moves up or down), the new architecture required to support the new strategy for the enterprise is described using the models. A gap analysis is then performed between the current and target architecture and the standards and transitional policies are used to move from the current to the target or desired architecture. The use of the architecture blueprint should reduce ambiguity and help to transform the capabilities of the enterprise in the manner required to support the desired strategic direction of the enterprise.

Most recently, the General Accounting Office provided an updated version of the Framework for assessing and improving enterprise architecture management. It provides federal agencies with a common benchmarking tool for planning and measuring their efforts to improve enterprise architecture management as well as provides the Office of Management and Budget with a means for doing the same government wide.

Current Status of E-Government and the Federal Enterprise Architecture

At a recent e-government conference, Mr. Mark Forman, then the Associate Director for information technology and E-government for the Executive Office of the President, discussed the status of e-government and the Federal Enterprise Architecture. In sharing lessons learned and plans for the future, Mr. Forman noted that government must focus on unifying and simplifying around citizen needs and that E-government enables the Government to move from agency-centered to citizen-centered. However, there is no magic formula for doing this.

The Government needs to simplify and unify business lines. He stated that there are currently 22,000 government web sites forcing citizens to deal with multiple agencies to get service. Business must complete multiple forms that ask for the same information and agencies cannot easily collaborate for key missions like Homeland Security. He noted that progress is being made to correct these problems. The Federal Enterprise Architecture will drive consolidation and transformation. Currently version 1 of the Performance and Service Reference Models, version 1.1 of the Technical Reference Model and version 2.0 of the Business Reference Model have been released. Version 1.0 of the Data Reference Model is expected to be released very soon.

E-government Phase 2 is focusing on delivering performance breakthroughs in citizen terms. Examples of such performance are: decisions in minutes, not weeks; businesses not having to submit the same data multiple times; the Federal government reporting immediately how much grant money goes to a state

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of a Congressional District, instead of taking two months; state and local emergency personnel teaming with federal agencies to respond, with measurable savings of lives and property.

The Office of Management and Budget has reinforced the importance of enterprise architecture by tying it to the budget. The message from Mr. Lorenz was clearly "no architecture, no funding". The plan is that agency architectures will map to the Federal Enterprise Architecture reference models so that citizen driven performance measures will drive the strategic direction of the agencies, which will be reflected in the architecture descriptions.

Issues

Although there are many examples of progress in e-government throughout the government -- not just at the federal but also the state and local levels as well as many foreign governments and international alliances, there still remain many issues that must be addressed before real progress is made.

There still remains considerable disagreement about even what e-government is and although the push to make whatever it is is citizen-centric, it is unclear what the citizens' expectations are. A recent survey finds Americans split on e-government, reflecting concerns about privacy and security. This is a problem not only with e-government but also with government in general. There are always many conflicting and opposing views about the level of government involvement in providing services to its citizens. This makes it quite challenging to determine consistent performance outcomes and hold each agency accountable for progress towards improving the outcomes. The European Commission benchmarks e-government every six months but they too are facing the issue about reaching agreement on what is "effective." Surveys have been used to provide a common basis for discussing progress and best practices. Based upon the survey results the commission is rethinking the e-government framework adopted by the eEurope initiative and will measure service levels, operational efficiencies and political return achieved by e-government rather than mere Web service delivery.

Although enterprise architecture has been identified as the cornerstone of e-government, there is considerable variation in the maturity level of government agencies in applying this discipline effectively. In a survey conducted last year, agencies rated themselves against criteria established by the General Accounting Office in terms of their ability to apply and manage enterprise architecture effectively. The scores indicated considerable need for improvement. A few departments and agencies are making very good progress. For example, the United States Patent and Trademark Office has jump-started its enterprise architecture to align with E-Government initiatives and the Federal Enterprise Architecture by using patterns for e-business. Additionally, many of the state and local governments are using enterprise architectures impressively. In some cases there are even collaborative efforts across counties or states. However, these are currently more the exception than the norm. Most organizations are struggling with even understanding the concept of an enterprise architecture that includes the descriptions of the operational functions and providing a level of abstraction that supports the identification of patterns that can be reused from existing components.

The perception of many managers is that enterprise architectures are for use by the technology community only. "The real users are on the business and strategic planning end. Yes, IT (information technology) does use it but if it stops at IT, it has not been totally successful" states Mr. Ira Grossman, the information technology architecture at the National Oceanic and Atmospheric Administration. In my personal experience with teaching a graduate level business course on "Enterprise Architecture for Managers," I believe this is one of the biggest hurdles that must be addressed. Enterprise architecture is still perceived to be a back office activity conducted by the technologists and the lines of business managers, and financial officers are not recognizing the need to integrate the architecture into their business activities. Until this happens, the architecture risks becoming nothing more than shelf ware and will not realize its full benefit in transforming the capabilities of the enterprise.

The perception that enterprise architecture is a technical rather than a managerial tool may be partially due to the fact that the models used to represent the descriptions, and the supporting software are currently those used for system development. These typically provide a level of detail and complexity inappropriate to meet the executives' needs. There is a need for both types of information to be captured and managed and a need for tools that can clearly trace the linkage between the different levels of abstraction.

Another factor that is key to the success of e-Government is organizational and human capital capabilities. A pilot study conducted with the Department of Labor describes an e-government strategy including four key dimensions: customer relationship management, enterprise architecture, security and privacy, and organizational capability.

Organizational capability refers to the policies, plans, people and management processes required to develop, implement, and sustain a high level of digital services in support of the mission. It is important to recognize that e-Government may require different skills and competencies among the workforce and it is necessary to assess this need and plan for the proper skill mix. A recently conducted research study under the direction of the director of the Office of Management and Budget concluded that significant reform is needed in the government

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The Role of Enterprise Architecture (cont.)

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in order to compete with private industry in recruiting and retaining a skilled workforce. This is critical in being able to realize the goal of applying technology to transform the government services to the citizens.

Summary

This article discusses the role of the Federal Enterprise Architecture as a cornerstone of the United States federal E-Government initiatives. It assesses some of the issues that must be addressed before the full benefits of E-Government can be appreciated. Most of these issues are managerial rather than technical in nature and are not unique to E-Government but to Government in general. The new technical capabilities to facilitate greater ease of information exchange between organizations has actually created opportunities and increased citizen expectations. However, the issues are the result of inflexible organizational structure, politics, organizational culture, resistance to change, and a reward structure that is designed to motivate organizational performance rather than citizen-centric service improvements. It is not likely that these issues can be resolved quickly but considerable progress has been made in the past few years in a long journey that can eventually transform the government and make it more efficient and effective.

Most of [the] issues are managerial rather than technical in nature and are not unique to E-Government but to Government in general.

Highlights of the Enterprise Architecture e-Government Conference 2003

By Carolyn Strano

With enterprise architecture being touted as the cornerstone of e-Government, the recently held enterprise architecture e-Government conference and exhibition in Washington, D.C. was a very popular event. The conference theme was "Practical Strategies for Implementing Enterprise Architectures."

Keynote speaker Rear Admiral John Gauss (ret) emphasized that enterprise architecture is not about technology but rather about structuring the enterprise optimally to improve performance, which he emphasized requires senior executive commitment to be successful. He noted that as the scope increases, the benefits derived from doing the architecture are increased but so too are the challenges in developing and implementing a successful architecture.

A second keynote speaker, Norm Lorentz, then the Chief Technical Officer for the Federal Government, provided the status of the Federal Enterprise Architecture and outlined the next steps. In response to concerns that momentum may be lost with the recent departure from government of several key executives, he claimed that the new leaders would be continuing at the same or even faster pace because it is the right thing to do and enough people are committed to making it happen to continue the momentum. Asked if there would be a security reference model added, he responded that security needed to be addressed in each of the existing reference models and thus would not have a separate model.

Jan Popkin, founder and CEO of Popkin Software, noted that today we are collecting data and putting the pieces together but tomorrow when we begin acting on the data, we will really reap the benefits of examining the whole architecture and making decisions based on it.

The conference included sessions that examined enterprise architecture quality metrics, tool comparisons, and mapping existing frameworks to the reference models. It also presented the First Annual Excellence in Enterprise Architecture Awards. Pleased with the overall success of this event, the conference managers are already meeting to plan for the next enterprise architecture e-Government conference.

Reflections on Emerging Technologies (cont.)

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it needs for optimal growth. This network could produce more food, with less work, while lowering costs and be less invasive to the environment.

In manufacturing, each component of a product could be identified from the moment it enters the factory. All components would be tracked as they are stored, used in assembly, and finally leave the factory as part of a final product. Products would have embedded in them all the information about its components so that upon final inspection, the exact manufacturing process has been tracked and documented. This increase in precision could them be translated to improvements in the manufacturing process, inventory control, and security.

Computers will evolve from interactive to proactive. With the combination of decreasing size and increasing sophistication, computers will need to be proactive in order to maximize their impact. Currently, computers can perform many functions when instructed by a user. In the future the separate computer units will communicate with other computing devices independent of the human who owns/uses them. These devices will query the sensor network and in some cases act in the behalf of the human to take actions that will benefit the users individually and increasingly society itself. In the agriculture example the benefit to farmers is only realized if array of computers can act upon their behalf. The data from individual plants would produce information overload for users if they needed too interact with the sensors directly.

Globally, the evolution of interactive to proactive computing will have great societal impact. For example, farmers using this type of technology food producers can replace low cost human labor with no-labor-cost computing machines. Other sensors will be used identify a vast array of potential hazards such as: drowsy and intoxicated drivers, detection of contaminants, and identification of medical conditions. Individual networks of sensors will work to improve the safety and quality of life.

The underlying technology will be "hidden" from the people using it. The emerging computing platforms and their associated networks will have sophisticated underlying machine methods. These computers will learn. They will use new modeling methods and technologies to make their decisions. Given the first two trends discussed, the traditional user-centric view of technology will need to evolve.

As with the agriculture example, these networks will have access to enormous amounts of data that would swamp a human decision-maker. The on-going monitoring will sense the environment and make micro corrections faster and quicker than a human could. Although not nearly as advanced as the projection described here is one current example of what we may see in the future:

http://www.greatduckisland.net/

Individuals and companies will "pay" for the information services they use. This occurrence has been described as the end-of-free and the start-of-fee. Computing while inexpensive is not free. These technologies will not be deployed because we have the technology prowess to do so. They will be deployed because someone has the foresight to see this type of computing as an investment and is willing to make the monetary and other payments needed to see the project to successful conclusion. Each new technology has to overcome the apprehension it invokes. Years ago, many people felt that playing music over the radio would end the music recording industry. That proved not to be the case. Technology offers the possibility of a different future, but it is humans that have to create that future.

The areas that will be the significantly impacted by these changes will be the pharmaceutical industry, education and the information technology industry itself. Why is this so? All of these industries tend to be reactive in nature. Currently, drug companies attempt to treat diseases after their on-set. In one possible scenario, the emphasis and the technology may be focused on prevention rather than the cure of disease. Education has historically lagged in adopting new technologies. In the future, technology can personalize education. These technologies may allow individuals to customize their interests and their abilities within their schools and courses of study. Lastly, the information technology industry has tended to focus on short term products instead of on longer term solutions. One possible future could see massive investment in future systems of computers that are amazingly resistant to failures. Think of a power grid that could prevent large numbers of power failures even in the event of a hurricane.

Will these projections come to fruition? The projections and trends discussed here are just one possibility out of a multitude. The trends described here are based upon a historical perspective and current research. There may be profound, yet unknown, technological innovation that could alter these projections. The uncertainty is what makes technology and its impact exciting. There is one certainty and that is this: people will determine their future and technology will help shape that future.

The Latest on Wearable Computers

By John Saunders

In a linear fashion over the last five years Wearable Computers (WCs) have increased in power and decreased in size. To be a viable commercial product, manufacturers will need to pack as many capabilities as possible into the main body of the wearable while keeping the size down to that of a current PDA. Additional components, such as external wireless cards, disk drives, cameras and power supplies quickly become cumbersome. They tend to label the wearable as "for geeks only" and reduce its advantage to a point where the lightweight notebook is a better option.

The following sections outline the remaining challenges that must be addressed before the wearable becomes the computer and communications device "of choice" and becomes competitive with notebook computers.

"The challenge is less concerned with technology than with cultural acceptance that 'the office' will no longer be necessary for conducting business. This is a cultural hurdle that most executives now consider heresy.."

Applications: High-end wearable computers now have comparable computing capability to desktop computers. As such, typical productivity applications such as word processing, spreadsheets, and databases are readily available on the wearable. These applications however are not likely the "best use" for these devices.

Applications where the user's work, education, and play includes a need for mobility plus computing will best fit the use of a wearable. An example would be the ability to bring up the prices for detergent at Costco while walking down the soap aisle at Safeway. Or the ability to use a connected miniature video camera on a field trip to scan a rock sample which is then input to a sophisticated recognition program on the wearable PC. Another interesting application will be the "tele-actor" where somebody with a video-enabled wearable acts on your behalf, perhaps half way around the world in a business negotiation, or maybe simply in the fresh produce section of your local supermarket.

The widespread use of wearables will require some adaptation in customary modes of input, output, and the way work is accomplished with computers. Future input will be oriented toward more cognitive friendly devices such as speech recognition and eye tracking. Future output will be more oriented toward visual symbol systems, less focused on text and numbers. It will also be oriented toward "augmenting reality" – that is adding information to what we are seeing. The challenge is less concerned with technology than with cultural acceptance that "the office" will no longer be necessary for conducting business. This is a cultural hurdle that most executives now consider heresy. At one time cell phone use was considered extravagant, frivolous, and even silly. The same is now true for wearable computing.

Central Processing Unit: Characteristics of a wearable computer CPU chip include light weight and low heat emission. As such Transmeta's Crusoe chip and others of a similar class are the chips of choice. These chips, however, remain higher in cost than fan cooled processors.

Operating System Software: While some of the wearable computer units on the market such as the Xybernaut POMA use the Windows CE operating system, one opinion is that a computer is not a true wearable unless

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it can run the latest operating systems, now Microsoft Windows XP or Redhat Linux.

Heads-up display: Two general technologies, LCD and Crystalline, are available as wearable visual displays. The LCD is a device about the size of your eye which uses traditional LCD technology. A single-eye LCD device was packaged with the POMA, sold briefly by Xybernaut in the U.S. but no longer available. It is pictured above at the top left. The device was manufactured by Hitachi and is now available only in Japan. Dual Eye LCD devices remain for sale in the U.S. but are typically configured to run with traditional desktop PCs using VGA output or with DVD players.

The Crystalline approach – using chips sold by MicroOptical Corp are much smaller and lighter in weight than the LCD devices. These devices may be seen in the lower two photos. The challenge here is for manufacturers to lower prices and increase resolution. Current devices cost $2500 while only providing 640 x 480 resolution.

Power Requirements: Lithium-ion batteries, the same ones used in personal digital

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The Latest on Wearable Computers (cont.)

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assistants are the current best option in this area with an approximate expected power output time of 2-3 hours per battery. These batteries are quite heavy though. Hydrogen battery technology is needed. It will weigh half as much, but is not yet commercially available.

Mouse & Keyboard: A well-designed application can eliminate the need for a keyboard. The devices below include a "thumb mouse" from Hitachi, and a device called the "twiddler. " The latter device requires the user to learn a new keyboarding paradigm, but is twice as fast as a traditional keyboard.

Wireless Connection: Universal unfettered wireless access remains a challenge in the U.S. Wide scale, narrowband service such as that offered with the Blackberry and the Palm PDAs, and with some digital phones is not available for other digital devices. Inside buildings and in certain airport and hotel locations the corporate 802.11b wireless access method may be utilized to connect a wearable computer. This access is typically accomplished through a PCMCIA or Compact Flash wireless card. This means the wearable must have these slots built into the base unit, or a USB connector.

Summary

It is likely that new "boxes" the size of a PDA, but with full Windows XP processing capability, will hit the market in 2004. But the principal hurdle to a cost effective total wearable solution will be a visual display that is lightweight, yet provides a "full screen" effect. It will be 3-5 more years before they come down to a $300-$500 commercially acceptable level. The infrastructure needed to deliver ubiquitous high bandwidth, also a requirement for wearables, is also 3-5 years away.

Web Sites to Visit

Xybernaut: http://www.xybernaut.com/home.asp
Note: Xybernaut does not sell directly to the public.

Millenium – IT: wspring@smartewear.com (410) 757-2500

Micro Optical Corp:
http://www.microopticalcorp.com/

Tek Gear: http://www.tekgear.ca/

VIA: http://www.via-pc.com/

Microvision:
http://www.mvis.com/nomad/index.html

Tips and Tricks for Successful Online Teaching

By Les Pang

Preparation

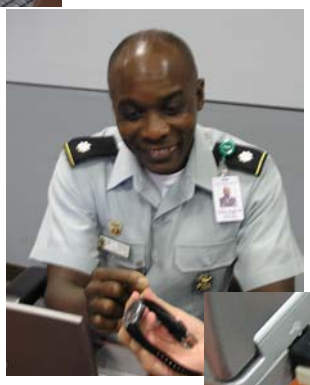
- Create a collaborative community of online educators to exchange ideas, lessons learned, etc.
- Ensure interface and format consistency among all courses (e.g., use a documented style guide)
- Hold a *face-to-face* kick off meeting involving the development team at the inception of the course

Course Development

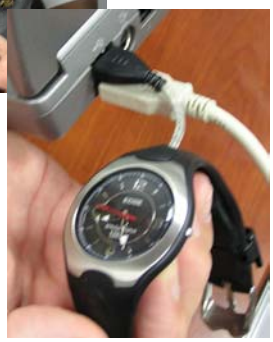
- Maintain the rigor and quality of resident courses
- Avoid the blind conversion of resident classroom content to the online environment
- Include multimedia in the course content but be cognizant of user issues such as bandwidth/plug-in requirements. (e.g., transfer video and other large files to CDs and distribute CDs prior to class)
- Try innovative active learning techniques – peer reviews of fellow student deliverables, debates, role playing (using chat rooms), simulation games, web scavenger hunts, etc.

Online Facilitation

- Check and update your content (e.g., URLs may change) before opening up a class
- Ensure that there are a manageable number of students in each class (Research indicates 12-30)
- Be sure to communicate all of your expectations *up front*
- Provide a student-centric perspective and be flexible (e.g. opening up lessons early near holidays). Know your students.
- Use pre-tests such as anticipation guides (present several statements and have students state whether they agree or disagree and provide their rationale; revisit their responses at the end of the course).
- Create a comfortable/social learning environment (establish a student union/coffee shop/pizza party discussion board; and have students introduce themselves and include a picture of their favorite pet.)
- Involve students in high-level discussions (i.e., avoid “cut-and-paste” responses)
- Properly manage team activities (maintain an appropriate team size; use peer self-policing techniques to minimize individuals "who are along for the ride"; appoint a qualified team leader; continually monitor team activities; instruct students use the online learning system -- and not e-mail -- for any exchanges regarding team activities)
- Be sensitive to cultural differences among the students; avoid off-color humor
- Respond to student questions in a timely manner but avoid individual e-mail replies and other inefficient means of communication unless necessary
- Have students answer other student questions, but monitor this closely
- Make the student constantly aware of your online presence; tell them when you are unavailable (e.g. on vacation or at a conference)
- Have lessons start on Monday mornings and assignments due on Sunday nights
- Be cognizant of time zone differences (e.g., when it comes to assignment due dates and time, use Sunday 11:59 am EST)
- Check your student deliverables for plagiarism (use a site such as www.turnitin.com)
- Use instant messaging (IM) capability to provide better contact and relationship with the student
- Explore the use of web logs as student journals (may contain reflective thoughts on the course)
- Think reusability (e.g. archive your announcements, comments on student discussions, etc.)
- Use metrics to measure the level of success.



Technology in the Classroom



Starting from the top and proceeding clockwise: Industry student from Raytheon, Jim Craft, is using a pliable **membrane keyboard**. Roger Taylor is looking at storing data in a **USB flash-drive watch**. Karen Halstead is preparing a paper on her state-of-the-art **laptop** that is linked to the college's **wireless network**. International student Ileana Antonio operates a **Tablet PC** in two modes. *(Editor's Note: This newsletter was created on a Tablet PC!)* Willie Thomas appreciates the productivity gains he received from his **personal digital assistant**.

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