



Electronic Commerce and Governance: A Darwinian Discussion

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Technologies, processes, and interactions between government bodies and their citizens can benefit from the improvements driving the private sector economy by streamlining processes to improve the quality of consumer/customer service; reducing waste, fraud, and overhead costs; and making better use of public budgets. Public-sector organizations can profit from lessons learned in the private sector where competition has fueled e-commerce expansion. This article addresses the benefits and challenges of electronic governance and e-commerce in the public sector; points to issues such as information security, and concludes with a discussion of the implications of changing the fundamental relationship between citizens and their governmental bodies.

An e-commerce strategy is *not* merely the online automation of the consumer relationship. It is the deep, fundamental redefinition of that relationship, combining a Pandora's box of security issues with a remarkable degree of autonomy and service for the consumer. However, what might begin with an offhand approach to Web-based services or the selling process can degenerate into a terrifying inability to respond to demanding customers. Retailers involved in legal battles due to last year's severely disappointed holiday shoppers know all too well how inadequate their planning or their understanding was. Perhaps in no other environment, except for life-support applications, does this quality of software demand such intense scrutiny, maintenance, and care.

Recently attorneys launched a class-action lawsuit against the online incarnation of a national toy store chain, saying the company's Web store accepted orders for toys during the 1999 Christmas rush even though it knew it would not be able to deliver purchases on time. Nine out of 10 customers who shopped the World Wide Web during the holiday season experienced problems, and 88 percent abandoned their shopping cart at some point during the visit [1]. In spite of this, U. S. consumers still spend about \$29 billion annually on Web commerce, and researchers at the Wharton School of Business estimate that this figure will reach \$133 billion by January 2004 [2].

Clearly a fundamental change is under way in the private sector's business practices and Internet use. But what does this have to do with the way government relates to its citizens? At the core of these relationships lies a transaction—an exchange of goods, services, or information that can be improved in the same ways as private-sector relationships. These transactions can:

- Provide better quality to the consumer/citizen.
- Improve the use of revenue/budgets.
- Reduce nonvalue-added expenditures or overhead costs.

Private/Public Sector Comparison

To be able to apply best practices from the private sector, it has to be acknowledged that there are some real differences between the world of government and commercial enterprise:

- **Government budgets.** These are invariably constrained. Unlike business, information technology (IT) success does not necessarily lead to an influx of new capital and increased budgets.
- **Politics.** All enterprises have internal politics, but the commercial world is not exposed to the frequent disruptions of changing administrations, rotating military leaders, and objectives.

- **Personnel.** Recruiting and retaining skilled IT staff is challenging for the most attractive technology firms. Government agencies are constrained by budgets, inability to offer incentives such as stock options, and less state-of-the-art work environments

- **Competition.** While most government organizations do not face the same direct competition as business, an increasing number are moving to a fee-for-service mode of operation. Although the government originally developed the Internet, the free market recognized its opportunity and exploited the new ecology first, fueling its growth and penetration into households around the world. Entrepreneurs seeking profits developed the practical applications and businesses that propelled the Internet into an economic force. That has made Silicon Valley the gathering place and breeding ground of "dot-com" millionaires.

Competition forces fierce survival tactics. The rapid changes imposed by the online revolution quickly eliminated those businesses that could not adapt. Similarly, only the best and most practical applications and processes survive the intense competition of the commercial world. Here are some examples:

- Amazon.com entered and redefined the world of book sales and now has 10 times the market value of Barnes & Noble.
- Electronic trading redefines the world of stock trading. Merrill Lynch is forced to enter into electronic trading. What does it do with its stockbrokers? The fee structure has been totally changed (i.e., reduced) and has led to a new market segment—day traders.
- E-Bay, by offering online auctioning, has created a sub-industry of traders in all sorts of commodities, especially antiques.
- Eastman Kodak is changing from a chemical company into a data manipulator as digital technology revamps photography. Polaroid is still struggling to make its transition. Why do you need an instant camera when a digital photograph is instant?

While the intense competition forces the commercial world to constantly innovate, only those innovations that prove viable and competitive will survive to maturity. As a result, the commercial world is a great source of battle-tested ideas, applications, and best practices—the same kind of revolutionary breakthroughs so needed in government.

A Model for Implementation

Adapting business and government to the Internet entails more than just creating a Web site and trying to draw as many visitors as possible. For the provision of electronic government

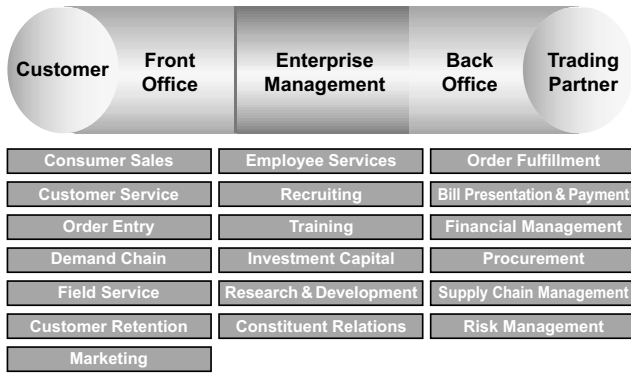


Figure 1. Commercial E-Business Model.

services to constituents, the site is only the beginning. E-business, electronic governance, and e-commerce are synonymous. This view dramatically understates the value, potential service, and efficiency gains offered by integrating all aspects of an enterprise.

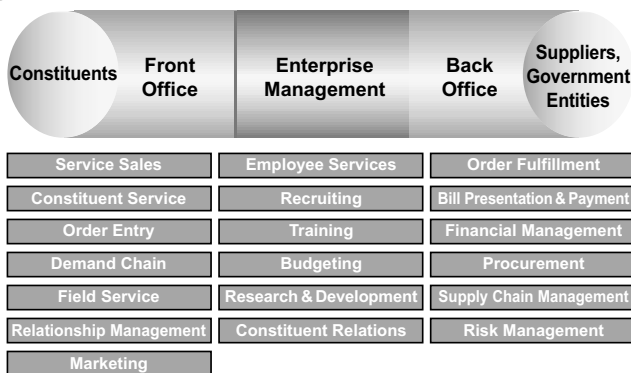
To achieve its full potential, the new electronic world interconnects front-office and back-office operations, integrating rather than replacing legacy applications. As alluded to earlier, it goes beyond simple technological implementation to a comprehensive rethinking of the processes, organizational structures, technology architectures, and all their interfaces. Figure 1 shows the potential for integration in the commercial world.

While recognizing the many differences between government and commercial organizations, this business model can be adapted to fit the needs of a government entity. Some of the differences are simply terminology while other cases will require an adaptation of business-oriented functions to serve a different, but related, government need. Figure 2 lays out this approach.

In this model, the customers from the business model become the constituents of government—its citizens and businesses. Back office operations are almost identical to those in a business. The government procures goods and services, sends and receives bills, delivers services, and must manage its finances and risks. Business-to-business services, such as online trading communities, have provided the auto manufacturers and other industry segments with tremendous savings in their procurement processes. Applying these concepts, and rethinking procurement regulations to enable efficient online trading, could provide governments with significant cost savings and competitive advantages.

Enterprise management functions in electronic government are also quite similar, although the emphasis may be different. All organizations are faced with recruiting, training, and supporting employees. Constituent relations in the business world refer to

Figure 2. Electronic Government Model



systems supporting investors, analysts, and the press. In the public sector, the investors are the taxpayers. In both cases, the investors want to know that their money is well spent.

Front office operations are most visible in an online government world. While the emphasis again is different, the basic functions have many similarities with their business counterparts. One particular area of interest that can be borrowed from the world of business is customer/constituent relationship management (CRM). Businesses use CRM to better understand the needs and preferences of their customers, and thereby tailor their services to these needs (i.e. a store discovering that flashlights should be placed next to Halloween costumes). Unlike the polls typically relied on by government agencies, CRM analyzes usage patterns and other factors to provide an objective view of citizen needs.

What makes this model so potent is its ability to tie disparate organizations or agencies into one common set of functions. This commonality enables information and application sharing across organizations in a comprehensive enterprise view. Now that we have established a model, let us explore its implementation.

Objectives and Benefits

Government's first step must be to set the goals and objectives for the electronic governance effort. Many organizations, commercial and otherwise, fall into the trap of incremental thinking when developing their electronic strategy. Lofty goal setting can guard against the tendency for conventional thinking and incremental gains—a sure prescription for failure in the zero-environment of the Internet ecology [3].

Grossly oversimplified, there are three primary areas government entities can pursue in setting electronic-strategy directions:

- It can increase revenues and optimize budget expenditures.
- It can reduce costs.
- It can improve constituent services.

Increasing Revenues

Every organization wants to increase revenues. The challenge is finding creative ways of increasing revenues that can provide funding to offer constituents enhanced services without additional taxation. Some areas where electronic data can assist include:

- **Selling information.** Data transmission such as high school records to colleges/universities for a fee is possible. Many states are selling or considering selling information over the Web, but issues such as privacy concerns can limit this.
- **Fee for service.** Arizona is charging user fees for some of the services it is offering on the Web. These fees are used to fund Web applications.
- **Improving collections.** Massachusetts is using the Web to simplify tax filings and payments. Using the Internet to provide better and more timely taxpayer information makes collection faster and easier. This encourages taxpayer compliance, increasing the odds that the returns are correct, and provides quicker access to tax funds.
- **Increasing compliance.** Using the Internet can simplify payment of parking fines and traffic tickets
- **Catching fraud.** Data warehouse applications can combine data from many sources to find fraudulent transactions, such as the same person filing multiple claims under different names, or duplicate/unmatched supplier disbursements.

Reducing Costs

Electronic media provides the government with the ability to dramatically reduce operating costs while improving its service to citizens. The state of Alaska provides a good example.

It implemented a Web and telephone interface that allows customers to renew automobile registrations without visiting the Department of Motor Vehicles. This resulted in cutting the state fulfillment cost from \$7.75 to \$0.91 and reducing citizen time from 2.5 hours (excluding travel) to less than three minutes (no travel). The State achieved a significant rise in citizen and employee satisfaction.

Alaska is reapplying this technology and process to its business license renewal department. While the states seem to be applying the Internet ecology more quickly than the federal government in some areas, clearly the benefits can be equally gained in areas of case management of entitlements, services such as those offered by the Veterans' Administration, and student loans. All of these functions are aggressively pursuing government use of the electronic media in the federal arena.

By applying best practices (such as the Software Engineering Institute's Capability Maturity Model® and effective IT management techniques, significant savings in IT operating costs can be obtained while simultaneously improving IT service levels. Outsourcing engagements, using the CMM Level 3 as a basis for management, have reduced operating costs 15 percent to 20 percent, reduced cycle time to up to 80 percent, and enhanced service levels raising customer satisfaction across the board.

Figure 3 displays the results of moving from CMM Level 1 to Level 3, based on an analysis of 1,300 projects developing 200,000 software lines of code. Achieving Level 3 provides the greatest benefit, both in deficit reduction and quality enhancement. When CMM processes are combined with the optimization of the government using the electronic media, the increase in available funding for developmental projects can be considerable for government entities. The benefits are significant and improve cost and quality, while reducing effort and time to market (cycle time). To survive in the fast paced world of e-business, performing at Level 3 or higher is not an option; it is a necessity.

Improving Constituent Services

There are endless ways to use the Internet and e-business concepts to enhance constituent services. The following are just some ideas drawn from the business world:

- Access to customized information is an obvious benefit of the Internet. For example, a retiree may get customized views of elderly services, while a youngster receives sports and education information. Non-English speakers may get information in their native language.

- Customer (constituent) self-service is used by businesses to lower customer support costs while increasing customer satisfaction. The government can benefit by transferring tasks to the constituents, who can work at their pace and schedule while reducing the time and inconvenience of performing the transaction. Some examples include allowing customers to file and research consumer complaints online, enabling citizens to inspect and correct personal government records, and providing such benefits as electronic tax filing.

These benefits are exciting, with huge potential return on investment. But there is a big difference between strategy and implementation. The quality of the implementation is as important as the quality of the technology. A government project in the electronic media is a big challenge, involving large applications that are difficult and complex to develop and roll out. The majority of Internet-related projects still have a negative return on investment, as witnessed by the performance of most web initiatives. These poor results, however, are not a reflection on e-business change management. Many years of large project management experience and \$100 million-plus run rate of Internet projects can offer some lessons.

Managing Cross-Functional Projects

Successful e-business projects require a cross-disciplinary approach that includes business, technology, and creative components. The commercial world is quickly developing people highly skilled in the rigors of e-business development and roll-out. Making use of this expertise is essential if government organizations are going to avoid costly mistakes and reinventing the wheel. Some requirements are:

- **Process Improvements:** E-business benefits cannot be achieved by attempting to automate existing processes. All successful projects begin with a blank sheet of paper. Their processes are redesigned from scratch before attempting to design and build systems.
- **Staffing:** Many companies are discovering that recruiting and retaining the skills needed to enter the world of e-business is costly and difficult. But numerous costly and specialized skills are needed only for a short duration, during development. The commercial world deals with these difficulties through outsourcing and the creative location of people. However, retaining a core of these exceptionally skilled employees is essential for maintenance purposes.
- **Project Risk Sharing:** Software projects are inherently costly and risky, with the buyers of services bearing the entire cost and risk of project overruns and failures. Consulting firms have devised new and creative ways to share development risk. Through outsourcing projects payments are linked to service level performance and guaranteed cost reductions or development projects include progress incentives. A new and growing area is fee for services, in which the consulting firm foots the bill for the development and rollout of an e-business application in exchange for a percentage of the fees or resulting cost savings. Just as the rules have changed for the relationship between the consumer/citizen and the provider of goods and services,

Figure 3. *Quantifiable Business Benefit*

CMM Level	Calendar Months	Level of Effort	Defects Shipped	Median Cost	Lowest Cost	Highest Cost
Level 1	30 Months	600 Person Months	61	\$5.5M	\$1.8M	\$100+M
Level 2	18.5 Months	143 Person Months	12	\$1.3M	\$0.96M	\$1.7M
Level 3	15 Months	80 Person Months	7	\$0.73M	\$0.52M	\$0.93M

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changes must be made in the relationship between the government and its suppliers. Many initiatives and organizations, such as the Industry Advisory Council, lead this beneficial maturation.

However, all parties to relationships in the Internet ecology must quickly become aware of the threats—both known and as yet developing—that will comprise the greatest challenge in the coming decade.

A Double-Edged Sword

The growing demand for access to more information, in greater and greater degrees of specificity, parallels increasingly virulent and violent cyber-attacks and cyber-crimes. Government and business customers expect providers to develop intimate relationships instantaneously, while guaranteeing privacy and security. Even as electronic commerce larceny carries serious repercussions, the dangers of this new human dimension focus on two areas: national threats to the country, and our lack of understanding or awareness of potential downsides to cyberspace. While tactics using firewalls, encryption, public key infrastructure, and other security measures are essential, we need to understand—at a deeply scientific level—the huge novel ecology we have created and entered.

Sen. Bob Bennett (R-Utah), at the October '99 Executive Leadership Conference in Richmond Va. attended by more than half of the federal chief information officers, pointed out that the Internet "... is a place. It is real. It brings trade and terrorism. And there are no oceans in the Web."

If you go to www.cybergeography.com, you will be able to view a beautiful and bewildering number of cyber-maps, showing the Internet from novel perspectives [4]. My favorite presents it in an abstract spider web of assorted colors, representing different countries. It reminds me of nothing so much as ganglions and neurons in the brain—the reds of Germany intertwined with the United Kingdom's lilac, U.S.' purples, and all the other colors of countries online. An example of a cyber-geography map is shown in Figure 4.

Bennett's point underscores the lack of boundary dimension of the Internet, which brings not only any museum's masterpieces or your favorite chef's recipe, but also the threats of demented minds and hostile groups. We are now everyone's neighbor, but without some fundamentally protective human skills. The eye-to-eye contact we use to confirm honesty, and the handshakes, which communicate nervousness or deceit, are no longer there for us. We have removed the very heart of body knowledge, and operate purely on the basis of rational, logical thought. Unfortunately, we did not evolve that way, and therefore, cannot exercise judgment on the basis of comprehensive human understanding.

Neurophysiology over the past decade has made remarkable discoveries of both the essential role of emotions for effective decision making, and the seamless relationship between the body-state, and the perception of emotions. In his groundbreaking book, *Descartes' Error: Emotion, Reason, and the Human Brain*, Dr. Antonio R. Damasio proposes:

"... Reason may not be as pure as most of us think it is or wish it were, that emotions and feelings may not be intruders in the bastion of reason at all: they may be enmeshed in its networks, for worse and for better.

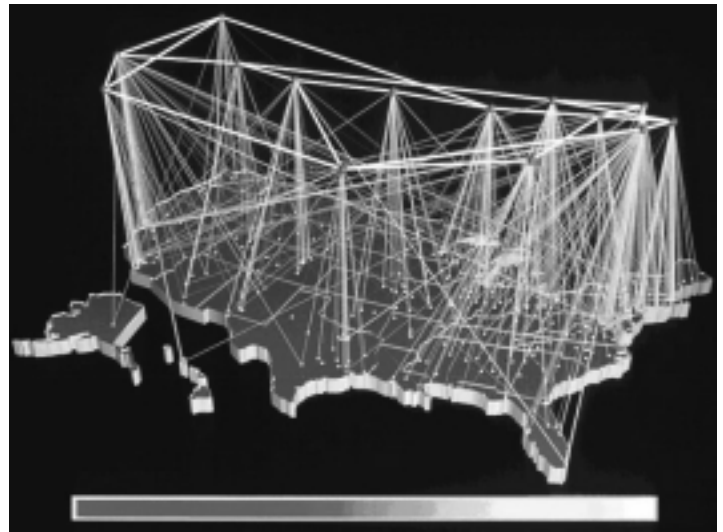


Figure 4. *Visualization Study of the NSFNET*

The strategies of human reason probably did not develop, in either evolution or any single individual, without the guiding force of the mechanisms of biological regulation, of which emotion and feeling are notable expressions. Moreover, even after reasoning strategies become established in the formative years, their effective deployment probably depends, to a considerable extent, on a continued ability to experience feelings [5]."

To state a complex discussion in an overly simplified manner, he demonstrates that body-state, our basic hormonal/chemical signals, triggers what we call feelings—those feelings are central to effective decisions that contribute to survival. More specifically, all of us can recall the sense of unease when we feel deception, but cannot quite verbalize why we know we are being lied to. And lying, per se, requires language.

Robert Wright, in *The Moral Animal: Why We Are the Way We Are*, writes, "Language evolved as a way of manipulating people to your advantage ... cognition, the wellspring of language, is warped accordingly [6]."

In ecology devoid of the somatic wisdom of face-to-face interaction, the advantage goes to deceivers. Heightened awareness of this essential characteristic of the Internet dimension must be a fundamental element of all our interactions, both at the national and personal levels. The growing assault on industry and government sites is being met with escalating security procedures and tools—it is a seesaw balance of terror that is probably a never-ending exchange. On the personal level, though, we must grapple with a change none of our forebears could have even imagined.

In his book *Creativity*, Mihaly Csikszentmihalyi points out that evolution in the past millennia has been driven by cultural forces far more than biological forces. Great minds, like Jonas Salk and Edmund O. Wilson, have called this tendency metabiological or biocultural. We are changing ourselves, our cultures, and *directing evolution* faster than biology. What we have now is a new dimension in which to exist, and like all great dramatic changes in human evolution, it carries powerful positive and negative consequences. But it is real. It is a place. And now there are no distances between either our enemies or our friends.

The Promise of the Future

Great leaps forward in technology, like the car, electric power,

and the Internet, inevitably carry great benefits and usually unanticipated downsides. Governance by electronic media, like e-business, is here to stay. And in a decade's time the issues and challenges of this article will seem childlike and innocent; the benefits will seem unimaginative and lacking foresight. Clearly though, government will play an increasingly important role as President Clinton stated in his National Plan for Information Systems Protection (V.11):

"The federal government does ... have an important role to play. This includes research and development efforts in the field of computer security, educating a corps of young computer scientists to help defend our federal cyber systems, and assisting the private sector as it creates defensive measures for its information technologies ... it is an essential undertaking that we must begin now, so that we can continue to enjoy the extraordinary opportunities of the Information Age and create the security we require for our prosperity and growth in the next century [7]."

As the thinkers and innovators of information technology, we in the field of software engineering owe our nation and ourselves a deep understanding of what it means to communicate, to decide, and to enter into relationships in the absence of body-knowledge. We must quickly bring the benefits of this new ecology to the realm of governance, taking advantage of the lessons learned in the private sector and looking to their leadership in some fields.

It must not be just a technological surge of understanding information security, though, but a paired commitment to understanding human decisions, feelings, and the seamless communication between our bodies and our brains. Only when we can dovetail these branches of communication theories will we truly feel secure in the Internet ecology. ♦

Acknowledgements

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7. The White House, *Defending America's Cyberspace: National Plan for Information Systems Protection, Version 1.0*, 2000, p. ii.

The Dana Alliance for Brain Initiatives maintains a Web site at www.dana.org/brainweb, which is a neurosciences Internet *Best Bet* and a Lycos Top 5 percent site.

Additional Reading

The following books delve into human brain functions, consciousness, organizational evolution, and human social hierarchies. They are particularly germane to the issues discussed in this article.

The Feeling of What Happens: Body and Emotion in the Making of Consciousness by Antonio R. Damasio

Descartes' Error: Emotion, Reason, and the Human Brain by Antonio R. Damasio

The Mind of the Strategist: The Art of Japanese Business by Kenichi Ohmae

The Engine of Reason, the Seat of the Soul: A Philosophical Journey into the Brain by Paul M. Churchland

Built to Last: Successful Habits of Visionary Companies by James C. Collins and Jerry I. Porras

The Evolution of Progress: The End of Economic Growth and the Beginning of Human Transformation by C. Owen Paepke

The Moral Animal: Why We Are the Way We Are: The New Science of Evolutionary Psychology by Robert Wright

Creativity: Flow and the Psychology of Discovery and Invention by Mihaly Csikszentmihalyi

The Logic of Failure: Why Things Go Wrong and What We Can Do to Make Them Right translated by Dietrich Dorner

Managing to Have Fun by Matt Weinstein

The Face of Battle by John Keegan

A History of Warfare by John Keegan

Origins of the Sacred: The Ecstasies of Love and War by Dudley Young

Blood Rites: Origins and History of the Passions of War by Barbara Ehrenreich

Well Made in America: Lessons from Harley-Davidson on Being the Best by Peter C. Reid

About the Author



Nancy Lee Hutchin is the bid and proposal manager for Keane Federal System Inc. and has an international reputation for professional excellence, with 22 years experience. She has had more than 30 articles published and participated in six international conference program committees, including more than 20 presentations, numerous keynote speeches, and serving as track chairwoman. The 45-plus projects she has successfully concluded have covered change management, information strategy, business process reengineering, information engineering, strategic and implementation planning, and legacy system migration/enhancement. She was named International Woman of the Year for the United Kingdom's *Cambridge International Dictionary of Biography*. Hutchin also has been included in Marquise's *Who's Who in Finance and Industry*, *Who's Who of American Women*, *Who's Who in the World*, *Who's Who in Science and Engineering*, and *Who's Who in America*.

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