"Once and Future King": The State of E-Business

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Overview

- Definitions
- Key Concepts
  - Being Digital
  - E-Markets
  - Value Chains
- Categories and Markets
- Forms
  - Business to Business
  - Business to Consumer
  - Peer to Peer
- State of Technologies

- Next Steps
  - Emerging Technologies
    - Objects
    - Identifiers
    - Directories
    - Messaging
    - Positioning
  - Possible Scenarios
    - Ubiquity
    - Mobility
    - Net-centricity
    - E-services
- Conclusion

September 3, 2001   State of E-Business   2

E-commerce versus E-Business

- Electronic commerce is the application of technology to the automation of business transactions
- E-Business is:
  - Business that makes smart use of technology
  - Business made possible by selected technology
- E-Business is concerned with efficient systems for:
  - Process reengineered workflow and document management
  - Enterprise Resource Planning and Supply Chain Management
  - Web-based components and Customer Relations Management

September 3, 2001   State of E-Business   3

E-Business, .com, and the WWW

- E-Business is much more than .coms.
- Ironically, a poorly organized and managed .com might not be a good e-business
- At the same time, a solidly constructed e-business is likely to use the World Wide Web(WWW)
- Web based e-business technologies are evolving
  - Cookies, wallets, and branding
  - Auctions, reverse auctions, and collaborative filtering
  - Infomediaries, portals, and vortals

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Key Concept: Atoms to Bits

- The use of atoms to hold bits
- The economics of bits
  - PC banking ($.01)
  - ATM ($.27)
  - Teller ($1.07)
- Bit commodities versus atom commodities
  - Singularity of ownership
  - Cost of duplication
  - Impact of usage

September 3, 2001   State of E-Business   5

Key Concept Electronic Markets

- The growth of markets
  - Bazaars and port cities
  - Brokered global markets
  - Digital or E-markets
- E-markets are quantitatively different
  - Network externality -- $N*(N-1)/2$
  - Global span
- E-markets are qualitatively different
  - Collaborative intelligence for seller and product
  - Brokerless access -- disintermediation

September 3, 2001   State of E-Business   6

Key Concept
The User Driven Value Chain

- The value chain refers to the process by which raw materials are transformed into products people buy.
  - E-Business is concerned with linking organizations in the value chain more efficiently
  - From the perspective of any organization, the value chain has two parts -- the supply chain and the demand chain
- Historically, organizations have designed and then marketed products for which they created demand
  - The demand chain has been push driven
  - Many believe that the demand chain will become user controlled or pull driven in the future

September 3, 2001   *State of E-Business*   7

Categories of E-Business

- Business to Business (B2B)
  - Electronic purchase order submission
  - Just in time inventory control agreements
- Business to Consumer (B2C)
  - Provision of product information online
  - System for product ordering online
  - Updates, help, and product documentation
- Peer to Peer (P2P)
  - On-line auctions
  - Job announcements
- E-services

September 3, 2001   *State of E-Business*   8

Evolution of E-Businesses

- E-Businesses emerge in several ways
  - The expansion of resource management systems to embrace the supply chain
  - The expansion of internal information systems to public systems of increasing sophistication
  - The resale of either of the above
  - The development of new channel opportunities
  - The development of new products optimized for new channels

September 3, 2001   *State of E-Business*   9

Size of the B2B and B2C Markets

	1998	1999	2000	2001	2003
$12T Market **B2B (BCG)**	$671B $92B HTML $579B EDI			(25%) →	$2.8T 2T HTML 800B EDI
B2B (GG)			$237B		$4T
B2B (FR)	$43B				$1.3T
$3T Market **B2C (BCG)**	$14.1B	$33.1B (1.4%)		(2%) →	$61B
B2C (GG)					$400B
B2C (FR)					$108B

Business to Business (B2B)

- Based on existing EDI/MRP/ERP systems
- B2B efforts are directed toward
  - Reducing procurement and distribution costs
  - Facilitating tighter inventory control
  - Allowing better supply chain management
  - Implementing customer relations management
- Are looking to exploit
  - Client server system interface flexibility
  - Expanded in-place browser capability (XML)
- System costs are coming down allowing application to SMEs

Business to Consumer (B2C)

- Organizations sell a product or service directly to the consumer
  - Complete electronic transactions – software
  - Transaction less product delivery – books
  - Informational shopping – cars
- Spurred by and dependent upon the existence of web protocol

Peer to Peer (P2P)

- On-line auctions (Ebay averages 1.7 million visitors per day)
  - Timed auctions
  - Reverse auctions
- Collaborative information exchanges
  - Chat rooms
  - News groups

State of the Technologies(1)

- Networks
  - IPv6 will improve the ratio of uses and addresses
  - Network directory services, firewalls, and security are solid
  - Wireless technologies are evolving
- Systems
  - Relational DBMS web connections are solid
  - Component technologies are evolving
- Protocols
  - Addressing and transmission protocols are solid
  - Application specific protocols (DCOM, RPC, and RMI as well as LDAP and CTM) are solid

State of the Technologies(2)

- Data Protocols
  - HTML is mature
  - XML is almost ready
    - Datatypes and Schema
    - XSL and XSLT
    - XPath, XPointer, and XLL
- Certification and Authentication
  - Encryption(DES, RSA, SSL) is solid
  - Authentication is maturing (smartcards and biometrics)
  - Certificates and Certificate Authorities are solid

Technologies: the Next Step

- Technologies
  - Objects
  - Identifiers
  - Directories
  - Messaging
  - Positioning
- The Ideas
  - Ubiquitous Computing
  - Mobile Computing
  - Netcentric Computing
  - E-services (.NET, JXTA)

September 3, 2001   *State of E-Business*   16

Objects

- Modern computing languages are based on objects
  - Objects allows for inheritance
  - Objects provide a level of encapsulation
  - Objects encourage code reuse
  - Objects provide a natural way to think about interfaces
- Objects consist of:
  - Private data stores
  - Public methods to access and manipulate the stores
- Objects allow for "component" design -- the Unified Modeling Language exploits this.

September 3, 2001   *State of E-Business*   17

The Value of Objects

- Microsoft has made extensive use of objects.
  - A spreadsheet or graphic in a document is made possible by and object oriented approach
  - The Component Object Model (COM) allows this on one machine
  - Distributed COM (DCOM) is the extension of COM to networks
- For objects to be really useful, there must be some way of identifying them

September 3, 2001   *State of E-Business*   18

URLs and URIs

- Uniform Resource Locators (URLs) were one of the more significant developments to come out of the World Wide Web.
- A URL is simply one form of Uniform Resource Identifier (URI) and its goal is to provide a means for locating resources
- A URI uniquely and persistently identify objects:
  - Each object is identified by a distributed ID where part one ids the authority and part two the object
  - If an object is moved, the owner simply needs to update the location value of the URI.
- To use URIs it is necessary to have some mechanism for looking them up. These mechanisms are directories.

Directories (1)

- A directory is a tool for locating objects, e.g.
  - The Windows registry
  - The Domain Name System (DNS)
- The X.500 Directory Service is a standard for a distributed directory (like DNS) capable of describing objects of any sort.
- The Lightweight Directory Access Protocol (LDAP) is a simplified form of X.500.
- These types of directories can be used for URIs, certificates, roaming profiles, etc.

Messaging (1)

- E-mail provides messaging for humans
- Some programs have been designed for mail notes
  - "vacation" is a program used by people to automatically handling e-mail messages while they are away
  - Bulletin boards and list servers provide simple automation of message processing
- Client server computing is based on the exchange of well defined messages between computer programs.

Messaging(2)

- EDI was an early effort to define the syntax and semantics for business transactions that could be machine processed
- The origin of Java was a project for messaging between internet "appliances"
- Systems for managing objects and the messages passed between them are emerging. The best known is The Common Object Request Broker Architecture (CORBA) which defines Object Request Brokers (ORBs) that provide object management and message management functionality
- XML is emerging as the wrapper for structured business messages

Support for Messages

- Envelops
  - The Simple Object Access Protocol (SOAP) will likely play a role in distribution
- Dialogs

   The Universal Description Discovery and Integration (UDDI) protocol defines the nature of the dialog
- Semantics
  - The Resource Description Framework (RDF) is being positioned as the mechanism for defining related semantics

Global Positioning

- Based on initial military applications, global positioning uses a set of low earth orbit satellites to fix the position of a device on the surface
- Current commercial applications allow positioning to within 10 meters but the resolutions continue to improve
- The increase in 911 calls made from cell phones has caused the FCC to mandate that cell phone companies be able to triangulate the position of cell phones
- Ultimately, any mobile device will be capable of knowing where it is as the cost of the GPS and other positioning systems come down

The Ideas

- Using objects, directories, messaging, and global positioning, the next generation web will allow for:
  - Ubiquitous computing – all electronic devices will be capable of some level of communications
  - Mobile computing – desktop computing capability at all times and places with location awareness and intelligence
  - Net-centric services – a rich data repository will be maintained on the network for each user
  - E-services – a form of distributed computing based on objects and component transaction monitors

Ubiquitous computing

- The reduced cost of chip technologies will enable almost all electronic devices to do some level of I/O, processing, communication, and actuation
  - Devices will be able to sense
    - Video cameras, microphones, and motion sensors
  - Devices will have programmable logic circuits
  - Devices will be able to sense other devices near them
  - Devices will be capable of acting in the real world
    - Speech synthesis
    - Micro and macro actuators

Examples of Ubiquitous Computing

- Current
  - Motion detectors in lights and doors
  - Smart microwaves, phones, cars, etc.
- Near Term
  - Smart kitchen and bathroom appliances and fixtures
  - Smart houses for heating, AC, lighting
- Long Term
  - Smart rooms will know what is being discussed
  - Smart cars will know where they are, and are going
  - Smart buildings will learn usage patterns

Mobile Computing

- Mobile computing is based on two converging technologies
  - Handheld devices with significant processing power
  - Cell phones with on demand connectivity
- At the current time, they operate very differently:
  - PDAs rely on periodic linking for update
  - Cell phones rely on modified content on demand
- The future will see everywhere connected devices with significant processing power

Net-centric Computing

- Next generation mobile computing enables net-centric computing
- Wireless access in broad geographic regions is provided either by wireless access protocols such as 802.11 or by 3rd generation phone technology
  - Local connectivity is provided by 802.15 or Bluetooth
  - Rich directory services that contain information pertinent to the user of the mobile device is provided by directory services (LDAP)
  - Data is provided through a ubiquitous standard for data interchange such as XML
  - Devices are made smarter by sensors that locate them and describe their environment

E-services

- The web provides access to pages of information.
  - Through CGI back ends, these servers are increasingly providing services.
  - Plug-ins on the client side are increasingly capable of data manipulation and logic.
- The web is increasingly being used as a shell through which small client programs communicate with multiple small server programs.
- The next generation web will need a system to optimize this activity. It is called a Component Transaction Monitor

Component Transaction Monitors

- Major vendors are providing new approaches:
  - OMG's CORBA
  - HP's E'speak
  - Microsoft's .NET
  - SUN's JXTA
- Each of these technologies provides a variety of built in services:
  - Service finding through naming
  - Security features like authentication and encryption
  - Transaction management

CTM Applications

- Using CTMs, it is possible to imagine a semantic web of the future where
  - Services are dynamically located
  - Aggregate services are dynamically composed
  - Agents manipulate information stores on the network on behalf of users
  - Filters operate on information to prepare it for destination devices and users
  - Relationships between different data stores are understood and data is translated transparently

Preliminary Conclusion

- E-Business is the next step in the evolution of business management using technology
- E-Businesses strive to:
  - Manage large operations with attention to detail both temporally and functionally
  - Reach new customers via e-channels
  - Develop new bit based product forms
  - Develop new communications based services

The State of E-Business

- The network has achieved critical mass
  - Proctor and Gamble rule
  - The S-curve of technology adoption
- E-Business is maturing
  - The revolution is turning to evolution
  - The cost to benefit ratio is decreasing (SMEs)
  - Best practices are emerging for branding, monetarizing, CRM, etc.
- There is at least one more technology revolution in the wings

September 3, 2001   *State of E-Business*   34

12