
E-BUSINESS REPORT: B-INTELLIGENCE INVADED BY ANN AGENTS

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Abstract: An IT business review has been presented on the state-of-the-art in the Business Intelligence (b-Intelligence). It is mainly a response to the overwhelming e-Business trends affecting small businesses and global networked enterprises alike. The specific knowledge management issues closely related to the knowledge creation and representation, feature extraction, pattern recognition, and Artificial Neural Networks (ANN) are discussed from the viewpoint of a business manager. Leveraging on these opportunities requires timely reconfiguration of the existing business models. Sustainable innovation of business processes is inevitable phenomenon. The IT enabled e-Businesses on the Web virtual marketplace is seen by managers as a natural ally staying successful.

Keywords: E-Business, Business Intelligence, Business Process Modeling, Web, Knowledge Management, Innovation, Artificial Neural Networks (ANN), Pattern Recognition.

1. Introduction

It might look like a war story report, but apparently as many IT reports on e-Business something nowadays, a virtual war is going on up there – on the Web [1]. A fierce challenge goes on among rather influential players e-Business vendors and software providers, all of whom promising new revolutionary approaches for addressing business problems. The e-Business software solutions are either Business-to-Customers (B2C) or Business-to-Business (B2B) depending on who the end-user target actually is. The B2C is aiming at individual end-users, the Web-based customers doing business primarily via direct e-Commerce applications. B2B however, aims at enterprises and large supply chains. It is the B2B that brings in the real change, promising enterprise rather innovative ideas, reengineering business solutions over the Web. challenge goes on among rather influential players e-Business vendors and software providers, all of whom promising new revolutionary approaches for addressing business problems. The e-Business software solutions are either Business-to-Customers (B2C) or Busi-

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Apparently, Business Intelligence (BI), and Knowledge Management & Massaging (KM&M) are most recent enterprise software solutions providing for e-Business promises. We'll be reporting on the state-of-the-art and the BI competitiveness on the Web comparing some renowned BI vendor solutions and the consequences of BI application by the end-user's community in general.

2. Report Outline

D-day. The Eve of the e-Business

E-Business is the most recent phenomenon of using the IT and Web technology extensively to conduct business processes, execute information and knowledge related tasks in order to acquire the necessary data for supply chain support, run value network processes, and gather information required for management decision support.

D-day+1. Virtual Battlefield: The Web

According to the Web administrative body [W3C](#): 'the World Wide Web (known as "WWW", "Web" or "W3") is the universe of network-accessible information, the embodiment of human knowledge. Using the Web to conduct the trade, both B2C and B2B trends will sustain an exponential growth (US B2B market: \$39b in 1998 up to \$1,500b in 2004), according to Goldman Sachs. What are the implications for businesses getting on the Web?

D-day+2. Meet the Players

Who are the main BI protagonists? Who are the enterprises competing for the e-Biz market share, banging the bells of victory, distributing White Reports often followed by success stories, claiming conducting the business - the e-Business way, or relying on the Business Intelligence solutions. As usual, one can't miss the software giants such as IBM, BEA, Computer Associates (CA), or Microsoft, followed by innovative players such as Software AG, and some never-heard-of vendors like Autonomy, Ltd.

D-day+3. The Hardware

PC is becoming ubiquitous. Computing has proliferated beyond ordinary PCs into mobile and wireless devices. WAP, the wireless application protocol, allows mobile devices to easily achieve the network connectivity. Ten years after the

64bit *Alpha-chip* inauguration, the microprocessor technology is about to introduce 64bit CPU architecture to desktop PCs. Intel has already announced its *Mered* 64bit CPU. On the server side, in order to meet the high demand and fractal behavior of Web transactions overflow, the parallel CPU-cluster processing apparently is capable enough to reduce the high price/performance gap providing more affordable, scalable but reliable e-Business transaction processing.

D-day+4. The Software

The e-Business trend is the plane no one wants to miss. There are many innovative ideas. New business models have been put forward. Surprisingly, some even got patented [2]. How to launch a '*killer app*'? One thing is clear; one size does not fit all. There is no '*silver bullet*' either. Number of B2B applications formerly designed for enterprise Intranets has spread out to supply-chain Extranets. B2C however is targeting b-Commerce, one-to-one trade on the Web. IT convergence, framework consolidation, and the Enterprise Java Beans (EJB) software components are topics of the day. Application integration across the Web knocking down enterprise boundaries has set up new guidelines for successfully deploying e-Business solutions.

D-day+5. Strategy: Sustainable Innovation

Innovate, Innovate, and Innovate. Keep changing the value added supply chain and maintain sustainable innovation apparently is the winning strategy.

D-day+6. Command & Logistics: Operating Systems

There are two distinct competitors on this front: Unix look-alike *Linux* suite and the new Windows NT/2000. The MS Windows NT share went up from 49% to 69% during 1999, according to figures from market research company Rhetoric. Can we expect its successor, MS' new Windows 2000 to maintain the lead? Will *Linux* succeed to play along big players?

D-day+7. Business Intelligence for e-Business

The software agents are popping up everywhere. From innocent software leftovers as *cookies* to sophisticated proxy software *agents*. Strategic resources allocated to report and perform information gathering remotely.

D-day+8. The Outcome

It's rather unpredictable outcome. The heavyweight R&D of big software vendors is pushing the technology to unprecedeted heights. Others are making fast acquisitions of perspective and innovative e-Business solutions providers. Many are reviewing the old information processing ideas: fuzzy sets and artificial neural networks (ANN) for pattern recognition for instance. Web-based benchmarking and the *Proof of concept* (Pock) idea is becoming a favorite convincing method for end-users. The *change* is all but certain.

3. The Eve of the e-Business

Web euphoria is all round us. Web-based businesses are popping up like mushrooms. Some, the successful ones, introducing new innovative ideas such as Amazon.com, E*TRADE.com, or Yahoo are immediately recognized. The innovative, advanced, promising technologies (e.g. optics, biotech, and genetics) are acquired immediately. Still, others are thriving, waiting its opportunity to break through the anonymity and become famous. Many remain unknown, unnoticed, and like bonfire sparks stay alive for awhile and then die out.

What are the current e-Business trends? Integration across value chains and customer-centric orientation still remain unchanged. Hence, Supply Chain Management (SCM), Customer Relationship Management (CRM), ERP included, are e-Business solutions no one can do without.

Traditional management ideas revolve around people, IT, and business processes. The manager's response is mixed. Some are rather enthusiastic; others are skeptic waiting for Proof of the Concept (Pock) that usually comes too late.

However, in order to stay afloat and succeed requires a constant innovation in the value-added business process. It takes frequent stirring of the value chain to introduce new products and services, still keeping customers in focus.

Easy access everywhere, business deals McDonald-style and 'free' Web offers are in abundance. Apparently, the end-user's response is perplexing and still awaiting somewhat more mature business relationships. Mobile intelligent devices and wireless Web access technology is making is way in. The new trends are Web Portals and Information Engines helping users navigate on the Web. Getting to know better your customers becomes ubiquitous. Faced with huge data volumes and multi dimensional data representation, Web-based transaction processing on-line becomes a burden for Knowledge Management (KM) and Customer Relationship Management (CRM) and a limiting factor for better understanding of the current business trends. Eventually, market leaders and e-Business software vendors are looking for solutions from almost forgotten field of artificial intelligence, artificial neural networks (ANN), and pattern recognition techniques. Suddenly, users are faced with Web-based neural software agents i.e. *Neugents* by CA. Web search engines equipped with self-learning style are capturing users' habits automatically. Solutions offered by *Raven* from IBM Lotus, *WebLogic* by BEA, or *Portal-in-the-Box* by Autonomy, are helping find your way on the Web. Intelligently, what else could we expect?

4. Virtual Battlefield: The Web

Following the introduction by W3C [About the WWW](#): 'the World Wide Web began as a networked information project at CERN, where Tim Berners-Lee,

now Director of the World Wide Web Consortium [W3C], developed a vision of the project. The Web has a body of software, and a set of protocols and conventions. Through the use of hypertext and multi-media techniques the Web is easy for anyone to roam, browse, and contribute to.'

The new, rather advanced e-Business software solutions are providing substantial strategic gains to enterprises. The most recent introduction of the new Web XML standard has risen the interest of end-users as well as enterprises that are in process of deploying legacy applications and migrating to new e-business solutions. It makes incentives for the introduction of innovative business models too. Rethinking the e-Business Framework, like supply-chain reversal, or applied redesign of e-Business solutions brings about new innovative models.. The aim is usually Supply Chain Management (SCM) value creation, cross-functional integration of business-to-business solutions, business-to-customer trade channels integration (sell-side or buy-side), introducing one-to-one marketing campaigns, integrating logistics systems across supply chains, tailor made enterprise resource planning (ERP) systems, or launching Web-based Customer Support Management (CSM) projects and alike.

All these three-lettered buzzwords stand for a specific e-Business solution that introduces an innovation process in improving traditional business processes. Despite the hype, it's of no surprise that the e-Business trend represents a considerable business opportunity, which computer industry and the existing, prospective software vendors wouldn't like to miss. Therefore, due to strategic importance of the Web, its dynamic nature and global reach, apparently, the Web becomes a war-theater where the competitive forces meet each other but no one could claim knowing it very well, let alone its players, the customers and the enterprises.

5. Meet the Players

Most prominent software vendors, system integrators, and a plethora of Web Information Portal Organizations (IPO) who have entered the game as serious contenders for sophisticated e-Business packages are offering one-stop integrated sophisticated solutions targeting a number of business problems. As usual, Microsoft is challenging the rest of the IT community continuing its Windows NT success with its new NOS Windows 2000 and XML enabled Internet Explorer 5.x browser. The integrated software products such as *Knowledge Transformation Services* by Cap Gemini, *Tamino* by Software AG, *Raven* by IBM Lotus, or *Jasmine ii* by Computer Associates, are the new BI tools also designed to support Web-based Knowledge Management & Messaging. There are as well some new Business Intelligence Portals, like *Portal-in-a-Box* offered by Autonomy Inc. It's an automated online information Web Portal. It provides an intelligent pushdown

Web service, enabling online e-Business publishers to easily create, maintain, and navigate customized portal site, whatever, wherever, and whenever is required by the user. Determined e-Business providers may make use of the BEA's *WebLogic*. It offers B2C enterprises a tool for in-house development of e-Business solutions. BEA *WebLogic* is an open, extensible, standards-based application server platform for assembling, deploying, monitoring, and managing distributed applications across the Web.

6. The Hardware

The end-user are anxiously expecting the *Merced* CPU, the new 64-bit Intel processor that is to render the promises of faster, cheaper and ubiquitous multi-media processing across the Web. E-Business enterprises are looking forward to more advanced SMP [3], bigger clusters of processors, for more reliable and high availability processing, offering true linear scalability. Software-fat PCs vs. thin PCs is *the dilemma of the day*. Intelligent networked devices, mobile, wireless, or embedded are all around us. Being networked is ubiquitous. However, Web security remains the main issue that the users and the e-Business providers alike have to be concerned about.

7. The Software

The Web software is gradually emerging from its highly complex multi-layered pyramid into a component-based integrated one-stop solution. It's a novel approach that goes well beyond simple e-Commerce application. It tries to solve the enterprise e-Business problems via Knowledge Management tools and sophisticated ANN-based decision support. Software Repository is leading the trend in e-Business software development. Repository is a software container of as tiny components as beep-sound generating Java applets up to large, encapsulated, monolithic legacy applications and ERP OO component modules and frameworks. Moreover, the software Repository is now responsible for the whole software development and deployment lifecycle. It is one-step software integration: from application configuration, software development and prototyping tools, test-&-verify workbenches to Web-publishing and deployment.

8. Strategy: Sustainable Innovation

The first business differentiation was based on *cost cutting*. Later it became a *quality* concern, QA and TQM for instance. Now, aiming at customer, it is to provide high *customer satisfaction*. The most recent trend set up by e-business differentiation, turns to be the innovation, innovation, and innovation...*Sustainable innovation*. How? Applying b-Intelligence, my dear Watson.

9. Virtual Command: Operating Systems

Windows 2000, or Unix suits and *Linux* is the question now? Software standards are consolidating its platforms and are playing decisive role in product differentiation on the Web. CORBA standards backed by Unix, Enterprise Java-Beans, or ActiveX with DCOM standards promoted by Microsoft are among the well-known contenders.

10. Logistics: Capturing Customer's Needs

Providing an intelligent Web support to customers, end-users, any time, any place; understanding who they are, what do they actually need, how do they need, at what costs, becomes crucial for the success of the e-Business software vendors and their respective service providers. There are many ways in order to capture customer's needs: based upon interactive queries, structuring and analyzing unstructured Web pages on-line, launching event-driven software agents, guessing or rather recognizing specific response patterns, etc. The XML standard is making a great debut providing Web page analyzers so much required hard traces in order to support traditional document databases and any virtual Web document. It's an apt pre-condition for labeling of Web-based unstructured information in any intelligence gathering process, a necessary step in separation between HTML document form and its XML content.

11. Business Intelligence for the e-Business

Inevitably software agents are everywhere. From innocent *cookies* to sophisticated proxy *agents*. Strategic resources are allocated to reporting and information gathering. Some traditional artificial intelligence software techniques known as neural agents or *neugents* applied in *Jasmine ii* by CA have been mobilized to enhance data collection on the Web, pattern recognition tasks, feature extraction, blind guidance and similar intelligence gathering tasks. Software's AG *Tamino* XML information server supports complex transactions OLTP and provides an acceptable EDI alternative over the Web. Autonomy's *Portal-in-a-Box*™ builds a personalized Web environment, an intelligent learning and easy-to-navigate search engine customized to the user's profile. *Raven* by IBM Lotus provides a similar tool that intelligently customizes their Domino's GroupWare environment and makes it transparent for Web access. *WebLogic* by BEA provides an intelligent application server that allows building e-Business applications on the fly. Many have noted that all these innovative business-Intelligence ideas are not only enabling the e-Business transformation but paradoxically, in some cases they are actually blocking the transformation progress due to the inevitable organizational change commitment. Along the roadmap, e-Business solutions have

evolved from task orientation through functional focus into cross-functional integration adaptively, learning on its best experiences. That's where Knowledge Management and business-Intelligence come into action. They're the front runners of information gathering and sustainable innovation process.

A brief review, in alphabetical order, on some business-Intelligence Web applications and software tools follows.

Autonomy, Portal-in-a-Box: Online Information Portal.

The Autonomy's data sheet describes *Portal-in-a-Box*TM as "an automated online information Portal that allows online publishers to easily create and maintain automatically an easy-to-navigate customized portal site, removing the need for manual labor in the process of categorizing, tagging and hypertext linking large amounts of information." Interestingly, the online portal describes individual user's interests either in natural language or mapped according to user's profile. Information content has been aggregated from diverse Web sources through customized channels allowing easy-to-navigate interface. Unique feature is advanced pattern matching and content extraction technology for individual profile generation and relevant, up-to-date information content selection.

According to Autonomy report, the *Portal-in-a-Box*TM technology, enables efficient targeted advertising based on user's interests and the development of content channels. It manages the content automatically keeping the portal up-to-date without requiring dedicated resources to manually categorize the information. It refines the understanding of individual user's interests hence, ensuring the user is notified on outstanding events or breaking news personalized to individual taste.

BEA Systems, WebLogic: Web Information Server

BEA *WebLogic* is an open, extensible standards-based application server platform for assembling, deploying, and managing distributed e-Business applications. Following BEA's report, '*WebLogic* enables delivering networked applications more reliably, faster, and with all the benefits of Java. *WebLogic*'s powerful Enterprise Java Beans (EJB) server and container providing industry-leading functionality, flexibility, and performance ... available now.'

Oscar Nyströmer, Swedish Rail, says: "The benefit of using BEA *WebLogic* Enterprise is that now we can add new sales and distribution channels faster and more easily. We no longer have to slowly and painstakingly distribute changes throughout each individual system as before, which impeded time-to-market. Now, any time we dream up a new way of selling tickets, new business rules, new passenger types, we need to change the system only in one central place, so all distributed clients and types will receive the new business logic automatically. BEA *WebLogic* Enterprise is designed to help us significantly improve our time-to-market."

CA, Jasmine ii : Intelligent Information Infrastructure

The IDC 1999 White Report on *Jasmine ii*, states that '*Jasmine ii*, i.e. TND (The New Dimension) is CBD and deployment environment for distributed applications.

It incorporates program development, application and data interoperation middleware, run-time management services, and Web application management. Unique to *Jasmine TND* among all development environments is CA *Neugent* technology, which initiates alerts based on pattern recognition in complex business data. IDC believes... render *Jasmine TND* an early leader in the development of next-generation tools for CyberSmart applications.'

Jasmine TND delivers the infrastructure that includes integrated object-oriented development and deployment environment allowing easy creation of completely new class of e-Business applications fully equipped with sophisticated, intelligent behavior for better positioning of enterprise in the future. Along with it comes its high visualization feature allowing developers to make use of object components, complex data, multi media such as audio and video clips, animation, medical images, plain photographs and diagrams, architectural layouts, virtual reality, time-series, and other types of data used in Web-based applications.

It is the neural agent technologies, *Neugents*, *Jasmine's TND* breakthrough feature. *Neugents* allow e-Business users the ability to actually enter the hyper-dimensional problem therefore, provide a visionary power to foresee the outcome of applied e-Business models, tasks, initiatives, and eventually enjoy the user's excitement resulting from business success.

IBM Lotus, Raven: "People, Places & Things" Theme.

Raven is a single integrated portal aligned under the IBM Lotus theme of "People" (expertise location), "Places" (portal) and "Things" (content catalog). *Raven* contains tools for content tracking and analysis, a knowledge portal to manage personal and community information, user profiling and expertise location, and an application integration toolkit.

Ted Smalley Bowen, IW reports [4]: "*Raven* catalogs data and personal information from local, distributed, and Web-based sources; creates associations; analyzes and ranks information and people; tailors information for individuals and groups; and includes virtual workspace and project management applications. *Raven* includes a Discovery Engine for information capture and organization, and a Knowledge Portal facility for personal and group information delivery. Addressing concerns about privacy and autonomy, the product includes a user-vetting function to permit individual control and authorization of the profiles that tie people into the system."

Lotus describes its new knowledge management suite, code-named "*Raven*" as, 'a single portal that allows end-users to find and discover useful information and applications on a given subject; make the user aware of other knowledgeable people in the company; and organized all related tasks, teams and projects. *Raven* provides virtual places where people and content are brought together to improve company responsiveness, speed innovation, enhance employee competency and increase efficiency.' It creates a fully integrated knowledge management suite hence, bringing people and content together in a virtual collaborative environment. *Raven* makes use of Domino messaging and GroupWare infrastructure.

Software AG, Tamino: XML Information Server

Tamino, an acronym for "Transaction Architecture for the Management of Internet Objects", also the name of the hero from Mozart's famous opera *The Magic Flute*, is the world's first Information Server in native (XML) eXtended Markup Language, claims Software AG. *Tamino* is a complete Web-enabled data management system for data exchange and application integration that can turn unstructured enterprise data into Internet objects.

XML suite is a W3C standard, endorsed by software industry market leaders, includes XSL style language and XQL query language standards. XML is able to label and transform unstructured Web pages into database readable tables. In fact, separating document content from document presentation XML is able to capture the meaning of information contained within. This enables a powerful document infrastructure for e-Business applications therefore, gaining overwhelming support both by the developers as well as the users. As a response to the new e-Business computing model, the robust and highly scalable XML Web-enabled information server can efficiently handle complex information objects and integrate Web objects with existing enterprise database sources.

Tamino provides a 'single server' view of a company's data sources and acts as an X-Port providing XML/EDI alternative to partners and clients across many-to-many networks of supply chains. The best illustration of *Tamino*'s versatile e-Business applications and XML's power is a WAP-enabled mobile phone, which emails the voice message automatically, or a smart fridge, which goes Web shopping triggered by supplies running low.

12. The Outcome

Information portals, Intelligent e-Business solutions, or sophisticated Information Servers are new CyberSmart applications offered by b-Intelligence software vendors.

Are we the silent witnesses of strategic moves among e-Business software vendors, enterprises' cyber battles, and Business-Intelligence software agents on the Web? 'Cookies' left in our PC memories are the only remains after the battle. Are we going to really see the actual outcome? Probably not! It evolves much faster than we could possibly imagine. Eventually, we are to learn to manage the change since, all but the *change* is certain.

13. Conclusion

E-Business is taking a firm ground among new galactic enterprises getting alive across the Web. B-Intelligence makes the ground soft, preserving the traces left in the sand by the Web Ocean. Some new forms of Knowledge Management integrated tools are required in order to navigate and change the course of the enterprise. B-Intelligence enables business managers to clearly see the path they are following. It enables to navigate and stir the enterprises throughout the Web.

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16. Appendix

A presentation of e-Business & b-Intelligence includes demos of some market-leaders in BI, Knowledge Management, or HTML/XML-based tools mentioned in the text.

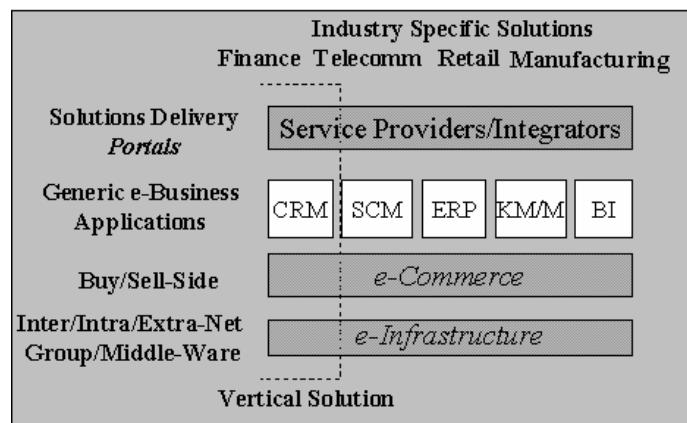


Figure 1: E-Business Framework