

Business Models for E-Commerce Data Translation Web Service Providers

Trung T. Pham

Dlcentral Corporation
(281) 480-1121, ext. 102
tpham@Dlcentral.com

Abstract

This paper outlines different business models for e-commerce B2B Web service providers. Each model is described in terms of the technological solution, customer base, and capital investment. Even though the core engine for these providers is the data translator, there are different approaches to assemble a complete e-commerce data translation solution on the Web: software acquisition, in-house development, and outsourcing. Each approach leads to a different customer base and different capital development. Advantages and disadvantages of each model are thoroughly discussed, and the outlook of each model is projected in this current economy.

Keywords: B2B, E-commerce, Web service, Electronic Data Interchange, Data Translation, Business Model.

1. INTRODUCTION

Business-to-business (Lohr, 1997; Cunningham, 2001) electronic commerce (Gutzman, 2001; Romm and Sudweeks, 1998; Kuglin and Rosenbaum, 2001; Rosen, 2000) is the conducting of business trading between two organizations through computer networks. In this setting, the process of electronic data interchange, often known as EDI (Raymond and Francois, 1996; Garguilo and Markovitz, 1996; Hinge, 1988; Kaufman, 1961), is used to exchange data between two organizations utilizing computer-to-computer network communications. These exchanged data represent business transactions such as purchase orders, invoices, advance shipment notices, etc. The electronic transference of these transactions allows automation of a business cycle that traditionally required massive amount of manual data entry. Therefore, EDI is strategically seen as a major key to improving productivity via reduced labor requirements, increased business activities, and improved accuracy.

The nature of business society is considered heterogeneous, i.e., each company is set up differently from other companies. Therefore, the exchange of data between businesses for electronic commerce must rely on a common data format in order for this exchange to work effectively. The key to achieve this commonality is the data translation (Arnold, 1994; Hauenschild and Eximan, 1997; Lemone, 1992; Dorr, 1993) between a particular format that a company uses and a commonly recognized data format that often has been established as a standard (Berge, 1994; Davis-Tanous, 1999; Atzeni *et al*, 2000; X12, 1999) so everybody can understand.

A data format is established in a way that the data definition is uniquely defined and universally accepted. At present, there are a few popular formats established and each has a number of companies endorsing it. Each standard has its advantages and disadvantages proportional to the availability of supporting software and the size of the endorsement. From a technical standpoint, a data format is just a convention of packing information in a certain way that it can be understood and parsed (Green and Morgan, 1996; Kempson *et al*, 2001; Wray, 2002) back into the original individual data elements. Data formats are often developed by consortium of software vendors, developers, and users so that all will endorse and benefit. However, there are cases where a data format is developed by a single vendor hoping to monopolize the market with its proprietary software. In this particular situation, the format will gain as much usage as the vendor's capability to capture market share.

Large companies conducting B2B e-commerce normally have the budget and resources to be self-supported in translating the data produced by their enterprise resource planning (ERP) systems into this common data format and back. However, small companies required to comply with this electronic common format almost always lack such budget and resources (Levy *et al*, 2002). In order to comply with the e-commerce requirement on a cost-effective basis (Levy *et al*, 2000; Levy *et al*, 2001), small companies often look to a shared platform provided by a service provider. An e-commerce service is traditionally provided by a value added network, commonly referred to as VAN (Dixon, 1990; Shy, 2001; Computer Industry Report, 1999).

The rapid expansion of the Internet has introduced a new class of e-commerce service providers that utilize the World Wide Web as the connection for easy access and for data transferring. These e-commerce data translation Web service providers are thoroughly examined in this paper according to their business models (Hedman and Kalling, 2003; Applegate, 2001; Cheng *et al*, 2001). Different categories of service providers are described, along with competitive advantages and disadvantages (Ginsberg, 1994; Mata *et al*, 1995) for each category.

The current downturn of the economy has significantly impacted on these service providers. Some providers capitalized on the fear associated with the risk of having to invest in software acquisition to capture clients who are willing to pay only on the usage basis. Some suffered severely because of budgetary constraints and/or extraneous spending with no immediate return. These cases are also outlined as forecast of the short-term future for these data translation Web service providers.

2. E-COMMERCE DATA TRANSLATION WEB SERVICE

A data translation Web service provides a central point for users to enter data so that the data can be translated to an appropriate format before being transmitted to a recipient. Since the Web is used, a Web page is provided as a central point for this purpose: the user, with a computer and a Web browser, accesses the service provider's Web page and conducts the required task there. Most of the time, the provider allows two modes of data entry: manual data entry and upload data. Once data are entered to the provider's system, they are translated into appropriate format that the intended recipient accepts and transmitted there.

2.1. Service Description.

Even though there are different business models set up to provide a Web-based e-commerce data translation service, the overall service that a typical user sees is basically the same. This fact makes the marketing strategy of product differentiation more difficult: providers often distinguish themselves with add-on features and customization to a vertical market that requires specific practices and unique business rules. This section describes the overall Web-based e-commerce data translation service.

Assumptions

A Web service provider should assume that the users only possess a minimum requirement of owning a (non-obsolete) computer with a Web browser and an Internet connection. These users will use the Web-browser to access to a central Web page set up by the service provider where the e-commerce data translation service is provided. This assumption implies that the service utilizes computer resources at a central server physically located at the provider's office. The users are assumed to be small/medium businesses that have no enterprise resource planning (ERP) system and must rely on manual data entry process to submit data to the receiving business partner.

Requirements

An e-commerce data translation Web service must contain the following functionalities: (i) security authentication of users, (ii) data management system, (iii) data visualization, (iv) data translation, (v) data protection, and (vi) data transmission. These functionalities are integrated together as an e-commerce data translation Web service, sometimes known as an e-commerce Web service.

Authentication. This feature allows each user to uniquely and securely identify him/herself as a registered user on the system. The most common practice is to require the user to enter a username to identify who he/she is, and a secret

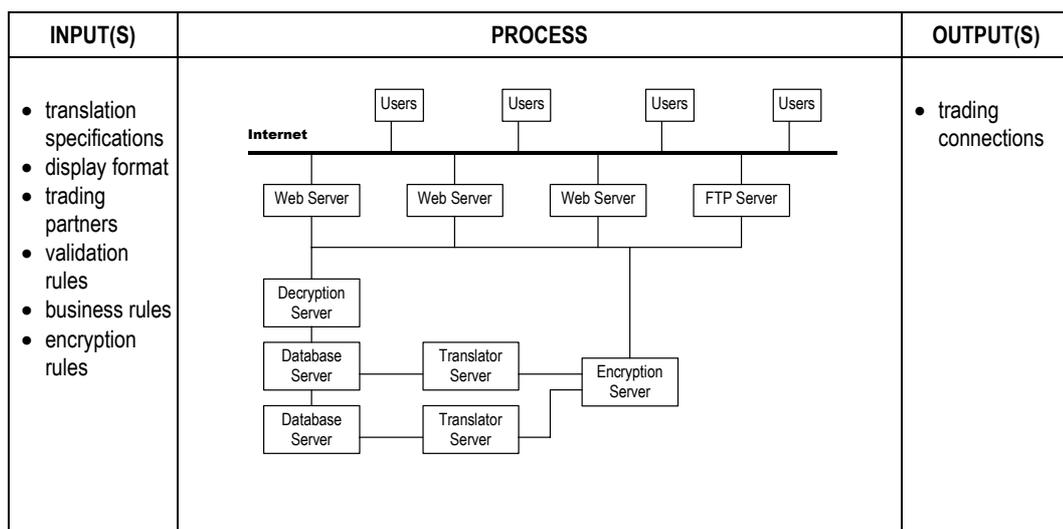


Figure 1. An EDI translation Web service provider must address the needs of small users with technical features making e-commerce seamless and effortless.

password to show that the person who accesses the system is a valid user.

Data Management. A user must be able to organize data into different categories, each category sorted in some chronological order for efficient use. This organization capability allows e-commerce data to be grouped into convenient categories such as incoming and outgoing, or different transaction types, etc.

Data Visualization. Individual data content must be presented to human users in a way that a user is accustomed to see. In business trading, transactions such as purchase orders, invoices, etc. have been recorded on standard format established by the accounting profession. E-commerce data must be unpacked from its compact format into something readable by humans trained to be accustomed to well-defined forms.

Data Translation. Data flowing into an ERP system must be translated from its original form to the form accepted by this receiving ERP system. This translation function is the main core of the service running quietly in the background of a Web-server. The user is only concerned with entering data into an electronic form available at the provider's Website. As the service is extended to medium-sized business, the capability is extended to allow the data be produced at the customer's system, uploaded to the service provider's server, translated and sent out at this server. Even though this extended model by-passes the data visualization requirement, some medium-sized companies still prefer viewing the data as part of the random check for quality assurance.

Data Protection. Business data are considered confidential and may contain information vital to a company's competitive advantages. Therefore, data protection must be provided to ensure that the data can only be accessed by the intended recipients and the content of the data is not tampered in any way when in transit.

Data Transmission. Data must be transmitted to the intended recipients. The transmission must be able to get through between computers of different platforms and to the intended recipient within a reasonable timeframe. If there is a breakup of one transmitting computer, the data must be queued up at some other computer and retransmitted at a later time.

2.1. Technical Setup.

An e-commerce data translation Web service provider must implement the following components: (i) Web server, (ii) database server, (iii) data translator server, and (iv) data encryption/decryption servers. These components are integrated together to provide e-commerce data translation Web service to individual users to conduct B2B e-commerce trading from a generic computer with no additional e-commerce software. Figure 1 depicts these components working together to provide a sustainable service to small and medium businesses. These components serve to satisfy the requirements stated earlier.

The Web servers are an array of machines dedicated to connect to the Internet so that users can access the service. These servers also provide the graphical user-interface representing business forms that the users were accustomed to for data visualization purpose. With the standardization of secure Web protocol, data encryption and decryption were also performed at these servers on the socket layers. These encryption and decryption procedure serve the data protection requirement.

The database servers perform the task of storing data for users to view and use. The query commands provided by these servers allow the data to be organized

into different categories that the user can effectively manage in his/her routine of processing a business transaction. These servers fulfill the data management requirements as well as serving as a data depository to keep data. Most businesses mandate that these data must be kept in storage for a certain period of time, normally a minimum of ten years.

The data translation servers perform the task of converting data from one format to another format. This conversion includes changes in both structural representation and contextual representation. Since e-commerce data must carry unique meaning, the syntax of the data must be strictly enforced before any attempt to do correct translation. An error in the syntax of a data will cause ambiguity that confuses the translator. Therefore, e-commerce data prepared with syntax errors are normally rejected by a translator because the data no longer carry a clear and unique meaning. Checking a data set for correct syntax before translating it has become standard practice in general machine translation of computer programming languages.

In e-commerce applications, data must be well defined. This is a major requirement for achieving commonality in e-commerce. Unlike human languages where data often represent more than one meaning, contain abstract (fuzzy) thought, and deal with inexact quantities, e-commerce data belong to a smaller class of languages designed mainly for computer processing. E-commerce data language specifications therefore are concise, finitely small, and uniquely structured. The definition for electronic data, or language specifications, is often provided either by organizations assigned to the task, or by software vendors promoting their commercial products. The e-commerce data definition is normally given as a set of vocabulary and grammatical rules. Sometimes the e-commerce data definition also contains data ranges for additional validation of data content. These definitions must be maintained in the database servers to guide the translator servers.

The data encryption and decryption servers perform the task of encrypting data before sending it out to the recipients, and decrypting data from the users for processing. These servers provide an additional set of data protection on the application layer. Since the National Institute of Standards and Technology recommended multiple data encryption to maximize the protection, it is a common practice to implement encryption at both the socket layer (between the Web servers and the Internet) and the application layer (between the translator servers and the Web servers).

2.3. Popular Data Formats.

Presently there are many popular data formats that are used for the purpose of electronic commerce between two organizations. Beginning when computer software was first developed for databases, two popular formats were adapted: ASCII fixed-length format and ASCII table format. As applications evolved, ASCII variable-length format was adopted to reduce the data size. Recent development on the World Wide Web introduced the eXtensible Markup Language (XML) to accommodate the display of functions on the Web browser.

ASCII Fixed-Length Format.

The ASCII fixed-length format is the most primitive data format developed since the early time of computer hardware when sequential storage device (magnetic

tapes) was the norm. The magnetic tape is a long strip of storage media wrapping around a rotational device. At that time a data set had to contain a fixed number of characters. A particular field was rigidly defined at a location in the tape specified by the positions of its first character and its last character.

ASCII fixed-length format was convenient for simple programs to read data sequentially from a magnetic tape and extract data as it became available. The tape reading mechanism could only read data as the long strip of storage media moved sequentially across it. The ASCII fixed-length format was basically a by-product of a magnetic tape technology. It takes a long time to read the data completely from the start to the end of a magnetic tape and the primitive computer did not have enough memory buffer to hold this complete set of data. Data had to be read in one record at a time and processed when they became available. On the recording side, modified data must be written back to the exact segment of the tape and therefore the data length must be rigidly fixed in order to avoid overwriting to part of another record sequentially recorded next to that record.

ASCII Variable-Length Format.

As computers applications became more sophisticated, a variable-length ASCII format was developed to improve the efficiency of data storage and retrieval. This new format, evolved from the ASCII fixed-length format, uses a special character as delimiter to separate data elements, eliminating the need to pad data with blank spaces.

ASCII Table Format.

As the database was developed, the concepts of records and fields were clearly defined and organized. This data organization was defined for the purpose of data searching by the users to retrieve only relevant data later on. The organization of records and fields can be best visualized as an ASCII table format: with several lines, each line representing a record, each record consisting of several fields. The column of the ASCII table format lists the same field for all records in the database.

Early ASCII table format was often listed at fixed length. This feature was carried over from the earlier ASCII fixed position format. Each record listed fields sequentially where each field was defined at a fixed position in a line representing a record. This fixed position was specified by the position of the first character and the position of the last character of that field. Thus, when records were listed with equal-width font on paper the fields were aligned vertically for humans to visualize.

As computer programs gained sophistication, the fixed length requirement was no longer important and word processing programs could align the display of data in the same manner for human visualization without forcing the use of blank spaces to pad a field. The database size was significantly reduced by removing these blank spaces previously used for the purposes of partitioning data fields and displaying data for visualization.

In this variable length ASCII table format, a symbol is used to mark the end of each record. Another symbol is used to mark the end of each field. The data can therefore be laid out sequentially, field after field, record after record, without any padding blank spaces. This variable length ASCII table format has been the common denominator for modern software to import data into its system.

XML Format.

As the Internet expanded with the World Wide Web infrastructure, competing Web browsers were developed and marketed. With these Web browsers came new ideas about markup language, including formatting (display) instructions encoded in the message so that Web browsers could better display data for human visualization. EXtensible Markup Language (XML) was developed for this purpose, with the main objective of allowing users the ability to define their own convention and standards. This flexibility is the key advantage to promote XML as the future standard. With the additional ability to format the encoded data for displaying on any Web browser, XML seems promising not only for Web data but for commercial application, particularly in business-to-business (B2B) transactions.

The flexibility of XML is also a potential disadvantage: it created a proliferation of incomplete standards within its general framework, causing confusion and disappointment among the industry. The large size of XML data increases the cost of transmission such that it prevents wide adoption for electronic commerce. With a few key software vendors setting up astronomical entrant costs and lockup tactics, XML has not become as universally popular as was anticipated.

2.4. Developmental History.

E-commerce data translation Web service providers form a relatively new market segment. Almost all of these providers are startup companies with less than ten years in existence because the World Wide Web only started off its popularity in the early 1990s. As the Web technology developed, the use of the World Wide Web was extended from the original intention of sharing data to different commercial applications, including the e-commerce data translation service.

3. BUSINESS MODELS FOR SERVICE PROVIDERS

A business model is a listing of components where each uniquely represents a strategy designed to gain specific competitive advantages. This section lists four popular models that the e-commerce data translation web service providers are using.

3.1. Technology Models.

Web service providers in the area of data translation can be categorized according to the technology that they employed. In this categorization, there are two basic groups: solution providers and technology providers.

Solution Providers. A solution provider is a company that integrates off-the-shelf products into a customized package specifically for data translation. The company provides a Web gateway so the clients can access the service. This type of companies normally is not flexible in terms of providing customized integration.

The solution providers have the advantage of a short development time. However, the platform is often rigid because of the limited capability from the software designed for a single-user purpose. Furthermore, the license fee is often the major huddle in their operation cost. These license fees translate into a minimum

number of customers required for a break-even operation. Furthermore, the expansion of customer base certainly translates into an increasing cost in license fees, impeding on the profitability at the economy of scale.

Technology Providers. A technology provider is a company that develops its own translation capability. The company also provides a Web gateway so its clients can access the service. This type of company is well known for the capability of providing customized integration because it can modify its core software easily to adjust to new requirements.

The technology providers are more solid in terms of intellectual property, expansion-at-diminishing-cost capability, and flexibility in implementing business rules. However, these providers must go through a lengthy prototyping phase to achieve the foundation technology. Most technology providers shortened the development phase by concentrating either on one particular format or one vertical industry. Some successfully balanced the development funding with market demand through an incremental process called rapid development.

3.2. Data Format Models.

E-commerce data translation Web service providers can be classified into different categories according to the data format they support. There are two fundamental categories: (i) all-format supporting, and (ii) specific-format supporting. The all-format supporting group provides e-commerce data translation service to anybody who uses electronic data interchange regardless of the format they choose. The specific-format group provides e-commerce data translation service only to customers who use one particular e-commerce data format that the provider endorses.

All-Format Supporting Providers.

There are very few all-format supporting e-commerce data translation Web service providers because it is difficult to maintain expertise on all formats, especially for young startup companies. The downturn of the economy further makes it more difficult for established providers to expand their support from one format to many formats. The lack of continuous investment funding stops the development work of many startup providers to achieve their original mission of supporting all formats. The lack of one off-the-shelf all-purpose translator on the market makes it prohibitively expensive to integrate an all-purpose service because for every additional new format, a provider must integrate two translators (one forward and one reverse translator) for each of the currently supported format. The license fee will mount up exponentially, provided that such translators exist. Most of the providers concentrated on two or three formats, with a quick fix to provide limited service for a small number of customers who use any other format.

Specific-Format Supporting Providers.

Many specific-format providers designed their system specifically to a data format to achieve efficiency in data processing. In this category, service providers often perform only data parsing: the data entered by user on a Web form are packed into a rigidly pre-defined format representing an e-commerce transaction before being

sent out to the recipient. Vice versa, an e-commerce transaction is parsed directly into specific fields displayed on the Web form.

The specific format supporting providers are often small startup companies with limited investment funding. They must quickly put together a bare-bone platform to immediately serve customers. As the result, they resort to a specific format, sometimes even a specific version of a specific format. The service, normally utilizing just a data parser, provides a few forms hard-coded to parse a transaction into displayable format and back. This type of provider is small but abundant in number, each serving a small segment of a particular vertical market concentrated in some geographical regions.

3.3. Investment Capital Models.

E-commerce data translation Web service providers can be classified into categories according to the capital funding. There are two fundamental categories: (i) startup providers, and (ii) spin-off providers.

Startup Providers.

Startup providers are companies that started from scratch with seed funding either from a group of individual investors or from a venture capitalist. These providers normally must go through at least three phases of funding: prototyping phase, pilot-program phase, and rapid expansion phase.

The prototyping phase is the period (typically less than two years) that the company gathers technical engineers to develop a working platform ready to service customers. In this phase, the company must either integrate off-the-shelf products or develop new products necessary to provide a multi-user platform allowing many customers to use. The pilot-program phase is the period when the company starts providing service to a small group of customers. During this phase, the company often needs to fine-tune its service to rapid expansion, the period when the company must expand its infrastructure to allow a massive number of customers. Furthermore, the company must rapidly expand its customer base with aggressive sales and marketing efforts. In this phase, there are two difficulties: technical expansion and management of growth.

Most startup providers have an advantage of a lean payroll and fast service. The lean payroll often translates into cost-competitiveness. The fast service effectively eliminates delay cost for the users. Since they try to prove themselves to gain customers, some providers might be willing to extend themselves further to provide customized integration at a relatively fast response. However, one major disadvantage of the startup providers is the fluctuated flow of investment funding during the current economic downturn. With funding drying up and affecting the original three-phase plan, some providers are forced to change their mission, their business plan, and their expansion effort; or in the worst case, declare bankruptcy.

Spin-off Providers.

Spin-off providers are companies starting from a division of a large enterprise. Sometimes, an enterprise with an IT division providing e-commerce data translation Web service for the company wants to spin off that division to provide the same service for other companies. Other times, a software vendor extends its business to provide the service with its core technology already developed and

proven on a single-user basis. Other times, a value-added network extends its reach to Web users in an effort to capture this new market segment to maintain its competitive edges.

The spin-off providers have an advantage of a proven platform and the knowledge of the practice in a certain vertical market. However, a major disadvantage of these spin-off providers is the cost structure. Since these providers come from large corporations, their culture carries expensive payroll and bureaucratic practice that equate with high cost. The high cost structure translates into high price for users. The bureaucratic practice translates into slow response time to any specific integration outside the parameters of their system's capacity.

3.4. Vertical Market Models.

E-commerce data translation Web service providers can be classified into categories according to the vertical market they are supporting. The major vertical markets are: retail industry, food industry, energy industry, lumber industry, automobile industry, etc.

E-commerce data translation service for the retail and food industries capitalizes on the need to shorten an inventory cycle and the cost effectiveness for doing so. In this scenario, suppliers must look for a cheap service that lowers the e-commerce data cost per transaction.

E-commerce data translation service for the energy industry is a unique situation: the number of transaction is not very high, but the dollar amount in each transaction is extremely high. Each transaction contains only a small number of items. Most suppliers are not sensitive to the cost of completing a transaction and the need to adapt electronic data interchange. e-commerce data translation service providers for the energy industry sometimes provide an added fax-to- e-commerce data translation service to these suppliers: the providers would accept a transaction by fax, retype it into an e-commerce data message, and send it out to the recipient. This added service assures the supplier that the business practice is not changed, provides comfort to business owners who, by human nature, fear technological changes.

E-commerce data translation service for the lumber industry customizes in the trading practice and tariff policy in North America. In North America, the distribution channels are structured into exclusive buying groups that maintain volume cost discount through rebates and other incentives. These costs are negotiated in advance kept confidential due to competition between buying groups. In addition, the lumber industry enjoys government subsidy in some countries while suffering stiff tariff in other countries despite of the North America Free Trade Agreement. This unique situation drives the industry to find ways of cutting cost as much as possible to offset the heavy tariff. E-commerce initiative is therefore one of the driven forces in bringing the cost down.

E-commerce data translation service for the automobile industry is controlled exclusively by each automobile industry because of its tie to the inventory control system. Each inventory control system is a proprietary secret to maintain the steady flow of inventory at minimal cost and therefore the e-commerce data translation service must be exclusively designed to maintain that secret. This service is also customized to the quality control practice and specific discount terms.

The major advantage that e-commerce data translation Web service for specific vertical market provides is the enforcement of specific business rules such as

discount/rebate policy, shipping instructions, barcodes label for automatic scanning and tracking, and efficiency in processing data. However, the major disadvantage of this type of e-commerce data translation Web service is the perception of its limitation to only one specific industry. This perception gives investors a false conclusion that there is no future for horizontal expansion to other vertical markets. The providers must rely on its profit margin to plan additional expansion.

4. FUTURE OUTLOOK

4.1. Short-Term Outlook.

Economic Difficulties.

The current economic downturn has witnessed many e-commerce service providers going out of business, primarily due to their inability to maintain a steady and healthy cash flow. The users are left with the painful reality of having to shop for another provider within a relatively short timeframe. However, those providers who maintained a strong survivability will endure the rough economical weather and will most likely pick up these customers with little sales and marketing effort.

Since most e-commerce Web service providers are startups, they often depended on the investment funding while operating at a loss. The last economical boom has shifted the investment paradigm from the traditional profit-oriented goal to a market share capturing strategy, abandoning the fundamental accounting practice of cost control and fiscal responsibility. This paradigm was effective during the economical boom when companies went public on the perception that they captured the market share and were able to handle the limitless future expansion.

Under the pressure of capturing market share and creating the public perception, most companies, including e-commerce Web service providers, spent enormous amount of money to build up relationships with investors and other startup companies. The relationship between investors and startup companies allowed a steady investment flow into the startup companies. The alliance relationship between startup companies created a perception that they were defining their market share

The pressure to go public also caused most e-commerce Web service providers to abandon the in-house development of their product to integrate off-the-shelf software as a quick solution. Development of a product requires time, effort, and intellectual power. However, the rapid expansion of the economy imposed a delay-to-market opportunity cost so severe that it became almost impractical for an investment firm to approve an in-house development strategy from any startup company. Since there was no development work, there were no resulting intellectual properties. As the investment paradigm shifted back to the traditional profit-oriented goal, intellectual property became one prerequisite to enable investment decision.

During the market crash, investors abandoned many of the startups. As the result, many startup companies ready to move from the prototyping phase into expansion phase were left dried up with no additional funding to move forward as originally planned. Many other startup companies with infrastructure ready to go public but having negative cash flow resorted to borrowing money to wait out for the rough

economy to turn upward. Eventually, these companies would have to file for bankruptcy protection from the creditors who loaned them money.

Marketing Strategy Backfire.

During the height of the economic boom in the late 1990s, many startup e-commerce Web providers raised unbelievable amount of investment money. In order to justify the large investment, their service was priced at an unusually high level to assure investors of their return. These prices were unrealistically way out of the affordability by small businesses, the intended users of such Web services. Many small businesses refused to subscribe the high-priced e-commerce Web service on the rationale that it would cost them more money to comply with e-commerce initiatives than the actual revenue they receive from fulfilling a typical order. It was obvious that the service price was intended to address the investor's concern of how long it would take to recover their investment. The price never took into consideration the consumers' basic economical cost-benefit tradeoff that played the major role in their decision to comply with e-commerce mandate from their trading partners.

Technological Fashion Obsolescence.

The latest fiasco over e-commerce technology resulted at the data format level. In the quest to push for revenue, software vendors started to push for a new format that combines the Web technology with business data that can be viewed on a normal Web browser. This approach solves the data visualization problem presented earlier. In addition, a new format that allows flexibility for the user to customize according to his needs was touted as the future direction.

When new e-commerce Web service providers quickly proliferated the market, many bet their future by endorsing only one particular new format. This specialization caused a great confusion to users who must make a decision on which data format to adopt. Furthermore, these new formats appeared so fast that any system designed with an older format might not have a chance to complete its normal life cycle. This fierce competition encourages a waiting game for users to delay joining the electronic commerce society: one who wanted to use e-commerce service would hold out as long as possible to get a better price and the most technologically up-to-date service. Those who already traded using older format would hold on to that format with the skepticism that all other new formats would become obsolete in a relatively short time any way.

In the short term, the quick proliferation of new e-commerce data format caused businesses to wait as long as possible until a winning format emerges. Furthermore, the frequency that a Web service provider files for bankruptcy deteriorates the situation: as soon as a provider files for bankruptcy, the format it promoted or endorsed, by guilty-of-association, becomes a laughing stock in the electronic community, further damaging the reason of using e-commerce Web service provider. Occasionally, a major software vendor announced it would stop supporting a particular format only to focus on its core business of implementing ERP systems. These moves further confused users and encouraged the waiting game.

4.2. Long-Term Outlook.

Regardless of the health of the economy, businesses found out that electronic data interchange is a means to improve productivity. Eventually, the demand for e-commerce data translation Web service will increase in the long run. Whoever survives the current rough economic weather will find itself thriving in a large demanding market with only a few surviving players to share. The most popular survival strategy is consolidation: a stronger company will buy out the smaller ones who are in financial trouble to form a more focused and cost-effective unit designed to ramp up profit margin.

Web Technology.

The technology for Web-based applications will expand rapidly as the speed of data transmission increases to the rate allowing massive data transmission. This speed improvement allows better data visualization and encourages more usage. As encryption becomes an integral part of a Web service, a sense of confidence will grow among the users that their data and their trade secret are well protected.

Market Demand.

As technology improves, more demand will be created for e-commerce data translation service as an effort to speed up revenues and improve productivity. In addition, businesses will be even more willing to adapt e-commerce initiative to maintain the trading connection with other large businesses that must use e-commerce to improve their productivity.

Open Standards.

The current market confusion due to the availability of so many standards will probably cause the industry to realize that this confusion serves as the bottleneck preventing the market expansion. In order to resolve this bottleneck, it is better for the industry to have a unified open standard to create the perception that the technology has stabilized to a point that user can confidently concentrate on the use of e-commerce instead of on the obsolescence of certain e-commerce data format.

Security.

As networking technology improves, network security becomes an integral part of the network standard protocols. Instead of depending on a few costly certification organizations to assure the users of data protection practice, the electronic commerce world will accept network security protocols as standard practice for transmitting data through the Internet.

Ethics.

The crash of many Fortune-500 companies in the early of the 21st century was traced to unethical practice of accounting. Therefore the handling of e-commerce data must be rigorous to ensure traceability, accountability, and integrity because these data represent financial transactions and will fed directly to the accounting

system. The practice of redundant data systems will be encouraged to provide integrity checking procedure and to allow tracing data flows.

5. CONCLUSION

E-commerce data translation service has been provided as Web service. The service was originally designed for small businesses to join the electronic commerce world at a nominal cost. The providers, according to their business models, will evolve around their competitive advantages to survive the current economic conditions and get ready for the next expansion phase. As Web technology improves, additional features, normally found in ERP systems, will be added on to attract medium-sized businesses. The current downturn of the economy serves as a sieve to filter out unsound service providers, leaving a smaller number of healthy and legitimate ones sharing a growing e-commerce data translation market.

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