DISS 890 Project Proposal:
A Strategic Plan for the Implementation of Electronic Commerce at American Axle and Manufacturing

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A paper submitted in partial fulfillment of the requirements
for DISS 890

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May 1999

An Abstract of a Paper Submitted to Nova Southeastern University
in Partial Fulfillment of the Requirements for DISS 890

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November 1999

Business-to-business electronic commerce is projected to grow at an annual rate of forty-one percent over the next five years. The automotive industry, recognizing this fact, is making significant progress in the deployment of electronic commerce technologies. Unlike its Big 3 customers, American Axle and Manufacturing (AAM), a tier one supplier of automotive driveline systems, is taking a "wait and see" approach to electronic commerce. In response to AAM's lack of an electronic commerce strategy, this project proposal is submitted. The goal of the project is to provide an executive summary that outlines the most effective business-to-business electronic commerce strategy for AAM to deploy over the next eighteen months. In the following pages, this project proposal paper included the first three chapters of the project paper. The first chapter covered topics: problem statement and goal, relevance, barriers and issues, plan and approach, and milestones and expectations. The second chapter provided a detailed review of the literature relevant to future business-to-business electronic commerce initiatives at AAM. The third chapter described the research methods and online tools and resources that will be employed in completing the project report. In conclusion, a discussion of anticipated benefits and projected outcomes of the project report were presented.

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Chapter I
Introduction

This project proposal is submitted to obtain approval to complete a project report titled *A Strategic Plan for the Implementation of Electronic Commerce at American Axle and Manufacturing*. The following introductory sections describe the problem to be investigated, goal to be achieved, and potential barriers and issues expected during the completion of the project paper. The introduction also provides the plan and approach of the project along with a timeline of milestones and expectations.

Problem Statement and Goal

Electronic commerce (e-commerce) is the process of using digital technology as the medium for transmitting information between organizations. For most companies, it refers to the processes of buying and selling goods and services and the associated methods of electronic payment for those transactions. E-commerce is generally divided into two types: business-to-consumer and business-to-business. Although the business-to-consumer market has received the most publicity, the business-to-business market has a larger dollar volume and is growing faster (Editor, 1999).

The automotive industry, recognizing this fact, is making significant progress in the area of business-to-business e-commerce. Examples include the Automotive Industry Action Group's (AIAG) Automotive Network Exchange (ANX) and Manufacturing Assembly Pilot (MAP). Other examples are General Motors', Ford's, and DaimlerChrysler's use of trading partner web sites. Via secured access over the Internet, these sites provide automotive suppliers with business information that ranges from production schedules to quality statistics.

American Axle and Manufacturing (AAM), a tier one supplier of automotive driveline systems, is an important member of the automotive supply chain. AAM is headquartered in Detroit, Michigan and has five North American manufacturing facilities. The company's near-term plans include expansion in Europe, Asia, and South America. AAM employs more than 8,500 associates.

AAM's information technology (IT) infrastructure consists of more than 2,100 desktops (i.e. Windows NT workstations running older versions of MS Office and MS Exchange). In spite of its "e-commerce ready" infrastructure, the company's IT Plan is very traditional and calls for only limited e-commerce initiatives. AAM is taking a "wait and see" approach to e-commerce. This approach runs contrary to the fact that business-to-

business e-commerce is projected to grow at an annual rate of 41 percent over the next five years according to the Yankee Group (Editor, 1999).

In response to AAM's lack of an e-commerce strategy and a clearly defined implementation plan, this project proposal is submitted. The company has failed to identify e-commerce as a high-priority business initiative. This oversight will place the company at a competitive disadvantage in the future. Furthermore, the goal of the project is to provide a concise (one to two page) executive summary. This summary will describe the benefits of expanding e-commerce at AAM. It will also outline the most effective business-to-business e-commerce strategy for AAM to deploy over the next eighteen months. Implementation of this strategy will allow AAM to leverage "best of breed" e-commerce technologies to gain a competitive edge as a tier one automotive supplier.

Relevance

This project is relevant to both the study of e-commerce and the future success of AAM. Key to successful project completion is the exploration and understanding of select areas of business-to-business e-commerce. Included are the following topics:

- Extranets and the ANX
- Business-to-business Portals
- Supply Chain Integration
- E-commerce Enabled Procurement Systems

These specific areas were chosen because they represent the most promising business-to-business e-commerce technologies in use today. In addition, they are mature enough to be deployed successfully within the given period at AAM.

Barriers and Issues

The primary barrier to the successful completion of this project is a shortage of time. There is a vast quantity of research material available relating to business-to-business e-commerce. This material must be gathered, compiled, filtered, and evaluated to determine its appropriateness to the project. A considerable amount of time has been spent thus far reviewing business-to-business e-commerce literature.

Successful project completion is also complicated by the many changes occurring in the area of business-to-business e-commerce applications. The long-term success of numerous emerging e-commerce technologies must be judged. Those deemed viable and ready for deployment must then be integrated into an effective business-to-business e-commerce strategy for AAM to deploy over the next eighteen months.

Plan and Approach

The proposed project report will be a descriptive study formatted in five chapters. The first three chapters will be substantially the same as the corresponding chapters of this

project proposal. The first chapter covers the project's problem statement and goal, relevance, barriers and issues, plan and approach, and milestones and expectations. The second chapter provides a detailed review of the literature relevant to future business-to-business electronic commerce initiatives at AAM. The third chapter describes the research methods and online tools and resources that will be employed in completing the project report.

The fourth chapter of the project report will analyze the available business-to-business e-commerce technologies with regard to their application at AAM. This analysis will be consolidated in a one to two page executive summary. This summary will outline a strategic plan for the implementation of business-to-business e-commerce technology at AAM. Included will be a brief description of the e-commerce technologies to be deployed along with a timetable for completion. Also included will be a discussion of the additional integration required for these technologies to function with AAM's current applications.

Excluded from the executive summary will be the details of the eighteen-month implementation effort (e.g. cost justification, resource allocation, and detailed project planning). The scope of the summary is limited for two reasons. Those reasons are the limited time available to produce the project report and the amount of detail considered appropriate for AAM executive review of future capital plans. In conclusion, chapter five will include a discussion of the anticipated benefits and projected outcomes of the project at AAM. Also included will be a look at future e-commerce initiatives after the initial eighteen-month project is completed.

Milestones and Expectations

The scope of the proposed project report is manageable and lends itself to investigation within the given time period. The following is a summary of the milestones for the project along with significant dates. The first milestone, writing and submitting the idea paper, was completed on April 5, 1999. This paper was approved with comments by Dr. Abate on April 14, 1999.

The next milestone is the approval of the project proposal. This proposal is an expanded version of the idea paper and consists of the first three of the five chapters that comprise the project report. The introduction, chapter one, was completed on May 2, 1999. This was followed by completion of the review of literature, chapter two, on May 29, 1999. Methodology, chapter three, was completed on May 30, 1999, and the project proposal was submitted for review by Dr. Abate on May 31, 1999.

After approval of the project proposal is received, the completion of the chapter four and five (results and summary) are the last milestones before submitting the final project report. Chapter four is scheduled to be completed by July 4, 1999, and chapter five prior to July 25, 1999. After extensive review and proofreading, the project report will be submitted on July 31, 1999.

Summary

In summary, the introduction given above described the problem to be investigated, goal to be achieved, and potential barriers and issues expected during the completion of the project paper. Also included were the plan and approach for the project along with a timeline of milestones and expectations. In the next chapter, this proposal provides a thorough review of literature relevant to future business-to-business electronic commerce initiatives at AAM.

Chapter II
Review of the Literature

The literature review that follows is organized by subject heading. Those subjects include: extranets and the ANX, business-to-business portals, supply chain integration, and e-commerce enabled procurement systems. A review of the literature pertinent to these subjects is critical to achieving the project's goal of providing a one to two page executive summary that outlines the most effective e-commerce strategy for AAM to deploy. In addition, this literature review attempts to focus on e-commerce technologies that are (at first glance) viable and capable of being successfully deployed in an eighteen-month period.

Extranets and the ANX

Companies are deploying extranets as a strategic tool to communicate with their customers and suppliers. According to an online survey conducted by InformationWeek Research, one in four businesses have created an extranet (Chabrows, 1998). These extranets give customers and suppliers access to internal company systems and applications over the Internet.

The automotive industry, realizing the value of extranets, launched the ANX in 1995. The ANX provides automotive trading partners with a single, secure network for e-commerce. It will eventually replace the redundant and costly multiple connections that currently exist throughout the automotive supply chain. The automotive industry expects the ANX to cut its costs by $1 billion a year (Scott, 1998). The ANX could ultimately involve as many as 40,000 companies that have a stake in manufacturing, financing, and insuring cars and trucks.

Extranets.

In a related text, *Extranets: The Complete Sourcebook*, Baker contributed to the project by outlining how extranets fit into a company's overall business strategy. Also included were chapters detailing how to plan, implement, and operate a corporate extranet. According to Baker, extranets are intranet-based applications and services that employ secured access to external users or enterprises (Baker, 1997). This is accomplished through passwords, user IDs, and other application-level security mechanisms. Therefore, an extranet is the extension of two or more intranets with a secure interaction between them. The extranet maintains control of access to those intranets within each enterprise in the deployment.

Baker goes further to say that the heart of an extranet is not technical definitions but the services it provides. There are two basic services offered by an extranet. Network services that provide the fabric to keep everything running, and user services that provide

the resources people use to share information. Typical network services are directories, replication, security, and management.

In another related text, *Extranets: Building the Business-to-Business Web*, Bayles contributed to the project with an analysis of the benefits versus the costs of an extranet (Bayles, 1998). Among the tangible and intangible benefits explored in the text were those related to infrastructure, sales and marketing, and customer service and support.

Costs savings included reduction in cost of supply and cost of sales; meeting, travel, and telephone time reduction; and printed communication costs. Hard costs that were accounted for included tangible goods such as hardware, wiring, software, and telecommunication lines. Also discussed were soft extranet implementation costs such as labor, training, and loss of sales opportunities.

Kosiur in his text, *Building and Managing Virtual Private Networks*, contributed to the project with a detailed explanation of the technology of today's extranets (Kosiur, 1998). Chapters included discussions of the basic components of a virtual private network (VPN) (e.g. security, firewall, and routers). Also covered were topics that included security and network performance management. Appendix B of the text included a listing of commercial VPN products and providers.

Another related work, *Implementing Extranets: The Internet as a Virtual Private Network* by Covill, contributed to the project by discussing the administration of extranets. Topics included in the text were help desk support, accounting for and sharing extranet costs, and policies and procedures (Covill, 1998). Also covered were the cost savings realized by corporations that have implemented the technology. Practical advice is given on how extranets can and cannot be used.

Booker, in a recent article titled *Best Extranet Application*, contributed to the project with a discussion of the Cleaver-Brooks extranet (Booker, 1999). Cleaver-Brooks, the leading maker of commercial and industrial boilers, opened its OrderNet extranet site last September. The site automates and streamlines the interaction of the company with its 1,500 independent sales and service representatives.

ANX.
Articles and white papers provided on the Automotive Industry Action Group's (AIAG) ANX Internet Site contributed to this project by detailing the past, present, and future direction of the automobile association's ANX extranet (AIAG, 1999). The AIAG is a nonprofit trade association of North American automobile manufacturers and suppliers. The association's members include the Big Three along with over 1200 automotive supplier companies. The mission of the AIAG is to improve the global productivity of the North American automotive industry.

AIAG member committees focus on business processes and supporting technologies. These committees research, develop, and provide training on standard business practices in a variety of areas. These include automatic identification, CAD/CAM, EDI/electronic

commerce, continuous quality improvement, materials management, returnable containers and packaging systems, and transportation/customs. Key AIAG projects are Auto-STEP, MAP, Quality/QS-9000, Autochain Online, Year 2000, and ANX.

In 1994, the AIAG published the document "Trading Partner Data Telecommunications Protocol Position" (AIAG, 1999). This document recommended that TCP/IP become the standard for transport of automotive trading partner electronic information. The ANX project was launched shortly thereafter in December 1995. The project was the result of the AIAG's decision (in the second quarter of 1995) to adopt the document's recommendations. The TCP/IP endorsement was in recognition of market trends (i.e. the explosive growth of the Internet) along with the rising use of Internet technologies for applications running within AIAG member companies. The initial goal of the ANX project was to develop a plan to implement data communication links between trading partners and to deliver a functioning extranet as the end result.

The ANX is an IP-based virtual private network for managing the automotive industry supply-chain. General Motors, Ford, Chrysler, and their suppliers and dealers support it. Initially, three implementation options were considered for the ANX. These included the public Internet, private network expansion, and virtual private network services. A fourth option - the ANX model - was finally adopted. The ANX model consists of:

- Multiple service providers certified by an ANX Overseer company
- All certified providers required to interconnect with each other
- Pricing to be comparable to existing VPN services

The goal of the ANX project is to save $1 billion annually or $70 per car. This will be accomplished by optimizing information flow within the supply-chain by reducing information lead-time. Direct savings will be derived from the following:

- Consolidation of multiple communication links
- Elimination of transaction-based charges
- Elimination of carrier management cost of multiple links
- Reduced maintenance costs and staff expenses
- Reduced hardware and software costs

Indirect savings include the ability to:

- Carry out business strategy more effectively
- Service new customers more quickly

- Support strategic partnerships more readily.

In short, the ANX will replace the intertwined web of connections that currently connect automotive suppliers and manufacturers with a single, secure IP-based network.

Business-to-business Portals

While business-to-consumer Internet portal sites such as Yahoo, Netscape, Lycos, and Excite battle for consumer traffic, a growing number of businesses are adapting the portal model as an efficient way for employees, suppliers, and customers to locate critical information online. An important benefit of a portal system is the organized access it gives users to a variety of information. By combining powerful search technology, recognizable topic hierarchies, and personalized desktops, companies are able to use portals to transform their disorganized intranets into easily understood self-service environments (Walker 1999).

Wilder, in a related article titled *Evolution of Enterprise Portals*, contributed to the project with a description of how Emery Worldwide (an automotive logistics supplier) is building an enterprise portal using ReportMart software from Sqribe Technologies (Wilder, February 15, 1999). Once complete, the portal will give Emery's several thousand employees organized access to logistical data, financial reports, customer data, and internal information.

Wilder also contributed to the project with another article titled *Data Gateway*. In the article, Wilder described the W.W. Grainger Corporation's portal project. Grainger is a multibillion-dollar distributor of industrial and office supplies (Wilder, February 8, 1999). The Grainger portal will catalog the company's intranet content. The portal will also search and categorize relevant information from the Internet on the company's market and competitive positions. Search crawlers will be able to retrieve the financial statements of competitors and notify the person responsible to analyze the information.

Another indication of the growth of business-to-business portals is Harbinger's (an automotive e-commerce supplier) launch of an Internet portal. Kanell contributed to the project with an article describing Harbinger's business-to-business e-commerce efforts (Kanell, 1999). The Harbinger portal provides information about electronic commerce, offers service help to customers, and lets companies do business with each other over the Internet. The site also creates records of transactions as it handles orders between two companies.

A recent article by Rogers in the Computer Reseller News titled *Netscape Hones Custom Netcenter Plan* contributed to the project by outlining Netscape's plan to move aggressively into to the area of business-to-business portals (Rogers, 1998). Netscape's Custom Netcenter is divided into three categories: vertical, intranet, and extranet portals. Vertical portals target an audience such as a telephone service provider offering another avenue of communication to its customers. Intranet portals offer corporate information to

employees. Extranet portals are an entry point companies would use to communicate with suppliers and business partners.

Supply Chain Integration

Last year, the AIAG completed the Manufacturing Assembly Pilot (MAP) project. The object of MAP was to improve the quality and speed of information flowing down the supply chain. The project demonstrated that (in an "agile" supply chain) information must be able to flow from the OEM to the last supplier in the chain without being truncated or distorted at any tier along the way (Hoy, 1998). In the study, EDI was the primary method employed, and e-mail was used for ancillary communications.

An article by the business writers of Business Wire contributed to the project by reporting the details of the new AutoChain Online supply chain management solution offered by Harbinger Corporation (Business Editors, 1998). AutoChain Online measures supplier conformance with the EDI implementation requirements set by the big three automakers: Ford, DaimlerChrysler, and General Motors. The system, developed under the auspices of the AIAG, provides a central location for Tier one, two, and three suppliers to track, manage, and report on their ANSI X12 and EDIFACT messaging capabilities.

DaimlerChrysler.
One example of the automotive industry's commitment to an integrated supply chain is DaimlerChrysler's linking of its private Supply Partners Information Network (SPIN) to the Internet. This connection allows buyers and engineers to share design and other data with important suppliers. An IBM white paper titled *Chrysler's Spin on the Web* contributed to the paper with a detailed description of the new network (IBM, 1998).

SPIN is an intranet-based supply chain management and support environment for distributing files over the Internet. In its first year of operation, SPIN increased productivity of DaimlerChrysler's extended network of suppliers by 20 percent. The network allows DaimlerChrysler to distribute applications and communications packages about policy, procurement, and inventory methods over the Internet.

Over 3,500 supplier locations are registered to access the SPIN Web site. In addition, more than 12,000 users have IDs with which they can access a variety of information (e.g. PDF files of DaimlerChrysler's EDI Guide, and QS9000 certification policies and procedures). Suppliers are also able to access dynamic database applications, such as real-time materials requirements data and procurement analyses.

Ford.
Another example is Ford's plan to connect 15,000 dealers worldwide via its FocalPt network for supporting the sale and service of cars. Ford's goal is to provide fully integrated automobile life-cycle support. Bayles contributed to the project with a description of Ford's network in her text titled Extranets: Building the Business-to-Business Web (Bayles, 1998).

The FocalPt network supports the sale and service of cars. It includes promotional, inventory, and financial information designed to help Ford salespeople close deals. In addition, FocalPt will automate the information exchange between Ford and its dealer service centers.

Oracle Automotive.
Oracle ERP2 is the enterprise resource planning application in use by many automotive suppliers, including AAM. An Oracle product summary of Oracle Automotive Release 11 contributed to the project with its detailed description of the manufacturing and supply chain processes inherent in the product (Oracle, 1999). Product capabilities included customer life cycle management, strategic procurement capabilities, and end-to-end supply chain synchronization. Built-in to the product are other features such as support for just-in-time and flow manufacturing.

E-commerce Enabled Procurement Systems

A recent white paper titled *Content Management* discussed the cumbersome non-production procurement processes currently in use by Fortune 500 companies (TPN Register, 1998). This paper contributed to the project by giving a comprehensive review of e-commerce enabled procurement systems. Non-production supplies (also known as indirect supplies or maintenance, repair, and operations (MRO) products) encompass everything from office staplers to pipe fittings. They are materials that a company routinely uses but do not go into its manufactured products.

The current procurement processes for these supplies are characterized by tremendous amounts of paperwork, lengthy cycle times, frequent errors, and costly "maverick" buying outside the bounds of established procurement rules and contracts (TPN Register, 1998). Consequently, companies are looking to e-commerce enabled procurement (i.e. Internet-based systems) as a means to save time and money in the indirect buying process. Purchasing departments wish to streamline the process by allowing employees to easily search, find, and order contracted items from approved suppliers.

In a related article the Wall Street Journal, Warner contributed to the project by discussing how the automotive industry, in an effort to cut millions of dollars from the cost of purchasing activities, is beginning to implement procurement solutions that use open standards-based supplier managed catalogs (Warner, 1998). Ford and DaimlerChrysler are implementing this type of Internet-based procurement system. At the heart of these systems are multi-vendor catalogs that allow buyers to quickly find the items they need. The catalogs reduce cycle time and eliminate order-processing errors. They also result in cost and productivity savings for both buyers and suppliers.

Three different types of Internet-based electronic catalogs are available for MRO purchases. They include sell-side catalogs, buy-side catalogs, and secure electronic marketplace services. The *Content Management* white paper gave a detailed description of each of the three types (TPN Register, 1998). Sell-side catalogs are offered by a small number of MRO suppliers on their Internet sites. These suppliers typically manage the

catalog content by themselves. While this is an improvement on current procurement practices, TPN Register points out that buyers with hundreds or even thousands of suppliers do not have the time to got to every supplier's Web site. In addition, purchases from sell-side Web catalogs are difficult to track.

The second electronic catalog type is the buy-side catalog. The white paper pointed out that these catalogs are built by buying organizations wishing to improve control of their non-production spending (TPN Register, 1998). Buy-side catalogs contain data on all the products approved by the company through negotiated contracts. These catalogs are served on a company's internal infrastructure (e.g. an intranet) and are accessed by employees using standard intranet browsers.

The third type of catalog is the secure electronic marketplace service. This extranet-hosted content and contract management service is shared by multiple large buying organizations and their trading partners. This service model allows buyers to outsource to a third-party organization that specializes in content and contract management. In fact, true electronic marketplace service vendors handle the entire supplier engagement and acquisition process and host all supplier catalog content for the buyer and the seller.

In a related Gartner Group research note on the growth of electronic catalogs, Spieler contributed to the project by providing a list of catalog functionality questions that enterprises should consider when shopping for catalog products (Spieler, 1999). Spieler also provided a list of catalog vendors and offerings. The two deemed most appropriate to the goal of this project were the TPN Register and Intelisys products.

TPN Register.
Avery, in an article in Purchasing Online, contributed to the project by describing the Internet-based multi-vendor catalog offered by TPN Register (Avery, 1998). TPN Register is a joint venture of Thomas Publishing Company and GE Information Services. The company recently released its Content Management Services Suite. This secure electronic marketplace enables corporate buyers and their suppliers to easily create and maintain "virtual private" catalogs. These catalogs are hosted by TPN Register and accessed over the Internet via a buyer's corporate intranet.

By using an intensive front-end content management process, TPN Register is able to deliver accurate product and pricing information. This allows buyers to quickly find required items. In addition, it reduces the cycle time and eliminates many order-processing errors. This translates into cost and productivity savings for both buyers and sellers. The TPN Register process adds value to supplier content by standardizing attributes, converting abbreviations into understandable terms, and organizing products into logical groupings.

Line items in the catalog are classified using the Thomas Register Classification System that contains more than 60,000 product headings. Suppliers are able to review their content online, incorporate the contract pricing and terms specific to the buyer, and give

approval to the content. Once the data is loaded and approved, suppliers distribute detailed line-item product information to multiple buying communities.

The current release of TPN Register's product suite demonstrates the power and flexibility of using Java on the server in an intranet/extranet environment for critical enterprise applications. TPN Register's Java architecture has better scalability and performance when compared to current two-tier and three-tier client/server architectures.

In another article related to the project, a product agreement between Oracle and TPN Register was discussed (Glass, 1998). This Oracle and TPN Register procurement solution combines Oracle Purchasing and Oracle Web Requisitions with TPN Register's electronic marketplace solutions. The companies estimated that implementing an Oracle and TPN Register solution would generate 10-20 percent savings. General Electric is deploying the solution in several of its businesses to achieve significant cost and productivity savings.

Oracle is also expanding its e-commerce offerings with the acquisition of E-Travel according to a recent article (McGuirk, 1999). Oracle's new eTravel system will allow end users to plan and book corporate travel using a standard browser. The product allows significant cost savings by cutting travel brokerage fees. Benefits to companies also include increased use of preferred suppliers and increased compliance with corporate travel policies. Another benefit is the integration of travel planning into ERP systems to provide comprehensive business intelligence that includes data on corporate travel and entertainment. These costs are typically the third or fourth largest cost for most corporations. Cost reductions of this type are directly related to goal of this project report.

Intelisys.

Warner, in an article in the Wall Street Journal, contributed to the project with a detailed report on Ford Motor Company's effort to cut billions of dollars from its MRO expenses (Warner, 1998). Ford spends an estimated $15.5 billion each year on non-production goods and services, making it, by company estimates, one of the biggest purchasers of such goods worldwide. Ford employees by the end of this year will use an Internet-based ordering system running on software designed by Intelisys.

Using the Intelisys electronic marketplace system, employees will no longer need to receive catalogs, fill out purchase orders, and have them cleared by their bosses over days or weeks. They will simply log on to an Internet system and browse manufacturers' catalogs, order from a pre-approved group of suppliers, and download the request in a matter of minutes. Ford expects to save nearly 30 percent ($5 billion) in processing and transaction costs using the system.

Intelisys will provide Ford with a customized enterprise-wide workflow process that integrates order approval, merchandise receipt, and vendor payments to reduce both cycle times and processing costs. As part of the Ford project, Intelisys is teamed with the Chase Manhattan Bank. Like Ford, a number of multinational companies have turned to Chase

for help in transforming their global purchasing-to-payables operations. Chase is managing Ford's payable transactions as an outsourcing service.

During the next two years, Ford and Intelisys will use business-to-business e-commerce to construct a worldwide trading network that will change the way it does business with its 5,000 suppliers. This, in turn, will change how those suppliers do business with their customers.

Information located on the Intelisys Internet site also contributed to the project (Intelisys, 1999). The site described in detail the Intelisys Electronic Commerce (IEC) solution. This product suite consists of multiple elements. The core is the Intranet purchasing system, IEC-Enterprise, which provides the ability to make purchases over the Internet. The remaining elements are directed toward the needs of suppliers. IEC-Link facilitates the automatic transfer of an order from the IEC-Enterprise purchasing system into and out of the supplier's order processing system. Another element, IEC-SupplyNet, allows suppliers to house catalog information on the Internet. It also facilitates the exchange of purchasing messages between buyers and suppliers (e.g. fax, e-mail) using Open Buying on the Internet (OBI) standards. The number of employees able to access IEC-Enterprise is only limited by the hardware on which a company chooses to run their intranet server.

Another article titled, *Best Business-to-Business E-Commerce Site* by Girishankar, contributed to the project with a description of the Chemdex Corporation Internet site (Girishankar, 1999). The Chemdex site was recently rated as the best business-to-business e-commerce site on the Internet. The site uses Oracle database and server, Tibco messaging, and OBI interfaces to handle 2,000 transactions per day. The Chemdex site is currently the trading hub for 160 suppliers and thousands of enterprise buyers of scientific research materials.

Summary

The literature review given above was organized by subject heading. The subjects covered were: extranets and the Automotive Network Exchange, business-to-business portals, supply chain integration, and e-commerce enabled procurement systems. The following chapter will describe the research methods and online tools and resources to be employed during the completion of the project report.

Chapter III
Methodology

Research Methods Employed

The primary research methods to be employed throughout the course of this project will be browser-based Internet searches. The literature reviewed will include textbooks, white papers, Web site reviews, trade journals, and magazine articles referenced by a selected set of online resources. Relevant texts will be located, ordered, and delivered using the Amazon.com Internet site. The full text articles from trade journals, magazines, and white papers will be located and subsequently downloaded from a collection of online electronic commerce resources.

Online Tools and Resources

A variety of online e-commerce resources will be used to locate and download literature relevant to the goal of the project. These resources will include ACM Search (www.acm.org/dl/Search.html), E-Commerce Times (www.ecommercetimes.com) Electric Library (www.elibrary.com), Forrester Research (www.forrester.com), Gartner Group (www.gartner.com), and ProQuest Direct (proquest.umi.com). Perhaps the most powerful search tool to be employed during the course of the project will be the intelligent search agent, Copernic 99.

Copernic 99 is a well-documented freeware search agent. It uses predefined channel sets, which allows researchers to target inquiries to all major Web search engines, search for relevant text in newsgroups, and access popular e-mail directories to find people (Copernic, 1999). Copernic conducts fast, multithreaded, full Boolean searches with progress displays and customizable search depth. Once results are compiled, Copernic displays returns (including name, location, and introductory text) in a right-click-enhanced list box sorted by relevance.

Expectations

It is expected that the executive summary (i.e. a strategic plan for the implementation of electronic commerce at AAM) that will result from the completion of this project will be the first step in changing AAM's current "wait and see" attitude toward electronic commerce. The executive summary, along with the full text of the project paper, will be made available to the AAM Information Systems staff for further discussion. Follow-up meetings will then be scheduled with software application suppliers and a few of the companies using their e-commerce applications.

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