

DISS 820 Project Proposal:
A Plan for the Implementation of Agent Technologies
at American Axle and Manufacturing

by

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In the next five years, agent-based technologies and services will become common. The market research firm Ovum predicts a \$4 billion software agent market in the year 2000 with applications of agent technology appearing in the computing, telecommunications, consumer, entertainment, manufacturing, and military market segments. In response to this growth and American Axle and Manufacturing's (AAM's) need to deploy new technologies to remain competitive, this project proposal is submitted. The goal of the project is to provide an executive summary that outlines the most effective agent technology 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. The second chapter provided a review of the literature relevant to the implementation of agent technologies at AAM. Literature reviewed covered areas that included e-commerce agents, information and search agents, manufacturing agents, network agents, personal agents, and user interface agents. 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 Agent Technologies 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.

Problem Statement and Goal

In the next five years, agent-based technologies and services will become common. The market research firm Ovum predicts a \$4 billion software agent market in the year 2000 with applications of agent technology appearing in the computing, telecommunications, consumer, entertainment, manufacturing, and military market segments (Caglayan & Harrison, 1997).

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 2,300 desktops (i.e. Windows NT workstations running current versions of MS Office and MS Exchange). In spite of its "agent ready" infrastructure, the company's IT Plan is very conservative and calls for only limited deployment of new technology. AAM's IT staff is taking a "wait and see" approach to all forms of new technology (including agent). This approach runs contrary to a recent statement made by Richard E. Dauch, AAM Chairman, CEO, and President (personal communication, October 26, 1999). In a meeting with the company's Operating Committee, Dauch stressed the application of new technology as one of only two key factors that will differentiate AAM from its competitors.

Based upon the latest projections, agent technologies will offer many competitive advantages (Linden, 1999, February 4). In fact, the Gartner Group ranked intelligent agents highest in its list of the hottest upcoming technologies. Agents are predicted to grow more than 500 percent, from 13 percent current deployment to 84 percent planned deployment within the next five years.

In response to AAM's lack of a strategy for the use of agent technology and a clearly defined implementation plan, this project proposal is submitted. The company has failed to identify agent technologies 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 one page executive summary. This summary will describe the benefits agent technologies. It will also outline the most effective agent technologies to deploy at AAM over the next eighteen months. Implementation of these technologies

will allow AAM to leverage "best of breed" agents to gain a competitive edge as a tier one automotive supplier.

Relevance

This project is relevant to both the study of human-computer interaction and the future success of AAM. Key to successful project completion is the exploration and understanding of select areas of agent technology. Included are the following topics:

- E-commerce Agents
- Information and Search Agents
- Manufacturing Agents
- Network agents
- Personal agents
- User Interface Agents

These specific areas were chosen because they represent the most promising agent 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 the vast quantity of research material related to agent technologies. This material must be gathered, compiled, filtered, and evaluated to determine its appropriateness to the project.

Successful project completion is also complicated by the many changes occurring in the area of agent technology. The long-term success of numerous emerging

technologies must be judged. Those deemed viable and ready for deployment must then be integrated into an effective 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. The second chapter provides a review of the literature relevant to the implementation of agent technologies 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 agent technologies with regard to their application at AAM. This analysis will be consolidated in chapter five into an executive summary that will outline a strategic plan for the implementation of agent technologies at AAM. Included will be a brief description of the agent technologies to be deployed along with a timetable for completion. Also included will be a discussion of the integration required for these technologies to function with AAM's current applications.

Excluded from the executive summary will be details of the eighteen-month implementation effort (e.g. cost justification, resource allocation, and detailed project planning). The scope of the summary will be limited for two reasons. The first is the limited time available to produce the project report, and the second is the amount of detail considered appropriate for AAM executive review.

Milestones

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, topic approval, was completed on November 4, 1999.

The next milestone is the approval of the project proposal. This proposal consists of the first three of the five chapters that comprise the project report. The introduction, chapter one, was completed on November 7, 1999. This was followed by completion of the review of literature, chapter two, on November 12, 1999. Methodology, chapter three, was completed on November 13, 1999, and the project proposal was submitted for review by Dr. Dringus on November 14, 1999.

After approval of the project proposal is received, the completion of chapter four and five (results and summary) are the last milestones before submission of the final project report. Chapter four is scheduled to be completed by January 9, 2000, and chapter five prior to February 12, 2000. After extensive review and proofreading, the project report will be submitted on February 13, 2000.

Summary

In summary, the sections provided above introduced the problem to be investigated, the goal to be achieved, and the potential barriers and issues anticipated during the completion of the project paper. Also included were the plan and approach for the project along with a timeline of milestones. In the next chapter, this proposal provides a review of literature relevant to the implementation of agent technologies at AAM.

Chapter II

Review of the Literature

The literature review that follows is organized by subject heading. Those subjects include: e-commerce agents, information and search agents, manufacturing agents, network agents, personal agents, and user interface agents. A review of the literature pertinent to these subjects is critical to achieving the project's goal of providing an executive summary that outlines the most effective agent technology strategy for AAM to deploy. In addition, this literature review attempts to focus on agent technologies that are (at first glance) viable and capable of being successfully deployed in an eighteen-month period.

E-commerce Agents

In a recent text, Murch and Johnson discussed how e-commerce agents will form the backbone of e-business (Murch & Johnson, 1998). Agents are expected to gradually take over many of the decision areas currently in the domain of people. Examples included automated customer service agents, production fulfillment agents, and purchasing agents.

The role of intelligent shopping agents in the next e-commerce wave were described in the related text, *Agent Technology Handbook* (Chorafas, 1998). For example, Anderson Consulting's BargainFinder agent was one of the first shopping agents to search online information and locate the best price for a particular product. Anderson's latest e-commerce agent, BizBots, goes the next step to negotiate price and

consummate the sale (Krantz, 1999, July 12). BizBots is currently creating e-market pilots for the chemical, financial-service, and transportation industries.

Information and Search Agents

The amount and complexity of information available has compounded the problems of information delivery. The article *KAOs: Toward an Industrial-Strength Open Agent Architecture* discussed the role of information agents in alleviating this problem (Bradshaw, Dutfield, Benoit, & Woolley, 1997). At the user interface, these agents assemble components, select data, and present and format information in the most appropriate way for a specific user and situation. Behind the scenes, agents discover, link, and securely access data and services.

The largest increase in information storage and communication has been on the Internet (Caglayan & Harrison, 1997). Caglayan and Harrison described the variety of Internet agents now available or under development. Examples are Web search agents, Web robots, information filtering agents, off-line delivery agents, and notification agents.

Manufacturing Agents

An article from the Daimler-Benz Research Systems Technology Group provided real world examples of manufacturing agents (Burmeister, Bussmann, Haddadi, & Sudermeyer, 1997). In one case at a Mercedes-Benz passenger car plant, manufacturing agents coordinated the activities of the plant's various assembly departments in order to achieve a consistent plant-wide strategy.

Another related article discussed the application of manufacturing agents at IBM (Millman, 1998, February 16). At its Intelligent Agent Center in Raleigh, North Carolina,

IBM completed the prototyping and testing of agents for the controlled-manufacturing industry. The system of agents oversaw delivery, production scheduling, and maintenance of equipment.

Network Agents

The benefits of deploying network management agents was reported by Plu (Plu, 1997). France Telecom is currently developing agents to manage and control all of its interconnected networks. In order to accomplish this, agents must embed strategic policies to allocate network resources according to scheduled future requirements and quality of service stability.

Another related article by Pendery, described the development of Computer Associates' neural agent - Neugent (Pendery, 1999, February 1). Neugent is a network agent that can predict the probability of various network states within 90 percent accuracy. This ability allows the agent to move beyond system monitoring to perform pre-emptive network management tasks.

Personal Agents

The use of personal agents to reduce work and information overload at work was discussed by Maes in a recent article (Maes, 1997). Examples included the use of agents for electronic mail handling, meeting scheduling, and electronic news filtering. Personal agents save many hours currently wasted dealing with junk mail, scheduling and rescheduling meetings, and searching for relevant information hidden along with large quantities of irrelevant information.

Boone in another related article described the use of intelligent e-mail agents that learn actions such as filtering, prioritizing, downloading to palmtops, and forwarding e-mail to voicemail (Boone, 1998). In contrast to rule-based systems that require users to write rules, Boone proposed e-mail agents that only require users to place example messages in folders corresponding to the desired actions. The agents would then learn the concepts and decision policies from these folders.

User Interface Agents

In the book *Software Agents*, Jeffrey Bradshaw discussed the growing use of user interface agents (Bradshaw, 1997). Interest in this type of agent is being fueled by concern in two areas. First is simplifying the complexities of distributed computing. Second is overcoming the limitations of current user interface approaches. Bradshaw discussed in detail the limitations of direct manipulation interfaces as well as the advantages of indirect management using interface agents.

Shneiderman, on the other hand, contributed to the topic with a discussion of the importance of scientifically evaluating interface agents (Shneiderman, 1997). Interface agents like other user interfaces should be tested against other viable alternatives, such as direct manipulation of action templates. In order to be classified as successful, interface agents must measure up in areas such as learning time, speed of performance, error rates, retention over time, and subjective satisfaction.

In another related article, Nicholas Negroponte proposed that the best metaphor for a human-computer interface is that of a well-trained English butler (Negroponte, 1997). In the future for example, intelligent agents will answer the phone, recognize the

caller, and disturb you only when appropriate. The agent-based interfaces in use today will emerge as the dominant means by which computers and people talk with each other.

Summary

The literature review given above was organized by subject heading. The subjects covered were: e-commerce agents, information and search agents, manufacturing agents, network agents, personal agents, and user interface agents. 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 Type

The project paper will be a research-based descriptive study. The key outcome of the investigation will be a strategic plan for the implementation of agent technologies at American Axle and Manufacturing. In addition, the results of the study will be formatted into an executive summary outlining the most effective agent technology strategy for AAM.

Research Methods Employed

The primary research method 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 resources.

Online Tools and Resources

A variety of online agent technology 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), Electric Library (www.elibrary.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 2000.

Copernic 2000 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 agent technologies at AAM) that will result from the completion of this project will be the first step in implementing agent technologies at AAM. 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.

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