

product locator

Dennis Ray Director

Gholan (Ali) Miamee Project Manager

Sadina Little Research

Richard Raehl Presentations / Public Relations

Andrew Ungvarsky Web Development / Technical Management

Dafei (David) Zhai Documentation / Specification

December 11, 2001
Old Dominion University

Abstract:

For economic reasons major “everything under one roof” stores like Wal-Mart, Sam’s Club, and Home Depot have expanded the capacity of their stores both in overall size and in the variety of products they sell. Many customers feel overwhelmed by their size and often lost when trying locating a particular product. The customer must often ask a sales associate for help locating the product.

Our solution to this problem is the Product Locator. The Product Locator is a kiosk-style system, which can be placed remotely throughout the store – for example near entrances or at the end of aisles. A customer would need only to enter a one to two word description of the product or its SKU number, and the system would return the product location, a brief description, cost, and any other pertinent information about the product. This powerful system’s applications will be nearly unlimited.

We will develop a functional prototype by May 2002 and three funded, functional test market systems by June 2003. We will break even and return investments by October 2004.

Table of Contents:

Abstract	2
Table of Contents	3
1. Overview	
1.1. Problem Description	4
1.2. Problem Solution	4
2. Project Implementation Plan	
2.1. Milestones	5
2.2. Gantt Chart	6
2.3. Tasks and Implementation Breakdown	7
3. Management Plan	
3.1. Evaluation Methodology	9
3.1. Test Plan	11
3.3. Potential Problems / Risk Management Plan	12
4. Budget	
4.1. Yearly Breakdown	14
4.2. Personnel Breakdown	15
4.3. Per-System Cost Analysis	16
4.4. Annual Cost vs. Revenue	16
4.5. Projected Profits	16
5. Resource Requirements	
5.1. Personnel	17
5.2. Services, Equipment, and Consumables	18
5.3. Description of Contracts	19
6. Marketing and Funding	
6.1. Marketing Plan	20
6.2. Funding Sources	21
7. Corporate Management Plan	22
A. Appendices	
A.1. Bibliography	23
A.2. Team Biographical Information	25

1.1 Problem Description

Large warehouse-style chain stores like Wal-Mart, Home Depot, and Costco have expanded the physical size of their stores both for economic reasons as well as to provide customers with an all-in-one shopping experience. This physical expansion has been accompanied by an equally large increase in product types and variety, especially in multi-purpose stores. In many cases, particularly for first time customers, conveniently locating products can be very difficult if not all together impossible for customers. Stores lose money on time spent by employees who could be doing other jobs, and customers become frustrated and dissatisfied.

1.2 Problem Solution:

Our solution to the problem is what we call the Product Locator. The Product Locator is simply a computer terminal located in a Kiosk near the entrance of a store or strategically placed in any number of other departments. The customer would be required to enter a one or two word generic description of the product or use a SKU number and would then receive an output of the product location and a brief description of the product. Next to the terminal there would be maps of the store. The isles would be numbered and further subdivided accordingly. Now all the customer needs to do is reference the map with the location number on the terminal screen and they will know where the product is located.

2.1 – Milestones:

10/16/2001 – Presentation II, Feasibility.

11/13/2001 – Presentation III, Rough draft of function specifications completed.

12/11/2001 – Presentation IV, Project Approval.

01/25/2002 – Database chosen, in proper format, fields selected, ready for use.

03/04/2002 – Search feature coded & functional, returning all hits.

04/05/2002 – Software Component done. Preliminary and Final Results pages displayed correctly.

02/25/2002 – Hardware selected for all aspects of project.

05/08/2002 – Testing complete, prototype is ready for delivery.

06/06/2002 – Project Funded for production.

08/14/2002 – First Customer Contract

09/26/2002 – Hardware purchased; full-scale components available for testing.

10/14/2002 – Final product fully tested and ready for use.

2.2 – Gantt Chart:

Gantt Chart on next page.

2.3 – Tasks and Implementation Breakdown

- I. Research & Design
 - A. Feasibility Presentation
 - B. Presentation III: Preliminary Project Planning & Milestones Presentation
 - C. Rough draft of functional specifications
 - D. Web Page
 - E. Presentation IV: Group Approval Presentation
- II. Functional Specifications
 - A. Project Description
 - B. Project Implementation Plan
 - C. Draft Budget
 - D. Bibliography & Biography Info
 - E. Assembly of Specs. Abstract, TOC, and cover page
- III. Database
 - A. Obtain database to work with. Our current efforts have brought us the following options:
 - 1. Computer store – available database
 - a. Complete inventory available in .dbase or .txt format
 - b. 6,345 item software-only database available in .dbase, .xls, or .txt format
 - i. NACS_SKU: Nat'l Assoc of Convenience Stores
 - ii. ISBN_UPC: International Standard Book Number - a unique machine-readable identification number for books.
 - iii. DESC1: i.e. "CART REFILL"
 - iv. DESC2: i.e. "EPSON STYLUS COLOR 800/1520 BLACK"
 - v. PUBL: Publisher Abbreviation
 - vi. CATEGORY: i.e. "PERPH - INKJET PRINTERS"
 - vii. ONHAND: Current Stock
 - viii. PRICE: Cost to distributor
 - ix. TYPE: i.e. "PERIPHERALS"
 - x. SUGG: Suggested Retail Price
 - xi. PUBL_NAME: Publisher name
 - xii. VENDOR

- xiii. ON_ORDER: amt on order
 - xiv. DUE_ON: date expected to arrive.
 - c. Neither contains location field as for a physical store
 - 2. Hardware store
 - B. Necessary fields assessment
 - C. Adaptation / Addition to database
- IV. Software Component
 - A. Opening Presentation Screen
 - 1. Welcome, Instructions
 - 2. Prompt for search text
 - B. Query/Search capability
 - 1. Database access – search specific fields
 - a. Product name
 - b. Description
 - c. Sku Number
 - 2. Returns Hits
 - C. Match Results Output
 - 1. Presentation of hits - display
 - 2. Selection Mechanism - clickable
 - D. Item Found Output
 - 1. Full, comprehensive display
 - 2. Fields shown to user: Item Name, Location, Availability (expected date if not available), Description, Price, Links to relevant information
- V. Hardware Component
 - A. Server
 - B. Client
 - C. Network
- VI. Prototype simulation testing
- VII. Prototype Delivery, detailed product specifications
- VIII. Funding / Project Acceptance
 - A. Obtain Management Facilities
 - B. Marketing
 - C. Sales
 - D. First Customer Contracts
 - E. Production
 - F. Training
- IX. Production / field testing
- X. Product Distribution & Delivery

3.1 – Evaluation Methodology:

We have carefully weighed the components of our project, considering the technical, management, societal, and financial aspects of the project. These aspects are shown below, where applicable:

Marketing – 20%

Management:

- Our marketing strategy must be clear and aggressive.

Societal:

- Considerations must be given to customer desire or lack thereof to use the product.
- Effectiveness must be clearly displayed.

Financial:

- Possibility of industry partners: Financial backers, Corporate support/sponsors, etc.
- If existing companies in the corporate world endorse the product locator, it will be more widely accepted.

Software Component - 20%

Technical:

- Design requirements must be clear and correct.
- Obtain data from the compatible database correctly.
- Must contain necessary functions to perform all required tasks.
- Must be tested with a database of significant size.
- Consider expansion of features.

Management:

- Software development must be allotted significant time in scheduling.

Database Component – 20%

Technical:

- Availability and standardization of existing databases.
- Required fields must be assessed and adjusted – in particular, location might need to be added.
- Management requirements:

- Compatibility with other existing systems in the store will be considered high-priority.

Financial:

- Possibility of needing to pay for test database for development.

Research / Data – 10%

Management:

- Our plan for implementation becomes increasingly defined with continued research.

Societal:

- Availability of sufficient information and the need to survey to obtain such information.

Financial:

- Investment and third party support for our proposed plan.

Integration – 10%

Technical:

- System's components must work well with existing systems.
- Expect and plan for unanticipated technical issues.

Management:

- Coordinate extensive testing and research.

Testing and Product Demos – 10%

Technical:

- Programmers will be assumed responsible for correct code, but extensive testing of the system as a whole and all of its components is considered crucial.

Management:

- Evaluation of real environment testing with product demos.

Societal:

- Evaluate: Have we accomplished our societal goals at the point of testing?

Financial:

- Product Demos and test markets will be essential to customer contracts.

Hardware – 5%

Technical:

- Hardware must be chosen to match functionality requirements.

- Speed and latency are will be a high priority; specifically, the servers must be capable of handling the workload.
- Operating system and software must be fully compatible with hardware.
- Hardware reliability of utmost importance.

Financial:

- Hardware costs must be carefully anticipated in the budget.

Website – 5%

Management:

- Coordination to keep site up-to-date and on schedule.

Societal:

- All site functions must be user-friendly and cross-compatible to promote a clear understanding of the project.

3.2 – Test Plan:

- Run server and client applications to ensure full compatibility with operating system and hardware.
- Confirm all initializations and communications between the components of the system take place properly
- Run test database on server, ensuring that all required functions for introducing the database to the system are working properly.
- Test integrity of data transfer through system.
- Run a series of queries and ensure accurate display of information. Note that extensive testing in this area is necessary to check search algorithms.

3.3 – Potential Problems / Risk Management Plan:

Risk	Mitigation
<p>Technical:</p> <ol style="list-style-type: none"> 1. Database unavailable for development. 2. Client database may not contain the necessary fields. 3. Compatibility with existing systems may be an issue. 4. Location, description, or information may become out dated or expired. 5. Prototype may prove that the network latency of our system is too high and that the end users may not accept its performance. <p>Management:</p> <ol style="list-style-type: none"> 1. Personnel planned for may not be sufficient for project completion. 	<ol style="list-style-type: none"> 1. We have obtained a working database from an online computer store with over 7,000 items. With an understanding of client standardizations, this should be sufficient to develop the database software. 2. We will add to it and manipulate it until it meets our requirements. 3. There are two existing standardizations in use today -- . Our system will be designed to work with both, and will be upgradeable on a case-by-case basis. 4. The database is to be regularly updated, and proper integration should minimize extra update work. We may also consider offering this as a service. 5. We will design the technical specifications of the system with high traffic as an utmost priority. The system will also be designed to be expandable and upgradeable. <ol style="list-style-type: none"> 1. Our current personnel budget estimates 100% for individuals whose workload we could lessen.

Risk	Mitigation
<p>Societal:</p> <ol style="list-style-type: none"> 1. Customers may choose not to use the system. 2. Customers may find the system difficult to use. <p>Financial:</p> <ol style="list-style-type: none"> 1. We may not get enough backing and support for our product. 2. Actual sales do not meet projected sales, delaying break-even and investment return. 3. Unexpected expenses affect budget accuracy. 	<ol style="list-style-type: none"> 1. An assistant could help new users take advantage of the system. Studies have shown that nearly all of the people who would use this system are comfortable with the interface. 2. Our system has been designed with customer convenience as a high priority. Our extensive surveying has resulted in valuable information about the type of interface customers will be comfortable with. <ol style="list-style-type: none"> 1. Our funding plan allots for a number of alternate sources of initial funding. Additionally, feasibility studies show that the market does exist for the Product Locator. 2. Our estimates are conservative and should allow for unexpected sales – for example, the company contracted in 2002 would likely purchase more units in 2003, but for a solid commitment to returning our investment on time, we do not count on this. 3. Our initial budget estimates are conservative enough to allow for discrepancies.

4.1 – Budget – Yearly Breakdown:

4.2 – Budget – Personnel Breakdown:

Personnel Breakdown on next page.

4.3 – Per-System Cost Analysis:

Per-System Cost Analysis

Administrative and Development Costs (Per System)	\$15,633.21
Kiosk Cost x Avg. 8 Units Ordered Per System	\$12,000
Installation	\$2,000
Network Hardware (Server, Hub, Wiring)	\$4,300
Cost Per System:	\$33,933

4.4 – Annual Cost vs. Revenue:

Analysis of Annual Cost vs. Revenue:	2001	2002	2003	2004
Administration and Development Cost:	\$73,326	\$887,163	\$1,663,350	\$2,159,923
Production Cost:	\$0	\$54,900	\$1,335,900	\$4,209,000
Sales:	\$0	\$101,800	\$2,477,124	\$7,804,638
Revenue:	(\$73,326)	(\$840,263)	(\$522,126)	\$1,435,715
Standing:	(\$73,326)	(\$913,589)	(\$1,435,715)	\$0

By October 2004, we will break even and have all investments returned. Below is

4.5 – Projected Profits:

Projected Years - Profit

Projected 2004-2005 Total Cost \$3,979,600

Possible Revenues from Different Contracts:

	Contracted Stores (10%)	Price	Profit
Costco	38	\$1,289,462	
JC Penny	110	\$3,732,653	
Kmart	220	\$7,465,306	\$3,485,706
Kroger	230	\$7,804,638	\$3,825,038
Walmart	450	\$15,269,944	\$11,290,343

5.1 – Resources – Personnel:

In the first year of our project, a select group of personnel was needed to successfully complete our tasks. We assigned a Project Manager to oversee and manage the entire project. In addition, we combined our resources to use three Software Engineers, four researchers, and a presenter. A field associate was also needed correspond with retail stores to obtain store database information. Our Webmaster built a functional web site for our clients. Finally we had five Documenters to compose our functional specifications.

In 2002 we added a number of personnel. Two database programmers will be needed to correct and build the store database. To design and implement our product we will need four software programmers and two testers. Heading our extensive marketing experts are a marketing expert and a salesperson. We also hire a proposal writer and a contract writer to write grant proposals and contracts respectively. Two trainers will start our customer training program. In addition, we brought on an accountant, a lawyer, an administrative assistant, two customer support specialists, and a network administrator.

In 2003 continues in full production and our personnel positions will not change. We will, however, add an additional administrative assistant, marketing expert, salesperson, trainer, and customer support specialist. Since our software is complete and debugged we will only need two software programmers, one tester, and no database programmers to maintain our software and update it.

In 2004, with our large expected increase in size of customer contract, marketing experts and salespersons will increase to four each. Trainers and customer support specialists will also increase to handle increased demand.

For the out years of the project, we will have tentatively prepared for a large company contract. Again, our marketing, sales, customer support, and training departments will all see increases.

5.2 – Resources – Services, Equipment, and Consumables:

We have allotted for the equipment we will need by year in our budget. Highlights include computer terminals for all employees, servers, printers, and miscellaneous office equipment. We have also accounted for consumables. Under our training and support department, our budget allows travel and expenses for our trainers. Our budgets use the information below for monthly expenses:

Office Space and Equipment Rental:

Per square foot.....	\$14.00
Required.....	1,500 square foot
Total.....	\$21,000/month

Data and Phone services for businesses:

(Data: DSL Professional Plus service) Verizon:.....	\$90/month
(Voice) Verizon:.....	\$500/month

5.3 – Description of contracts:

We have decided to contract two aspects of our project: kiosk production/assembly and system installation. Below is our breakdown of these contract costs:

Per-System Cost Analysis

Administrative and Development Costs (Per System)	\$15,633.21
Kiosk Cost x Avg 8 Units Ordered Per System	\$12,000
Installation	\$2,000
Network Hardware (Server, Hub, Wiring)	\$4,300
Production Total:	\$18,300
Cost Per System:	\$33,933

6.1 – Marketing Plan:

Our personnel budget brings on Marketing Experts in June of 2002, immediately after the project is funded for full development. We feel that our preliminary marketing plans are conservative enough to return investments on time, yet aggressive enough to give the Product Locator maximum opportunity for success.

For 2002, we plan to have a test market of three systems. Candidates for these systems include, but are not limited to the following: Lowe's, Home Depot, Wal-Mart, Kmart, JCPenny, and Costco.

With our heavy marketing and sales efforts and successful test market systems, we conservatively plan to contract a small to medium size chain of similar size to the Lowe's chain (currently operating 730 stores nationwide) in project year two. Our contract will guarantee us 10% (or more) of their stores using our product.

In our final project year, taking us from the end of 2003 until October 2004, we estimate that we will contract a medium to large size chain of similar size to the Home Depot chain (currently operating 2,300 stores nationwide).

Trade Show expenses have been included in our budget as travel expenses. This considers costs of air travel and transportation, shipping and booth construction. We plan on attending the following shows:

Western Retail Services, June 2-4
BookExpo America
Chicago, Illinois

Retail Systems, April 16-19
Chicago, Illinois

Trade magazine advertisements have also been included in our budget. We plan to advertise in the following publications:

TradePub.com

Contact: Gina Geertz, 831-440-4205

NetLine

Contact: Mitch Diamond, 831-440-4202

6.2 – Funding Sources:

We have considered the following funding resources for our project:

Government Agencies for hi-tech startups:

- CIT offers \$90,000 for one to two year development projects. This would cover our project for the first 3-6 months of prototype development.

Large retail store corporations:

- Corporations interested in our product may receive significant discounts in exchange for investment.

Private investment:

- Another possible investment resource is private venture capital funds. We are considering Garage Venture Capital – a venture capital firm in California, who is interested Large, strategic markets.

7 – Corporate Management Plan:

Product Locator Corporation will provide training in all aspects of the system during the first week of setup and by appointment otherwise. Once the Product Locator system is installed and operating in a particular store the suggested plan of maintenance and management is as follows:

Hardware management:

- Hardware updates will be paid for by clients.
- These physical updates will be outsourced.

Software management:

- Network administrator will issue central software upgrades to stores.
- Customer support is available and budgeted to increase with expanding company size.

Database management:

- Database is updated regularly and automatically according the specifications of the store's existing systems.
- Third party information such as coupon and additional product information may be sold and coordinated by the client company or possibly as an expansion to our plan in the out years of the project.
- Customer support is available and budgeted to increase with expanding company size.

A.1 – Bibliography:

Cezzar, Dr. Ruknet. Hampton University, Computer Science Department.

Community Project Design; Guidelines for Leaders.
<http://www.scn.org/ip/cds/cmp/pdesign.htm>.

Costco. <http://www.costco.com/>.

Dell. <http://www.dell.com/>.

Garage Venture Capital.
<http://www.garage.com/companies/faq.shtml>.

Henry, T. The Center for Atmospheric Sciences, Hampton University.

Home Depot. <http://www.homedepot.com/>.

Jefferson, Steven. Director of Implementation for Home Depot, Atlanta, GA.

Henderson, Walt. Home Depot Store Manager, Virginia Beach.

Kmart Corporate Information. <http://www.kmartcorp.com/corp/>.

JCPenny. <http://www.jcpenney.net/>.

Laudon, Kenneth. Management of Information Systems. Second Ed. 1991.

Lientz, Bennet and Kathryn Rea. Project Management for the 21st Century. Academic Press. Second Edition. 1998.

Lowe's. <http://www.lowes.com/>.

News America Marketing. <http://www.newsamerica.com/>.

NexTag: Sell Your Item. <http://www.nextag.com/>.

Pembroke Realty. <http://www.pembrokerealty.com/listings/>.

Perry, Rebecca. Database Administrator, Hampton Public Library.

Pooley, Rob and Perdita Stevens. Software Engineering with Objects and Components. Addison Wesley Longman. 1999.

Ray, Dennis. CS 410 Instructor, Old Dominion University.

Salary.com. <http://www.salary.com/>.

Sommerville, Ian. Software Engineering. Fifth Ed. Lancaster University 1995.

U.S. Census Bureau: Home Computers and Internet Use in the United States, September 2000. <http://www.census.gov/>.

Verizon DSL Service for business. <http://www.verizon.com/>.

Virginia's Center for Innovative Technology. <http://www.cit.org/>.

Wal-Mart. <http://www.walmart.com/>.

A.2 – Team Biographical Information:

Little, Sadina – Research.

Major: Computer Science, Old Dominion University.

Software Experience: Pascal, C++, Excel, Word, Publisher.

Related Experience: Java Team in Naval Combat Simulation,
Web page design.

Miamee, Gholam (Ali) – Project Manager.

Major: Computer Science, Old Dominion University.

Software Experience: C++, MIPS – SGI, Fortran 90, HTML,
Java, Pro-Log, Scheme, SML, Rational Rose.

Related Experience: Problem Solving in Programming,
Advanced Data Structures & Algorithms, Public
Speaking, Intro to Software Engineering, Software
Engineering & UML, Component Based Object Oriented
Modeling, Computational Methods & Software.

Raehl, Richard – Presentations / Public Relations.

Major: Computer Science. Old Dominion University.

Software Experience: C++, HTML, Oracle SQL.

Related Experience: Beowulf project at SPAWAR, 10 years
U.S. Navy NTDS.

Ungvarsky, Andrew – Web Development / Technical Mgmt.

Major: Computer Science, Old Dominion University.

Software Experience: C++, Visual Basic, HTML, Javascript,
Flash, Perl, PHP, MySQL, Excel, Word, Powerpoint.

Related Experience: Web Developer - 5 years, Company
president - Drewmedia, Advanced Data Structures &
Algorithms, Software Engineering, Public Speaking.

Zhai, Dafia (David) – Documentation / Specification.

Major: Computer Science, Old Dominion University.

Software Experience: Visual Basic, Visual C, SQL Server,
ODBC Application, GUI-based Device Controlling
Application.

Related Experience: Network/Unix Administration in a large
organization, Windows, Network/Technical Service from a
small IT firm.