



NIST
National Institute of
Standards and Technology

FY 2004 PROGRAM SOLICITATION

NIST-04-SBIR

U.S. DEPARTMENT OF COMMERCE
National Institute of Standards and Technology

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Proposal to National Institute of Standards and Technology (NIST) Small Business Innovation Research (SBIR) Program Cover Sheet

Solicitation No.: NIST-04-SBIR
Name of Submitting Firm

Address of Firm (Including Zip Code +4)

Title of Proposed Project

Requested Amount	Proposed Duration 6 months	Solicitation Subtopic
Solicitation Subtopic Title		

THE ABOVE ORGANIZATION CERTIFIES THAT:

- | | | |
|---|-----|----|
| 1. It is a small business firm as defined in this Solicitation. | Yes | No |
| 2. The primary employment of the principal investigator will be with the firm at the time of award and during the conduct of the research. | Yes | No |
| 3. A minimum of two-thirds of research will be performed by this firm in Phase 1. | Yes | No |
| 4. It qualifies as a minority and disadvantaged small business as defined in this Solicitation. | Yes | No |
| 5. It qualifies as a woman-owned small business as defined in this Solicitation. | Yes | No |
| 6. It will permit the government to disclose the title and technical abstract page, plus the name, address and telephone number of the corporate official if the proposal does not result in an award to concerns that may be interested in further information. | Yes | No |
| 7. This firm and/or Principal Investigator has has not submitted proposals for essentially equivalent work under other federal program solicitations, or has has not received other federal awards for essentially equivalent work. | | |
| 8. The offeror and/or any of its principals are, are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency; and have, have not, within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a Federal, state or local government contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and are, are not presently indicted for, or otherwise criminally or civilly charged by a Government entity with, commission of any of these offenses. | | |
| 9. Complete the following:
It is, is not a veteran-owned small business concern.
It is, is not a service-disabled veteran-owned small business concern.
It is, is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material change in ownership and control, principal office of ownership, or HubZone employee percentage has occurred since it was certified by the Small Business Administration in accordance with 13 CFR Part 126; and
It is, is not a joint venture that complies with the requirements of 13 CFR Part 126, and the representation above is accurate for the HUBZone small business concern or concerns that are participating in the joint venture. [The offeror shall enter the name or names of the HUBZone small business concern or concerns that are participating in the joint venture: | | |

Each HUBZone small business concern participating in the joint venture shall submit a separate signed copy of the HUBZone representation.

PRINCIPAL INVESTIGATOR

Name Title Day Telephone No.

Signature E-Mail Fax No.

CORPORATE OFFICIAL (BUSINESS)

Name Title Day Telephone No.

Signature E-Mail Fax No.

OTHER INFORMATION

Year Firm Founded Number of Employees: Avg. Previous 12 mos. Currently

Has This Proposal Been Submitted to Another Agency? Yes No

If Yes, What Agency?

Taxpayer Identification Number (TIN): TIN has been applied for.

Data Universal Numbering System (DUNS):

Type of Organization:

- Sole proprietorship Corporate entity (not tax-exempt) Other
- Partnership Corporate entity (tax-exempt)

Common Parent Name: TIN:

Offeror is not owned or controlled by a common parent

PROPRIETARY NOTICE

For any purpose other than to evaluate the proposal, this data shall not be disclosed outside of the Government and shall not be duplicated, used or disclosed in whole or in part, provided that if a funding agreement is awarded to this proposer as a result of or in connection with this submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the funding agreement. This restriction does not limit the Government's right to use information contained in the data source without restriction. The data in this proposal subject to this restriction is contained on separate proprietary page(s).

Proposal to National Institute of Standards and Technology (NIST)

Small Business Innovation Research (SBIR) Program

PROJECT SUMMARY

NAME OF FIRM

AMOUNT
REQUESTED

ADDRESS

PHONE #

FAX #

E-MAIL

PRINCIPAL INVESTIGATOR (NAME AND TITLE)

TITLE OF PROJECT

SOLICITATION
SUBTOPIC NO.

SOLICITATION SUBTOPIC TITLE

TECHNICAL ABSTRACT (LIMIT TO 250 WORDS)

KEYWORDS

POTENTIAL COMMERCIAL APPLICATION OF THE RESEARCH

**PROPOSAL TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)
 SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM
 Proposed Budget - Phase 1**

COMPANY NAME					
A. PERSONNEL (<i>Employees</i>) NAME	ROLE IN PROJECT Project Manager	EST. HOURS	HOURLY RATE	FRINGE BENEFITS	TOTAL COST

B. CONSULTANTS NAME	ROLE IN PROJECT	EST. HOURS	HOURLY RATE		
C. EQUIPMENT (<i>specify type, whether purchased or leased, and cost</i>)					
D. TRAVEL					
E. OTHER DIRECT COSTS					
1. Materials and Supplies 2. Testing Services 3. Computer Services 4. Research Institution 5. Subcontracts 6. Other					
TOTAL OTHER DIRECT COSTS					
F. TOTAL DIRECT COSTS (<i>A through E</i>)					
G. INDIRECT COSTS (<i>specify rate and basis</i>)					
TOTAL INDIRECT COSTS					
H. TOTAL COSTS (<i>F plus G</i>)					
I. FEE OR PROFIT					
J. TOTAL AMOUNT OF THIS REQUEST (<i>H plus I</i>)					
K. Has any executive agency of the United States Government performed any review of your accounts or records in connection with any other grant or contract within the past year? Yes No If Yes, give name, address, and phone number of reviewing office and official:					
L. CORPORATE/BUSINESS AUTHORIZED REPRESENTATIVE – TYPED NAME AND SIGNATURE					DATE:
(Signature)					

1. Identification and Significance of the Problem or Opportunity

The societal problem that presents itself, and to which our technology targets, is credit card fraud. It is a proven fact that current credit card systems do not provide a reliable method for automatically preventing fraud at the point of sale. The impact on retail industry is reported to be in the billions of dollars and on average retailers absorb approximately 55% of the cost due to related fraud. Businesses then pass these incurred costs onto their customers via higher prices, interest rates, and additional fees. While the expense to retailers is great and can be observed with hard-line numbers and bottom-line impact, the effect on the actual consumers cannot be ignored. Consumers are most greatly inconvenienced, having to ultimately support the price hikes and related costs, all while enduring the frustration and time spent falling victim to fraud. Here in lies the opportunity where the proposed product plans to capitalize. On one end there are retailers whose profits are cut into due to the credit card fraud that occurs in their stores and on the other there are the consumers who have grown tired of being victims of fraud.

To understand what the proposed solution will prevent, the security flaws by which individuals propagate fraud must be elaborated upon. A popular fraud mechanism that is highly prevalent in the UK and other countries is called skimming. This process employs the services of a hardware device that is used to swipe and “skim” the card information to memory. The data is later retrieved from the device for the production of illegal and unauthorized cards. Newer methods by which unauthorized individuals obtain credit card information come by means of photography via camera phones. In these situations individuals will position themselves behind a credit card paying customer and take a photograph of their card while the customer is making payment. The card information is later read and used illegally for either personal use or

distribution through illegal channels. Other prevalent methods include spoof sites, scam solicitations, the common dishonest employee, etc.

All of the aforementioned methods are addressed by the proposed solution, the credit card fingerprint scanner. The plan in place is to develop and implement a hardware/software package that will verify biometric data stored on a credit card to that of its cardholder at the time of each transaction. A solution of this magnitude would render fraud at the point of sales impossible and will take a major step towards addressing a fraud issue that is rapidly increasing.

2. Phase 1 Technical Objectives

BioCharge intends to provide a product that will prevent unauthorized credit card use that will result in identity theft. The prototype will consist of a sub-dermal fingerprint scanner, smart card reader, smart cards and a fingerprint-matching algorithm.



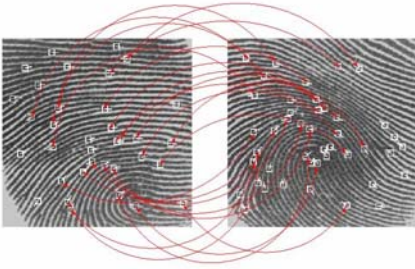
- The fingerprint scanner is of the sub-dermal type. By using this type, the product will be able to capture a more accurate image of the customer's fingerprint. This type scans below the top layer of skin and eliminates the interference of dirt and oil on the fingers.



- The smart card reader is of a hybrid type. It is capable of reading both the smart card as well as the magnetic stripe cards.



- The smart cards will be capable of storing biometric information. These cards will contain 256 bytes of protected EEPROM memory.



- The fingerprint matching algorithm used by BioCharge's Credit Card Fingerprint scanner is designed to accurately compare the cardholder's fingerprint to all fingerprints

embedded within the smart card. This entire process is performed within 1/10 of a second. The accuracy of the product results in a very low false-acceptance-rate and false-rejection-rate.

3. Phase 1 Work Plan

3.0. Phase 1 Overview

The purpose of phase 1 is to prove the technical feasibility of the Credit Card Fingerprint Scanner, and the quality of performance of BioCharge. Feasibility will be proven by (1) recording any research related to credit cards, biometrics, and other aspects of the product, (2) writing an acceptable project plan and any legal documents, (3) creating a high level prototype design, and (4) developing a lab prototype that will simulate both the point of sale transaction and the initial activation of the credit card. The research and development occurring within this phase will take place at Old Dominion University in Norfolk, Virginia. Please reference the Work Breakdown Structure and Gantt Charts for phase 1 found in Appendix A.2 to see the schedule.

3.1. Research

The seven employees of BioCharge will continue to research all aspects of this project. One purpose of this research is to evaluate the societal problem laid out in section 1 of this document. Another purpose is to analyze and manage the risks. Monitoring these risks will reduce any effects that they could occur due to uncertainties. The competition will be monitored to make sure the features of the Credit Card Fingerprint Scanner will be more advanced than these competitors. The software and hardware managers will research any technical advancements related to the product. They will also consult with experts in biometrics, and credit cards to assist with the development of the specifications for the prototypes.

3.2. Project Plan & Legal Documents

The initial project plan is included in this document. One of the first tasks in phase 1 will be to refine and expand on this project plan. The employees of BioCharge will be seeking advice

of experts like Mr. Dennis Ray. At the same time the legal manager will consult with legal experts to create initial documents to protect the company and the customers.

3.3. High Level Development Specifications

As the project, legal, and marketing managers finalize the project plan, the hardware, software managers will begin to develop the high level specification for the lab prototype and the actual prototype. When these specifications are almost complete, the quality assurance manager will begin to develop the testing plans.

3.4. Lab Prototype

3.4.1. Hardware – The Credit Card Fingerprint Scanner can be prototyped during phase 1.

The assistance of a hardware consultant will be required during this phase. The prototype will be constructed in a controlled environment for testing and validation of quality results and expectations. The hardware components will be provided by private vendors as follows:

1. Fingerprint Scanner - Access Control UK Fingerprint Scanner
2. Smart Card Reader - Magtek Incorporated
3. Smart Card Writer - Magtek Incorporated
4. Smart Cards - Advanced Card System, LTD.

3.4.2. Software - Because the staff consists of software engineers, the lab prototype development will be shared by most of these members. A rigid software process will be followed to produce quality software with limited defects. This is important because the development of the actual prototype will just be expansion on this lab prototype. Table 3.1 shows the process that BioCharge will be following for all software development. The software portion of the lab prototype can be broken down into the five routines described below.

Table 3.1 - BioCharge Software Process

- | | |
|----------------------|--------------------|
| 1. High Level Design | 6. Compile |
| 2. Design Inspection | 7. Code Inspection |
| 3. Low Level Design | 8. Unit Tests |
| 4. Design Inspection | 9. Integration |
| 5. Code, Review | 10. System Tests |

3.4.2.1. Capture Fingerprint Data – This procedure will acquire the fingerprint template from the fingerprint scanner and either output it to the fingerprint algorithm or the procedure to write it on the smart card.

3.4.2.2. Write Fingerprint Data on the Smart Card – The Smart Card has a Java interpreter on its microprocessor. This procedure will use this interpreter to store Credit Card and Fingerprint data on the card upon activation of the card,

3.4.2.3. Capture Data from the Smart Card – The software package will capture the fingerprint template from the smart card for comparison with the actual fingerprint.

3.4.2.3. Drive Fingerprint Algorithm – BioCharge will purchase a fingerprint algorithm from a reputable company. These algorithms are made up of two processes: Extract, and Match. The fingerprint scanner outputs an image file. The Extract process converts the image to a template using minutia points. The Match process compares the template with either a database or the template on the smart card. Documentation enclosed with the algorithms will assist the developers in the creation of a routine that will pass the data to the algorithms and print out the results.

3.4.2.4. Database Application – All data stored on the credit card will also be stored in a database. In the actual product, this database will be used to reinsert data on cards that need updated. It can also be used as a backup if a reader is not functioning. We will show this function in the lab prototype.

3.4.2.5. The Main Driver with Graphical User Interface Screens – This main program will drive the above procedures. It will display instructions to the user and will show the results from the algorithm.

3.4.2.6. Testing Database - NIST has a database of fingerprints available for testing fingerprint algorithms. The database contains two tables of fingerprints that can be used for comparison. A routine using this data will be developed for testing.

3.5. Post Mortem – To close out phase 1, the managers of BioCharge will evaluate phase 1, and then prepare for phase 2. One of the main activities will be searching for office space and equipment.

4. Related Research and Development

Related work will include the following items:

1. Continue research and development of fingerprint algorithm efficiency
2. Continue research of latest fingerprint scanning devices and possible applications
3. Explore possible implementations of home based fingerprint scanners for internet applications
4. Research internet implementation
5. Develop third party credit card program
6. Monitor emerging credit card fraud tactics
7. Technical support contracts
8. Continue prototype development to explore new fingerprint technology
9. Establish relationships with fingerprint scanner manufacturers to influence new scanner designs
10. Continue research to make technology cheaper and easier to implement.

5. Key Personnel and Bibliography of Related Work

5.1.1 Mary Beebe

Mary is currently pursuing a Bachelor's of Science in Computer Science with a minor in Mathematics at Old Dominion University, upon completion of the CPI program in December 2004. Mary has held programming duties creating database applications for a software firm. Recently she performed accounting tasks for a small retail company, where she handled all of the company's credit card transactions.

5.1.2 Gerard Collins

Mr. Gerard Collins has been a computer programmer and computer repair specialist since 1993. He holds an Associates Degree in Computer Electronics from ECPI, an Associates Degree in Computer Science from Tidewater Community College and is currently pursuing a Bachelors Degree in Computer Science from Old Dominion University to be attained in December 2004. Gerard is currently employed by General Dynamics (one of the biggest government contractors in the world) where he maintains simulation software and flight control systems for E2\C2 Hawkeye Naval Reconnaissance aircraft and VH3\VH60 helicopter flight simulators (the VH3\VH60 is the transport Helicopter for the President of the United States). He also holds a secret security clearance from the Department of Defense. Gerard is also well-versed in many program languages and also co-authored the web-site for Mt Calvary Baptist Church located in Portsmouth VA.

5.1.3 Addiel Lora

Addiel Lora currently holds a position as a Programmer/Analyst for the Fortune 500 Affiliated Computer Services (NYSE: ACS.) Among his current duties, programming for revenue generating contractual obligations and interfacing with the company's financial system to achieve departmental goals reigns prevalent. His computing career also includes programming and design positions at Bell Laboratories and Lockheed Martin where he implemented solutions with a wide range of programming languages and computer initiatives. Aside from his current professional obligations with ACS, Addiel also lends his services to web projects, database design, and other computing consulting for engineering firms, universities, and individuals alike.

5.1.4 Bolawole Orenuga

Bolawole Orenuga is a senior at Old Dominion University studying Computer Science and will be graduating in May of 2004. He is currently employed with the Norfolk Sheraton Waterside Hotel in Norfolk, Va. His current position is guest service supervisor, where he is responsible for making the schedule and handling both the guest and the employees' problems. He is also a deacon at First Franklin S.D.A church in Franklin, Va. While working and going to school he is also participating in a non profit organization that helps the homeless children in Nigeria, and he is in the Big brother and Big sisters program.

5.1.5 Dennis Seran

Mr. Dennis Seran is a student at Old Dominion University and is planning to receive his Bachelors Degree in May of 2004. He is a Computer Science major with a minor in Computer Engineering. He currently holds an Associates Degree in Engineering from Tidewater Community College and an Associates Degree in Electrical Engineering Technology from ITT Technical Institute. Mr. Seran is currently employed in the IT Department of the City of Norfolk. His responsibilities include assisting the Database Administrator in management and maintenance of various databases throughout the City's resources while also serving as a Crystal Reports administrator for his department.

5.1.6 Kevin B. Slocum

Kevin has been a computer "guru" ever since his early high school years. His higher education began with electronics but has since evolved to Computer Science. Kevin has personal and professional experience with both the software end of computers as well as the hardware end. Kevin is pursuing a Bachelor's degree in Computer Science from ODU to be attained in December 2004.

5.1.7 William Wade

Mr. William Wade is currently finishing up a bachelor's degree at Old Dominion University. He has worked at the largest computer repair facility in his city for nearly six years, and is in charge of all on-site repair contracts. His programming experience includes setting up a database that was used to enhance the productivity of several subsections of the Suffolk Public School system. He is also proficient in C, C++, Java, and HTML.

5.2 Bibliography of Related Work

ANSI – Data Format for the Interchange of Fingerprint... Information.”
Nist Special Publication. 1-2000. NIST US Department of Commerce.
ftp://sequoyah.nist.gov/pub/nist_internal_reports/sp500-245-a16.pdf

Fleet Credit Card Services. “Smart Card Terminology.”
http://cards.fleet.com/card_features/terminology.shtml

Leydon, John. “How to Get a Pin Number in 15 Guesses.” The Register.
12 Mar. 2004.
<http://www.theregister.co.uk/content/55/29425.html>

“National and State Trends in Fraud & Identity Theft.” 2003. Federal Trade Center.
<http://www.consumer.gov/sentinel/pubs/Top10Fraud2003.pdf>

Prabhakar, Salil, Anil Jain. “Fingerprint Identification.” Biometrics at
Michigan State University.
<http://biometrics.cse.msu.edu/fingerprint.html>

Smith, Adam. Congressman Washington’s Ninth District.
“Smith Introduces Identity Theft Bill.” October, 2002.
http://www.house.gov/apps/list/press/wa09_smith/021010pr.htm

Citigroup financial institution website
<http://www.citigroup.com/citigroup/press/2003/031103b.htm>

Credit card scanner information website
http://www.merchantwarehouse.com/products/VF_Tranz330.shtml

Credit card merchant account website
<http://www.charge.com/>

Sub-dermal fingerprint reading technology
<http://www.accesscontrol-uk.co.uk/access-control-uk-fingerprint.htm>

ID theft statistics
<http://www.consumer.gov/idtheft/stats.html>

Smart card and payment identification related website
<http://www.cardtechnology.com/>

Credit card fraud related statistics
<http://www.celent.com/PressReleases/20030121/CreditCardFraud.htm>

6. Facilities and Equipment

6.1 Facilities

Old Dominion University will provide an adequate facility for research and development of our system. A separate testing facility will not be required due to the small scope of initial testing; prototype terminals can be located right next to each other, and take up virtually no space. Final testing will be done at a facility which is deemed compliant of all NIST guidelines, and which allows observation from outside sources (such as members of magazines and other news agencies); however, this will not take place until well into Phase 2.

6.2 Equipment

The following list of equipment, organized by sector, will be required for research and development purposes:

- I. Project Manager
 - a. Laptop Computer: \$1,200.00
 - b. Desktop Computer: \$1,600.00
- II. Sales Supervisor
 - a. Laptop Computer: \$2,404.00
- III. Marketing Manager
 - a. Desktop Computer: \$1,600.00
 - b. Laptop Computers (2): \$3,200.00
- IV. Web Designer / IT Supervisor
 - a. Personal Workstation: \$799.00
- V. Software Manager
 - a. Workstation: \$1,890.00
 - b. Borland C++ Licenses: \$3,876.00
 - c. East Shore Fingerprint Algorithm: \$100.00 ¹
 - d. MySQL Licensing: \$0.00 ²
 - e. Java Licensing: \$0.00 ³
 - f. NIST Database Fingerprint Testing: \$90.00
- VI. Hardware Engineer
 - a. Desktop Computers (2): \$3,200.00
- VII. Legal Supervisor
 - a. Desktop Computer: \$1,100.00

¹ The East Shore Fingerprint Algorithm is being provided at a discounted rate, and has been confirmed by Steve Harris (Manager). ² MySQL Licensing Fees confirmed by Matt Fredrickson (Salesperson). ³ Java provided as a part of Linux.

7. Consultants and Subcontracts

Several experts in the fields of credit card and fingerprint technologies have agreed to lend their support in developing BioCharge's proposed system.

Among them is Steve Harris, the actual developer of the East Shore Fingerprint Algorithm, which will be used exclusively in all terminals. Mr. Harris brings with him over 25 years of experience with fingerprint technology, and has been extremely cooperative in all efforts related to the project.

Next is John Arodo, a sales representative from Magtek Credit Card Readers. Mr. Arodo will be answering any questions concerning the technology provided by currently existing credit card readers, as well as assisting with information related to modifying these terminals for fingerprinting purposes.

From Jefferson Lab, we have Michael Ferguson, a Microcontroller and Embedded Systems Specialist. His job picks up where Mr. Arodo's tasks end; Mr. Ferguson will be helping with the more technical details of creating the new fingerprint card reader itself.

Finally, Robbin Harland and Harold Box, Jr., from ACS and the Navy Exchange Service Command respectively, will be closely monitoring the progress being made within the project. They both have experience with the monetary side of our project, and will be not only helping by making suggestions, but also proposing amendments to budgets and estimates when applicable.

8. Potential Commercial Application and Follow-on Funding Commitment

Potential commercial use of the proposed implementation initially spans retailers offering proprietary credit lines to their patrons. Future implementations and tentative designs consist of offerings that expand such functionality to all major credit cards and issuing banks which render Visa, MasterCard, and other credit services.

Commercialization would be pursued with a strategic and strong marketing plan which is initially focused around retailers that suffer from high incidents of credit card fraud and also have a customer base which has little or no resistance towards biometric technologies. For further investigation into the proposed marketing plan please see Appendix article A.5.

Potential application by the Federal Government would revolve around situations where verification or authorizations were needed in conjunction with the use of a card. Moreover government may find such a technology extremely attractive for setups that require intensive verification needs to be performed without the presence of an external database (used to supply the data being verified.)

Such adhoc functionality with a streamlined interface make the credit card fingerprint scanner a versatile tool that could be modified to fit a wide range of verification authorization needs.

9. Budget

Funding is one of the most critical elements of any successful project. The initial source of funding for this project comes via the Department of Commerce. Phase 1 includes the preliminary lab prototype development, legal plan and business plan. Most of the funds received in phase 1 will be spent on the staffing for the different fields of expertise needed for the completion of all research and development.

Phase 2 is a longer-range plan that takes us through 2005. Phase 2 includes the development of the more production oriented, software and hardware development, legal contracts, management plan, marketing plan, personnel plan, testing and evaluation plans. The hardware and software (algorithm) will be put together for testing. The money allocated from this phase is \$300,000 will be supplemented with loans and investments funds to cover the phase cost of \$1,211,348.

Phase 3 is when the production will actually take place and operational profits will start taking place. The marketing department and sales department will play a major role in this phase and will have added monies allocated to them to deploy an aggressive marketing campaign.

Phase 4 is when the company is in operation out years. It will maintain training and installation of the product, and also create legal documents that to uphold the latest in biometric regulation. The charts below show the cost analysis for the total development, profit, and the amount of units that will need to be sold to break even.

Budget Table 9.1

Phase 1				
Staffing				
Staff Description	Hours needed	Annual Salary	Hourly	Total Cost
Project Manager	160	\$80,288	\$38.60	\$6,176
Legal & Documentation Manager	160	\$72,971	\$35.08	\$5,613
Marketing Manager	160	\$52,500	\$25.24	\$4,038
Quality Assurance Manager	160	\$64,021	\$30.78	\$4,925
Senior Hardware Engineer	160	\$51,773	\$24.89	\$3,983
Senior Software Engineer	160	\$59,253	\$28.49	\$4,558
Webmaster	160	\$54,681	\$26.29	\$4,206
Credit Card Service Consultant	10	\$66,560	\$32.00	\$320
Biometric Consultant	100	\$70,964	\$32.00	\$3,200
Technical Writing Consultant	10	\$35,703	\$32.00	\$320
		Staffing Subtotal		\$37,339
Software				
Software Name	Quantity	Price		Total Cost
Borland C++ Licenses	4	\$969		\$3,876
MySQL		\$0		\$0
Java (part of Linux)		\$0		\$0
East Shore Fingerprint Algorithm	1	\$100		\$100
NIST Testing Fingerprint Database	1	\$90		\$90
Antheus Inc. Fingerprint Algorithm	1	\$895		\$895
		Software Subtotal		\$4,961
Hardware				
Hardware Name	Quantity	Price		Total Cost
Desktop Computers	5	Varies		\$7,500
Laptop Computers	4	Varies		\$6,804
Workstations	2	Varies		\$2,689
Fingerprint Scanners	1	\$196		\$196
Smart Card Readers	1	\$200		\$200
Smart Cards	50	\$2		\$100
Smart Card Writers	1	\$140		\$140
			Hardware Subtotal	\$17,629
		Phase 1 Subtotal		\$59,929
		Staff Overhead 40%		\$14,936
		Phase 1 Grand Total		\$74,865

Budget Table 9.2

Phase 2				
Staffing				
Staff Description	Hours needed	Annual Salary	Hourly	Total Cost
Project Manager	3120	80,288	\$38.60	\$120,432
Legal & Documentation Manager	2480	72,971	\$35.08	\$87,004
Marketing Manager	2960	52,500	\$25.24	\$78,750
Marketing Representative	2080	29,500	\$14.18	\$44,250
Marketing Representative	2080	29,500	\$14.18	\$44,250
Quality Assurance Manager	2960	64,021	\$30.78	\$91,107
Quality Assurance Assistant	2080	45,553	\$21.90	\$45,553
Sales Supervisor	2960	60,780	\$29.22	\$86,495
Senior Hardware Engineer	1000	51,773	\$24.89	\$24,891
Senior Software Analyst	2960	64,021	\$30.78	\$91,107
Database Administrator	2080	45,553	\$21.90	\$45,553
Systems Administrator / Webmaster	2960	\$58,995	\$28.36	\$83,954
Credit Card Service Consultant	80	\$66,560	\$32.00	\$2,560
Biometric Consultant	100	\$70,964	\$34.12	\$3,412
Sales Consultant	20	\$68,480	\$32.92	\$658
Sales Consultant	20	\$68,480	\$32.92	\$658
Legal Consultant	120	\$80,815	\$38.85	\$4,662
		Staffing Subtotal		\$855,296
Software				
Software Name	Quantity	Price		Total Cost
East Shore Fingerprint Algorithm	1	\$2,635		\$2,635
Testing Database	1	\$95		\$95
MySQL - Production Price	4	\$495		\$1,980
Java - Multi-User	1	\$1,875		\$1,875
Antheus Inc. Fingerprint Algorithm	1	\$895		\$895
		Software Subtotal		\$7,480
Hardware				
Hardware Name	Quantity	Price		Total Cost
Servers	2	\$2,553		\$5,106
Fingerprint Scanners	2	\$196		\$392
Unit Casings	3	\$25		\$75
Smart Card Readers	2	\$200		\$400
Smart Cards	100	\$2		\$200
Smart Card Writers	2	\$140		\$280
			Hardware Subtotal	\$6,453
		Phase 2 Subtotal		\$869,229
		Staff Overhead 40%		\$342,119
		Phase 2 Grand Total		\$1,211,348

Budget Table 9.3

Phase 3				
Staffing				
Staff Description	Hours needed	Annual Salary	Hourly	Total Cost
Project Manager	1568	\$80,288	\$38.60	\$60,525
Marketing Manager	1568	\$52,500	\$25.24	\$39,577
Marketing Representative	1568	\$29,500	\$14.18	\$22,238
Marketing Representative	1568	\$29,500	\$14.18	\$22,238
Quality Assurance Manager	1568	\$64,638	\$31.08	\$48,727
Quality Assurance Assistant	1568	\$64,638	\$31.08	\$48,727
Sales Supervisor	1568	\$60,780	\$29.22	\$45,819
Senior Hardware Engineer	1000	\$51,773	\$24.89	\$24,891
Senior Software Engineer	1568	\$66,617	\$32.03	\$50,219
Systems Administrator / Webmaster	1568	\$58,995	\$28.36	\$44,473
Office Assistant	900	\$29,120	\$14.00	\$12,600
Hardware Technician	1000	\$35,936	\$17.28	\$17,277
Technical Writer	152	\$32,246	\$15.50	\$2,356
Sales Consultant	20	\$68,480	\$32.92	\$658
Sales Agency	30	\$68,480	\$32.92	\$988
Lawyer	1040	\$80,815	\$38.85	\$40,408
Customer Support				\$95,500
		Staffing Subtotal		\$577,222
Software				
Software Name	Quantity	Price		Total Cost
Borland C++ Update	1	\$2,635		\$2,635
		Software Subtotal		\$2,635
Hardware				
Hardware Name	Quantity	Price		Total Cost
Desktop Computers	5	Varies		\$7,500
Laptop Computers	4	Varies		\$6,804
Workstations	2	Varies		\$2,689
			Hardware Subtotal	\$16,993
	Phase 3 Subtotal			\$596,850
	Staff Overhead 40%			\$230,889
	Phase 3 Grand Total			\$827,738

Budget Table 9.4

Phase 4				
Staffing				
Staff Description	Time needed	Annual Salary	Hourly	Total Cost
Project Manager	40 hrs / wk	\$80,288		\$80,288
Marketing Manager	40 hrs / wk	\$52,500		\$52,500
Marketing Representative	40 hrs / wk	\$29,500		\$29,500
Marketing Representative	40 hrs / wk	\$29,500		\$29,500
Quality Assurance Manager	40 hrs / wk	\$64,638		\$64,638
Sales Supervisor	40 hrs / wk	\$60,780		\$60,780
Senior Hardware Engineer	40 hrs / wk	\$51,773		\$51,773
Senior Software Engineer	40 hrs / wk	\$66,617		\$66,617
Systems Administrator / Webmaster	40 hrs / wk	\$58,995		\$58,995
Office Assistant	40 hrs / wk	\$29,120		\$29,120
Hardware Technician	1040	\$35,936	\$17.28	\$17,968
Customer Support				\$95,500
Sales Consultant	20	\$68,480	\$32.92	\$658
Sales Agency	30	\$68,480	\$32.92	\$988
Lawyer	2080	\$80,815	\$38.85	\$80,815
		Staffing Subtotal		\$719,640
	Phase 4 Subtotal			\$719,640
	Staff Overhead 40%			\$287,856
	Phase 4 Grand Total			\$1,007,496
		Project Total		\$3,121,447
	Development Cost before Out Years			\$2,113,951

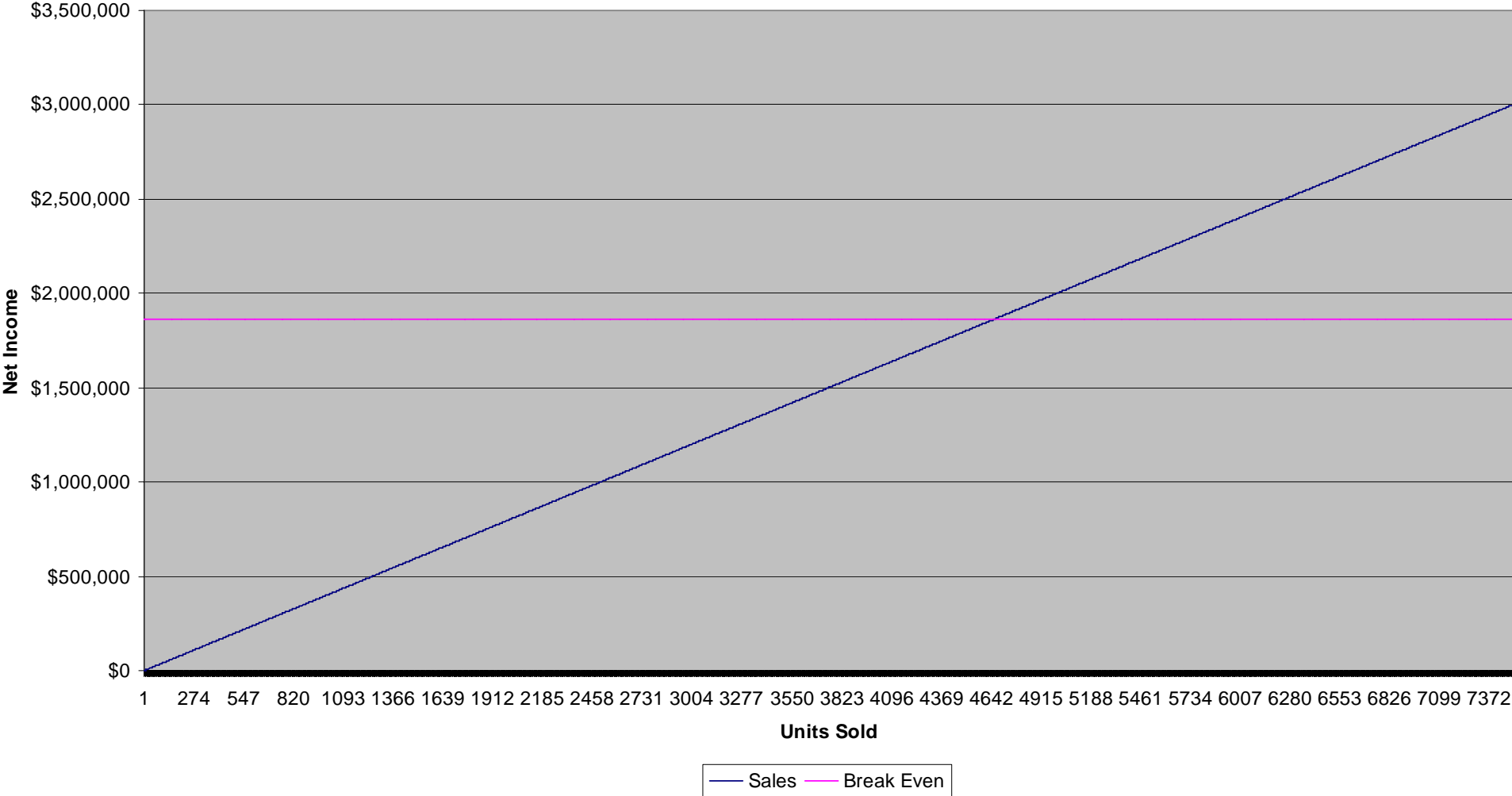
Budget Table 9.5

Funding		
Phase 0 Cost	\$0	
Phase 1 Cost	\$74,865	
Phase 2 Cost	\$1,211,348	
Phase 3 Cost	\$827,738	
SBIR Phase 1 Funding		\$74,865
SBIR Phase 2 Funding		\$300,000
Loan Phase 2		\$911,348
Loan Phase 3		\$827,738
Total Development Cost/Funding	\$2,113,951	\$2,113,951

Profit Analysis	
Investment Payback	\$1,739,086
Investment Payback Interest 7%	\$121,736
Investment Payback Total	\$1,860,822
Production cost per unit	\$800
Cost per unit training/installation	\$300
Sales price per unit	\$1,500
Profit per unit	\$400
Break even – Units Sold	4652
Break even – Total Sales	\$6,978,000

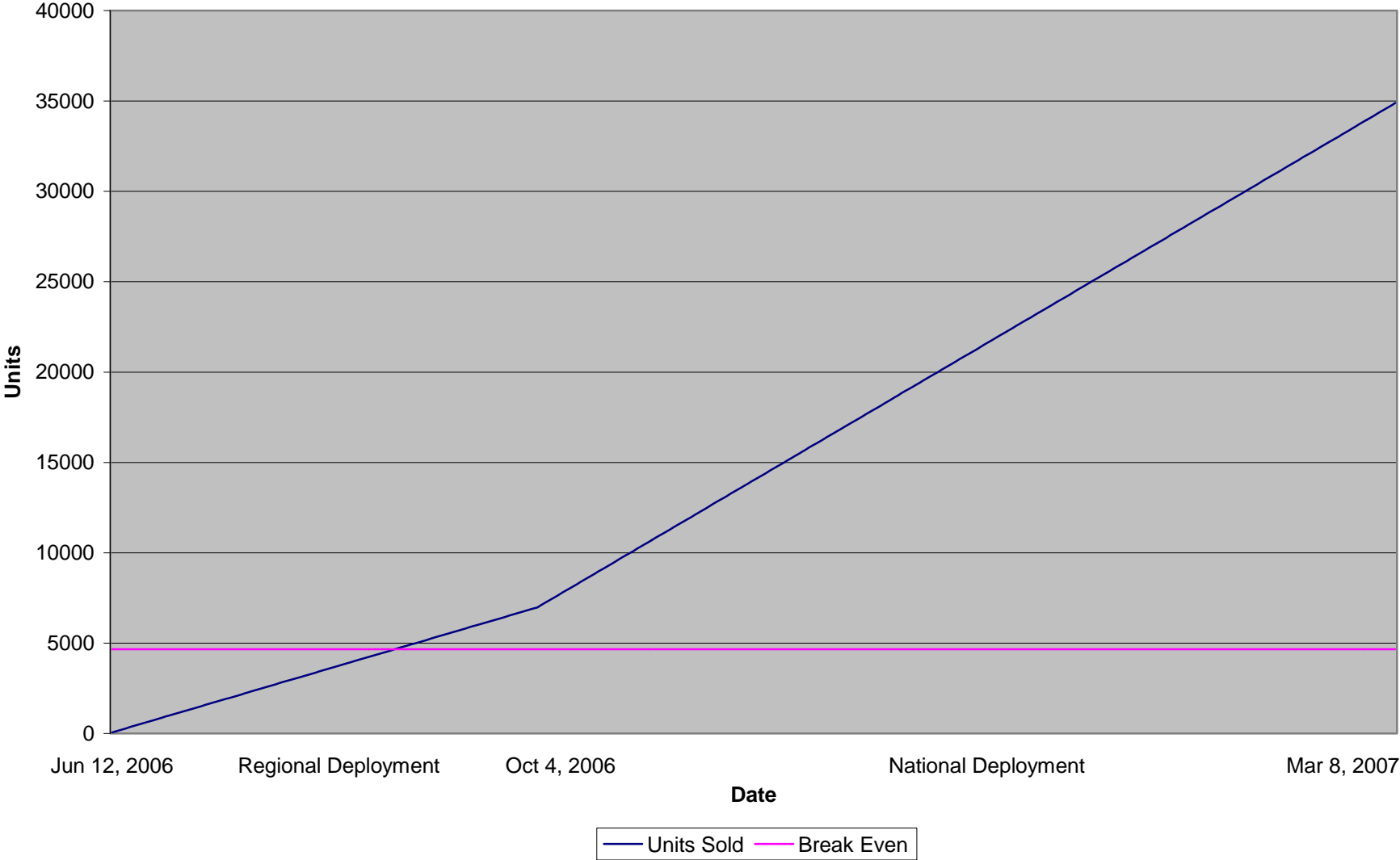
Budget Table 9.6

Break Even - Sales



Budget Table 9.7

Break Even - Timeline



A.1 Prototype

The description of the lab prototype which will be developed in phase 1 is described in section 3.4 as part of the work plan. The BioCharge developers will modify the lab prototype procedures to create an actual prototype. This prototype will then be thoroughly tested before going into production. There are two separate products to be developed. One will be used at the point of sale, and the other will be used to activate the card.

A.1.1 Activation of the Card

There are two devices a Card Writer/Fingerprint Scanner and software within the terminal. Refer to Figure A.2 which is the dataflow diagram for this activation process.

A.1.1.1 Customer Service Terminal

A database will store information from the customer; the field names are listed in Table A.1 A GUI Screen will be developed to allow the user to enter the information into the database. There will be warnings given to the user to obtain proper identification from the customer. Once this information is submitted, limited data will be passed to the Writer to be encrypted on the card. If this is a renewal of a card, the fingerprint template will be retrieved from the database and also sent to the Writer. Credit information and the fingerprint template will then be received from the Writer to be added to the database.

Table A.1 – Database Fields

Customer ID	City	Credit Card Field
Last Name	State	ID Verification
First Name	Zip code	ID 2 Verification
Address	Phone Number	Fingerprint Templates

A.1.1.2 Writer/Scanner

GUI screens will be developed to instruct the client to insert their credit card. It will continue to instruct them to properly place their finger on the fingerprint scanner. A message will be displayed when the fingerprint is properly scanned. Within seconds the Credit Card will contain the customer data and the fingerprint template, and the database will be updated with the same fingerprint template. Figure A.2 shows the flow of the data.

A.1.2 Point of Sale

The point of sale terminal will also contain two devices a Card Read/Fingerprint Scanner and software within the terminal. Refer to Diagram A.3 which is the dataflow diagram for the point of sale.

A.1.2.1 Reader/Scanner

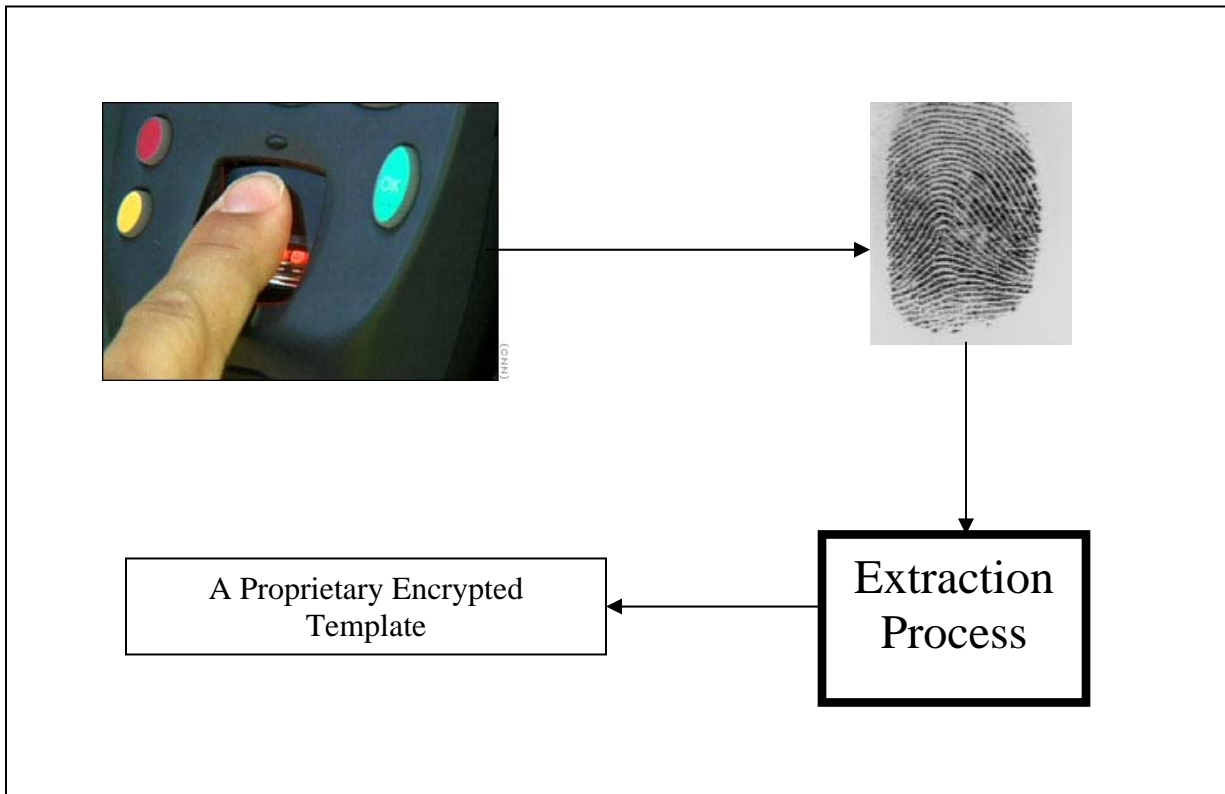
The GUI screens for the Reader will be similar those of the Writer instructing the client to insert their credit card. If a major credit card is inserted, or if the user is not using the fingerprint option, our system will initiate the credit card service program and stop processing. Otherwise the user will be instructed to place their finger on the scanner. Output from the reader will be the customer's actual fingerprint image, the fingerprint template(s) from the credit card, and the credit card information

A.1.2.2 Point of Sale Terminal

The fingerprint algorithm is made up of two processes: Extract, and Match. The fingerprint image will be inputted into the Extract process which will convert the image to a template using minutia points. The Match process will compare this template with the template from the smart card. If accepted the credit card service program will be initiated. The user will

be given a fixed number of tries to produce the acceptance code. If a rejection code is continually received, a message will be displayed on the cashier's terminal.

Figure A.1.1 – Fingerprint Extraction Process



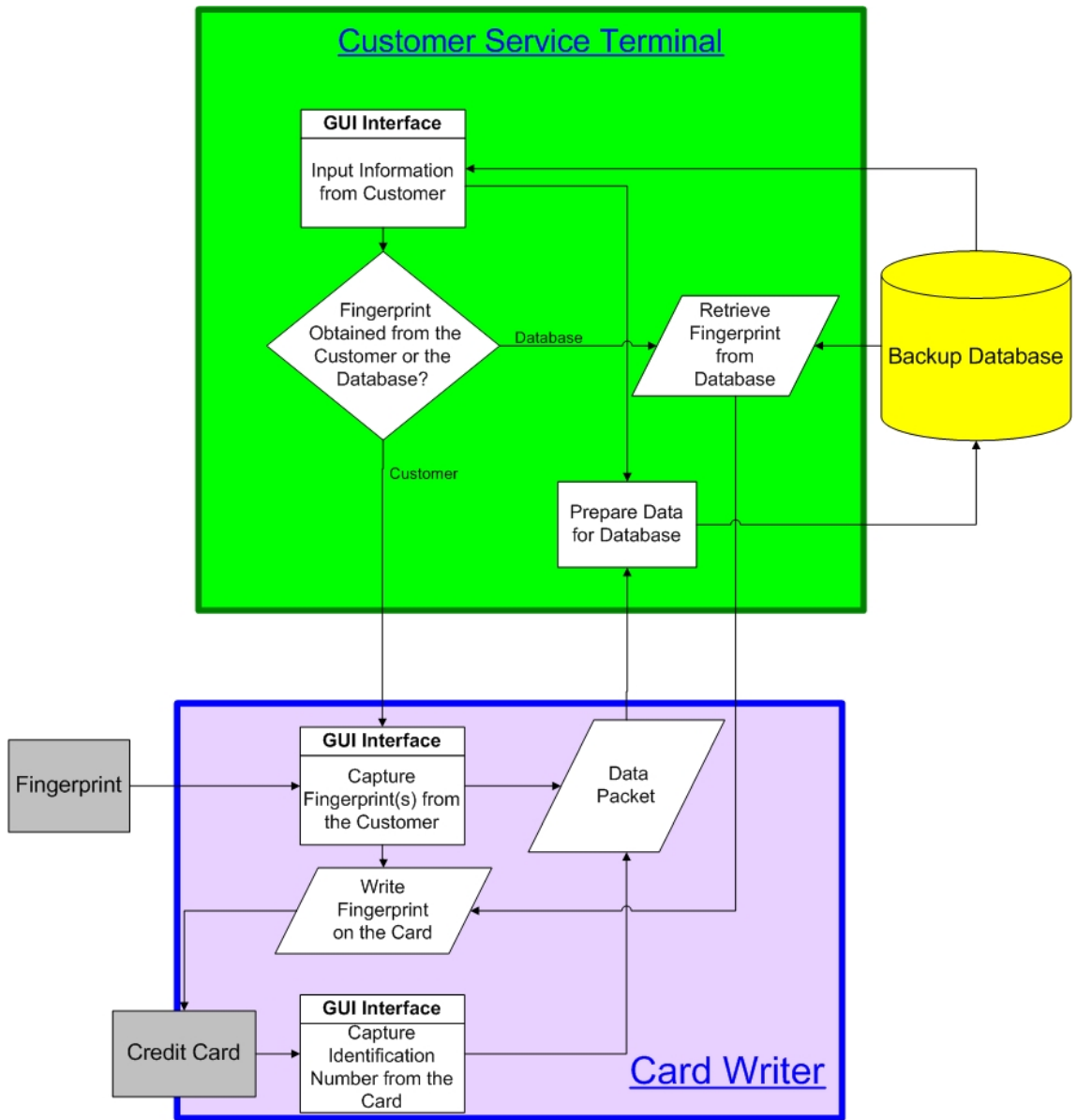


Figure A.1.2 - Dataflow Diagram for the Activation of the Credit Card

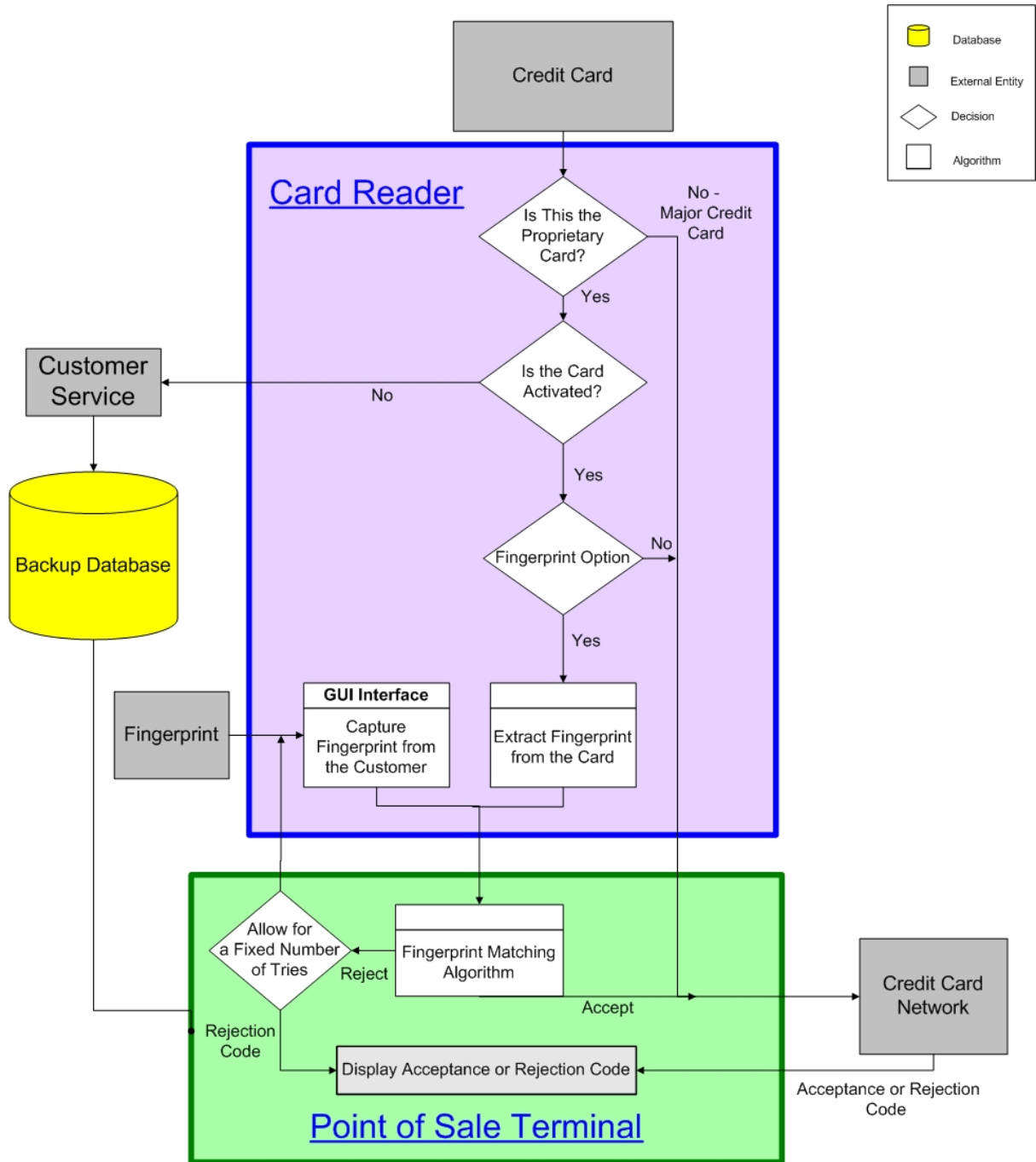


Figure A.1.3 - Dataflow Diagram at Point of Sale

A.2. BioCharge CCFP Project Work Breakdown Structure

A.2.1. Notes

1. In Phase 0 & Phase 1, we are college students so number of days includes weekends. All other phases reflect a 5 day work week.
2. Tasks are scheduled by origin date and completion date. There are many tasks listed on the WBS that will not require daily labor. Some examples are in section 0.2.
3. In Phase 2 and 3, when milestones are reached many deliverables are reverted to maintenance. These sections are listed on the Gantt chart to show that that employees are needed to maintain the deliverables, but they may not require daily tasks. See sections 2.10, and 3.5.
4. Included in this appendix is a description of each phase followed by the WBS Gantt Charts.

A.2.2. Phase 0 - Inception

Phase 0 Overview – The purpose of phase 0 was to perform the initial feasibility of a product that solves a societal problem. Three presentations were made to a group of experts in project management to evaluate the project. The overall goal was to receive funding from an SBIR department.

1. **Selection of a Project** – This was accomplished by researching several ideas presented by a large group of students at Old Dominion University. The Fingerprint Credit Card Scanner was carefully chosen.
2. **Initial Feasibility Presentation** – This presentation answered the questions: “Can it be done?” and “Should it be done?”
3. **Milestone Presentation** – Deliverables and milestones were discussed in this presentation.
4. **Approval Presentation** – This presentation was to the Board of Directors of BioCharge. The main purposes were to request the approval to continue with this project and to request the approval to submit an SBIR grant proposal for phase 1.
5. **SBIR Application** – BioCharge will file the Department of Commerce SBIR upon approval of the Board of Directors.
6. **Other Activities** – One of the main activities of this phase carried out by all staff members was research. Another deliverable was the development of the BioCharge Website.
7. **Post Mortem** – The phase will conclude with an evaluation of the phase and team members.

A.2.3. Phase 1 - Initiation

Phase 1 Overview - The purpose of phase 1 is to prove the technical feasibility of the Credit Card Fingerprint Scanner, and the quality of performance of BioCharge. Feasibility will be proven by (1) recording any research related to credit cards, biometrics, and other aspects of the product, (2) writing an acceptable project plan and any legal documents, (3) creating a high level prototype design, and (4) developing a lab prototype that will simulate both the point of sale transaction and the initial activation of the credit card. The research and development occurring within this phase will take place at Old Dominion University in Norfolk, Virginia.

1. Research - The seven employees of BioCharge will continue to research all aspects of this project.

2. Project Plan & Legal Documents - One of the first tasks in phase 1 will be to refine and expand on this project plan. The employees of BioCharge will be seeking advice of experts like Mr. Dennis Ray. At the same time the legal manager will consult with legal experts to create initial documents to protect the company and the customers.

3. High Level Development Specification - As the project, legal, and marketing managers finalize the project plan, the hardware, software managers will begin to develop the high level specification for the lab prototype and the actual prototype. When these specifications are almost complete, the quality assurance manager will begin to develop the testing plans.

4. Lab Prototype -

- a. Hardware** – The Credit Card Fingerprint Scanner will be prototyped during phase 1. The assistance of a hardware consultant will be required during this phase. The prototype will be constructed in a controlled environment for testing and validation of quality results

and expectations. The hardware components will be provided by private vendors as follows:

- Fingerprint Scanner - Access Control UK Fingerprint Scanner
- Smart Card Reader - Magtek Incorporated
- Smart Card Writer - Magtek Incorporated
- Smart Cards - Advanced Card System, LTD.

b. Software - Because the staff consists of software engineers, the lab prototype development will be shared by most of these members. A rigid software process will be followed to produce quality software with limited defects. This is important because the development of the actual prototype will just be expansion on this lab prototype. The BioCharge software process used in all software development is listed below:

- 6. High Level Design
- 7. Design Inspection
- 8. Low Level Design
- 9. Design Inspection
- 10. Code, Review
- 6. Compile
- 7. Code Inspection
- 8. Unit Tests
- 9. Integration
- 10. System Tests

The software portion of the lab prototype can be broken down into the six routines:

- 1. Capture Fingerprint Data
- 2. Write Fingerprint Data on the Smart Card
- 3. Capture Data from the Smart Card
- 4. Drive Fingerprint Algorithm –
- 5. Database Application
- 6. The Main Driver with Graphical User Interface Screens

c. **Testing Database** - NIST has a database of fingerprints available for testing fingerprint algorithms. The database contains two tables of fingerprints that can be used for comparison. A routine using this data will be developed for testing.

6. Post Mortem – To close out phase 1, the managers of BioCharge will evaluate phase 1, and then prepare for phase 2. One of the main activities will be searching for office space and equipment.

A.2.4. Phase 2 – Critical Design

Phase 2 Overview – In phase 2, BioCharge will separate from Old Dominion University and become a corporation. All milestones needed to begin production in phase 3 will be completed during this phase. This includes legal documents, marketing, sales, two websites, actual prototype, and training manuals. By the end of this phase, four stores will be actively beta testing the actual product.

1. **Move into Facility** – The first week will be dedicated to moving into the new facility.
2. **Review Board** - The seven managers will review and revise their portion of the project plan and/or product development specifications to prepare for a review board meeting. Following that meeting all managers will begin the development of the milestones related to their field.
3. **The Legal Manager** will join the group and work with the legislators, and legal consultant to finalize the legal documents. Much of his/her work will be making sure documents are developed correctly.

4. **The Marketing Manager** will formulate his marketing team; he will hire the two representatives and create their job descriptions. Once hired they will review the market, and begin advertising.
5. **The Sales Manager** will find the initial beta testing and network stores, and then prepare them for system startup. He will be assisted by a Sales Consultant.
6. **The Webmaster** will design and create the intranet website, along with the public website, and maintain the BioCharge's computers.
7. **The QA and Software Managers, Hardware Engineer** will revise the lab prototype to develop the actual prototype that will model the Credit Card Fingerprint Scanner. They will follow the same software process used in phase 1. Following severe alpha testing, the actual readers, writers, and software packages will be developed for the beta testing store. While those are being developed, the training manuals will be revised and packaged. Temporary assistants and consultants will be hired when needed.
8. **Site Operational Beta Testing** – The BioCharge product will be installed and tested in one store.
9. **Site Operation Network Testing (3 additional stores)** – When the one store is completely tested, BioCharge will install their product in three additional stores which are networked with the first store.
10. **Phase Maintenance** – Once a Milestone is complete, the employees working on those milestones will maintain their products throughout the duration of the phase.
11. **Post Mortem** – As with all phases, the managers of BioCharge will evaluate this phase, and then prepare for the next.

A.2.5. Phase 3 - Execution

Phase 3 Overview – In Phase 3, BioCharge will take the Credit Card Fingerprint Scanner into production to all stores of our initial target.

1. **Advertising** will continue to gain prospective business for the out years.
2. **Semi-standard Package** - The software portion of the Credit Card Fingerprint Scanner will become a semi-standard package to be used for the deployment. The development of this package started in previous phases. Manuals will also be packaged for use.
3. **Regional Deployment** will begin immediately after the stores are confirmed.
4. **National Deployment** will begin after the regional deployment is established.
5. **Phase Maintenance** – All milestones achieved in phase 2 will continue to be maintained in phase 3.
6. **Post Mortem** – Before going to the out years, the regional and national deployment will be reviewed.

A.2.6. Phase 4 - Out Years

Phase 4 Overview – BioCharge will start unlimited deploy in phase 4. Because it will continue for an undetermined amount of time, phase 4 does not have an ending date. Advertising, customer service, and product monitoring will continue. BioCharge will research ways to improve their product, and new releases of the product will be installed when they become available.

ID	Duration	Task Name	2004				2005				2006				2007				2008	
			Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1
1	1534 days	Credit Card Fingerprint Scanner																		
2	113 days	Phase 0 Inception																		
4	114 days	Phase I Initiation																		
6	516 days	Phase II - Critical Design																		
8	274 days	Phase III - Execution																		
10	379 days	Phase IV - Out Years																		

Project: CCFP
Date: Tue 5/4/04

Task



Milestone



External Tasks



Split



Summary



External Milestone



Progress

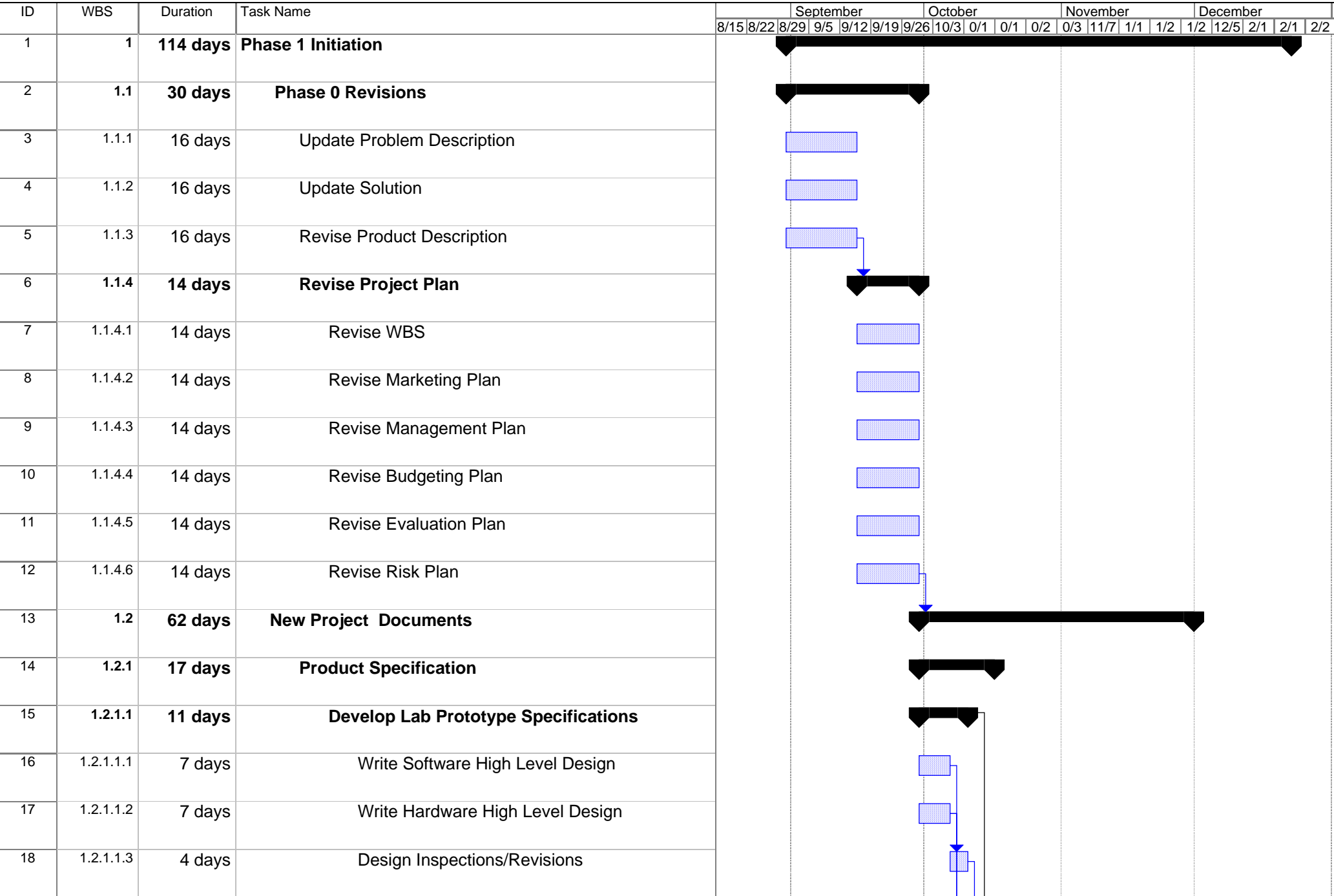


Project Summary



Deadline



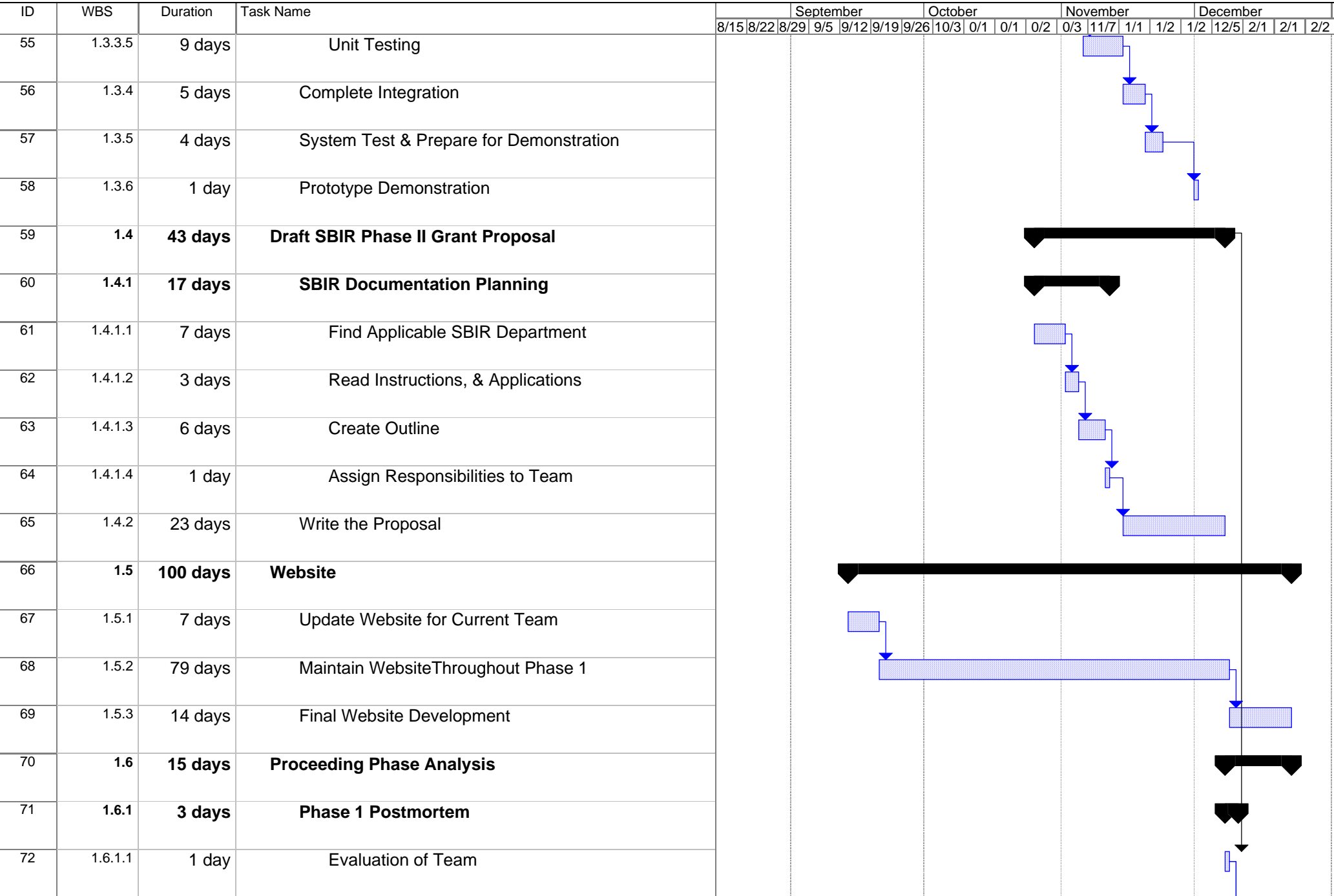


Project: CCFP
Date: Tue 5/4/04

Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

ID	WBS	Duration	Task Name	September					October				November			December						
				8/15	8/22	8/29	9/5	9/12	9/19	9/26	10/3	10/1	10/2	0/3	11/7	1/1	1/2	1/2	12/5	2/1	2/1	2/2
19	1.2.1.2	10 days	Develop Product Specifications																			
20	1.2.1.2.1	7 days	Write Software High Level Design																			
21	1.2.1.2.2	7 days	Write Hardware High Level Design																			
22	1.2.1.2.3	3 days	Design Inspections/Revisions																			
23	1.2.2	9 days	Write Test Plans																			
24	1.2.2.1	3 days	Write Test Plans for Prototype																			
25	1.2.2.2	3 days	Write Initial Test Plans for Product																			
26	1.2.3	21 days	Write Initial User Manuals																			
27	1.2.4	21 days	Write Initial Training Documents																			
28	1.2.5	28 days	Research & Start Legal Contracts																			
29	1.2.5.1	14 days	Interview Experts																			
30	1.2.5.2	10 days	Find patent firm																			
31	1.2.5.3	10 days	Research OEM contracts																			
32	1.2.5.4	10 days	Research Customer Contracts																			
33	1.2.5.5	14 days	Create legal customer agreements																			
34	1.3	59 days	Prototype Development																			
35	1.3.1	18 days	Acquire Equipment																			
36	1.3.1.1	10 days	Acquire Fingerprint Scanner																			

Project: CCFP Date: Tue 5/4/04	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	



Project: CCFP
Date: Tue 5/4/04

Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

ID	WBS	Duration	Task Name	2005				2006				
				Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	
1	2	370 days	Phase II - Critical Design									
2	2.1	6 days	Move into Development Facility									
3	2.1.1	3 days	Final Acquisition of Facility, Furniture, & Equipment									
4	2.1.2	3 days	Setup Facility									
5	2.2	18 days	Phase 1 Revisions									
6	2.2.1	15 days	Review Project Plan									
7	2.2.1.1	9 days	Revise WBS									
8	2.2.1.2	9 days	Revise Marketing Plan									
9	2.2.1.3	6 days	Revise Management Plan									
10	2.2.1.4	5 days	Review Product Description									
11	2.2.1.5	9 days	Revise Budgeting Plan									
12	2.2.1.6	5 days	Revise Evaluation Plan									
13	2.2.1.7	5 days	Revise Risk Plan									
14	2.2.2	15 days	Review Development Specifications									
15	2.2.2.1	10 days	Revise Software Design									
16	2.2.2.2	10 days	Revise Hardware Design									
17	2.2.2.3	4 days	Revise Test Plans									

Project: CCFP_Real_World
Date: Tue 5/4/04

Task		Rolled Up Task		External Tasks	
Progress		Rolled Up Milestone		Project Summary	
Milestone		Rolled Up Progress		Group By Summary	
Summary		Split		Deadline	

ID	WBS	Duration	Task Name	2005				2006				
				Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	
18	2.2.2.4	10 days	Revise User Manuals									
19	2.2.3	3 days	Review Board Meeting									
20	2.3	36 days	Legal Contracts									
21	2.3.1	14 days	Meet with lobbyist to secure interaction with legislators.									
22	2.3.2	25 days	Finalize patent documentation and receive sign off from patent firm.									
23	2.3.3	25 days	Finalize contracts with respect to the protection of BioCharge as an OEM.									
24	2.3.4	25 days	Finalize contracts with respect to the protection of BioCharge customers.									
25	2.3.5	25 days	Finalize legal customer agreements.									
26	2.4	160 days	Marketing									
27	2.4.1	24 days	Formulate Marketing Team									
28	2.4.2	136 days	Review Target Market									
29	2.4.2.1	10 days	Collect & Examine Portfolios of Retailers									
30	2.4.2.2	6 days	Prioritize Market Customers from High to Low									
31	2.4.2.3	60 days	Solicit Product to Retailers									
32	2.4.2.4	60 days	Identify Prime Retailer & Negotiate Contract									
33	2.4.3	85 days	Research Advertising Schemes									
34	2.4.3.1	30 days	Investigate Different Mediums									

Project: CCFP_Real_World
Date: Tue 5/4/04

Task		Rolled Up Task	
Progress		Rolled Up Milestone	
Milestone		Rolled Up Progress	
Summary		Split	

External Tasks	
Project Summary	
Group By Summary	
Deadline	

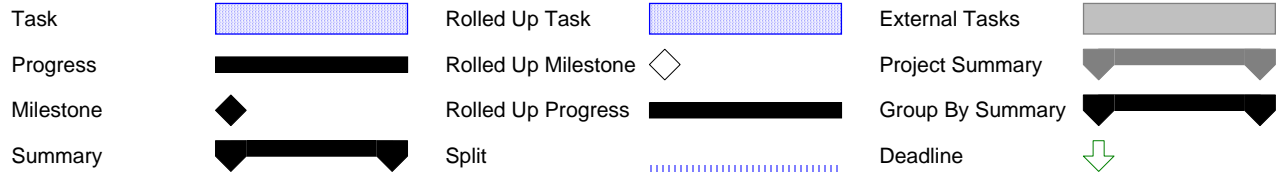
ID	WBS	Duration	Task Name	2005				2006				
				Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	
35	2.4.3.1.1	30 days	Research Television									
36	2.4.3.1.2	30 days	Research Radio									
37	2.4.3.1.3	30 days	Research Newspaper									
38	2.4.3.2	10 days	Deliberate on Allocation of Funds for each Medium									
39	2.4.3.3	45 days	Attain Services of Advertising Medium Providers									
40	2.5	193 days	Sales									
41	2.5.1	21 days	Analyze Initial Customer									
42	2.5.1.1	7 days	Identify Key Customer Elements									
43	2.5.1.2	7 days	Identify Competition's Key Customer Attributes									
44	2.5.1.3	7 days	Assess Position In Market Relative to Competition									
45	2.5.2	158 days	Confirm Single Beta Store									
46	2.5.2.1	122 days	Collect & Examine Demographics for Beta Testing									
47	2.5.2.2	10 days	Deliberate & Choose Best Beta Store Location									
48	2.5.2.3	3 days	Adjust Budget to Suit Target Beta Testing									
49	2.5.3	14 days	Analyze & Find Network Stores									
50	2.5.3.1	7 days	Research Current Target Network									
51	2.5.3.2	3 days	Adjust Budget to Suit Target Network Beta Testing									

Project: CCFP_Real_World
Date: Tue 5/4/04

Task		Rolled Up Task		External Tasks	
Progress		Rolled Up Milestone		Project Summary	
Milestone		Rolled Up Progress		Group By Summary	
Summary		Split		Deadline	

ID	WBS	Duration	Task Name	2005				2006						
				Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3			
52	2.5.3.3	4 days	Obtain Approval for Testing Network											
53	2.6	28 days	Web Development											
54	2.6.1	14 days	Intranet Web Page											
55	2.6.1.1	4 days	Design Initial Webpage											
56	2.6.1.2	10 days	Initial Webpage Development											
57	2.6.2	14 days	Public Web Page											
58	2.6.2.1	4 days	Design Initial Webpage											
59	2.6.2.2	10 days	Initial Webpage Development											
60	2.7	92 days	Development of the Actual Prototype											
61	2.7.1	24 days	Hardware Tasks											
62	2.7.1.1	5 days	Create Housing Design											
63	2.7.1.2	4 days	Review Hardware Specifications											
64	2.7.1.3	15 days	Subcontract											
65	2.7.2	82 days	Software Tasks											
66	2.7.2.1	5 days	Confirm Working Agreement with Credit Card Service Provider											
67	2.7.2.2	18 days	Test Algorithms											
68	2.7.2.2.1	14 days	Purchase Top 3 Algorithms for Development Use											

Project: CCFP_Real_World
Date: Tue 5/4/04

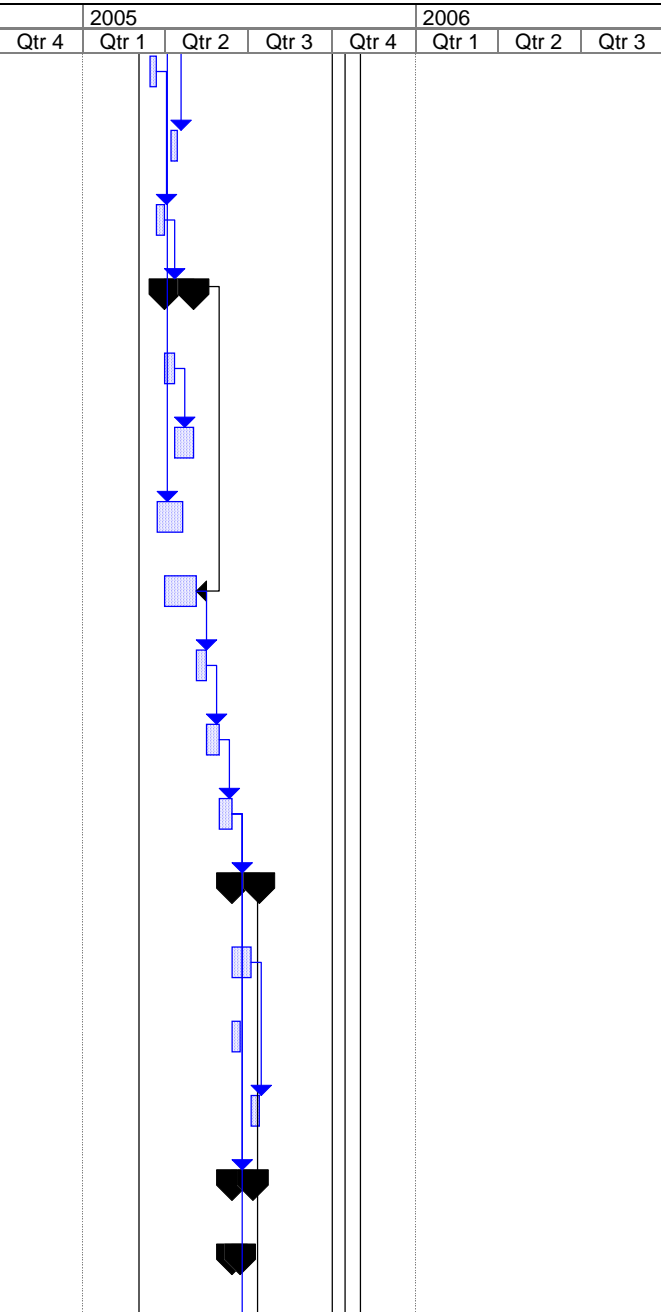


ID	WBS	Duration	Task Name	2005				2006					
				Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3		
69	2.7.2.2.2	5 days	Design Testing Harness										
70	2.7.2.2.3	7 days	Code Testing Harness										
71	2.7.2.2.5	5 days	Run Tests of Algorithms										
72	2.7.2.2.6	1 day	Choose Best Algorithm for Product										
73	2.7.2.3	10 days	Detailed Design										
74	2.7.2.3.1	6 days	Revise Detailed Design										
75	2.7.2.3.2	4 days	Detailed Design Inspection/Revisions										
76	2.7.2.4	37 days	Code, Review, & Compile										
77	2.7.2.4.1	7 days	Reader										
78	2.7.2.4.1.1	6 days	Revise Graphical User Interface										
79	2.7.2.4.1.2	7 days	Revise Capture Fingerprint Data										
80	2.7.2.4.1.3	7 days	Revise Capture Credit Card Data										
81	2.7.2.4.2	10 days	Terminal										
82	2.7.2.4.2.1	7 days	Drive Fingerprint Algorithm										
83	2.7.2.4.2.3	5 days	Revise Graphical User Interface										
84	2.7.2.4.2.4	10 days	Drive CC Service Software										
85	2.7.2.4.3	22 days	Writer										

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Task		Rolled Up Task		External Tasks	
Progress		Rolled Up Milestone		Project Summary	
Milestone		Rolled Up Progress		Group By Summary	
Summary		Split		Deadline	

ID	WBS	Duration	Task Name	2005				2006						
				Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3			
86	2.7.2.4.3.1	5 days	Review Reader GUI											
87	2.7.2.4.3.2	5 days	Write on smart card											
88	2.7.2.4.3.3	7 days	GUI screen for manager											
89	2.7.2.4.4	22 days	Server/Database											
90	2.7.2.4.4.1	7 days	Revise Database											
91	2.7.2.4.4.2	15 days	Revise Backup database application											
92	2.7.2.4.5	20 days	Code Inspections/Revisions											
93	2.7.2.4.6	25 days	Unit Tests											
94	2.7.2.5	7 days	Software Integration											
95	2.7.2.6	10 days	System Test											
96	2.7.3	10 days	Software & Hardware Integration											
97	2.8	22 days	Develop Prototypes for Operational Site Testing											
98	2.8.1	15 days	Subcontract Readers & Writers											
99	2.8.2	7 days	Create Testing Harness for Site Testing											
100	2.8.3	7 days	Test Prototypes											
101	2.9	17 days	Revise Training Packages											
102	2.9.1	7 days	Revise Training Manuals											















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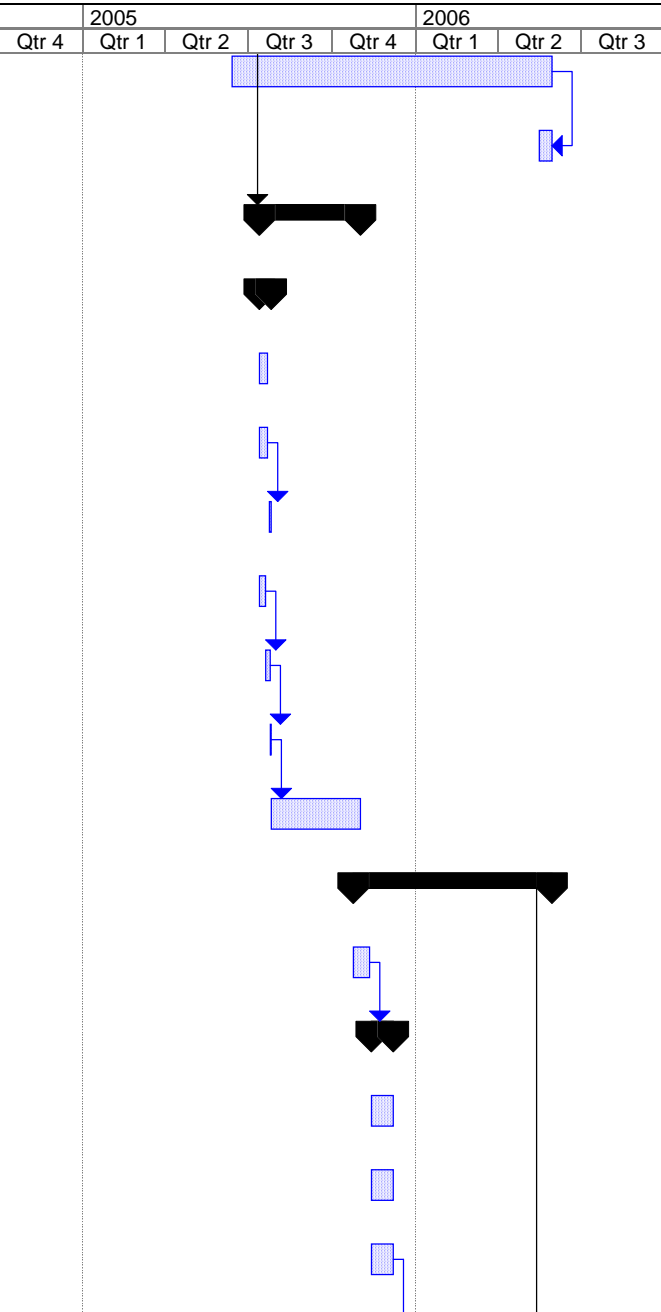
Task		Rolled Up Task		External Tasks	
Progress		Rolled Up Milestone		Project Summary	
Milestone		Rolled Up Progress		Group By Summary	
Summary		Split		Deadline	

ID	WBS	Duration	Task Name	2005				2006				
				Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	
103	2.9.1.1	7 days	Manuals for Installers									
104	2.9.1.2	7 days	Manuals for Vendors									
105	2.9.2	10 days	Create Training Presentations									
106	2.10	315 days	Phase II Maintenance									
107	2.10.1	160 days	Marketing									
108	2.10.1.1	160 days	Maintain Ongoing Services of Advertising Medium Providers									
109	2.10.2	150 days	Sales									
110	2.10.2.1	150 days	Maintain Customer Agreements									
111	2.10.3	293 days	Web Pages									
112	2.10.3.1	293 days	Ongoing Maintenance									
113	2.10.4	251 days	Product Maintenance									
114	2.10.4.1	251 days	Hardware									
115	2.10.4.1.1	251 days	Maintain Current Hardware									
116	2.10.4.1.2	251 days	Research New Innovations									
117	2.10.4.1.3	251 days	Update Products as Needed									
118	2.10.4.2	251 days	Software									
119	2.10.4.2.1	251 days	Monitor Defects									

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Task		Rolled Up Task		External Tasks	
Progress		Rolled Up Milestone		Project Summary	
Milestone		Rolled Up Progress		Group By Summary	
Summary		Split		Deadline	

ID	WBS	Duration	Task Name	2005				2006					
				Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3		
120	2.10.4.2.2	251 days	Research New Innovations										
121	2.10.4.2.3	10 days	Initialize Creation of Semi-Standard Software Package										
122	2.11	79 days	Site Operation Testing (1 Live Store)										
123	2.11.1	9 days	Install All Hardware										
124	2.11.1.1	7 days	Remove Current Readers										
125	2.11.1.2	7 days	Install Card Reader Box At All Registers										
126	2.11.1.3	2 days	Install Card Writers In Customer Service Area										
127	2.11.2	5 days	Install All Software										
128	2.11.3	3 days	Test System For Proper Operation										
129	2.11.4	1 day	Employee Training										
130	2.11.5	70 days	Go Live & Monitor Systems										
131	2.12	156 days	Site Operation Network Testing (3 Additional Stores)										
132	2.12.1	14 days	Confirm Target Network of Stores										
133	2.12.2	18 days	Install All Hardware										
134	2.12.2.1	18 days	Remove Current Readers										
135	2.12.2.2	18 days	Install Card Reader Box At All Registers										
136	2.12.2.3	18 days	Install Card Writers In Customer Service Area										



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Task		Rolled Up Task		External Tasks	
Progress		Rolled Up Milestone		Project Summary	
Milestone		Rolled Up Progress		Group By Summary	
Summary		Split		Deadline	

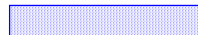
ID	WBS	Duration	Task Name	2005					2006			
				Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	
137	2.12.3	18 days	Install All Software									
138	2.12.4	4 days	Employee Training									
139	2.12.5	102 days	Go Live & Monitor Systems									
140	2.13	3 days	Phase II Postmortem									
141	2.13.5	3 days	Evaluate Phase II									
142	2.13.6	2 days	Evaluate Team									

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Task



Rolled Up Task



External Tasks



Progress



Rolled Up Milestone



Project Summary



Milestone



Rolled Up Progress



Group By Summary



Summary



Split



Deadline



ID	WBS	Duration	Task Name	3rd Quarter					4th Quarter			1st Quarter			2nd Q	
				May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
1	3	196 days	Phase III - Execution													
2	3.1	45 days	Advertise													
3	3.1.1	30 days	Attempt to Gain Prospective Business													
4	3.1.1.1	15 days	Review Best Methods of Advertisement													
5	3.1.1.2	15 days	Analyze Current Competition Advertising Methods													
6	3.1.2	15 days	Begin Advertising Campaign													
7	3.1.2.1	15 days	Monitor Advertising Effect on Sales													
8	3.1.2.2	15 days	Monitor Competition Advertising Adjustments													
9	3.7	19 days	Package User Documents													
10	3.7.1	17 days	Edit Documents													
11	3.7.2	14 days	Produce Documents for Deployment													
12	3.2	18 days	Finalize Semi-Standard Software Package													
13	3.2.1	5 days	Finalize Code													
14	3.2.2	5 days	Test & Revise													
15	3.2.3	5 days	Produce CDs													
16	3.2.4	3 days	Test CDs													
17	3.3	83 days	Regional Deployment Phase													

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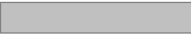









Task		Rolled Up Task		External Tasks	
Progress		Rolled Up Milestone		Project Summary	
Milestone		Rolled Up Progress		Group By Summary	
Summary		Split		Deadline	

ID	WBS	Duration	Task Name	3rd Quarter					4th Quarter			1st Quarter			2nd Q	
				May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
18	3.3.1	14 days	Confirm Regional Network of Stores													
19	3.3.2	10 days	Train Local Crews for Installation													
20	3.3.3	30 days	Install All Hardware													
21	3.3.4	30 days	Install All Software													
22	3.3.5	5 days	Employee Training													
23	3.3.6	30 days	Monitor Systems													
24	3.3.7	30 days	Fix Defects Found in Regional Deployment													
25	3.4	134 days	National Deployment Phase													
26	3.4.1	14 days	Confirm National Network of Stores													
27	3.4.2	40 days	Install All Hardware													
28	3.4.3	40 days	Install All Software													
29	3.4.4	10 days	Employee Training													
30	3.4.5	30 days	Go Live & Monitor Systems													
31	3.5	194 days	Phase III Maintenance													
32	3.5.1	194 days	Marketing													
33	3.5.1.1	194 days	Maintain Ongoing Advertising													
34	3.5.1.2	194 days	Monitor Advertising Effect on Sales													

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Task		Rolled Up Task		External Tasks	
Progress		Rolled Up Milestone		Project Summary	
Milestone		Rolled Up Progress		Group By Summary	
Summary		Split		Deadline	

ID	WBS	Duration	Task Name	3rd Quarter			4th Quarter			1st Quarter			2nd Q		
				May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
35	3.5.1.3	194 days	Revise Advertising Campaign As Needed												
36	3.5.2	194 days	Sales												
37	3.5.2.1	194 days	Maintain Relationship with Customers												
38	3.5.3	194 days	Quality Assurance												
39	3.5.3.1	194 days	Monitor Live Product												
40	3.5.3.2	194 days	Test Any Updates												
41	3.5.4	194 days	Web Maintenance												
42	3.5.4.1	194 days	Intranet Website Maintenance												
43	3.5.4.2	194 days	Maintain Network & Assist Developers												
44	3.5.5	176 days	Product Maintenance												
45	3.5.5.1	176 days	Hardware												
46	3.5.5.1.1	176 days	Maintain Current Hardware												
47	3.5.5.1.2	176 days	Research New Innovations												
48	3.5.5.1.3	176 days	Update Products as Needed												
49	3.5.5.2	176 days	Software												
50	3.5.5.2.1	176 days	Monitor Defects												
51	3.5.5.2.2	176 days	Research New Innovations												

Project: CCFP_Real_World Date: Tue 5/4/04	Task		Rolled Up Task		External Tasks	
	Progress		Rolled Up Milestone		Project Summary	
	Milestone		Rolled Up Progress		Group By Summary	
	Summary		Split		Deadline	

ID	WBS	Duration	Task Name	2nd Quarter		3rd Quarter			4th Quarter			1st Quarter			2nd Q
				May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
52	3.5.5.2.3	176 days	Update Products as Needed												
53	3.6	2 days	Phase III Postmortem												
54	3.6.1	2 days	Evaluate Phase III												
55	3.6.2	2 days	Evaluate Team												

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Task



Rolled Up Task



External Tasks



Progress



Rolled Up Milestone



Project Summary



Milestone



Rolled Up Progress



Group By Summary



Summary





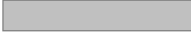






Split







Deadline



ID	WBS	Duration	Task Name	2007				2008		
				Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2
1	4	271 days	Phase IV - Out Years							
2	4.1	271 days	Unlimited Deployment							
3	4.1.4	271 days	Monitor Deployment							
4	4.2	271 days	Marketing							
5	4.2.1	271 days	Maintain Ongoing Services of Advertising Medium Providers							
6	4.2.2	271 days	Monitor Advertising Effect on Sales							
7	4.2.3	271 days	Revise Advertising Campaign As Needed							
8	4.3	271 days	Sales							
9	4.3.1	271 days	Maintain Relationship with Customers							
10	4.4	271 days	Quality Assurance							
11	4.4.1	271 days	Monitor Defects in New Releases & Customer Use							
12	4.5	271 days	Web Maintenance							
13	4.5.1	271 days	Intranet Website Maintenance							
14	4.5.2	271 days	Public Website Maintenance							
15	4.6	271 days	Product Maintenance							
16	4.6.1	271 days	Hardware							
17	4.6.1.1	271 days	Maintain Current Hardware							
18	4.6.1.2	271 days	Research New Innovations							

Project: CCFP_Real_World Date: Tue 5/4/04	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	


ID	WBS	Duration	Task Name	2007				2008	
				Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1
19	4.6.1.3	271 days	Update Products as Needed						
20	4.6.2	271 days	Software						
21	4.6.2.2	271 days	Research New Innovations						
22	4.6.2.3	271 days	Update Products as Needed						

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Task 

Split 

Progress 


Milestone 

Summary 

Project Summary 

External Tasks 

External Milestone 

Deadline 

A.3 Management Plan

The BioCharge management plan revolves around three major components that include components relating to company financials, customer relations and market strategy. Firstly, periodic review of company financials to ensure that expenses do not overrun available funds is high on the management priority list. To further ensure that operations never see a lapse in funding, management will also employ common investment strategies of company capital. Management will also carry the responsibility of tracking all major assets to ensure that full potential is exercised and exploited during the life of all company assets.

Customer relations are another key component of the BioCharge management plan. For this reason the Sales Department has been setup to satisfy all customer and constituent relations. The services rendered by this company division have been setup to ensure customer satisfaction so that all potential sales are finalized and so that all customers who have finalized sales are kept content.

Following close with good customer relations will be a fortifying marketing team which will keep management up to speed on the latest trends and statistics. Focuses of management in this discipline are to ensure that advertising campaign is verified successful and that marketing methods yield the prospect of new business.

A.4 Marketing Plan

A market for our product has emerged due to the growing trend in the usage of electronic forms of currency coupled with the resurgence of credit card fraud. By the year 2006, nearly 50 percent of all transactions will be conducted electronically. By the year 2010, over 60 percent of all transactions will be handled electronically. Credit card transactions comprise approximately 40 percent of all electronic transactions. Credit card fraud is the number one form of identification theft accounting for 33 percent of all reported identification theft complaints. Credit card fraud costs the industry and consumers over 17 billion dollars per year in the United States alone. Of the billions of credit cards in use today, this market is more than capable of justifying and sustaining the costs of our project.

Initially our marketing strategy will be structured around retailers that offer a proprietary credit card. In particular we have chosen Sears Roebuck and Co. Sears is chosen because Sears has the infrastructure needed to launch a project such as this one. They have a proprietary credit card that is stable and currently in wide distribution across America and Canada. Also, the Sears charge credit card has acquired by Citigroup (the parent company of the Citibank Corporation), which is one of the largest issuers of Master Cards and Visa Cards in the United States. This relationship will help launch our third party credit card campaign once the proprietary credit card market is proven successful. Another reason for choosing Sears is for its predominantly female customer base. Females make up only 14 percent of the segment of society that resist biometric identity verification. In addition, Sears is a very successful franchise with the revenue and resources to support this project. With their 25 million active credit card accounts, 872 stores, 41 billion dollar annual revenue and 15.7 billion dollar annual profit Sears is the ideal choice for implementation of this project. Finally the average Sears store loses approximately 30,000

dollars in credit card fraud per year. This gives Sears a vested interest in exploring new ways to combat credit card fraud.

A dedicated marketing agent will be hired to solicit our product to Sears as well as other well known retailers with similar market presence such as Target, Wal-Mart, JC Penny, Lowe's, etc. This marketing agent will be responsible for analyzing potential customers and understanding the strength of each retailer in their respective market to provide the most lucrative customers from best to worst for our project. The job of the marketing agent will be to convince our customers of the significance of the problem within their establishment and to show how our project will save our customers hundreds of millions of dollars over the long run. In addition, the marketing agent must prove the added benefit of protecting not only themselves but their customers as well.

Proving return on investment is crucial in selling this project to the retailers. The cost per register is approximately 1,500 dollars. With credit card fraud in the tens of thousands of dollars per year per store, a company like Sears can realize a return on their investment well within five years. The long-term benefits are event greater, with savings potentially climbing into the hundreds of thousands of dollars per year per store over the next couple of decades.

The implementation of our marketing strategy into Sears will begin with a beta store. This test bed will be used to verify the reliability of the system in a very small-scale environment. The new card will be optional and backwards compatible. The public acceptance of this project will be further studied to gauge the true percentage of Sears customers who will be willing to add this feature to their Sears charge cards. Once the beta store is deemed a success the project will move on to a small area network of a few stores within the same demographic area. More studies and data will be gathered to position the project for the full regional

implementation across a wide area network spanning the North East. Lastly the project will be spread across the United States and into Canada for the full-scale implementation of all the Sears stores.

After the success of the regional implementation is proven successful then the push toward acquiring new business from other franchises will begin. There will be a small be fully staffed marketing team established to solicit our project to the large market of other retailers across the nation. As revenues are created the focus will then shift to the issuers of Master Card and Visa Card. This strategy will initiate with the current contacts through Sears. Sears will be used because of their close ties with the Citibank Corporation. Running concurrently with this endeavor there will be research efforts in place to provide secure online purchases using our fingerprint technology.

Initially, there will be no funding outside of the SBIR grant proposal. To remedy this dilemma the marketing manager will lobby to banks for small business loans to cover the initial start up costs needed to sustain the project until the commercial customers buy into the project. The marketing manager must come up with the business strategy that shows a reasonable return on investment for BioCharge. This will not be difficult to show considering the fact that just success with Sears alone could single handedly support BioCharge and all of its operations. To make a return on investment, BioCharge needs to implement the fingerprint scanning modification onto 34,800 registers. Considering just the mall based Sears stores alone there are nearly 35,000 registers in use. This single retailer success potential will be used by the marketing manager to provide an argument promoting this solid investment opportunity that BioCharge has to offer to a potential lender.

A.5 Evaluation Plan

During each phase of the project, evaluation will take place for every milestone/deliverable. The process of evaluating each milestone/deliverable will consist of five stages including design reviews, code reviews, module testing, integration testing, and continuous evaluation. These stages of evaluation will be used to reduce the number of errors and flaws at an early date, thus reducing the cost of time and money that they would incur at a later date. The five stages are as follows:

A.5.1 Design Reviews

Design reviews will occur during the beginning stages of each milestone/deliverable. A design document will be produced outlining how the milestone/deliverable is to be obtained. This design document will undergo a group wide review by all parties involved in the milestone/deliverable as well as any additional parties that may be of use. If the design document is deemed not acceptable, it will be revised and reviewed again until acceptance is agreed upon by all individuals involved.

A.5.2 Code Reviews

Code reviews will pertain to software oriented milestones/deliverables. The code reviews will occur at various stages throughout the implementation stage of the milestone/deliverable. Similar to the design reviews, code reviews will be a group wide review of the code being used by all parties involved in the milestone/deliverable as well as any additional parties that may be of use. Following the code review, any errors and/or flaws will be corrected and a follow-up code review will be conducted if deemed necessary.

A.5.3 Module Testing

Once a milestone/deliverable has been presumably obtained, its validity and effectiveness will be reviewed in and of itself. This ensures that the milestone/deliverable in question is a valid and working end result without regard to any other pieces.

A.5.4 Integration Testing

Once the module testing of an individual milestone/deliverable has been satisfied, the milestone/deliverable will then be tested for validity and effectiveness in regards to all other existing pieces. This step is to ensure that all components of the project continue to work well in relation to one another.

A.5.5 Continuous Evaluation

In addition to the four defined stages above, all processes and techniques will be continuously monitored and evaluated by the respective managers. This continuous evaluation is intended to help reduce errors and/or flaws as they are introduced thus reducing the amount of errors and/or flaws that must be discovered at a later date.

A.6 Risk Assessment

The risks for this project are divided up into three categories, including Societal Risks, Technical Risks, and Financial Risks. Within each category, the risks are ordered by level of impact starting with the highest impact. The risks are presented within this document in two different formats. The first format is a detailed, paragraph form. The second format is a slightly less detailed, tabular form intended for ease of use. The categorized risks are as follows:

A.6.1 Societal Risks

A.6.1.1 Acceptance by society is low because of privacy issues.

Impact: High

Probability: Medium

Mitigation: A detailed, legal privacy agreement will be provided in order to ensure the public that every possible effort will be made to keep the biometric data private. In addition, efforts will be made to educate the public on privacy protection laws for biometric data as well as the difficulty of obtaining and using the biometric data maliciously. Lastly, efforts will be made to show that the risks to personal privacy are much greater with current credit card systems compared to what they will be if fingerprint verification is used.

A.6.1.2 Government enforces a Big Brother policy to view fingerprint databases.

Impact: High

Probability: Medium

Mitigation: Efforts will be made to educate the public on privacy protection laws for biometric data as well as the difficulty of obtaining and using the biometric data maliciously. In addition,

efforts will be made to show that the risks to personal privacy are much greater with current credit card systems compared to what they will be if fingerprint verification is used.

A.6.2 Technical Risks

A.6.2.1 Hardware malfunctions will cause backups at the checkout lines, hence frustrating consumers and affecting store sales.

Impact: High

Probability: Low

Mitigation: The hardware will be continuously and rigorously tested during the design and implementation phases to ensure that the frequency of hardware failure is as low as possible. In addition, procedures will be put in place for situations of hardware failure. For example, if a nearby unit is available for use, then that unit will be used in place of the unit that is malfunctioning. Furthermore, if a spare unit is not available for a unit with a malfunctioning card reader, then a backup fingerprint database will be available to obtain the fingerprint data of the authorized users to compare to the user attempting to use the card.

A.6.2.2 Software malfunctions will cause backups at the checkout lines, hence frustrating consumers and affecting store sales.

Impact: High

Probability: Low

Mitigation: Software will be continuously and rigorously tested during the design and implementation phases to ensure that the frequency of software failure is as low as possible. In addition, procedures will be put in place for situations of software failure.

A.6.2.3 Lost cards yielding in the identity theft of individuals who have their fingerprints stored on card.

Impact: High

Probability: Low

Mitigation: Smart Card technology will make obtaining the data within the card difficult. In addition, encryption techniques will be used to protect the data in the event that it is obtained from the Smart Card. Furthermore, since the data on the card is not actual fingerprints, only data that represents fingerprints, it cannot be used to reproduce a real fingerprint. Finally, the scanning techniques that will be used will have methods built in to protect against fake and forged fingerprints by using sub dermal scanning.

A.6.2.4 Fingerprint fraud becomes as prevalent as other types of fraud.

Impact: High

Probability: Low

Mitigation: Smart Card technology will make obtaining the data within the card difficult. In addition, encryption techniques will be used to protect the data in the event that it is obtained from the Smart Card. Furthermore, since the data on the card is not actual fingerprints, only data that represents fingerprints, it cannot be used to reproduce a real fingerprint. Finally, the scanning techniques that will be used will have methods built in to protect against fake and forged fingerprints by using sub dermal scanning. All of these protective measures combined together will make fingerprint fraud within this system extremely difficult. Since fingerprint fraud will be so difficult, very few criminals will attempt to pursue it.

A.6.2.5 New automatic and reliable fraud prevention techniques are invented that have benefits over fingerprint technology.

Impact: High

Probability: Very Low

Mitigation: Current markets and technologies will be continuously monitored and analyzed in order to keep up with technology so that the fingerprint solution stays the most reliable and cost effective method available for credit card fraud prevention.

A.6.2.6 Smart Card Reader technology, or other technology used by the system, changes.

Impact: Medium

Probability: Medium

Mitigation: The system will be designed such that new technologies and techniques will be as easy as possible to integrate into the existing system.

A.6.3 Financial Risks

A.6.3.1 Public reluctance to embrace technology due to the release of their biometric identity would yield a decline in store sales resulting in stores being reluctant to use fingerprint verification technologies.

Impact: Low

Probability: Low-Medium

Mitigation: Efforts will be made to educate the public on privacy protection laws for biometric data as well as the difficulty of obtaining and using the biometric data maliciously. In addition,

efforts will be made to show the risks to personal privacy are much greater with current credit card systems than what they will be if fingerprint verification is used. Lastly, stores will be allowed to make fingerprint verification an optional security feature to their customers thus preventing the loss of business.

A.6.3.2 Retailers are reluctant to commit to the initial investment.

Impact: High

Probability: Medium

Mitigation: Efforts will be made to show that the current loss due to credit card fraud outweighs the initial investment. Additionally, potential customers will be provided with detailed estimates on the return on their investment and break even point, thus showing approximately how long it will take for savings due to reduced fraud loss to make up for the initial investment.

A.6.3.3 Initial investment is too expensive for smaller retailers.

Impact: Low

Probability: Low-Medium

Mitigation: Continuous efforts will be made to analyze production methods and the cost of technologies used verses other available technologies. This will result in a proactive effort to keep production costs as low as possible while maintaining high quality. As production costs are reduced, the savings will be reflected in the cost to customers thus making the product more feasible for smaller retailers.

Risk	Impact	Probability	Mitigating Factor
Societal Risks			
Acceptance by society is low because of privacy issues	High	Medium	Privacy agreement and Public education on privacy laws compared to current privacy risks
Government enforces a Big Brother policy to view fingerprint databases	High	Medium	Privacy agreement and Public education on privacy laws and privacy risks compared to current privacy risks
Technical Risks			
Hardware malfunctions will cause backups at the checkout lines, hence frustrating consumers and affecting sales	High	Low	Continuous testing and procedures in the event of failure as well as a backup fingerprint database
Software malfunctions will cause backups at the checkout lines, hence frustrating consumers and affecting store sales	High	Low	Continuous testing and procedures in the event of failure
Lost cards yielding in the identity theft of individuals who have their fingerprints stored on card	High	Low	Smart Card technology, encryption techniques, & scanning techniques
Fingerprint fraud becomes as prevalent as other types of fraud	High	Low	Difficulty in obtaining and using fingerprint data make fraud unlikely
Emerging fraud prevention techniques invented that supersede fingerprint technology	High	Very Low	Continuously monitoring current markets and technologies
Changes in Smart Card Reader technology/other technology used	Mid	Mid	Designed to be easy to integrate new technologies
Financial Risks			
Public reluctance to embrace technology due to the release of their biometric identity yielding a decline in store sales	Low	Low-Medium	Educate the public and allow stores to make it an optional security feature
Retailers are reluctant to commit to the initial investment	High	Medium	Show investment outweighs fraud loss and show ROI and break even point
Initial investment is too expensive for smaller retailers	Low	Low-Medium	Continuously analyzing production methods and costs to keep price as low as possible