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Mobile Fire Protection Application

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Mobile Fire Protection App MQP

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Table of Contents

Acknowledgements	1
Chap.1 – Introduction.....	2
The Project Objective	2
Product Description.....	2
Product Value – Time, Money, and more Safety	3
Further Applications	4
Field Review by Chapter	5
Chapter 2 – Literature Review.....	5
Chapter 3 – Axiomatic Design & Value Stream Mapping	5
Chapter 4 – Methodology.....	5
Chapter 5 – Market Segmentation	6
Chapter 6 – Financial Analysis	6
Chapter 7 – Conclusions and Recommendations.....	6
Chap.2 – Literature Review	7
Search results pertaining to “business interruption insurance”	7
Search results pertaining to “market entry point”	7
Search results pertaining to “distribution channels” and “channel partners”	8
Search results pertaining to “exclusive distribution channels”	9
Search results pertaining to “market segmentation” and “analysis”	9
Search Results pertaining to “customer return on investment”	10
Chap.3 – Axiomatic Design of Fire Protection System	11
Overview of Functional Requirements.....	12
Axiomatic Functional Requirements	13
FR-0 Create an Understanding of the Market to Effectively Sell the Product	13
FR-1 Identify the Market Entry Point	14
FR-2 Financial Analysis of System.....	23
FR-3 Distribution Plan.....	29
Overview of Design Parameters.....	33
Axiomatic Design Parameters	33
DP-0 System for Creating an Understanding of the Market to Effectively Sell the Product.	33
DP-1 System for Identifying the Market Entry Point.....	33
DP-2 Analyze overall product financials	39

DP-3 System for Generating a Distribution Plan	41
Interactions within Axiomatic Design.....	43
Connections with FR 1.2 Identify SWOTs	43
Connections with FR 1.2.1 Identify Product Strengths	43
Connections with FR 1.2.2 Identify Product Weaknesses	44
Connections with FR 1.2.3 Identify Product Opportunities	44
Connections with FR 1.2.4 Identify Product Threats.....	44
Connections with FR 1.3.3 Specify Product Placement.....	44
Connections with FR 1.3.4 Specify Product Promotion.....	45
Connections with FR 1.3.5 Determine Functionality.....	45
Connections with FR 1.3.5.1 Saves Time and Money.....	45
Connections with FR 1.3.5.2 Creates a Safer Work Environment	46
Connections with FR 3 Generate a Distribution Plan	46
Connections with FR 3.1 Determine Distribution Channel	46
Connections with FR 3.2 Determine Distribution Timeframe	46
Chap.4 – Methodology	48
Additional Processes	50
Analyze Economic Viability of New Application	50
Product Factors of Market Potential	50
Identifying Channel Partners.....	51
Chap.5 – Market Segmentation.....	52
Research Conclusions	52
SWOT analysis	52
Segmentation Factors.....	55
Market Segmentation Grading Factors	58
Industry/Client Analysis.....	61
Chap.6 – Financial Analysis.....	63
Chap.7 – Conclusions.....	66
Results for FR-0:	66
Results for FR-1:	66
Results for FR-2:	67
Results for FR-3:	67
Recommendations.....	67

Our High-Level Takeaways	68
References	69

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Chap.1 – Introduction

The Project Objective

The purpose of this project is to examine the feasibility of market penetration and expansion of our sponsor' fire protection mobile application into the commercial setting. In order to accomplish this objective, we did the following:

- Perform preliminary market and product research, including current customer satisfaction statistics, to identify possible market expansion;
- Create a financial analysis of possible future returns
- Research current and possible future market competition to assess the financial risks that may arise from expanding the product
- Analyze product feasibility and produce a preliminary report on the financial implications of expanding this product.

From these deliverables, we gained an understanding of the market and to ultimately create an efficient distribution plan for the product.

Product Description

Our sponsor' product, at this moment, does not have an actual name, but for the purpose of this project, we have decided to use the working title of "mobile fire system control" system. To briefly describe this product, it is a system that provides real-time information to a facility's control room on the status of any room where a sensor has been placed. The product's purpose is to provide a more accurate system that can provide this information to any mobile device programmed to do so, and allows for access directly into a facility's fire control system. It allows for total control over said system's functions, including the activation and deactivation of fire safety alarms and, as previously mentioned, provides this functionality with all relevant data updated in real-time. Our sponsor' worked in tandem with Honeywell to create this product specifically for initial investor, who hired them to do it originally, and now this product is being considered for other clients as well on the open market. In order for our group to adequately

assess that market, the product's relevant information and value must at least be somewhat judged to proceed.

Product Value – Time, Money, and more Safety

The mobile fire protection application has the potential to bring economic value to companies with high numbers of buildings or campuses that need to be monitored constantly. The most value the application has will come in the form of saving time. When the fire detector first sounds the silent alarm that something is wrong, and the maintenance worker has to check the information before the loud alarm begins, the application will bring the alert and all the corresponding information directly to his location on his mobile device. This is inconsistent to the worker traditionally having to leave whatever he is currently doing to travel to a central location where the information from the fire detector is sent. For a company with a large campus, this could take minutes of travel time and that wasted time could potentially spell disaster for both employee safety and costs.

Other ways the application adds significant value for the customer is that it can remotely test fire detector systems, which would cut down the need for annual or bi-annual walk tests by both the maintenance workers and fire marshals. The original value this product added for initial investor was their need to have the fire detectors turned off in their productions studios that were using smoke machines. Prior to the application, when an actual alarm went off, the process would require a worker to drop whatever they were doing to travel to the central information location and manually turn the fire detectors off. Then, after the allotted production time, the worker would have to return and proceed to then turn the detector back on.

By saving time, the mobile fire protection application simultaneously creates a safer work environment and saves the company money. With these three topics being achieved hand in hand, it is clear to see the tremendous amounts of value that the application can add for a company.

Further Applications

This product has the capability and flexibility to be applied to different functions because it becomes completely integrated into the user's system. While it is operational, it currently has access to all of the sensors throughout all of the system's facilities, and so it would have access to all of those different locations as well. As the technology improves, those sensors could be updated to read much more than they do currently and thus can play host to a wider array of different functions. One example of these could be reporting other types of information, such as air toxicity, and coupling the system with different alarms for other notifications, such as a warning for a methane leak. These warnings would be dependent on the business conducted at the facilities, thus another example of how this product provides use for all different types of businesses and their companies. Our sponsor is already making steady improvements to the system, such as suggested evacuation procedures based on readings that the system interprets in real time based on a real time event.

Field Review by Chapter

Chapter 2 – Literature Review

This section represents the general layout of the following report, given in the form of each topic of research and the justification for researching those topics. We hope to provide an in-depth summary of all of the research that we have gathered on important and related topics of the product our project is based on. The format for this section begins with an introductory paragraph, that will briefly but adequately summarize the importance of this project and the process included. It also include a summary of the articles of research included, a conclusion that will summarize the major findings, and finally a list of the references used in the final report, listed in the proper format.

Chapter 3 – Axiomatic Design & Value Stream Mapping

This section of the report details the process of designing our project problem solving method, which is based on of the axiomatic design process. In order to understand how to solve the issue at hand, we first need to understand how to go about solving the proper problem. The axiomatic design and value stream mapping process decomposes the problem so we are able to adequately advise the project sponsor. First, a problem statement needs to be prepared that represents the main goal of the project. Then, sub-goals are stated that represent the main areas of research that will help to solve that initial problem statement. That process continues until a detailed composition is developed. For each of these statements, the design format also includes a description of the process for each statement, as well as the tool used to help measure that statement.

Chapter 4 – Methodology

This section provides a brief explanation of the processes used in order to complete our project, as well as justifications for those processes. It begins with an introductory statement that will describe the main goal of the project. It will be followed by our main topics of research in the form of questions that need answers to arrive at a conclusion. After providing the results of our findings, a conclusion is presented.

Chapter 5 – Market Segmentation

This section details the process in identifying key similarities between potential markets and the product, and how we derived our suggested potential target customers and the industry analysis. Beginning with initial factors to help us understand how the product might affect the customers themselves, an outline of the grading criteria that enabled us to trim the list of potential clients and markets is shown. This is followed by a list of the top suggested customers to target based on the level of financial benefit that the product would be projected to provide. The section concludes with an industry analysis to facilitate future market entry decisions for our sponsor.

Chapter 6 – Financial Analysis

This chapter provides the current and future financial analysis needed to draw conclusions for the sponsor. This information is demonstrated graphically and in written form. Most of the data will be compiled in Excel. In doing so, we are able to make future projections on the company's financials. Before making those projections, we will provide detailed information on existing companies based on our segmentation research about who would be good candidates for this product. This results in advisements for our sponsor to use in decisions about selling this product in the future.

Chapter 7 – Conclusions and Recommendations

This section will compile all of the conclusions found in this project as well as recommendations for future work. It will provide concrete statements on what our major conclusions were about the product itself and on our research. Along with our conclusions, we will provide ideas and recommendations for our sponsor. These recommendations will be in two forms. Based on the information we gathered, we will be able to find which information is not relevant and prevent from research on those unnecessary topics. Second, we present recommendations for the company and their product's success.

Chap.2 – Literature Review

This section details the layout of the report. Each topic of research and the justification for researching those topics is shown. We provided an in-depth summary of all of the research that we have gathered on important and related topics about the product. This section begins with a paragraph, that briefly summarizes the importance of this project, and the processes included. It also includes a summary of the articles found from research conducted, a conclusion that summarizes the major findings, and a list of the references.

Search results pertaining to “business interruption insurance”

A search of business interruption yielded results that describe when this type of insurance is initiated and for what types of events that it provides coverage for. According to the search, this type of insurance is only triggered in the instances shown in Table 1 below:

1.) physical damage to premises is severe enough to close operations for a period of time
2.) physical damage to other property directly caused by damage that prevents access and is covered within the company insurance policy
3.) the government is forced to shut down an area for property damage covered in company insurance and prevents access to that certain area

Table 1 – Causes for Business Interruption Insurance

This insurance generally only applies to suspensions, slowdowns or cessations and the coverage is limited by a delay period and a certain period of time that it can remain active, which is usually 12 months (AIADC, 2014).

Other results found that there are three different kinds of business interruption terms that should be known: business interruption, extended business interruption, and contingent business interruption. Business interruption insurance is intended to compensate the company specifically for income lost during the period that the premises are restored. Extended business interruption insurance includes the aforementioned insurance, but also includes coverage for the period of time it takes for income to return to the level it was prior to the incident. Contingent business interruption insurance provides coverage for damages, but not to the company itself, instead it provides it for the providers of the property (Berry, 2000).

Search results pertaining to “market entry point”

A search of market entry point resulted in the discovery of a potential recommended process of determining the correct point for a particular process. According to the search results, it is crucial to first determine what “entrant” type category that the company of the product would fall into. This would then lead to a certain method, or “mode”, of entry that would be plausible for the company. Once determined, the entrant would require a certain amount of resources and level of capabilities in order to undertake the entry process (Helfat and Lieberman, 2010). Such results would help determine the recommended process for the product in question for this project.

Other results yielded important criteria when going through the decision making process on which market entry point to fit to a product. Some of these factors are need based, as in the market has an underserved need or that there is need for the product at all, and measuring the level of those needs. Other factors include the viability of the product based on the wealth of the company that is selling or manufacturing the product, and whether or not there are entrenched competitors already within any portion of the market (citeseerx).

Search results pertaining to “distribution channels” and “channel partners”

A search of the literature yielded definitions for what distribution channels and channel partners are. Some search results focused on the importance of distribution channel relationships. “An enduring relationship between buyers and sellers is emphasized to enhance efficiency and facilitate the coordination and integration of international channel activities” (Johnston, p.34, 2012).

The literature search provided tools that help in understanding the distribution channels. “In channels of distribution, joint action refers to the degree to which buyers and sellers carry out focal channel activities in a cooperative and coordinative manner to achieve their individual or common objectives. Prior studies, though limited, have indicated that joint action reduces uncertainty, decreases friction, mitigates safeguarding problems, and resolves conflicts” (Johnston, p.34-35, 2012).

Many of the sources informed researchers on the value of choosing the right distribution channel and channel partners for their company. One source stated, “In short, cooperation is necessary for partners to access the full benefits, capabilities, and resources of their inter-organizational relationships” (Samaha, p. 105, 2011).

Search results pertaining to “exclusive distribution channels”

Similar to the above search terms, exclusive distribution generated results that first defined the term distribution itself. Since exclusive distribution is one form of distribution, it is not uncommon to find search results that are focusing on the broader term “distribution.”

There was an example found in the literature that explained “...when producers use exclusive dealers (i) the joint collusive retail prices are no longer achievable and (ii) the producers can extract all retail profits” (Gabrielsen, p. 353, 1999). Exclusive distribution is described as distribution of a product through one wholesaler or retailer in a specific geographical area (Unit 13). The literature also related keywords like “intermediaries” to the ones searched.

Search results pertaining to “market segmentation” and “analysis”

A combined search of market segmentation and analysis resulted in information that provided a greater understanding of what segmenting a market truly requires, and theories of possible ways to go about segmenting a particular market. Market segmentation is a term that describes how market demand is disaggregated, or split from the whole, into components and parts with distinct demand characteristics (Dickson and Ginter, 1987). Results also showed that a clear distinction needs to be made on the difference of “differentiated” and “undifferentiated” products and how they affect market segmentation to appropriately assess a product. A differentiated product is one that has been distinguished from other products based on the perspective buyer and leads to a preference (Dickson and Ginter, 1987). The importance of said terms are revealed in the market segmentation analysis, we must be sure that the product in focus has been differentiated by using segments that are only important to the potential buyer. We began this project unsure of those market segments, we must begin with a system of choice based on the perceived product values and justify those choices.

Other results showed how we might go about setting up our own market segmentation analysis, albeit in a more technical fashion. However, these results show the fundamental theory that went into constructing a market segmentation study. This theory that would be instrumental in our segmentation analysis. As was mentioned previously, segmenting the market begins with dividing it based on customer needs or wants; and should be done based on the strengths, weaknesses, and characteristics of the product. It can then be implemented such

that the greatest opportunities can be found, while also accounting for the density in said market segments (Johnson, 1971). The rest of the case goes into detail regarding how this theory was applied. While not completely related, this market segmentation theory provides a fundamental origin for our market segmentation analysis.

Search Results pertaining to “customer return on investment”

A search of ‘customer return on investment’ yielded results that would help to distinguish what particular definition of “return on investment” applies to this product and project, and how this return could impact future distribution of the product. Results show that there appears to be a difference in how customer satisfaction can be determined when purchasing products. A customer may not always be a consumer of the products that s/he purchases. In our case, the company or client would be purchasing the mobile fire protection application for their own use at their facilities, making them consumers. This is an important distinction because the search results show that customer satisfaction may not always be adequately summarized just by transaction-specific satisfaction. Through a more fundamental indicator developing over time and use of the product (Anderson, Fornell, and Lehmann, 1994). This fundamental indicator would be the measure that we hope to understand and establish. The product is designed to ensure safety over a period of time where incidents may occur at random intervals.

Other search results yielded examples of how a return on an investment could lead to other marketing situations for the product. One example could be word-of-mouth advertising. As we will discuss later in this report, such a form of advertising would be important if the customers would have access to others feedback through some kind of communication method. This form of advertising has shown, through case studies and other analyses, that customers are willing to spend more, and more often, for products with positive reviews from other known customers, as there is already an implied trust on their part (Barton, 2006.)

Chap.3 – Axiomatic Design of Fire Protection System

The premise of this chapter is to analyze customer needs by relating functional requirements (FRs) to the design parameters (DPs) that fulfill them through the product and company. Axiomatic design is design method using interactive decomposition matrices to systematically analyze responses to customer needs (See Figure 1).

The objective is to create FRs and DPs that collectively fulfill our top level FR-0: which is to create an understanding of the market in order to effectively sell the product. Each of the top level functional requirements are broken down subsets of requirements needed to fulfill those FRs. Once determined, each functional requirements uses a design parameter to ensure that each requirement is solved (Suh, The Principles of Design, 1990).

The results of this type of methodology are simple and easy to follow.

$$\begin{bmatrix} FR_1 \\ FR_2 \end{bmatrix} = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix} \begin{bmatrix} DP_1 \\ DP_2 \end{bmatrix}$$

Figure 1.

A Design is only as good as its FRs and the summation:

$$FR_0 = (FR_1 + FR_2 + FR_3 + FR_4 + \dots + FR_\infty)$$

Figure 2.

All of the FRs in a design should yield the goal of FR-0, see Figure 2. (Suh, The Principles of Design, 1990)

The approach to create an understanding of the market in order to effectively sell our product starts with the top level functional requirement of identifying a market entry point. Axiomatic design seeks to maximize the independence of the FRs and minimize the information connected in the decomposition. (Suh, The Principles of Design, 1990) This allows for the functional requirement to be controlled and adjusted if need be.

Based on the axioms, two or more design compositions are the presented. For example, the DP for (1) would be stated as: System for Identifying Market Entry Point. None of the design parameters can intertwine. This clarifies the redundancy in the criteria.

The design matrix is used to show how the goals of a system are achieved through the use functional requirements. As shown in Figure 2, FR-0 is the most important functional requirement. If it is not properly defined, a solution will be concluded for a problem that was not intended to be solved initially.

Once defined, the hierarchical decomposition continues in specifying the upper level functional requirements. These functional requirements for our design are ordered from 1-3 by importance. Table 2 explained what those FRs are.

FR1: Identify a Market Entry Point
FR2: Analyze Overall Product Financials
FR3: Generate a Distribution Plan

Table 2 – Top level Functional Requirements

These functional requirements, when added together are designed to fulfill FR0. Decompositions that are collecting existing and mutually exclusive are better at fulfilling FR-0.

Overview of Functional Requirements

Functional requirements can encompass many different things, as it is displayed in the form of a statement, the main premise of the system and that of which all subsequent FRs should refer back to. However, in this case, it represents primarily the characteristics of a market analysis of a mobile fire protection application, the product of emphasis. Thus, the statements include aspects of financial analysis that deal specifically with the customer and the product's producer, some of which include terminology such as return on investment, market entry point, and a product's placement and promotion. Some of these statements represent "children", or sub-statements that refer back to a "parent" or more general topic statement. An example of this is from the previous mention of a product's placement and promotion, which are more specific ideas and refer back to the more general theory involving the Four P's of product financial analysis. It is from this breakdown that the desired result of the system is achieved, no matter how many requirements are needed to do so.

The functional requirements can be looked at as parts that are needed to complete a whole, which is the initial functional requirement, FR-0. After that, each functional requirement is a sub component of the initial requirement. These requirements also have the necessary function of connecting with the next step within the design process, which are the design parameters that fulfill the FRs. Within the design process, there needs to be a design parameter for every functional requirement. If the functional requirements are considered what is needed to complete the desired goal, than the design parameters are considered to be the process that will be used to achieve those requirements.

Axiomatic Functional Requirements

The expanded form of the functional requirements from the axiomatic design are shown in Figure 3 below, following the detailed descriptions of each functional requirement:

FR-0 Create an Understanding of the Market to Effectively Sell the Product

In order to suggest the proper course of action in marketing the Mobile Fire Protection App, our goal is to create an understanding of the market so that our sponsor may be able to effectively sell the product. While this product was originally constructed to fit one particular client's needs, there appears to be potential for this product to be profitable on the open market. In order to determine if such an undertaking might happen, we plan to identify the market entry point that would be most appropriate for the product, analyze the product's financials so that it can be most profitable for Our sponsor, we will generate the most appropriate distribution plan so that Our sponsor is able to provide the product to the customer so that it meets the customer's needs.

These factors are crucial in developing a deep understanding of the market, and so each of these factors must be well developed and provide sound results. In order to identify the most appropriate market entry point, the product must be assessed for its usefulness to a customer, its compatibility with varied market segments, the appropriate method of marketing the product, and the appropriate manner in which to eventually sell the product. In order to analyze the product's economic viability, the return on investment for both the seller and the buyer must be determined while determining what course of action would fulfill the needs of both. Finally, in order to generate the most appropriate distribution plan, a strategy is needed for the

appropriate timeframe in which the product will be placed in the market, and the best channel to do so. By doing this, we would provide our sponsor with the means to effectively sell this product.

FR-1 Identify the Market Entry Point

The first step in creating a well-developed understanding of the market is to determine the most appropriate market entry point for the product. To do this, we have focused our analysis on four areas of research: market segmentation, the products SWOTs, customer interaction vehicles, and potential channel partners.

FR-1.1 Segment Potential Market

In order to determine the ideal market for the Mobile Fire Protection App, a market segmentation must be performed in order to distinguish the different markets, and their customers, from one another. Every potential target customer already has at least some form of fire protection system, so the question is not whether this product can be implemented, but rather what is the benefit from purchasing this product. As we have determined that the greatest benefit this system can provide is as insurance to save a customer a substantial amount of money, then the market segmentation process would assess what factors affect those potential savings. We have researched that and developed three main general concepts: the size of the ownership, the type of the ownership, and the risk of the ownership.

FR-1.1.1 Type of Ownership

Markets are typically segmented by companies that buy various products. Some purchases may be impacted more by potential hazards to their fire protection systems, or deal with certain factors that make them more vulnerable to potential losses when they occur. Initial investor is a company that operates a twenty-four broadcast. Any interruption to their business impacts the value and quality of product they produce for their customers. Thus, they were more inclined to procure a system in advance of the overall. The types of ownership that we found will be discussed later in the section on channel partners, and our findings will be shown in our market segmentation chapter.

FR-1.1.2 Size of Ownership

As we are interested in the amount of savings that the Mobile Fire Protection App can provide for its user, an important factor to consider is the size of the company in question. Characteristics including the number of employees working within a company's facilities, the number of buildings the company's campus contains, or simply the amount of acreage each facility takes up would be measures of the physical size of the company. Depending on the size of a company, this product could have multiple benefits that have already been named, including increased safety and mobile access to a safety system that covers a wide area. Initial investor might be an example of such a campus, as their main headquarters in Connecticut contains thousands of workers and several buildings that need to have their fire safety system and sensors checked and monitored. The results from these factors are shown in the market research section of the report.

FR-1.1.3 Risk of Ownership

Each customer that can be considered as a potential market target for this product will face a certain amount of risk, both in investing in the product or by choosing not to invest. The MFPA acts like insurance. It prevents a potential substantial loss in revenue for incidences of unknown origin and timing. Weighing that risk centers largely upon determining the financial incentive to purchase the product, which is based on the difference of projected earnings and loss sustained from incidences with the customer's fire systems. While projections can be made for potential savings lost or saved, the fact is that we can only determine a projected margin and then suggest whether it is an acceptable one or not. Only the customer can decide whether or not that margin is truly satisfactory in order to purchase the MFPA.

In order to make this decision easier for our sponsor, we have addressed the projections for both potential savings and potential losses. This was done to provide the company with information to help decide whether or not to continue with marketing this product, as well as whether or not this product would provide substantial savings for the customer. Those results can be found in our financial analysis section of the report.

FR-1.2 Identify SWOTs

The next step in identifying the appropriate market entry point is to assess the actual product and determine the characteristics that should be utilized or ignored when going to market. These characteristics include the product's strengths, weaknesses, opportunities, and threats, as previously mentioned. By ascertaining these characteristics, the appropriate market entry point will be better outlined based on the positive features and functions the product provides the customer.

FR-1.2.1 Identify Product Strengths

A product's strengths are the internal positive characteristics of a product, and so represent the value that can be held from the actual product itself. When considering the Mobile Fire Protection App, the strengths would include the features that the system provides that were not provided before for the customer, and the additional functionality it provides as well. For example, initial investor hired our sponsor to create this product so that it could provide mobile access to their current fire protection system, thus limiting the number of people and the man hours needed to do safety checks on that system. Whether or not the functions of this product are benefits to other customers is determined by the characteristics of the customer. However, that does not change what can be considered strengths of the product, as they are provided by the product itself and are independent of individual customers. Further results are shown in the market segmentation chapter later in the report.

FR-1.2.2 Identify Product Weaknesses

While a product's strengths are the internal positive functions of a product, the weaknesses are the internal negative aspects of the product, and they are just as important when considering the appropriate market entry point. These aspects of the product would not only be factors that should be avoided when marketing this product, but would also detract from the value of the product in the eyes of the potential customer if in the wrong market. The results of our findings for the Mobile Fire Protection App weaknesses can be found in the market segmentation chapter later on in the report.

FR-1.2.3 Identify Product Opportunities

An important factor when assessing the market is to determine what opportunities present themselves, if they apply to a certain product to be launched in the market, and when to take advantage of those opportunities. These factors are external and are dependent on the functions of the product and the pre-existent lack of a need or desire being fulfilled for customers in a market. Due to initial investor contracting with our sponsor to create this product initially, there are no similar products in existence, and none that possess the detailed characteristics that companies such as initial investor are looking for. This was one of the reasons our sponsor was asked to design the product in the first place. As such, there is no specific market for this product, and could be used to eventually anchor its own market. Another possibility would be determine a suitable market that this product still applies and market the new functions that would satisfy customer needs that were previously unfulfilled. Further results and findings can be found in the market segmentation chapter of the report later on.

FR-1.2.4 Identify Product Threats

Threats to a product in the market are external reasons why the product wouldn't be as profitable as it should be unhindered. These "threats" are generally driven by competition within the market, and competitors releasing products of similar function at either a higher value or more affordable price or a combination of both. When considering threats and what market to release a certain product in, the general suggestion would be to avoid as many possible threats as possible by releasing the product in a fairly uncontested market. In regards to the Mobile Fire Protection App, which is a product that is fairly unique in its own right, these types of threats would not be as applicable, as there are very few products that could possibly compete with it at this point in time. However, there are other threats to products that could come from not the market itself, but from the other companies involved in the development, Gamewell and Simplex. These larger corporations could choose to exclusively continue the project without the assistance of our sponsor, thus making the biggest threat one involving corporate relationships. This is what we considered for our sponsor' product, and our findings are elaborated on in the market segmentation chapter.

FR-1.3 Specify Customer Interaction Vehicles (4 P's)

When identifying the market entry point of our product, one should consider the 4 P's of marketing. The 4 P's of marketing are: price, product, placement, and promotion. Through specification of this marketing mix, our group is able to conclude a more defined market entry point for our sponsor' Mobile Fire Protection Application.

FR-1.3.1 Specify Price

In determining the mobile application's selling price, we have to consider a number of factors; the first is the actual value of the product to the buyer. The value of this product results from what the customer gains from using it. In this case, our sponsor' Mobile Fire Protection Application is capable of benefitting its customers by addressing their values of money, time, and safety. This application is capable of saving companies from having significant financial losses due to their current fire protection system. Whether the company's total income or worker's salaries are being affected, this application will dramatically reduce their losses due to its capabilities. Not only does this product save their customer's a ton of money, it addresses time and safety issues as well.

This device is capable of resolving problems faster when a fire alarm goes off in a building. By having a mobile application on your phone, you are able to determine where the fire is taking place and if the building does experience a false alarm, someone will be able to shut off the alarm from their phones. Currently when there is an alarm event, someone has to travel to one of the fire panels located in the building just to be able to see whether or not there is an actual fire or not. This product will relieve the time that a person would travel and in doing so the company will save time and money, property and maybe lives.

When looking at the safety aspect of this product, it expresses great value for any customer. Due to quicker recognition of a fire, employees will be able to exit the building safer and quicker. This application also gives directions on the safest way to exit the building if need be. With this, companies will have a safer work environment. Along with safety, this product results in being more convenient. It is convenient because of the fact that a fire alarm panel can be controlled from your phone and because of how much time and money is can save for the buyer.

Knowing the value of this product, it is also important to consider other products similar to this one. Fortunately at this point there are no other products that we are aware of in the market that are capable of doing what our sponsor' MFPA system does. With that said, the price of our product can vary because the market range is undefined. Initial investor is the first company that our sponsor is selling their system to. Initial investor hired our sponsor to develop this product specifically for their own use. At the current time, there is no fixed price that we are able to determine for the system. Considering the value it will have for future purchases, and the value it currently provides for initial investor, the market price will be a direct reflection of that.

FR-1.3.2 Identify the Product

The initial investor was looking for a company that could create a product that would them save money they were losing due to their inefficient fire protection system. Initial investor is a company that is operating 24 hours a day, 7 days a week. Initial investor has people on their campus at all times. With their current fire system, when an alarm would sound one of their workers would have to travel to a specific part of their campus that held their fire panel. This created an expensive problem for the company for several reasons. For one, the company would have to shut down their networks because everyone would have to be rushed outside. With that, initial investor would potentially lose millions of dollars for having to stop ongoing broadcasts. Their system also creates a huge inconvenience for the person that has to travel long distances from wherever they were, to go to the fire panel in order to find out the current situation. Unfortunately there can be false alarms as well. If a false alarm occurred, initial investor would experience a loss financially. Having this issue fixed was one of initial investor main priorities. They reached out to our sponsor and asked if he would find a solution to their problems.

Our sponsor created a Mobile Fire Protection Application that displays initial investor fire control panel on their phones. With this application, the fire panel can be accessed and controlled from anywhere on the campus with the click of a button. This product is also able to determine whether or not there is an actual fire in a building or if it is just a false alarm going off (i.e. a fog machine). Along with that, the application provides directions for people to find the fastest and safest escape routes out of a building if need be.

It is clear that this product is like no other for the various reasons above. For initial investor, this product was exactly what they needed and what they were looking for. For future buyers, this product is intended to benefit them on a number of levels. This product will save companies money and time, as well as produce a safer and more convenient workplace.

FR-1.3.3 Specify Placement

Specifying placement is challenging for this product because at this time the product is new for its potential market. Initial investor is the only customer our sponsor will be selling its product to at this point in time. When trying to understand placement, we chose to use Gamewell as a channel partner. Since our sponsor is working with Honeywell and Gamewell to create this product for initial investor, Gamewell acts as a channel partner for our sponsor. Having access to Gamewell's publically available client list has helped us determine who our sponsor should sell this product to next. (Honeywell, 2012) This specific product will directly benefit companies that are most comparable to initial investor.

With initial investor, this application addresses their revenue, time, and safety. We want to address companies similar to initial investor that have issues such as: (1) their revenue stream is interrupted; (2) they are producing unproductive man hours; (3) their continuous operations are interrupted; (4) they need a solution that can be found quicker; and/or (5) they want to update their current fire protection system. Using Gamewell's client list, we will be able to prioritize companies into different tiers of targets that we recommend to market to. Companies that are found to have ≥ 4 of these issues will be considered a high priority. Those with 2-3 issues will be considered a medium priority. And those with 1 issue will be considered a low priority. With this determination, we are able to identify the companies that our sponsor should try to target next.

We believed that in selling to a large number of buyers, the product will decrease in value because it won't be "rare" anymore. Our plans for our sponsor are to sell this product only to companies that are multimillion dollar companies that want a product that they will truly benefit significantly from.

FR-1.3.4 Specify Promotion

Promotion is the last aspect of the 4 P's and it is one that be determined by answering questions on where, when, and how our sponsor will promote their new product to the

marketplace. Knowing the product's value and identifying who may become a future buyer for this application product will help in answering those questions. Presently, our sponsor is not actively promoting its new product because it has been made specifically for initial investor. Once the product is given to initial investor and put into use that will be the time that our sponsor will be able to promote their product to a wider market. As specified above, the product is looking to launch into a market that is made up of large companies that are looking to save money, save time, have a safer work area, and want to update their current fire protection system providing more convenience and lower operating costs. Basing our promotional ideas off of that market, there are many different ways for our sponsor to accomplish this. Since our sponsor is using Gamewell as a channel partner, other people could be promoting the product by themselves. Any type of connection could help promote the product become a success. The best time to promote this product would most likely be after initial investor has used it enough that their reviews of it are excellent.

As stated before, in developing a promotional strategy it is best done after specifying the other 3 P's beforehand. Since there is currently no competition for this product, focusing on promoting the product's values to buyers and their return on their investment is truly what is going to help this product launch, sell, and be successful overall.

FR-1.3.5 Determine Functionality

Functionality is a term used to describe the ability of a product, and to relate its usefulness to and for the user. As we are performing an analysis to find the proper market entry point for this product, it is important that functionality be considered in this process. Understanding how the product works will also provide us with an understanding of the benefits, both direct and discrete, that it provides. The customer will be looking at this product in terms of what it can provide for them, so knowing these benefits will effectively provide us with a connection to a customer population that might be interested in the product. We hope to find an appropriate market entry point that will help the manufacturer to effectively sell their product. After an examination of the functionality of this product, we can determine that this product will be viewed in generally two facets: it saves time and money, and it creates a safer work environment.

FR-1.3.5.1 Saves Time and Money

When considering the benefits provided by this product, the aspects that are going to capture the customer's attention are the ones that will provide the greatest affect in a single area. For instance, if we consider the money being saved by the product, what the customer will focus on is not any minor cuts to certain costs, but the greater potential losses that they could incur. It is that aspect that this product in particular can yield some insight on, as an error in any current fire protection system can halt a business' operations for an extended period of time. Not only that, but evacuation and safety procedures must then be followed and in the meantime, the employees are remaining idle. For some businesses, this may not be an important issue, but for initial investor, this causes great potential profit loss because they are operating continuously and over a large campus. Using the mobile fire protection app, any alert in the system automatically gets sent to the operator and can be properly vetted without any interruption in the company's operations, thus preventing any potential loss for the company from this scenario.

FR-1.3.5.2 Creates a Safer Work Environment

While the product can potentially save customers from large potential losses will be its most attractive feature, the fact that this product will also create a safer work environment is of no-less importance. Current systems include much more person-centered maintenance for performing any switches with the system as well as performing any tests involved with the systems. When the sensors are triggered with current systems, as we understand them, it requires time to de-activate the system for someone to go and make that change. The real-time data sharing application will provide the user with all the information off-site they could need to respond to any situation appropriately, whereas any prior system that relied more on person-performed maintenance could not provide that same information as quickly or as accurately. Any responsible employer would ensure that the employees work in an appropriately safe work environment, and this product would work well in insuring that.

FR-1.4 Identify Channel Partners

A channel partner is a company that partners with a manufacturer or producer to market and sell the manufacturer's products, services, or technologies. In the case of our

sponsor' mobile fire protection systems application, there would likely only be two possible companies for them to partner with. This short list is made up of the fire potential companies Gamewell, a subsidiary of Honeywell, and SimplexGrinnell, which is a subsidiary of Tyco International. These are currently the only two possible channel partners for our sponsor because they approximately split the fire detection and control market for large companies between each other.

FR-1.4.1 Analyze Gamewell

Currently, our sponsor is partnered with Gamewell in order to introduce the mobile fire protection system application to their first client initial investor, where the application is being tested with very positive reviews. By having Gamewell as a channel partner, our sponsor will be able to use their extensive client list as a way to jump start their marketing and distribution of the application. This is because the client's will be going through their same seller of Gamewell only with the additional option of adding the mobile fire protection application to the suite of products. In this report, the client list is broken down into various segments that help determine which of their clients would be high priority targets for the mobile fire protection application as well as the clients that are medium and low priority targets. Having this market segmentation information will provide our sponsor the knowledge of which of Gamewell's clients will be most in need by the application and therefore be the largest return on investment.

FR-1.4.2 Analyze Simplex

SimplexGrinnell is the largest competitor to Gamewell in the fire protection system market. They control the largest portion of the market share after Gamewell. It would be most advantageous for our sponsor to be able to have Simplex as another channel partner in distributing and selling the mobile fire protection application. At this time it is almost certain that Simplex is not interested in having our sponsor as a partner. The true reason is unknown, but perhaps they are developing their own version of a mobile fire protection application.

FR-2 Financial Analysis of System

This functional requirement will include our analysis of important factors regarding the customer and producer in terms of investment and the product itself. By doing so, we hope to derive a means for appropriately assessing the market for this product.

FR-2.1 Analyze Customers Return-on-Investment (ROI)

In order to accurately assess the economic viability of the system, we first need to determine what benefit the customer is receiving after they have purchased, the product. By doing so, we will be able to determine a monetary value amount for what benefit the customer is receiving and an amount of potential savings the customer has incurred for deciding to invest in this product. We will use this information to help determine with more certainty for what reason did the customer make their choice, as well as other factors involved in their decisions. From there, we can more accurately determine a market entry point that would detail the product to consumers that would be more likely to choose this product over another.

FR-2.1.1 Quantify Customer's Costs

A factor that should be considered in any purchase decision is the cost of the product being evaluated for sale. Thus, we can safely assume that when considering purchasing this product, the purchase cost as well as the other costs involved with this product will be heavily considered when the customer makes their decision. To get a better idea of what the customer would consider when purchasing this product, we must first look at what the relevant costs are. The costs that we might consider are purchase price, maintenance price, warranty costs, upgrade costs, and an estimate of unforeseen costs.

The purchase price is the initial price of the product itself, and it represents the minimum amount that the customer will have to pay in order to receive this product. Maintenance cost would include the price of any technological services required, such as installation and backup systems. Warranty costs would be costs that would ensure the customer doesn't have to pay any extra costs if the product should for some reason not work for an extended period of time. With systems like these, there are often new technological applications or systems created to improve any current system, and so any of these upgrades would also incur costs should the customer choose to purchase them. The last of the costs that we could consider are costs that result from a malfunction or a system problem that no one can plan for.

If the customer wishes their system to be up-to-date and well-protected, they will consider all of these costs when deciding whether or not to purchase the product, and so we must consider all of them as well. While there may be other costs that we have not considered,

we believe considering these costs will give us the best idea of what the customer is investing into the product on their end. In order to assess the return the customer receives, we need to consider the different benefits the product provides.

FR-2.1.2 Quantify Customer's Benefits

Evaluating the different costs of a purchase is only half of the process of determining the end result of an investment, with the other half being the customer's benefits. When considering a successful purchase or investment, it is generally described as one where the benefits outweigh the costs. These benefits, however, are not easily quantified because how it affects the user's lifestyle is not usually determined by quantifiable standards. Due to this, in order to determine values of products that the customers would agree with, forecasts must be derived from market research to determine how highly valued product benefits are, and therefore how they can be priced. The same process must be used with this product, especially since this product is unique and yet to be brought to the market and most of the figures regarding the product are merely projections.

Specifically, as mentioned previously, this product is being tailored more towards customers that are continually operated and have many fire alarm systems in place. Interruptions to the operational flow would cause things to halt for an extended period of time and displace employees from their stations, costing the customer a great deal of money. Not only that, but by implementing a system that relies more heavily on technology and sensors rather than person-centered maintenance, time is being saved in terms of response time to situations as well as time needed to be spent on the system in general. If the client also should run facilities that need to incorporate many of these fire alarms and sensors due to factors such as nature of their work or number of employees in the facility, then having this mobile app and system will also lead to a safer work environment. There are other more discrete benefits that could possibly be derived from this product, but those would be dictated by what or who the client or customer was and what they were using the facilities for.

FR-2.2 Analyze Seller's ROI

It is important to determine whether or not the money invested into the application can yield a positive return. By computing the possible gains from the investment we can then give

the seller a measured percentage of the efficiency for the proposed endeavor. If it is determined the ROI for a project is negative or there are higher ROI opportunities available, then the project should not be undertaken at the given time.

FR-2.2.1 Analyze Seller's Cost Center

The purpose of a cost center is to indirectly contribute to a company's profitability. It is the part of a corporation in which the finances for the operations are computed and is often looked to as having a negative impact on profits for a company, but is necessary in order to keep track of a projects budgets and finances.

FR-2.2.1.1 Value Technology Input/Output

Along with the seller's cost center analysis, it is important to understand the technology invested into the production process. During the research phase it is important to collect data to determine a cost effective way to ensure the output exceeds the technological resources input into the application. If only a small or negative return is established, then reconsidering the type and cost of the technology would be important to the success of the project.

FR-2.2.1.2 Identify Optimization

One way to establish whether or not a product or organization is successful is to identify whether or not they have optimized their process to its fullest potential. This means inputting the least amount of resources, technology and budget, in order to produce the optimal output.

FR-2.2.2 Analyze seller's revenue center

A revenue center is the area in a company that gains income by product sales and or service provided. In the case of our sponsor and the mobile fire protection application, the sources revenue will be broken down into three main streams. The first stream is the initial setup and installation fees associated with incorporating the application with a business' buildings and systems. The second stream will be a monthly fee that will be necessary for use of the website that will be an expansion of the application. The last main income stream will be software maintenance in the form an agreement for quarterly or yearly maintenance of the software. Additional opportunities for revenue streams will be custom development services

and professional services. These services would be when a company wants to adapt the software for an additional purpose than the original package.

FR-2.2.2.1 Value of product

Valuing the application in terms of what to charge customers will be determined by this MQP group as well as our sponsor. It will be determined on the value that the clients give the application. The cost of developing the application has already been established at around \$240,000. This cost has already been covered by the initial development contract from initial investor. To value the product for following customers will be dependent on how much purpose the application has to them. In some cases for top tier clients, the application could be considered revenue protection for the clients by allowing them to continue operations that run twenty-four hours a day without the fear of a false alarm halting those operations, or if there is a fire, to determine where and how bad the situation is more quickly than otherwise possible. Clients that have need for this type of protection will value the application higher than other types of clients and will therefore pay more for the service.

Middle or lower tier clients will be the ones that do not need the revenue protection but will be protected against financial loss that corresponds with the unproductive man hours associated with having to evacuate an entire building of workers. These clients will still have a value for the product but it will not be nearly as high as the highest tier clients. Further client values of the product will be the third tier that will use the application mostly out of convenience more so than protection from any losses. This low tier of clients will value the application the lowest and prices should be based off this valuing.

FR-2.2.2.2 Financial statements

The financial statements documents the activities of our sponsor in terms of the mobile fire protection application. This is important for the project by keeping the important financial actions organized and to make sure that the application is bringing in more revenue for the company than is being spent on it.

FR-2.2.2.3 Estimation of Sales Forecast

Estimating the sales of the mobile application will be dependent on a few variables. The first variable being the value set for the application on each tier. The second variable will be the amount of companies off of Gamewell's client list that will be in each of the three different tiers. Then by using these numbers it will be possible to determine a sales projection for all sales as well as breaking up the sales projection for each of the tiers. By doing so it is easier to determine the strongest tier for the effectively selling the application.

FR-3 Distribution Plan

When generating a distribution plan, a distribution channel and timeframe for the product needs to be determined. In this case, our distribution plan will be based on research information and current knowledge about our sponsor's Mobile Fire Protection Application and initial investor. Based off of this information, our sponsor will be able to have a better understanding of the market for the product in order to effectively sell it in the future.

FR-3.1 Determine the Distribution Channel

A distribution channel is a series of firms and individuals that facilitates the movement of a product from the producer to the final consumer. There are a number of functions that a distribution channel performs. A distribution channel is much like the '3rd P' of the marketing mix, placement. It is used to create time, place, and ownership. When figuring out distribution channels it is important to know how it will improve efficiency for the company, how they will transport and store their products, how they will facilitate their purchase, how much risk they are taking, and how they will promote and communicate their product. Channel partners are differentiated by the number of intermediaries there are between the producer (Our sponsor) and the consumer. There are three types of distribution channels: (1) Intensive; (2) Selective; and (3) Exclusive. In Intensive distribution, a company aims at having their product available in every outlet. In doing so, the company (Our sponsor) would be working with many intermediaries. This type of distribution is used for convenience goods most of the time. Selective distribution is when the company aims at having their product available in a limited number of selected outlets in a given area. This means our sponsor would be working with selected intermediaries. This type of distribution is common among companies that are selling shopping goods. Exclusive distribution is when the company sells a product through only one

outlet within a given area. With that, our sponsor would work with a single intermediary directly. This type of distribution is found among companies that sell specialty goods.

For Our sponsor and their Mobile Fire Protection Application, it would be wise for them to use the Exclusive distribution method because of several market, product, and producer factors. Factors such as the market size, the nature of the product, the price and positioning of the product, and its resources all help in determining this type of distribution. In the upcoming future, our sponsor hopes to have a larger number of buyers of his product, but not an overbearing amount. This specific application cannot be sold in retail or wholesale stores. This product costs too much money to make and a lot more to sell. This type of product is not a convenience or shopping good but rather a luxury one. There are only a limited number of buyers who can and are willing to purchase this type of product which is why our sponsor should use an exclusive distribution channel and only sell to certain customers using a single intermediary.

FR-3.2 Determine Distribution Timeframe

In determining the distribution timeframe it is important to recognize where the company currently is with their processes. Currently, our sponsor has started developing a Mobile Fire Protection Application specifically for the initial investor campus in Bristol, CT. This application features a replication of a fire panel that can be used to turn on/off an alarm sounding directly from your iPhone or iPad. The product gives specific details on where the alarm is sounding and for what reason, whether it be for a fire or a fog machine creating a false fire alarm. Along with being able to control access to the campus' fire panel, the application generates the safest and quickest escape routes for individuals in a building that is alarmed due to a fire. Our sponsor is still making improvements on their product in the hope that they can create more features for it. The completion of this product is hard to define because there is no product like it in the market. Initial investor is counting on our sponsor to develop this application for them. At this point, there is no mobile application like the one our sponsor is developing. So our sponsor is building the product from the ground up and the sooner initial investor can receive it, the better.

Once the product is completely finished and initial investor is more than satisfied with its success that is when our sponsor will begin their venture on acquiring more buyers for their product. The timeframe for distributing the product can range from 2-10 years. This is because,

each application made has to be made specific to the company our sponsor is producing it for. Each company has a different setup with different rooms, a different number of buildings, a different campus size, a different number of employees, and so on. With that, it can take several years for our sponsor to create another replica of their application for another buyer.

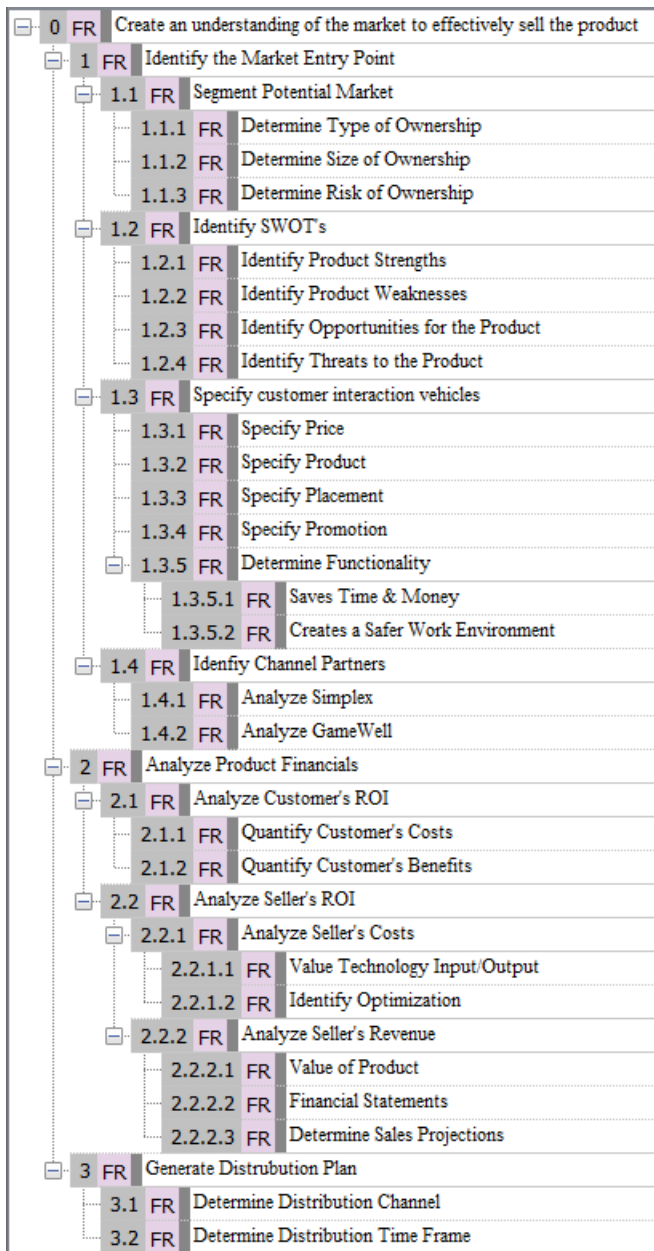


Figure 3 – Expanded Functional Requirements of Decomposition

Overview of Design Parameters

Design parameters (DP's) are physical terms that characterize the design that satisfies different Functional requirements (FR's). These design parameters explain "how" an FR will be fulfilled. Every functional requirement has a design parameter created to help solve it. A DP begins with: "a system that..." Under each DP's description is an explanation of what the system is solving for and how we are creating that specific system.

Design parameters correspond to their given FR's and can sometimes interact with other ones. When a design parameter interacts with more than one FR, it is called coupling. In order to avoid coupling, more DP's can be introduced so that not one system interferes with another. Each design parameter influences its related functional requirement from the actions or operation of its system design. DP's can have a small or large influence on their FR as well as other FR's.

Axiomatic Design Parameters

The expanded form of the design parameters from the axiomatic design is shown in Figure 4 below, following the detailed descriptions of each design parameter:

DP-0 System for Creating an Understanding of the Market to Effectively Sell the Product

In order to create an understanding of the market, we must first address the requirements that enable us to do so by understanding the system that each requirement will be represented by. The following sections are used to describe the "systems" or methods of carrying out the functional requirements, and will inevitably provide justification to our problem-solving processes, as well as provide a medium for our solutions. This will allow us to adequately resolve the functional requirements and achieve our project goals.

DP-1 System for Identifying the Market Entry Point

The first step in creating an understanding of the market in order to effectively sell the product is to identify the market entry point. This system is demonstrated through the use of market segmentation, SWOT analysis, interaction vehicles, and identifying channel partners.

Each of these tools have their own systems for achieving results, and they collectively help to identify the appropriate market entry point for Our sponsor' product.

DP-1.1 System for Market Segmentation

This system is used to determine how to appropriately assess how well the product applies to a particular market and, more importantly, how well the product fulfills a desire or need for the customer. The process used to determine this is based off of the size of the customer, the type of customer, and the level of risk that can alleviated for the customer. By identifying these things, we will be able to determine how well the product applies to a particular client or market, and can help us determine the appropriate market entry point.

DP-1.1.1 System for Type of Ownership

This system will determine the type of client or customer that may be best suited to market the product to. Through the process of determining the customer's characteristics, we will be able to determine how well those characteristics pair with the product's features and value. The use of this determination will help to determine the appropriate market entry point for the product.

DP-1.1.2 System for Size of Ownership

This system can help to determine the appropriate market entry point by determining the size of the potential client and whether or not it is an important enough characteristic to affect its need for the product. In order to do so, factors such as the number of employees and buildings, as well as the size of the revenue, will be considered to determine this designation. In doing so, we will be able to determine the size of the customer in question and will be able to determine if it is a viable option or not.

DP-1.1.3 System for Risk of Ownership

This system will help us to determine how much risk this product can address and nullify for a potential customer. This product acts as an insurance measure for certain incidents that occur for a company, so addressing the potential risk for the customer also addresses the

potential benefit the company can have by purchasing this product. This determination will ultimately aid in identifying the appropriate market entry point for the product.

DP-1.2 System for SWOT Analysis

This system will be used to determine the important characteristics of the product itself. By addressing the product's strengths, weaknesses, opportunities, and threats, we will be able to determine the value that any customer might find with the product. This value will deviate depending on the particular market the customer is looking to purchase a product from, and so in order to find the correct entry point, we need to determine how well the product fits in a particular market. This will be done by determining the characteristics, both positive and negative, of the product.

DP-1.2.1 System for Product Strengths

This system will determine the positive internal characteristics of the product and how they might benefit a particular customer. By assessing the product's strengths, we can determine what type of customer and market the product would be best served in. This all connects back to identifying the market entry point, as the product's strengths would be marketed favorably.

DP-1.2.2 System for Product Weaknesses

By identifying the product's weaknesses, we can address the aspects of the product that would be viewed as less than favorable by the customer. Markets which involve products with better quality of these characteristics would then be less than ideal product placement options for this product. By eliminating those options, it can help to shrink the field of potential market destinations for the product, so as to ensure the product is being marketed to the most appropriate customer. By doing so, we would then be identifying the correct market entry point for this product.

DP-1.2.3 System for Product Opportunities

Other than identifying a product's strengths, another way to find the appropriate market entry point would be to determine the possible opportunities that exist for a product

like this. These external conditions would be designated as potential for growth and immediate compensation for marketing the product in that manner. The level of potential benefit for the seller would help to determine if that is a viable market entry point for the product.

DP-1.2.4 System for Product Threats

Other than a product's weaknesses, a potential hazard of entering the market are the potential for threats to the overall success of marketing a product. These threats come from external sources and usually from competition, such as producing a product with either more higher value or a more favorable price for the customer. Identifying markets with potential threats for the product will help to determine the appropriate market entry point to allow this product to be most successful.

DP-1.3 System for 4 P's (Price, Product, Place, Promotion)

This system is being used to specify our customer interaction vehicles. By defining the price, product, place, and promotion of our product, we will be able to identify our market entry point. Doing this will fulfill our FR₀: Create an Understanding of the Market to Effectively Sell the Product.

DP-1.3.1 System for Specifying Price

This system is being used to specify the price component of our marketing mix (4 P's). We will determine the mobile application's price by identifying the value of the product to the buyer along with other factors. Our sponsor will help us in determining the value of their product. This will then help in fulfilling the DP: System for 4 P's (Price, Product, Place, Promotion).

DP-1.3.2 System for Specifying Product

This system is being used to specify the product component of our marketing mix (4 P's). Through research, we will identify the customer's wants and needs for our sponsor' product. Understanding what the customer wants will help in the development of the product and its specification. That will then satisfy the DP: System for 4 P's (Price, Product, Place, Promotion).

DP-1.3.3 System for Specifying Place

This system is being used to specify the place component of our marketing mix (4 P's). We will determine where this product should be sold and to whom in the upcoming future. We will use channel partners as well as conduct research in areas that our product could be marketable. In doing so, the DP: System for 4 P's (Price, Product, Place, Promotion), will be further completed.

DP-1.3.4 System for Specifying Promotion

This system is being used to specify the promotion component of our marketing mix (4 P's). It was created to find new ways of promoting our sponsor's product to the marketplace. We will research different methods of advertising and promote this "word of mouth." initial investor will be the number one promoter of our product for the new market. This system along with the other 3 P's will fulfill the DP: System for 4 P's (Price, Product, Place, Promotion).

DP-1.3.5 Functionality

In order to determine the functionality, we have chosen a design parameter focused on the main advertising points for this product to the customer. The purpose of a market entry point analysis is to determine which portion of the market the product belongs, which would entail the customer having an interest in the product. We believe that the points of emphasis that the product can offer the customer is through its ability to prevent large potential profit loss, save time in terms of use and maintenance, and to help create a safer work environment.

DP-1.3.5.1 Saves time and money

We believe that a customer interested in this product will be interested in saving themselves from large potential financial losses, as well as the time being saved on the maintenance and use of their fire systems. While this system can provide a certain degree of savings in terms of operational costs and decreasing the number of technicians being used, we believe the product will be best served being marketed for its potential to prevent larger losses in the future. This parameter also details the marketable trait of saving time in terms of its

maintenance and its use via the mobile app. The design parameter outlines our process for determining those figures and displaying them in a more clear format.

DP-1.3.5.2 Safer work environment

To demonstrate the use of this product to the customer, we must focus on the aspect that it has the ability to create a safer work environment with the potential to add even more safety measures for the work place. The product functions alongside the current system by providing faster information to mobile sources, therefore increasing response speed. Being able to quantify this benefit is the process with which we are trying to accomplish in this design parameter.

DP-1.4 System for identifying channel partners

The channel partners were decided on based off of the companies that had controlling shares of the fire safety and protection industry. This system led to the choices of looking into the two companies, Gamewell and SimplexGrinnell. Ultimately, it was chosen that Gamewell will be the channel partner of choice for our sponsor.

DP-1.4.1 System for analyzing Gamewell

Our sponsor had an already established contract with Gamewell to provide a mobile fire control application for their client. This made it easy to determine the system that analyzes Gamewell's client list and look for more possible clients that our sponsor could sell their product to. This is important to finding where our sponsor can enter the wider market with their Mobile Fire System Control Application.

DP-1.4.2 System for Analyzing Simplex

SimplexGrinnell controls roughly half of the fire safety protection market, this is an obvious indicator to have a system in place to analyze them. The first choice would be for Simplex to be another channel partner for our sponsor, but they do not seem interested in dealing with the company. Thus, it would be prudent to be aware of possible competition later down the road.

DP-2 Analyze overall product financials

The second aspect used to help determine the market strategy for this product is to analyze the overall product financials. This design parameter will help us to better understand the financial impact on both the producer and the customer, thus providing a better understanding about the market, and its prominence, potentially for this product.

DP-2.1 Analyze Customer's ROI

This functional requirement aims to explore the financial aspects of the purchase decisions related to this product, so the design parameter includes clear financial motives related to that decision from the customer's point-of-view. The two we focused on were the customer's costs and the benefits they receive from the product.

DP-2.1.1 Quantify Customer's Costs

One of the most prominent financial motives in all purchase decisions are the potential costs for the customer. The customer wants to know how much they will need to invest and over how long of a period in order to obtain a product or service. In order to determine the return on investment for the customer, we need to understand the level of investment required by the customer for this product, which would be shown by the amount of money required for its various costs.

DP-2.1.2 Quantify Customer's Benefits

On the other end of the spectrum, another prominent financial motive is the level and degree of benefit that the customer going to receive from their purchase decision, should they choose to make it. This design parameter describes the way we are using expected benefits and converting them to monetary figures to get an idea of how much the benefits are worth to the customer.

DP-2.2 Analyze Seller's ROI

The constraints for analyzing the seller's ROI should include the initial investment put into the product as well as any other resources our sponsor has allocated to bettering the

application. It helps our sponsor relate the current allocation of resources to the bottom line of the company, in order to determine whether or not the appropriate action is being taken.

DP-2.2.1 Analyze Seller's Cost Center

The DP is necessary to account for the budget of project. It includes an organizations budget for marketing, human resources, and research throughout the process of bringing a new technology to market.

DP-2.2.1.1 Value Technology Input/Output

It is important to establish a parameter in which the technological input for the project can help the organization succeed and profit. If a project proves to become too costly for the company, or the company realizes that the technology being invested in the project is not producing a profit proportional to a successful product. Forming a stabilized environment in which to operate is crucial for to day to day operations.

DP-2.2.1.2 Identify Optimization

In order to create an optimal environment then it is imperative to adhere to a set of restraints in which to conduct business. Minimizing the input of materials and maximizing the output of revenue, is the ideal strategy for optimization. Conducting your business at peak performance and minimalizing any potential waste of resources allocated to the project permits optimized results for the project and organization.

DP-2.2.2 System for Analyzing Seller's Revenue Center

In order to successfully run a business, one needs to know how it makes money. That's where the seller's revenue center comes into play. Developing a system for understanding how our sponsor will make money off of the Mobile Fire Control System Application is paramount to determining the market entry point as well if the product has a strong ROI.

DP-2.2.2.1 System for Valuing the Product

The different clients from Gamewell will have mixed valuations of the Mobile Fire Control System Application. This makes it necessary to create a system for valuing the product

for each specific company. This will allow our sponsor to adjust their prices of the products, whether up or down, on how much need the customer will have for the application.

DP-2.2.2.2 System for determining financial statements

Having a record of the revenue brought in and the expenses paid out is necessary in any successful business. Developing this system to determine the financial statements for our sponsor will help keep track of the cash flows that are a part of this new project and young company.

DP-2.2.2.3 System for Determining Sales Projections

A system to determine the sales projections of the Mobile Fire Control System Application will be necessary in order to bring investors into the project and showing the success of the business.

DP-3 System for Generating a Distribution Plan

This system is being used to generate a distribution plan for the Mobile Fire Protection Application that will be sold by our sponsor. We are creating this system by dividing it into two different parts: the Distribution Channel and the Distribution Time Frame. This system will be used to help solve Fr_0 .

DP-3.1 System for Determining Distribution Channel

This system is being used to determine our distribution channel for the product. It was created to fulfill the DP: System for Generating Distribution Plan and to add value to Fr_0 . We will find the time, place, and ownership of our product in its distribution channel. By researching the different distribution channels, we will come to a conclusion that fits best for our sponsor.

DP-3.2 System for Determining Distribution Time Frame

This system is being used to determine the time frame for our distribution plan. This will add in solving Fr_0 . We will take into account where the company currently stands with its product development and when we believe will be the right time to determine when to

distribute the product. Our sponsor will be able to give us a timeline on their product development and from there we will be able to determine the product's time frame.

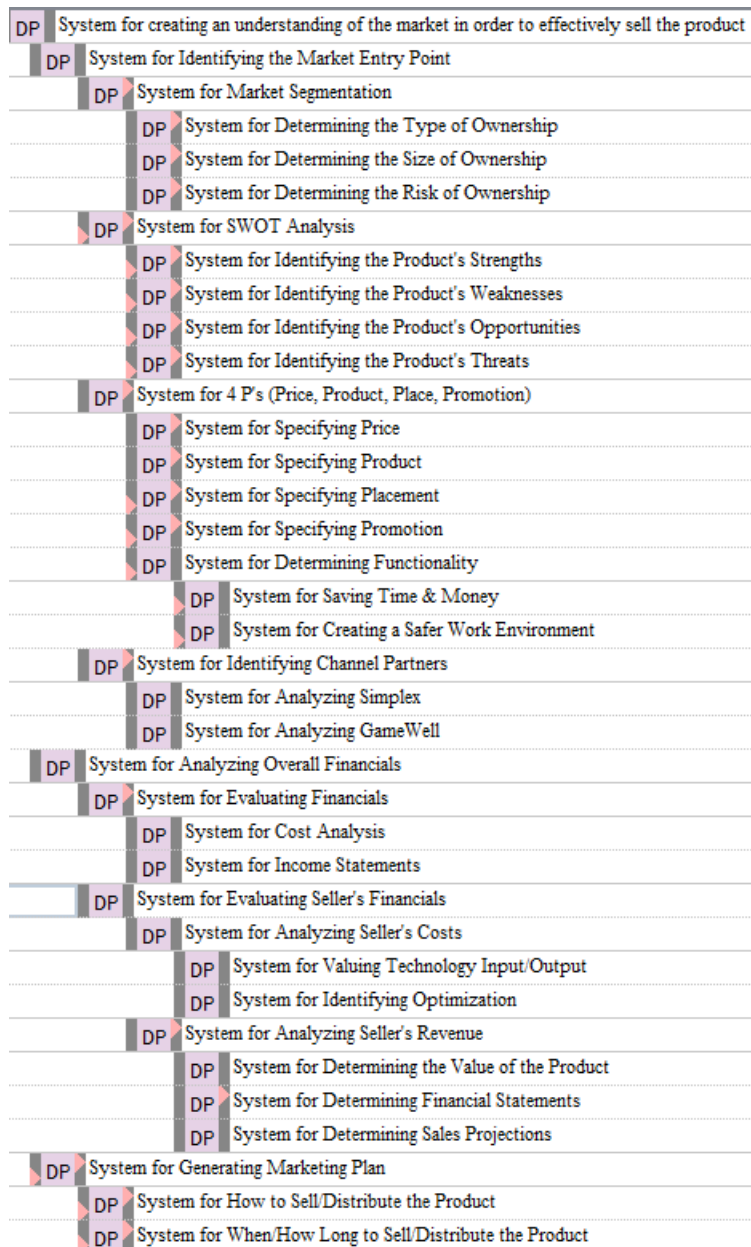


Figure 4 – Expanded Decomposition of Design Parameters

Interactions within Axiomatic Design

Coupling between the FR's and the DP's is found when a design parameter influences more than one FR. Once identifying an interaction between a functional requirement and a design parameter, it is marked in the axiomatic design matrix with an X. This marking is used to help designate to the user which processes affect one another. The following are the intersections found within the axiomatic design for our sponsor's Mobile Fire Protection App, which can be seen in Figure 5.

Connections with FR 1.2 Identify SWOTs

The SWOT analysis outlines a particular product's strengths, weaknesses, opportunities for profit, and threats within the market. This functional requirement was found to overlap with the design parameter for specifying the product, which is reasonable as the latter is directly related to the characteristics described within the analysis. This overlap also would justify why the remaining "children" in the axiomatic design for this functional requirement subset are also overlapped as well.

Connections with FR 1.2.1 Identify Product Strengths

The strengths of a product are the characteristics that make a particular product more endearing to a customer when compared to similar products within a market. As this characteristic represents the product itself, it would directly relate to the design parameter of the axiomatic design specifying the product. Specifying the product would mean elaborating on a product's characteristics, and as such, that would include a product's particular strengths.

Connections with FR 1.2.2 Identify Product Weaknesses

The weaknesses of a product are the characteristics that make a particular product appear less marketable to a customer when compared to similar products within a market. As this characteristic represents the product itself, it would directly relate to the design parameter of the axiomatic design specifying the product. Specifying the product would mean elaborating on a product's characteristics, and as such, that would include a product's particular weaknesses.

Connections with FR 1.2.3 Identify Product Opportunities

The opportunities of a product are the potential for profitable market decisions regarding a particular product based on what need or desire it can fulfill for a customer. As this characteristic represents the product, it would directly relate to the design parameter of the axiomatic design specifying the product. Specifying the product would mean elaborating on a product's characteristics, and as such, that would include a product's potential opportunities in the market.

Connections with FR 1.2.4 Identify Product Threats

The threats to a product are the potential for potential hazards to a product's market position based on external factors within the market, most notably with a highly competitive product. As this characteristic represents the product, it would directly relate to the design parameter of the axiomatic design specifying the product. Specifying the product would mean elaborating on product's characteristics, and as such, that would include a product's potential threats in the market.

Connections with FR 1.3.3 Specify Product Placement

The product's placement is the decision of entering a product into a particular market for a specific reason, such as its potential appeal to the consumer base. Identifying where to place a product within a market also incorporates identifying how the product will reach that market, known as the channel to the market. The design parameter determining the distribution channel thus relates to this functional requirement because it incorporates the decision of what channel to use to bring the product to the market, and so these two factors overlap.

Connections with FR 1.3.4 Specify Product Promotion

The product's promotion is essentially how the seller of the product decides to best market the product to the customer, which would mean determining how they want the customer to learn of the product. This decision would incorporate many factors, including the time in which the seller plans to place the product in the market so as to make the customer aware of when this product is available to purchase. The design parameter determining distribution timeframe incorporates this same decision, and so these two factors overlap with one another.

Connections with FR 1.3.5 Determine Functionality

We determined that this functional requirement overlapped with all of the segment potential market requirements, the SWOT analysis requirements, and the specifying product and placement requirements of the customer interaction vehicles. Potential market requirements include determining the type, size, and risk of ownership for the companies we focused on, so how the product functions impacts the daily interactions within the company's workplaces. SWOT analysis requirements include the product's strengths and weaknesses, as well as the opportunities for and threats to it. How the product functions help to identify the benefits that it provides as well as where it is lacking in comparison to a company's operations, and these requirements are also impacted by the product's functionality. Lastly, how the product performs is viewed in terms of what it provides to the customer, and so that are related to the segments of what exactly the product is and where it should be placed within the market.

Connections with FR 1.3.5.1 Saves Time and Money

This functional requirement was found to be overlapping with two other design parameters: identifying the product strengths and analyzing the customer's return on investment (ROI). The product strengths are the characteristics that attracts customers to the idea of owning this product, and the fact that the product has the potential to save the customer or company a substantial amount of time and money, demonstrates why these two requirements are overlapped. Besides that, customer's purchase decisions are also impacted by the potential return they expect to receive from purchasing this product. While this product

doesn't necessarily directly provide a return, it acts like insurance in the event that there is an unexpected interruption to business operations from its fire alarm system and procedure, which impacts future earnings and therefore, saves the company time and money.

Connections with FR 1.3.5.2 Creates a Safer Work Environment

We only determined that this functional requirement overlaps with one other design parameter, and that is to identify the product strengths. Fire alarm systems and procedures are designed to ensure the employees safety within the workplace, but any disruption caused by a trip in the system can create accidents or unforeseen occurrences of danger. One of the strengths of this product is its ability to address the situation in a more timely and accurate manner, which demonstrates the relation between these two requirements.

Connections with FR 3 Generate a Distribution Plan

Generating a distribution plan is how the Mobile Fire Control System Application will be brought to the customers. To do so will require inputs from various other systems within the axiomatic design. The first overlap involving the generation of the distribution plan is with the system for specifying the customer interaction vehicles. This is followed by its sub-systems for specifying price, specifying placement, and specifying promotion. Another system needed is to identify channel partners. The last systems needed are from analyzing the seller's revenue center as well as its sub-system of analyzing the seller's costs.

Connections with FR 3.1 Determine Distribution Channel

Determining the distribution channel is how our sponsor' channel partners will bring the Mobile Fire Control System Application to the customers. The first overlaps with determining the distribution channel will be with the system for specifying the customer interaction vehicles and its sub-system for specifying placement. Lastly, for determining the distribution channel is the system for identifying the channel partners.

Connections with FR 3.2 Determine Distribution Timeframe

Determining the distribution time frame is used in order to figure out how long it will take to bring the Mobile Fire Control System Application into the market. The design parameter

systems that are required for determining the distribution time frame are for specifying the customer interaction vehicles and its subsystem, and the system for specifying promotion.

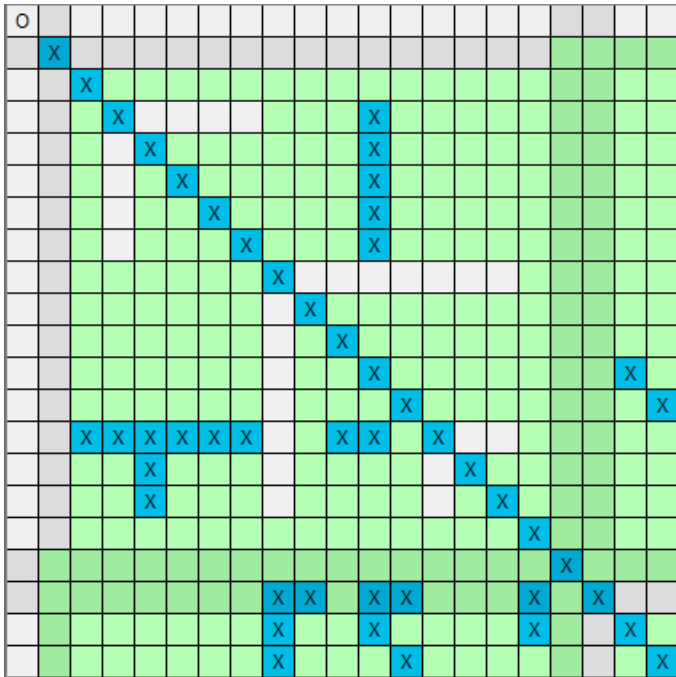


Figure 5 – Upper level of the Design Matrix Interactions

Chap.4 – Methodology

This section will provide a brief explanation of the processes used in order to complete our project, as well as justifications for all of those processes. It will begin with an introductory statement that will describe the main goal that we wish to accomplish. It will be followed by our main topics of research in the form of questions that we will need to provide answers for if we wish to come to some sort of conclusion. After providing the results of our findings, then we will be able to come to some sort of conclusion that we hope will provide an adequate response to the initial inquiry we first posed.

The six steps in Table 3 were used to examine the market segmentation process.

	Method Used	Purpose
Step 1	Initial market segmentation factors are defined	Measures how well the product applies to certain potential market targets
Step 2	Researched market segmentation factors	Determines how well the product fits with a potential customer's needs
Step 3	Potential market targets defined	Determines the initial suggested list of potential targets for Our sponsor to consider as customers
Step 4	Market segmentation grading factors defined and used to measure targets	Measures how well certain targets apply to the benefits provided by the product
Step 5	Annual revenue for remaining potential targets researched	Determines the targets that stand to have the most financial incentive to purchase product
Step 6	Top potential market targets for Our sponsor determined	Suggests the potential clients to Our sponsor that would be most willing and suited to purchase product

Table 3 – Market segmentation methods and purpose

The six steps in Table 4 were used to examine the marketing mix for our sponsor' mobile fire protection device.

	Method Used	Purpose
Step 1	Marketing mix (4 P's) is defined	Specifies how customer interaction vehicles are able to identify the market entry point for our product
Step 2	Our sponsor helps determine the value of the product to the buyer	Determines the mobile application's price
Step 3	Customer wants and needs for Our sponsor' product are researched	The development of the product is specified

Step 4	Research is conducted in areas that our product could be marketable and channel partners are determined	Decides the place in which the product should be sold and to whom
Step 5	Research different methods of advertising	Ways of promoting our product are found and we will use initial investor as our number one promoter
Step 6	Completed the marketing mix (4 P's)	Satisfies one requirement in determining and identifying the market entry point for our product

Table 4 – Methods used in defining the marketing mix (4 P's) for our product

The six steps in Table 5 were used to examine the SWOT analysis for our sponsor.

	Method Used	Purpose
Step 1	SWOT chart is defined	Measures how well the customer's needs are being satisfied
Step 2	Met with Our sponsor	Found our more information about the product and where it stands
Step 3	Met with Wally Towner, MQP Advisor	Came up with new ideas
Step 4	Brainstormed research ideas for the company	Determined the strengths, weaknesses, opportunities, and threat for Our sponsor and its product
Step 5	Had SWOT analysis reviewed by Wally Towner and Our sponsor	Identify mistakes and make any necessary changes
Step 6	Finalized SWOT analysis	Satisfies one requirement in determining and identifying the market entry point of our product

Table 5 – Methods used in creating the SWOT analysis for our sponsor

The five steps in Table 6 were used to examine the distribution plan for our sponsor.

	Method Used	Purpose
Step 1	Distribution plan and timeframe are defined	Measures where and when the product should be distributed
Step 2	Research is conducted on types of distribution channels	Able of finding the time, place, and ownership of our product that fits best for Our sponsor and their product
Step 3	Met with Our sponsor	Determined where the company currently stands with its product development and created a timeline based off of that information

Step 4	Researched “distribution channels and channel partners” and “exclusive distribution channels” as part of literature review	Created a better understanding of the type of distribution channel Our sponsor should enter
Step 5	Made final decisions for distribution plan and timeframe	Satisfies all requirements for generating a distribution plan for Our sponsor

Table 6 – Methods used in generating a distribution plan for our sponsor

Additional Processes

Analyze Economic Viability of New Application

This process included assessing the return on investment of both the customer and the seller, which was outlined in our financial analysis. Our method to determine how to achieve the desired end result was to determine how to best represent this information within our calculations and processes. We determined that the best way to represent the return on investment for the seller, our sponsor, was through a NPV calculation after discussing it with Walter Towner, our project advisor. This calculation was derived from our findings within the financial analysis, which was revised by our sponsor, our project sponsor, and was determined to fundamentally project the potential return on investment on the MFPA product. After completing this, we determined that to continue with the NPV analysis and assess the projected risk of not having the product would be the optimal way of demonstrating the return on investment for the customer.

Product Factors of Market Potential

This process was included in the market segmentation process, as it helped to determine what factors to use to distinguish a good potential market target to one that was not. As the axiomatic design outlined, this process is defined by the product’s ability to save time and money, and to create a safer work environment. Our methodology involved with this process was to determine grading factors that were detailed to this. These factors are elaborated on further in the market segmentation chapter.

Identifying Channel Partners

This process detailed the list of potential market targets that we used within our market segmentation analysis. The list was determined based on feedback from our sponsor and their potential channel partners, Gamewell and Simplex. Our sponsor decided to move forward with Gamewell, so the list of targets consisted of Gamewell's listed clients.

Chap.5 – Market Segmentation

Research Conclusions

As was outlined by our axiomatic decomposition, in order to know best how to achieve our sponsor' goal of outlining and suggesting a business plan for this product effectively, we determined the value added of the application from the market's point-of-view. The research involved getting a better understanding of what the product is, how to best market it, and what markets may be endeared towards it. The results of that research are as follows:

SWOT analysis

In order to determine a better understanding of the product, a SWOT analysis was prepared to determine the perceived benefits and possible non-benefits of the application. This would aid in finding what market might be best suited for the application and reveal an appropriate marketing plan.

SWOT - Strengths

The strengths of the MFPA are many. From a simple mobile app platform the MFPA allows the client to monitor, adjust, and respond to alarms generated by their campus fire protection system. The MFPA allows the client to monitor and control sensors on a room by room basis. It allows the operator to monitor the system from anywhere at the facility. This saves time in an emergency while also saving money since the operator doesn't have to be tied to a fixed monitoring station. The system is easy to operate and requires minimal training for an operator already familiar with the client's fire protection apparatus. In an emergency, the software will guide the user to the nearest safe exit point.

For large entities that have critical operations needing to operate around the clock, the cost of the system is negligible compared to potentially lost revenue. Our analysis shows that the cost of the MFPA system is small compared to the lost revenue and potential risks caused by false alarms.

SWOT – Weaknesses

As part of the SWOT analysis for our sponsor' Mobile Fire Protection System Application, the weaknesses currently known about the company and product will be examined. At this time, initial investor is the only customer for the Mobile Fire Protection System Application. Initial investor first stated the desire for the system and paid an initial fee to our sponsor. It is unknown how well the application is working for initial investor and if it is saving them money as planned. There are assumed to be extra costs for services to initial investor that may lessen their desire to continue with our sponsor if the application is not performing as well desired. Another limitation is that level of competition in the market is unknown, so the available time to introduce the application to the market with first mover advantage is also unknown. Other limitations could include the possible concerns over security issues with the application and making sure it is secure from malicious threats. The amount of time needed for a company to implement the application and learn its new interface could also be a deterrent for them to purchase the system.

SWOT – Opportunities

After identifying the strengths and weaknesses, the next step in the SWOT analysis is to find the opportunities. These opportunities are anything in the external environment that can be used as an advantage for the company and the product. Here is a list of opportunities identified in the project:

- The developer could try selling the system to:
 - Office buildings including universities/colleges, residential properties, and prisons
 - Business sectors which include organizations that are industrial, commercial, healthcare, and government support – businesses that include a large number of people in its facilities
- Market segmentation by size of organization:
 - # of employees
 - Acreage
 - # of buildings
 - Ownership
- Channel partners – Honeywell
- Restoration buildings that were damaged by a fire could be targeted

SWOT – Threats

The final stage of the SWOT analysis is to list and analyze the different threats that could pose an issue to the overall product or goal. Threats are considered all factors that are external and can negatively impact the overall success of the product or goal; which essentially means that any factor that is outside of the main organization in charge of the product or goal that can negatively affect the process to complete it. This is an important step in the SWOT and overall analysis process because it will help prepare management, i.e. those in control of the situation, for potential pitfalls that can either derail or slow the success of the product.

In this scenario, our sponsor is considered to be the organization in charge as it is the developer of the system, the mobile fire protection application, and the purpose for this project is to determine a market entry point for this product. The following are a list of factors that are external and could negatively impact the application's success on the market:

- Honeywell and their role in the design, application, marketing, and sale of this product
- Negative public response to the product
- Lack of interest in the product due to: uncertainty of need for application, unwillingness to pay price for application, and other purchase decision cautions for the customer
- Unknown product and an unknown market

The greatest of all external factors is the impact that Honeywell could have on the product itself, as well as the plan for it. Initial investor had originally contracted Honeywell to perform this operation, and while our sponsor has been at the forefront of its design and application, Honeywell can still impact and interfere greatly.

The current system requires manual operation and attention to be paid to it, and while it is not as efficient, it can easily be trusted because the errors of manual operation are few and understandable, whereas errors by a more technical system can be far-ranging and not as easily solved. This lack of trust in a technical system stems generally from a lack of understanding of the system and of technology itself. Issues that arise would need specialists to fix them, which requires the use of more time, people and money. Also, because this product is original and new, it creates an intrigue as well as confusion, as there is uncertainty in how and where to sell it. We have attempted to take these factors into account so that our response would be in the form of a market entry point for this product that can alleviate these concerns.

Segmentation Factors

The primary step in developing a marketing plan for any product is segmenting potential markets by a ranking system using factors that relate to the product. The results of our market segmentation were from an analysis of several factors of different aspects of companies that were potential clients for our sponsor, which we then used to rank the perspective clients. These ranking factors were first determined by conclusions we came to after researching the following characteristics of potential our sponsor clients:

Conclusions – Companies by Ownership

After reviewing the results from our research, we could see that the majority of companies found on the client list own the buildings that they operate. This result did not come at a surprise, as many of the companies on this list are high-profile or fortune 500 companies, and so they would almost assuredly own the buildings of their operations. This is because for large and successful companies, it makes financial sense to own the facility that houses operations that are likely to continue in that area and not to spend money to pay an outside agency for the area while operating under a set of regulations that that agency could install for their property. There were, however, certain companies that are believed to be working out of leased buildings and facilities, which impacts the purchase decision for the system. If the company works out of a leased building, than the purchase decision would have to be approved by more than one owner possibly, and the overall desire of purchasing this system for a building they might not continue to operate out of into the future might come into question.

The purpose of working out of leased buildings we can either certainly tell or assume for several reasons. For some companies, such as AT&T, they operate out of many stores worldwide, yet only have a certain number of public offices or headquarters. This would make sense as they would have less financial commitment on branches of their organization that are subject to change or movement based on the consumer response in those areas. Another reason that we found, such as with Quaker Oats, the main company and operator at a certain location is part of an organization that has merged at one level or another, or aligns with a company that has a certain level of financial investment in that area. This would cause the other company to have partial ownership of certain facilities in certain areas. Putting these reasons

aside, it can be said that the vast majority of clients on this list own their buildings and therefore would be the target of marketing and contract conversation when selling and distributing the product at the base of this project.

Conclusions - Number of Employees

Currently in the fire protection industry there are only two major players, Honeywell and Tyco, who just about split the market. Our sponsor is working with Honeywell to satisfy initial investor's need for the mobile fire protection application. Without the association with Honeywell this application would not be able to get off the ground due to companies already established with their safety provider and our sponsor not wanting to take the responsibility of becoming a complete fire and protection provider. This information led us to determine that the best way for the mobile fire protection application to penetrate the market is to be included with all of Honeywell's current clientele. This list is found through Honeywell's subsidiary Gamewell.

The first data set we researched from the client list is the number of employees each company has. The application adds value because it could save lost man hours due to false alarms, and quicker response times to real fires. The research we have conducted demonstrates that an overwhelming majority of Gamewell's clients have over 1,000 employees, of over 75% of the clients. Due to the insurance this application provides to companies that employ larger work forces, this shows that the mobile fire protection application is very applicable to these companies with high numbers of employees.

Conclusions – Companies by Acreage

After reviewing the segmentation results for our research, we found that not many companies provided information on company size by acreage. Although there was not a lot of information, we did generate some conclusions based on what we could find. We first broke up the companies into six different categories based on their type: industrial, institutional, commercial, healthcare, hospitality, and government companies. It was noticed that commercial, healthcare, and hospitality companies gave the least amount of information based on their acre size. When looking at the other types of companies, the majority were found to have more than 150 acres of space and land. In comparing this data to initial investor, the

companies are relatively close in size. Initial investor is sized around 123 acres. Based on these results, it could be helpful to find more information on companies that have over 100 acres of space. This research gives us a better idea on what companies our sponsor should target when selling their product by using initial investor as a comparison.

Conclusions – Companies by # of Buildings

When initial investor contracted our sponsor to deliver this product to them, it did so with the intention of keeping all of their employees across their entire campuses safe and reduce operating costs. In order to do so, the product would need to be effective, not only through mobile application but, as a part of their network for all of the buildings of its facilities. As this product provides direct access to the system, it would also provide access to all sensors and detectors in all of their buildings as well. Thus, as this product is being considered for open market selling or corporate contracting, it is important to note the market segment that would include other companies like initial investor, who could gain from the services of said product.

The results of our market segmentation show that, due to the size of the potential clients and their level of production, many of the potential clients to be considered would find value in this mobile fire protection app. Even if there are clients that don't operate out of multiple buildings in locations, such as a hospital, these areas still operate in larger areas or buildings with high enough levels of production to warrant the use of such a product.

Market Segmentation Grading Factors

In order to effectively narrow down the list of the 69 listed clients of Gamewell, additional factors were required to judge which clients would find the MFPA most beneficial. Relating back to the first chapter, as we summarized in our “Product Value” section, the most marketable feature of this product is the potential savings that this product can produce for a company. As such, our grading factors were based on those three criteria. The five criteria we used were whether or not a company was:

- Operating 24 hours a day
- Whether the incident would affect salary
- Whether the incident would affect income
- Whether or not the company would benefit from quicker problem solution, and
- Whether or not the product would be convenient to the customer.

The grading scale used for these distinctions were markers of the number one, and so we determined the results by totaling the markers for each potential customer. Those companies that received totals of four and above were deemed high potential targets, and were given priority further along in the segmentation process. We determined the effect on income and salary based off of assumptions made on business practices and corporate reports that detailed their business processes, which allowed us to determine whether an interruption would affect certain companies or not. Every company received a distinction for ‘quicker problem solution’ and convenience based on the capabilities of the application itself, as it would provide both of those things for a client. The clients that were applicable to the most of these factors was deemed acceptable to pass until the next decision of cuts. The results are as follows and shown in Figure 6, with those passing highlighted in green:

GAMEWELL CLIENTS	Revenue		Time		Safety	Total
	Income	Salary	24 hr Operation	Quicker Problem Solution	Convenience	
Company						
ESPN	1	1	1	1	1	5
Philadelphia Electric		1	1		1	4
DuPont	1	1			1	4
Nike World Headquarters					1	2
Ford Aerospace Company	1	1			1	4
Westinghouse					1	2
Los Alamos Laboratories	1	1			1	4
Northrop Grumman					1	2
Sunoco Paper Mills (Holyoke, MA)		1			1	3
Honda Manufacturing Facility (Atlanta, GA)	1	1			1	4
Yamaha Manufacturing	1	1			1	4
Hearth N Glo Mfg.		1			1	3
Panduit Corp.					1	2
Newport News Shipyard (Newport News, VA)	1	1			1	4
Apple Computer	1	1			1	4
Hewlett Packard					1	2
Lucent Technologies		1			1	3
Duke University Medical Center					1	2
Harvard University					1	2
Florida Hospital	1		1		1	4
New England Deaconess Hospital	1		1		1	4
Boston University					1	2
New Orleans School District					1	2
Brown University					1	2
University of Maine					1	2
Los Angeles Unified School District					1	2
Philadelphia Detention Center			1		1	3
Minnesota State University					1	2
Carleton College					1	2
University of California - Channel Islands					1	2
Baldwin Wallace College					1	2
University of Pennsylvania					1	2
Baylor University (Waco, TX)					1	2
Providence College					1	2
Masonic Home (Wallingford, CT)			1		1	3
Camden Yards					1	2
Home Shopping Network	1		1		1	4
Bank One Building (Dallas, TX)					1	2
Hyatt Resort Hotels	1	1	1		1	5
Christa McAuliffe Planetarium					1	2
Marriott Hotels	1	1	1		1	5
Quaker Towers - Chicago					1	2
SeaWorld (Orlando, FL)	1				1	3
Oakland Airport (Oakland, CA)	1	1	1		1	5
Swedish Covenant Hospital	1		1		1	4
St. Bernard's Hospital	1		1		1	4
Rockford Memorial Hospital	1		1		1	4
St. Mary's Hospital	1		1		1	4
Mt. Clemens General Hospital	1		1		1	4
Hard Rock Hotel & Casino – Tampa	1	1	1		1	5
Treasure Island Casino (MN)	1	1	1		1	5
Marriott at the University (Chicago)	1	1	1		1	5
Starwood Hotels	1	1	1		1	5
Ellis Island					1	2
Fort Sam Houston			1		1	3
General Services Administration			1		1	3
Lackland Air Force Base			1		1	3
The Pentagon			1		1	3
Lemore Naval Air Station			1		1	3
United States Navy			1		1	3
Norfolk Naval Base			1		1	3
City of Boston Municipal System			1		1	3
Camp Lejeune Marine Base			1		1	3
Kit Peak Observatory					1	2
Edwards Air Force Base			1		1	3
Vandenberg AFB			1		1	3
Great Lakes Naval Training Center			1		1	3
Ft. Benning (GA)			1		1	3
Veterans' Administration					1	2

Figure 6 – Listed Honeywell Clients and Distinctions

The highlight in yellow was for SeaWorld, and the reasoning behind passing this on for consideration after this round of cuts is because it represents the only major client in this market. This means that even if this company doesn't provide the financial incentive to be a top-tier target client, it would be the main client to consider if our sponsor ever decided to move their product into this market.

Once we used these grading factors to narrow the list of potential target clients, we then researched the annual revenue streams of each of those clients. We used the information from the latest available corporate reports that we could find, and determined their most recent annual revenue figure. This was crucial to our market analysis because it designated how we would narrow the list of potential clients even further. The purpose of this product is to save the customer potential losses, thus the most applicable clients would be those that would stand to lose the most money if they didn't have this technology. It was from this step that we were able to determine the top ten suggested clients that our sponsor should make a priority in marketing their product to.

Industry/Client Analysis

By using the top ten target list from the market segmentation chapter, it is possible to organize the different companies into their corresponding industries. From the selection of companies, the industries that were chosen to be represented are; hospitals, hotels, 24 hour broadcasting, airports, and lastly shipyards. With the industries chosen, the process of analyzing them more can begin. The desired data from the analysis is to be the total amount of money that a company, within one of these industries, can save over the course of a year by using the mobile fire safety application.

To accomplish this, the first step is to take the annual revenue data that was collected for the market segmentation and create an industry average annual revenue. Followed by dividing that number by 365 days and then taking that result and dividing it by 24 hours in order to get the average industry hourly revenue. Now by having the average hourly revenue per industry, as shown in Figure 7 below, it leads into how this product can be marketed to the various industries through the concept of business interruption insurance.

	<u>Avg. Ann. Rev.</u>		<u>Avg. Daily Rev.</u>		<u>Avg. Hourly Rev.</u>
Selected Hospital Average	\$ 36,797,900,000		\$ 100,816,164		\$ 4,200,674
Selected Hotel Average	\$ 7,350,000,000		\$ 20,136,986		\$ 839,041
24 Broadcast Average	\$ 1,100,000,000		\$ 3,013,699		\$ 125,571
Airport Average	\$ 130,000,000		\$ 356,164		\$ 14,840
Shipyards Average	\$ 6,700,000,000		\$ 18,356,164		\$ 764,840

Figure 7 – Industry Revenue Table

Business interruption insurance is a way for companies to protect the value of their continuous revenue stream and it follows the simple equation of:

$$Time \times Quantity \times Value = Total \text{ amount } (\$).$$

For the purpose of this project, the Time variable will be considered as the amount of time in hours it would take for a company in the given industry to return to normal operation after a fire alarm has been set off. The quantity variable is the assumed number of false fire alarms within a given year for a company in that industry. And lastly, the value variable is the industry average hourly revenue. By using these variables and the business interruption

insurance equation, it is possible to find that desired number of the average industry incident savings per year. These results are shown in Figure 8 below:

		Time	Quantity	Value	total
24 hr broadcast	=	2	3	125570.8	\$753,425
Hospitals	=	3	3	4200674	\$37,806,062
Hotels	=	1	6	839041.1	\$5,034,247
Shipyards	=	1		764840.2	
Airports	=	3	2	14840.18	\$89,041

Figure 8 - Business Interruption Insurance by Industry (savings per year)

The results of this revenue analysis show some interesting data. First, it is to be noted that the group has decided that due to a lack of transparent information, the shipyard industry will not be in the final results. From the remaining data, it can be seen that hospitals are the industry that will be most protected from risk by having the MFPA. Followed by hotels and then the 24 Hour Broadcasters.

Chap.6 – Financial Analysis

In order to quantify the customer's costs the Net Present Value, 'NPV' of the installation and maintenance costs of the system for five years was calculated and compared to the NPV of the potential risk to each industry group over five years by estimating the amount of time lost during an incident and an average number of incidents per year as shown in Figure 9 shown below:

Risk Analysis						
	Avg. Hourly Rev.	Avg. Length (Hours)	Avg. No. Incidents	Potential Risk		
Hospitals	4,200,674	3	3	37,806,066		
Hotels	839,041	1	6	5,034,246		
24 Hour Broadcast	125,571	2	3	753,426		
Shipyards	764,840	1	1	764,840		
Airports	14,840	3	2	89,040		
NPV of Risk Potential						
	NPV of Risk	Year 1	Year 2	Year 3	Year 4	Year 5
Hospitals	(143,314,735)	(37,806,066)	(37,806,066)	(37,806,066)	(37,806,066)	(37,806,066)
Hotels	(19,083,753)	(5,034,246)	(5,034,246)	(5,034,246)	(5,034,246)	(5,034,246)
24 Hour Broadcast	(2,856,077)	(753,426)	(753,426)	(753,426)	(753,426)	(753,426)
Shipyards	(2,899,345)	(764,840)	(764,840)	(764,840)	(764,840)	(764,840)
Airports	(337,532)	(89,040)	(89,040)	(89,040)	(89,040)	(89,040)
Installation & Support						
	Year 1	Year 2	Year 3	Year 4	Year 5	
	\$ (200,000)	\$ (120,000)	\$ (120,000)	\$ (120,000)	\$ (120,000)	
NPV	(\$527,622)					
5 year Expense / NPV of Risk Potential						
Hospitals	0.368%					
Hotels	2.765%					
24 Hour Broadcast	18.474%					
Shipyards	18.198%					
Airports	156.318%					

Figure 9 – Cost Effectiveness Table

$$\text{Cost Effectiveness of the MFPA} = \text{NPV (Installation \& Maintenance)} / \text{NPV (Risk Potential)}$$

Cost effectiveness is a function of the cost of the MFPA to the potential risk it offsets. This ratio is highly dependent on the industry group and their unique exposure to the risk of downtime. In the case of the hospital industry, five year cost represents only 0.368% of the potential risk exposure. At the other extreme is the airport industry where the five year cost represents over 156% of the potential risk exposure. In this case it's obvious the MFPA is not cost effective.

There are some inherent limitations in this analysis that the client and the company will have to evaluate to determine feasibility, as there were some assumptions of the data used in the analysis. Using Florida Hospital as an example, this organization consists of 24 separate facilities throughout the state. Our assumptions for hospitals is that there are three incidents each year lasting three hours in each case, using the average hourly revenue for the hospital. This assumes that each facility has the same number of incidents (three per year for three hours). This needs to be compared to the hospitals actual experience on an individual basis.

The Mobile Fire Protection App (MFPA) Financial Analysis is based on a five year projection of sales and associated expenses for this product. Sales projections are based on various assumptions. We looked at a cross section of Gamewell's existing client base and selected the ten largest clients with critical facilities that need to operate on a 24 hour schedule. We then calculated the average hourly revenue for each industry group to determine which clients were at the greatest risk should their facility need to be evacuated. Because of the newness of the product and its cost, we used conservative assumptions for the number of units to be sold. For example, although Florida Hospital alone has 24 locations, we are only estimating sales of 25 units during the first five years. Updates/Service revenue is based on a monthly service agreement at \$10,000 per month per unit. Custom additions reflect an average of \$10,000 per installation for customizing software to each client's needs. Installation reflects the cost of the unit and its installation on the client's premises at \$70,000 per unit.

The projected expenses, shown in Figure 10 below, include the cost of installation and necessary support and service. Technician salaries include two installation technicians at \$80,000 each per year to work solely on this project and three maintenance technicians at \$20,000 each per year. It is assumed that the maintenance technicians are not working solely on this project. The \$20,000 is assumed to be an additional expense for them. Call Center expense includes two people at \$28,000 each per year. All salaries include a four percent (4.0%) increase per year. Outbound sales include a two and one-half percent (2.50%) commission on the total cost (including updates, custom additions, & installation) of the sale. The component cost is the cost of the 'MFPA'. The net present value ('NPV') is then calculated at 15%, 25%, and 35%.

Mobile Fire Protection App Financial Analysis						
		Year 1	Year 2	Year 3	Year 4	Year 5
	No. of Products Sold	1	6	7	6	5
	Cumulative Products Sold	1	7	14	20	25
Revenue						
	Updates	\$ 120,000	\$ 840,000	\$ 1,680,000	\$ 2,400,000	\$ 3,000,000
	Custom Additions	\$ 10,000	\$ 60,000	\$ 70,000	\$ 60,000	\$ 50,000
	Installation	\$ 70,000	\$ 420,000	\$ 490,000	\$ 420,000	\$ 350,000
	TOTAL	\$ 200,000	\$ 1,320,000	\$ 2,240,000	\$ 2,880,000	\$ 3,400,000
Expenses						
	Technician Salaries	\$ 220,000	\$ 228,800	\$ 237,952	\$ 247,470	\$ 257,369
	Call Center	\$ 56,000	\$ 58,240	\$ 60,570	\$ 62,992	\$ 65,512
	Outbound sales	\$ 5,000	\$ 30,000	\$ 35,000	\$ 30,000	\$ 25,000
	Component cost	\$ 45,000	\$ 270,000	\$ 315,000	\$ 270,000	\$ 225,000
	TOTAL	\$ 326,000	\$ 587,040	\$ 648,522	\$ 610,462	\$ 572,881
	Contribution Margin	\$ (126,000)	\$ 732,960	\$ 1,591,478	\$ 2,269,538	\$ 2,827,119
NPV (5 yrs.)						
	5%		\$ 6,001,871			
	15%		\$ 4,194,274			
	25%		\$ 3,039,124			
Assumptions:						
Updates	Monthly maintenance per month			\$ 10,000		
Custom Additions	Software modifications per installation			\$ 10,000		
Installation	Installation per unit			\$ 70,000		
Call Center	2 at \$28,000 per year plus a 4% annual increase.					
Technician Salaries	2 at \$80,000 per year plus 3 at \$20,000 per year plus a 4% annual increase.					
Outbound Sales	2.5% of total cost (including updates, custom additions, & installation) as commission					

Figure 10 – Financial (Cost) Analysis

Chap.7 – Conclusions

Results for FR-0:

We created an understanding of the market by addressing the functional requirements associated with that goal. The suggested market entry point would be the list of top market target clients, and their perspective industries. The product's financials were determined through the designating of what industries would benefit most from this product and the NPV of this product with regards to the seller, our sponsor. Finally, the distribution channel was determined through the choice of channel partner that already existed with our sponsor, with the timeframe dictated by the time of production as well as upgrading the product itself. In determining these, we were able to suggest a market plan that, based on the information gathered, would help to effectively sell the product.

Results for FR-1:

A market segmentation analysis was performed in order to determine recommended potential customers for our sponsor to target. These clients were first graded on:

1. how well the product could benefit them, and then
2. how much of a financial impact the product could have as well.

The resulting list of targets was discussed in the market segmentation chapter.

An industry analysis was performed to provide suggested future market penetration for our sponsor to consider. Taking the results from the market segmentation analysis, the annual average potential savings for each of the list's industries were found. From this, it was determined that hospitals and hotels are the types of targets that would benefit most from the insurance provided by the MFPA. Annual savings, based on the length of incident interruption caused, the number of occurrences project per year, and the hourly revenue rate, hospitals could save approximately \$37.8 million and hotels could save approximately \$5 million.

Results for FR-2:

A cost/benefit analysis was performed to determine the feasibility of using the MFPA in several different industry settings. Using NPV Discount Cash Flow Analysis, the five year cost to own the MFPA was compared to the potential risk that a given industry is normally exposed to. Based on that analysis, the hospital, hotel, 24 hour broadcast, and shipyard industries would benefit the most from this system.

A five year income/expense analysis of the MFPA was performed. Revenue from the sale, installation, customization, maintenance, and support of the product were included. Expenses included the cost of the unit, salaries for technicians and support personnel, and sales commissions. A contribution margin was calculated for each of the five years followed by a determination of the NPV at varying rates of 15%, 25% and 35%. The calculated NPV is \$4.2 million, \$3.0 million, and \$2.2 million respectively.

Results for FR-3:

Currently the MFPA is in beta testing. Upon completion of beta testing the product will be ready for general distribution. At this time it is anticipated that the technicians maintaining the system will be the first point of contact for sales. Due to the technical nature of the product and the customization required to incorporate the MFPA into an existing fire protection system, our sponsor should use an Exclusive distribution channel (e.g. Gamewell) with the knowledge and experience to implement this technology successfully.

Recommendations

The Mobile Fire Protection Application is a unique system and the first of its kind to be developed. In order to garner the success our sponsor hopes to have with this product, our following recommendations are listed in Table 8 below:

- | |
|---|
| 1. Our sponsor should become exclusively sold to Gamewell clients, specifically the hospitals in which Gamewell services. |
| 2. The financial analysis conducted showed that hospitals have the most to gain should an alarm be detected and diagnosed sooner because of this opportunity. |

3. Gamewell services six hospitals, each of which pose to lose on average \$37.8 million should they stop operating for one hour.

Table 7 – General Recommendations and Conclusions

Our High-Level Takeaways

Throughout the process there were many opportunities to enrich our knowledge of how to expand upon an existing business. We have listed our takeaways in Table 9 below:

- | |
|---|
| 1. We found how the development of a solution for a need does not always lead to a lucrative market. |
| 2. The use of an axiomatic design decomposition allows for a business to analyze all aspects of the market opportunity. |
| 3. NPV and Discount Cash Flow analysis can be used to sum the value of an entrepreneurial opportunity. |

Table 8 – Takeaways from Axiomatic Design and Analysis'

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