EnPro 355

ENHANCED VISION SYSTEM FOR CONSTRUCTION SITE SAFETY

OPPORTUNITY ASSESSMENT

FALL 2008

a. Name of product

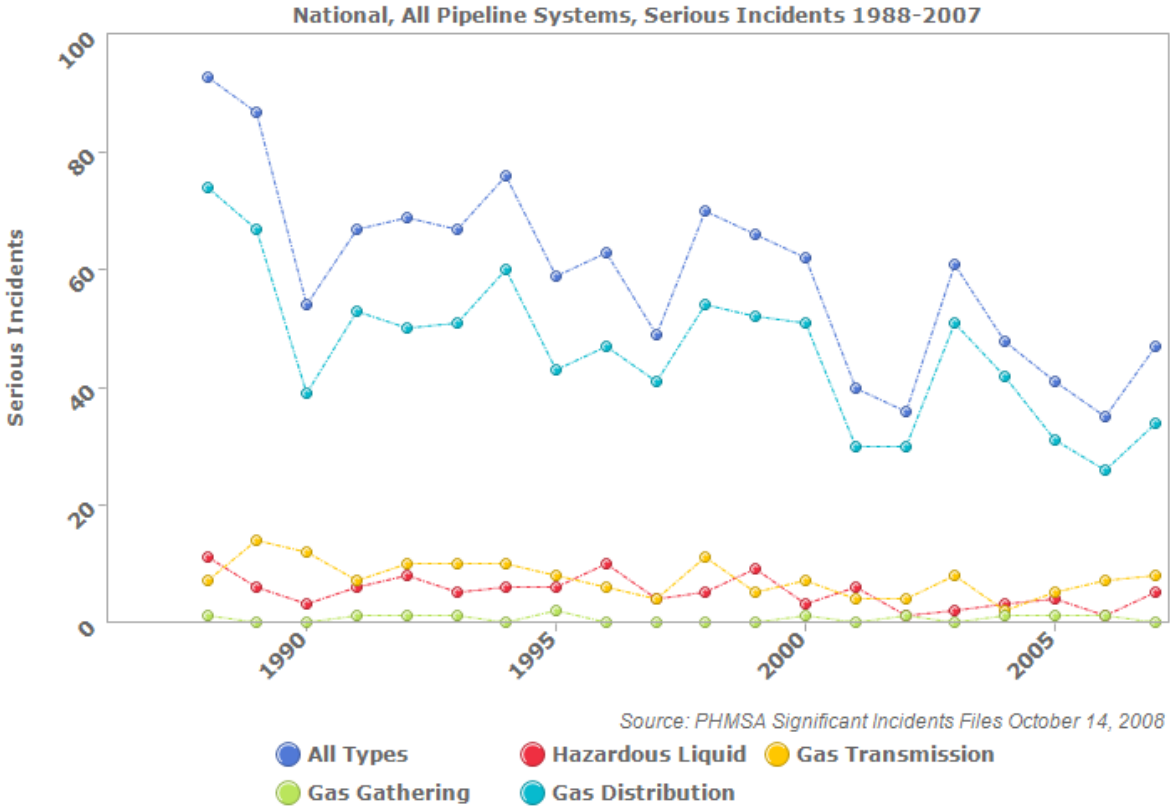
Enhanced Vision System

b. Name of team members

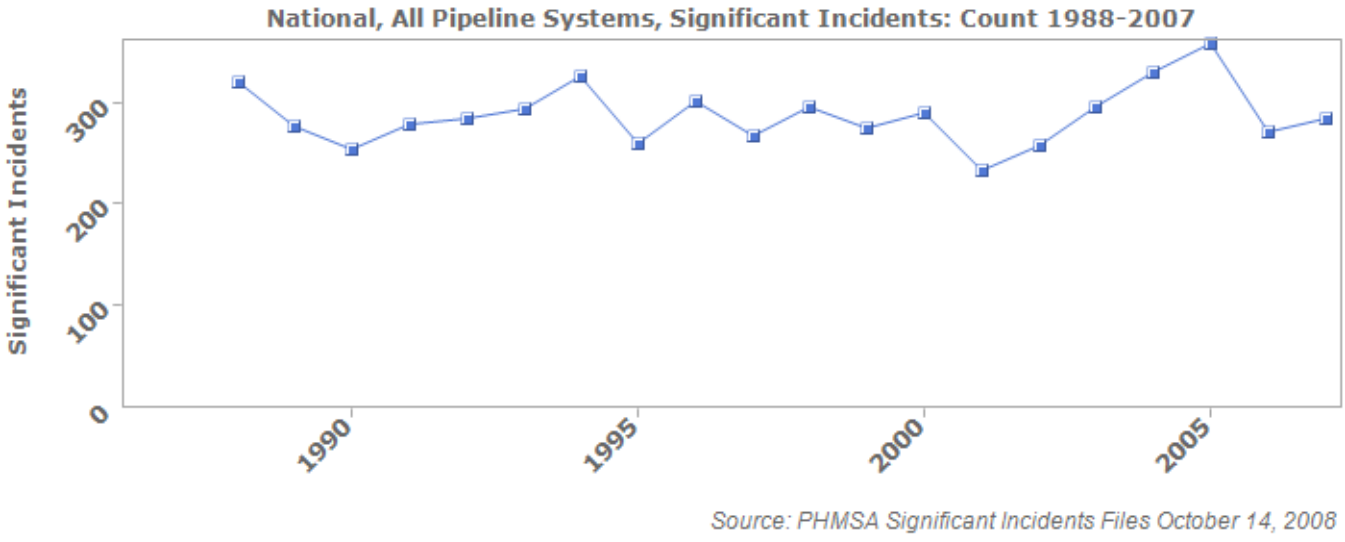
Jeff Mizek, Leo Bassett, Dave Connolly, Kok Ann Gan, Melissa Lee, Mike Beemsterboer, Tom Montgomery, Sara Sustersic, Charles Sticha, Kevin O'Leary

2. Table of contents (Tom)

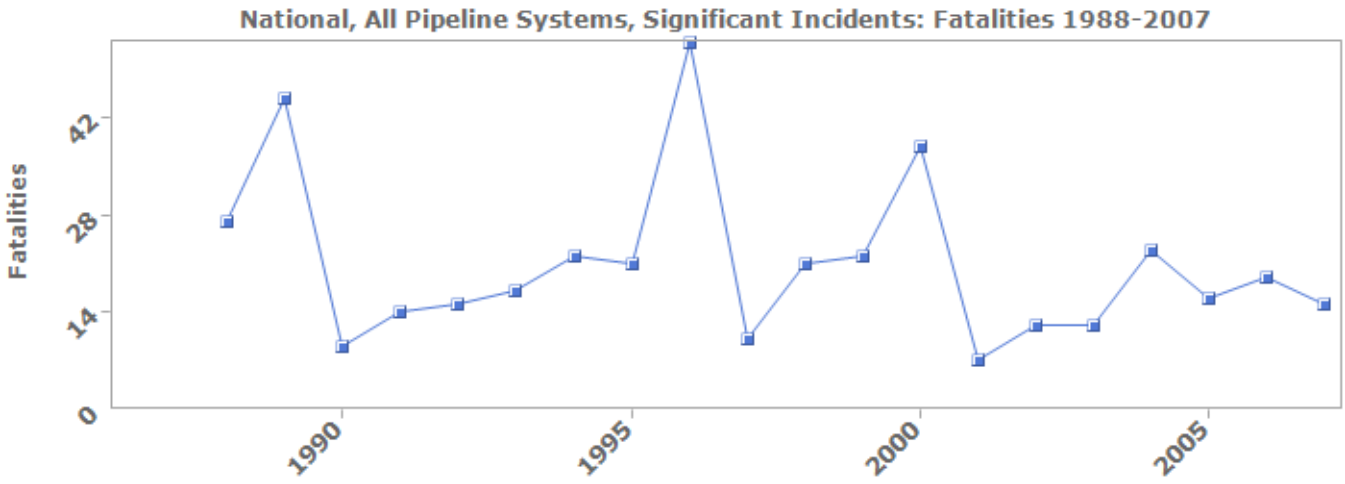
3. List of tables/figures (Tom)



Trend analysis (downward?), graphs for other utility lines



Source: PHMSA Significant Incidents Files October 14, 2008



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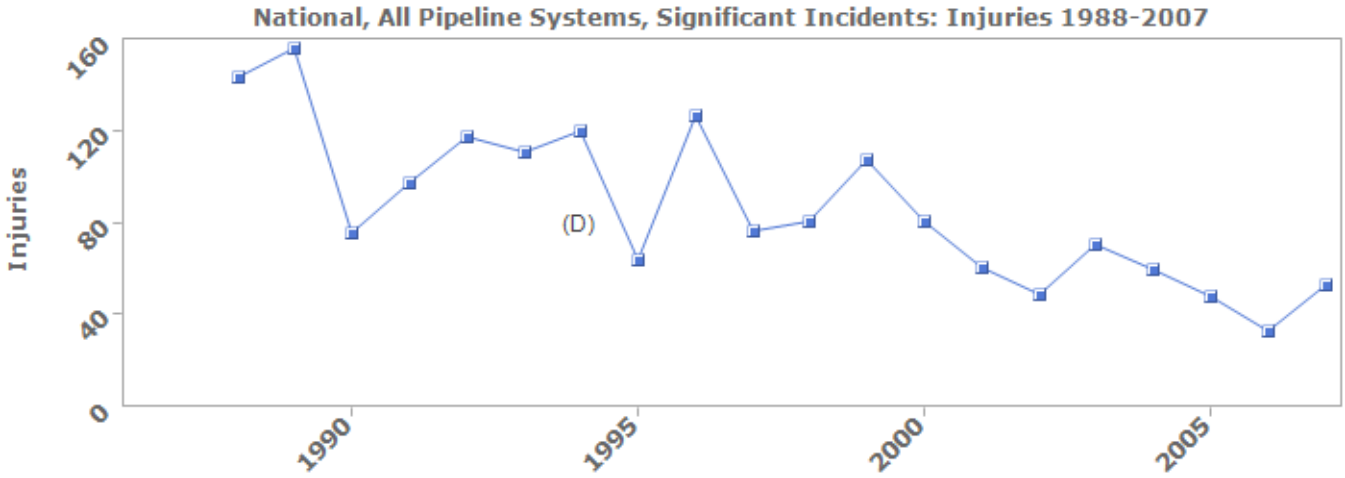
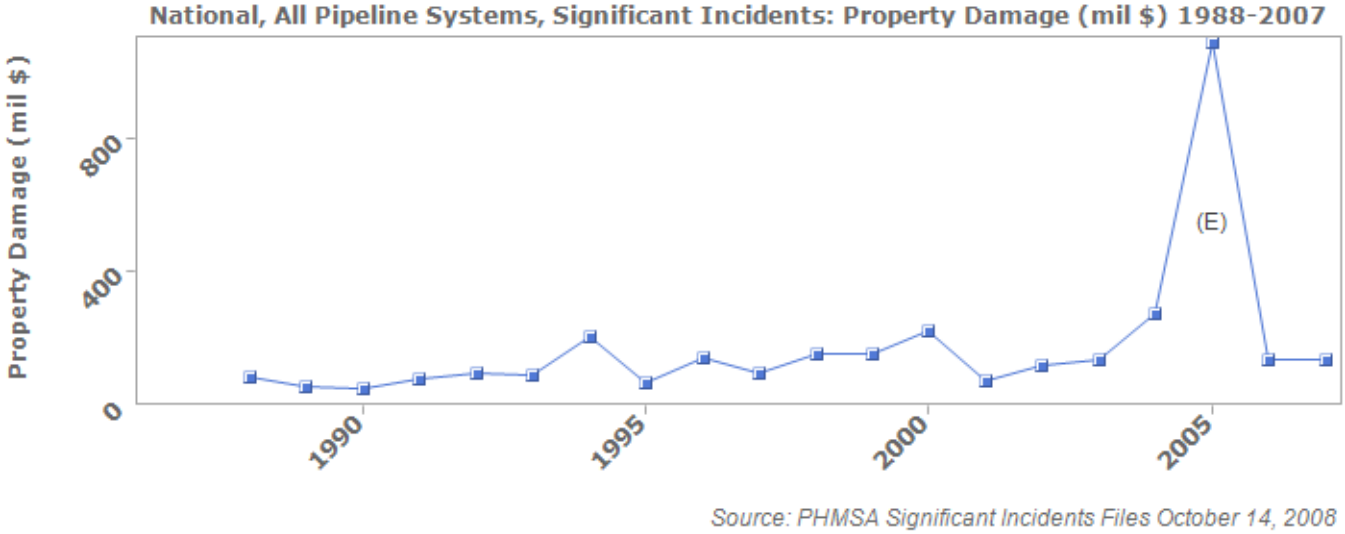


Source: PHMSA Significant Incidents Files October 14, 2008



NOTES:
[A] Serious Incidents indicates incidents involving a fatality or injury requiring in-patient hospitalization.

[B] PHMSA defines Significant Incidents as those incidents reported by pipeline operators when any of the following conditions are met:

1. fatality or injury requiring in-patient hospitalization
2. $50,000 or more in total costs, measured in 1984 dollars
3. highly volatile liquid releases of 5 barrels or more or other liquid releases of 50 barrels or more
4. liquid releases resulting in an unintentional fire or explosion

[C] A hazardous liquid is a liquid that is dangerous to human health or safety or the environment if used incorrectly or if not properly stored or contained. Pipeline safety regulations identify petroleum, petroleum products, or anhydrous ammonia as hazardous liquids.
Gathering lines are pipelines that transport oil or natural gas from the wellhead to a transmission line.
A transmission line is a pipeline used to transport natural gas from a gathering, processing or storage facility to a processing or storage facility, large volume customer, or distribution system.
A distribution line is a line used to supply natural gas to the consumer. A distribution line is located in a network of piping located downstream of a natural gas transmission line.

[D] Does not include 1,851 injuries that required medical treatment reported for the October, 1994 accidents that were caused by severe flooding near Houston, Texas.

[E] Approximately 94% of the Property Damage for Gas Distribution Incidents in 2005 was caused by flooding in New Orleans. The $466.5 million associated with this incident represents lost gas and operator property damage, but does not include damage to public and private property caused by the flooding.

4. Executive Summary- (David)

Enhanced Visual Systems (EVS) for construction site safety was created by a small group of students at the Illinois Institute of Technology seeking to develop software and hardware application that will evolve into a tangible entrepreneurial business venture.

This opportunity assessment reviewed the business opportunity of EVS and determined that this entrepreneurial project is best positioned to address EVS's five principle objectives as it moves forward: 1) to obtain a handheld GPS mapping device from Trimble Worldwide Inc., 2) to develop software applications utilizing software development kits from Trimble Worldwide Inc., 3) to develop working relationships with Trimble Worldwide Inc., or other similar suppliers of handheld GPS mapping devices, 4) To create a viable working prototype, and 5) Operate on at least a break-even basis with the goal of earning a profit.

Lives and a substantial amount of money are lost every year as a result of construction site accidents involving underground utility and communication lines. A single pipeline accident has the potential to cause a catastrophic disaster that can injure or kill hundreds of people, affect thousands more, and cost millions of dollars in terms of property damage, loss of work opportunity, community disruption, ecological damage, and insurance liability. Excavation and construction

activities are the largest single cause of accidents involving critical underground infrastructure.

EVS seeks to reduce the danger and costs related to accidents involving underground utilities by integrating a detachable ultra mobile PC into construction vehicles. The detachable UMPC will display a two-dimensional map upon which utility lines are digitally superimposed and update in real-time as the heavy equipment operator moves about.

When an operator of an excavation vehicle on a construction site accidentally hits an underground utility line, there's more than money at stake. Construction employee safety is in danger too. A ruptured natural gas line can cause a fire or explosion. A severed electric line can can be fatal. Underground utilities, electric, telephone, gas, water, and others may be almost anywhere under a construction site. These utilities were usually put in at different times, and different companies own them. Currently, to locate underground infrastructure, heavy equipment operators must rely on wooden stakes and lines painted on grass and concrete that quickly disappear

The research that was conducted is contained within this opportunity assessment and provides the groundwork from which a business plan will be developed during the next semester of the Enhanced Visual Systems entrepreneurial project.

5. Introduction

Enhanced Visual Systems For construction site safety seeks to aid heavy equipment operators involved in excavation activities as to the location of underground utilities. EVS was created not only to save construciton company's and general contractors money, but more importantly, to eliminate the safety hazards related to current methods used to locate utility markings. The current methods used to identify underground utility and communication lines are that of quickly disappearing painted lines and wooden stakes. This method is most certainly old, outdated, and definitely flawed.

During our Market Feasibility Study, our team has also uncovered a hanful of patents regarding products that seem similar to EVS. In due dilligence, our team has had our idea compared to other such patented products by a licensed patent attorney as well as a Kent College of Law student. Upon review of our product as compred to others, it was determined that we are not infringing on similar products, but unfortunately, our product will not be patentable because it is similar enough to render EVS "not a new and innovative idea." In any event, with such tremendous advancement in technolgy, especially that of GPS technology, in the time it would take EVS to receive a patent, our device will most certainly be obselete. This has only resulted in our team moving forward with our business venture and in developing a working prototype.

Throughout our research, our team has conducted numerous on-site interveiws with heavy equipment operators involved in excavtion activities. During these interviews we determined that there is an extremely high level of interest for a device such as EVS, and it would not only be welcomed, but an EVS product and software application is in fact needed. Our team also conducted and extensive interview with Mr. Martin Turek, Safety Administrator of Local 150 Heavy Equipment Operators Union. Local 150 operates heavy equipment in several states and Mr. Turek is very interested in our product, expressed his opinion that our product can provide enourmous value to heavy equipment operators, and Mr. Turek also expressed his willingness to work with our team in the future.

The information we have obtained throughout our research also tells us there is a need for a device

to aid in the identification of underground infrastructure in overseas markets as well as here in the United States. As EVS moves forward, the research that we have conducted will not only help to lay the foundaition with which to develope a business plan, but has also provided the framework for a strategic marketing plan to be implemented, which should most certainly include penetration into overseas markets throughout Europe, Asia, and Australia.

Current ideas for marketing include but are not limited to; on the ground sales people, internet advertising via EVS' company website. The website will include information about different product offerings, particularly software applications that can be used to improve safety on construction sites.

a. Product overview (Sam)

The product is a software application on a handheld device that can be mounted in construction vehicles. The application displays a 2-D map upon which utility lines are digitally superimposed, updating in real-time as the user moves. This application also shows a representation of the user's location and his or her selected safety range. The application also logs the time and location of the user.

b. Opportunity statement- (Sara)

(insert case study) The usage of a mobile safety device could potentially reduce the probability of utility line contact accidents happening. The research conducted by this team has shown that a high number of accidents occur each year worldwide. <Insert some stats here, such as from Office of Pipeline Safety> These accidents result in injuries and deaths, as well as extensive property damage and settlement costs. Many of these accidents could be prevented if the locations of underground utilities are accurately marked. When markings exhibit a deviation from the actual position of these utilities, the likelihood rises that a heavy machinery operator will strike an underground utility, based on the incorrect positioning of that marking. This inaccurate strike is what can lead to various accidents, such as damage to the pipe or cable, severing service, or worse, an explosion. Therefore, it is of utmost priority to make construction sites safer for everyone involved.

The research conducted has found various products similar to the idea outlined in this document, as well as patents on similar products. Some of these products are widely used, such as location devices by Trimble, while others are for the most part are not commonly used, such as Guardian Pro Star. In analyzing the various companies' websites, products offerings, and financial statements, the team has determined that the majority of these companies have yet to gain awareness and fully enter the market. Why is this? Furthermore, during the team's multiple interviews, the interviewees expressed no knowledge of these other products and strong interest in using a location device to make the job site safer. Just about every person involved in construction has a top goal of improving safety on the job site. The top goal of this team is to offer a product that will do just this- create a safer work environment for heavy machinery operators and every one else involved.

At this time, the team has set forth a series of goals to achieve, as outlined above.
Currently, the team has contacted Trimble in an attempt to obtain a Trimble locating device and develop an open communication channel. The team is still in the process of hearing back from the appropriate individuals from Trimble. Meanwhile, the technical subteam has been working to create new software applications using a software development kit from Trimble. The business subteam continues to conduct research on accidents, competitors, and other products, in order to determine how best to enter this niche market.

Much information and conclusions have resulted from the research and interviews conducted. It appears there is general consensus that safety is of extreme importance on any construction site and that any improvements to safety should be explored. Additionally, it also appears that there is a general lack of awareness of such products and services currently available. Or, as some interviewees expressed, some current offerings are too expensive or complicated to use, and as a result, go unused. This team seeks to not only create additionally software applications for such devices, but also to raise awareness of current products and services available to improve safety while digging.

Furthermore, it appears that the various companies and products currently out there are failing to fully meet the safety needs of the construction industry. For example, larger, well-established companies, such as Trimble and Topcon, offer products that can map utility positions on a digital screen, but require users to obtain their own sources of utility locations. On the other hand, smaller companies, such as Guardian Pro Star and Bloodhound, have products and services to locate underground utilities, but they lack awareness and have barely entered the market. Therefore, anyone about to dig, especially construction companies, can certainly benefit from using a device that can accurately and easily locate underground utilities. This can potentially lead to safer conditions that will result in a reduced amount of accidents, deaths, and injuries. Consequently, building awareness of such products and developing additional software applications is the goal of this team.

6. External analysis (Sam, Melissa)

a. Industry overview

The growth of the Computer integrated systems design industry started out in the 1980s. The industry revenues were $2.2 billion as early as 1980 despite some criticism that the tech bubble burst in the late 1990's, it had continued to steadily increase totalling nearly $88 billion in 1999 and 2000.

These figures reflect the growing importance of systems integration in businesses where in depth computer knowledge is not a listed prerequisite - such as the construction field and numerous other areas. More and more businesses are in need of specialized software which caters to their needs. For example, an accounting firm might need calculating software which utilizes specific algorithms.

System integrators serve as a gateway to companies to cutting edge technologies. By having a contract with system integrators, businesses do not need to spend a lot of resources for research and development. They are guaranteed a system that will meet their needs with a fixed price and delivery date.

i. Our position in the industry

Statistics from the US Department of Transportation reports a total property damage of $3,664,961,647 since 1988 with 421 fatalities and 1780 injuries resulting from pipeline incidents. Although not all of the incidents are caused by construction site accidents, these figures showed an opportunity to improve safety in construction sites. This is an ideal market for Enhanced Vision System (EVS).

There are a large number of construction jobs going on in the United States everyday and many large companies can afford to spend money on safety and are willing to do so (at least in Chicago). Most companies have budgets specifically allocated towards workplace and worker safety.

Our primary market research as stated above has shown that there is a lack of awareness in companies which offer similar services. Our interviews showed that while there is no knowledge of these products, there is a strong interest to make the construction site safer.

ii. Competition.

Our closest competitor Guardian Prostar Inc. had a similar concept but did not see much exposure. Larger firms such as Topcon and Trimble offer equipment to increase safety at construction sites but they require the customers to obtain their own data in order to map the work site. We have also identified our indirect competitors. They are companies such as Bloodhound which will locate and mark utility lines when requested.

Currently there is no company dominating this niche of the industry. This may be because there is a lack of awareness in the construction industry of such products. In addition, even though Trimble and Topcon offer good quality equipment, they require a significant amount of training before their equipment can be utilized. This might hamper the use of their equipment, or render functionality of the equipment useless by construction workers.

iii. What makes EVS unique

EVS' marketing strategy is to emphasize on the user-friendliness of our product. We make sure that our product has a [ ] user interface which relates to the customer. It would only require rudimentary knowledge in operating computer systems.

In addition, the EVS team consists of a group of highly computer skilled personnel with the understanding of the latest hardware and software systems. We make sure that updates are available on time and ready to be operated.

iv. Long term outlook of the industry

Along with the development of technology, the concern for safety will also increase. There is no doubt that construction projects will continue to exist and along with them, the possibility that an accident may occur. It is also safe to say that continuing to account for the safety and livelihood of construction workers in the midst of modernization will always remain important.

An interview with Mr. Turek from Local 150 tells us that there is a great need for such a product in the working field and it is our mission to create awareness of the benefits of this product. However, he has also mentioned that this product would not have a viable entry to the market. It is known that the US economy has recently taken a big hit and these construction companies would most likely be currently financially strapped. Thus, our company's strategy is to first create awareness and introduce our product to the market. When the economy revitalizes, our opportunity to grow, expand, and profit will be unbounded.

b. Market analysis (local, state, national, international)

Interview results

c. Target Market

The target market is inclusive of all companies in the construction industry that may benefit from the problem our product will help to solve. Viable markets may be specified further to include: large to small construction companies, GPS device producers, companies that manufacture construction equipment and machinery, utility companies (such as gas, water, etc), and landscape companies. Depending on our liability options, individuals may be included as a market as well. If a partnership with Trimble is able to be forged, our prospective marketing regions will include all those in which Trimble products are sold. If a partnership is not possible, then the products will be sold in the Midwest region.

The companies that would make the best customers as our product first releases into the market would most likely be those that which was Chicago-based. These include: Walsh Group Ltd., Pepper Construction Group, Bovis, McHugh, and Power. As these companies' revenue have ranged from 3,635 to 560 million, they may possess the fiscal capability and creative markets to acquire new and innovative products. Information of these companies' revenue will also help determine our pricing for our software.

To reach the target market, several tactics may be employed. Firstly, the team have acquired sufficient field information which indicates a desire for EVS software from heavy machinery operators and superintendents. If marketed to the potential users, the call to purchase our system may reach those with purchasing powers faster. Another approach is to go to the producers of the heavy machinery and share the benefits of having an extra precautionary measure exclusively in their products. In addition, if the product is able to produced so that it is handheld, utility and landscaping companies can certainly benefit. To reach those markets, either direct merchandising or releasing our software into third party brick and mortar store may reach them.

7. Analysis of internal resources, needs and capabilities(David)

a. Resources and capabilities

Illinois Institute of Technology

b. Strength, weaknesses, opportunities and threat analysis

SWOT Analysis

ENHANCED VISUAL SYSTEMS FOR CONSTRUCTIN SITE SAFETY

STRENGTHS

EVS has the potential to help prevent catastrophic construction site accidents involving underground infrastructure that can injure hundreds of people, affect thousands more, and cost millions of dollars in terms of property damage, loss of work opportunity, community disruption, ecological damage, and insurance liability.

EVS has access to a broad range of highly specialized students and other industry professionals to assist in the development of our software and hardware applications.

Research and interviews conducted throughout the course of this semester and from previous semesters validates the need for EVS, the serious problems it could help to resolve, and the value it can provide to multiple parties throughout the U.S. and the world.

EVS display will always show utilities using same color standards as JULIE and DIGGER and cannot be obscured, removed or washed away like spray painted lines or flags.

WEAKNESSES

Without highly capable software development engineers, computer scientists, and sufficient funding, the success of EVS developing a viable prototype may be limited.

The method of obtaining, as well as the accuracy of underground infrastructure data currently available to be used to display utility lines on EVS will remain a critical success factor.

Because of the accuracy of existing underground utility data, our product will only be as accurate as the data that already exists, unless we map our own GIS data and integrate it into EVS.

Business processes, systems, and connectedness up, down, and across the value chain have not yet been analyzed and implemented.

OPPORTUNITIES

EVS has a market opportunity that is tremendous in its scope. Among these opportunities for market penetration, as an example, include ComEd, Peoples Gas, and NorthShore Gas of the Chicago land area.

Other municipalities with power and gas companies within the continental United States present even more opportunities.

Our research tells us that if EVS is successful in developing a viable prototype, penetration into European markets and other counties is possible, if not likely to occur.

EVS has an opportunity to sell a product and to license software upon development of a viable prototype

THREATS

Economic downturns, trends in the construction industry, as well as downward trends in construction accidents involving underground utility accidents could reduce the short-term need for EVS.

Changes or advances in technology that could render our product/software obsolete.

Federal Regulations (OSHA) that require hand digging around pipelines may reduce the need for EVS.

New entrants into market as well as existing competitors such as Guardian ProStar and other mobile GPS mapping devices that could supplement EVS.

8. **Business planning and objectives - (Leo, Sara)**

a. Product positioning/Selling Channels

For EVS, the key channel for sales will be as an accessory/add-on to a repertoire of construction site tools. EVS is a stand-alone device, so the product can be positioned as a work-site tool for companies that use heavy machinery for digging or that do smaller scale digging in populated areas. It is intended that EVS be used as an add-on to increase safety near utility lines. As such, it must be positioned as a product that not only accomplishes this goal efficiently, but also does so in an affordable and easy-to-use manner.

A key selling channel for the EVS upgrade will be prospecting for new customers. This search will be conducted via salespeople and cold-calling to construction firms from our headquarters. Since this product is not of great interest to any large group of people, the niche market identified for our product will need to be contacted directly. As such, once we are able to market this product and build awareness of its offerings, there is the possibility for direct sales to the customer which will improve our profit margin on the product greatly. For example, once word gets out and construction companies and other individuals become awareness of this product and more interested in improving safety on construction sites, it will become possible to sell directly to end-users. In time, there will be a dedicated fleet of experienced and knowledgeable salespeople who will meet individuals in the field to talk specifics about how EVS can improve safety and be of benefit to them. Once this becomes possible, this means that awareness of EVS has been achieved and that direct-selling can result. The focus will be to primarily conduct business in this manner, and utilize commission-based sales.

Another key selling channel will be via EVS' company website, another direct to consumer method. The team envisions using multi-channel selling, which will combine different selling tactics, such as internet, phone calls, and field salespeople. The website will include information about different product offerings, particularly software applications that can be used to improve safety on construction sites. The information provided will include details of what the different software applications and products do, as well as how to use them and details of how to obtain utility location data for different uses. Prices will also be included on the website and end users will be able to purchase directly from the website. A website will create a consistent, unified buying experience for users and a one-stop solution for their buying needs.

In the future, the team hopes to have a website that can also be personalized to individual customers, so that they can easily locate, configure, and purchase whatever products meet their needs. This model will be more intended for repeat-purchases from existing customers, but can certainly be used by prospective customers who want to learn more about EVS' offerings and who prefer to order online. A website will also reduce the amount of telephone calls, printed materials and catalogues, and reduce travel for salespeople, all of which will lead to reduced costs for the company. This will help us to achieve break-even sales, especially after two years in operation.

PART A IS DONE IN MY OPINION. ANYONE CAN LOOK OVER AND ADD ON! -SARA

b. Purchasing scenarios STILL HAVE TO ADD MORE TO THIS PART TOO! -SARA

The product itself will be a software upgrade to an existing product, so we must investigate the possibility of offering our product as a bundle with certain models to smaller outfits as an "All-in-One" solution. Currently, if offered only as a software upgrade, it will be used in conjunction with existing hardware and software products, such as Trimble GeoX series or Topcon locator devices. EVS upgrades will include additional software applications developed by this team and used on devices such as those mentioned. I WILL ADD MORE TO THIS ON MONDAY! -SARA

Aftermarket Heavy Machinery Add-on

Portable/Detachable for small sites-

Companies working on smaller sized lots will benefit from a smaller quantity of products that are mobile, meaning they can be used in various heavy machinery vehicles by multiple operators. Rather than be stationary in just one vehicle, a detachable device will allow operators to move their own device to and from the different machinery they operate, to multiple operators using a small quantity of these devices in different machinery vehicles. This portability will allow a company to save on costs because they can purchase a smaller quantity. Furthermore, using such a device will inherently improve safety, thus potentially reducing the probability of accidents and related costs.

Large Sites-Multiple Units

Plotting/Mapping for sites to supplement site markings.

c. Profit and financial analysis
The basis of the model for the EVS offering involves development of firmware based on the Trimble GeoX family of hardware. This will involve having the necessary IT infrastructure, as well as proper work space and appropriate individuals in place to execute our model. The primary drivers in place will be our workforce of both developers and salespeople, who will be responsible for creating the product and informing our target markets of its viability in the construction field.

Profitability based on this model will come in the first year, where the limited types of overhead in software development will allow us to incur fixed costs during growth and improvement slowly. Since we are already employing developers, an outsourced website design will be followed-up with no maintenance costs as our development team can maintain the site. The growth of our company will involve improving our initial offering as well as developing new ones, and growing our infrastructure as our projected profit allows. We will be able to offer a significant Return on Investment (ROI), and $50,000 would buy approximately 5% interest in the firm. This stake would then grow to valuation of approximately $200,000 over 5 years, which would equate a 400% ROI for the investor. (calc out the % return)

Financial Numbers

Profitable after the First Year
$200,000 needed
Start-Up expenses and Firm growth
  New Versions of EVS
Potential for new R&D after 2 years

There are assumptions that come into play in this scenario, such as unit sales being based on 20% of the total market size being eventual consumers. The model also assumes that growth and decline will be normally distributed, leaving the window of high probability open for expansion into new products.
Profit Goal: 300% of development cost over unit sales projections in first 3 years
$1,000,000 in development costs
$3,000,000 in profit
We won't have exact numbers/charts - We will have estimations and details to back-up these claims.
To justify the unit sales, we should mention things like early adopters, larger construction companies, etc. and then go on to mention once awareness has grown and the market has been pentrated, the product will spread by various means- WOM, advertising, trade magazines and writeups, etc.- and be well established. We can also include mention of economy recovering a year-ish down the line and more construction occuring, bigger projects, more profitability, etc.
Justify the unit sales somehow. Will the current financial system crisis effect this product?
25% Hurdle rate annually.

	Year One	Year Two	Year Three	Year Four	Year Five
Sales Volume (Units)	650	1,500	3,500	6,000	4,800
Revenue ($) [$399]	259,350	598,500	1,396,500	2,394,000	1,915,200
Expenses ($)	237,080	318,320	459,143	617,505	799,414
Net Profit ($)	15,589	196,126	656,150	1,243,546	758,563
Breakeven Sales (Units)	594	798	1,151	1,548	2,004

9. **Conclusion (Melissa, Tom Dave)**

This analysis addressed the market opportunity for the device and software package of EVS within the construction and utility industries. Two critical sections of this Opportunity Assessment of which to build upon will be the marketing and financial sections of the business plan as the EVS EnPro moves forward.

Our analysis confirms our belief that EVS is not only a viable product in practicality, but also in market need. The construction industry is projected to support introduction of our product into the current market, with profitability within the first year and just $200,000 in start-up costs.

10. **Bibliography (Tom)**

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There are other sources throughout the course of our research who by request, for the time being, would like to remain anonymous.