

I PRO 316

Final Report

New Applications for Virtual

Reality Training

November 30, 2007

1.0. Introduction

IPRO 316: New Applications for Virtual Reality Training is a project sponsored by Product Animations, Inc. Our primary goal was to find new applications and markets, beyond operator training in the pharmaceutical industry, for virtual reality training. This included both market research, to search for new opportunities for our sponsor, and development of a prototype ASP website, as a new content delivery system for their product.

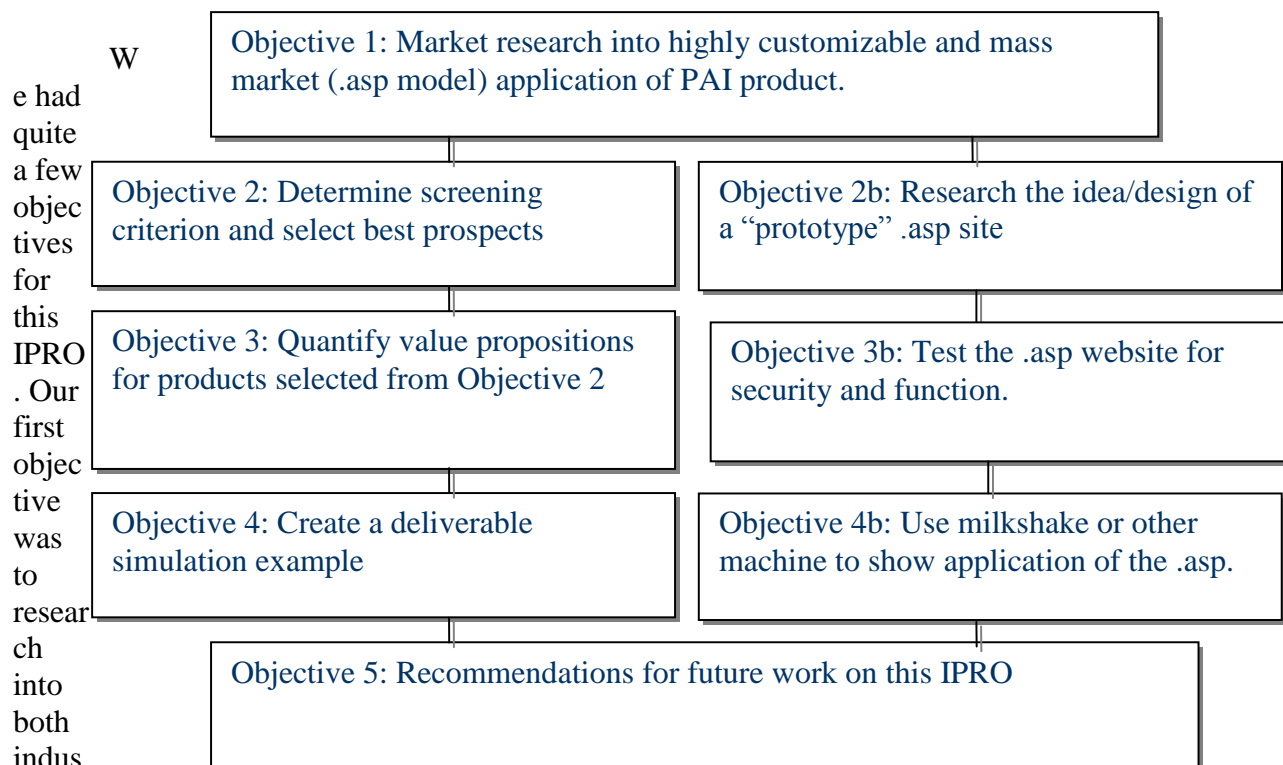
2.0. Background

Training operators on complex industrial equipment is a \$15 billion industry. The pharmaceutical, semiconductor, and food industries are significant segments of the training market where training is particularly difficult and expensive. A large proportion of this training necessitates removing critical processing and packaging equipment from active service, resulting in lost productivity and sales. The cost of equipment downtime for training and the resulting loss of production can range from tens of thousands to hundreds of thousands of dollars per year, far exceeding the cost of the training itself. Equipment operators and their outsourced training providers have sought to avoid or reduce these costs by offering supplemental training, e.g., instructor-led seminars, manuals and videos. However, research has demonstrated that operator cognition and skill development is significantly higher (up to 9 times higher) when a trainee can see or visualize the item, look at it from a variety of aspects and interact with it, or in other words, when the person can learn by doing. Visual simulation training, in which the trainee learns in a 3-D, virtual environment, is the preferred alternative to other passive training methods, but, to date, the extremely high cost of harnessing this technology has limited its application.

Product Animations Inc. (PAI) is a technology company providing product and services to develop 3-D visual simulations for interactive operator training on industrial equipment. Using PAI's technology the cost and time to produce these programs is reduced by at least 60% versus other options. PAI's proprietary software product, VRTrain, takes digital assets, such as computer-aided design (CAD) drawings, and other graphical files and efficiently converts them into 'virtual reality' simulations, allowing industrial equipment buyers to train new operators more effectively at far less cost than traditional passive training. PAI's technology has been proven with Bosch Medical Packaging, G.D. Searle, Wyeth, Niro Soavi and others, thus confirming the validity, cost competitiveness and promise of PAI's visual simulation tools for the desktop computer.

The company's business to date is highly concentrated in the Pharmaceutical industry where equipment is very expensive, product changeovers are frequent and operator interaction is significant. Downtime for training or from miss-operation is very costly. The value proposition in this environment is very high and easily supports the company's current business model.

3.0. Purpose



trial and mass market applications of the Product Animations technology. After this first objective, we took 2 paths. The first led to determining a screening criterion to select the best industrial prospects. We then did further research to quantify the value propositions for the prospects selected from objective 2. After this was finished, we originally planned to create a deliverable simulation example; however, due to time and budget constraints involved in working with a start-up company in one semester, we were unable to complete this objective. Finally, we planned to write down any and all recommendations for future work with this IPRO. The other path led to researching the idea and design of an ASP, or Application Service Provider, website, as a possible distribution method for PAI's product. After this was implemented, we used a PAI example of a milkshake machine, and are showing this on the ASP at IPRO day.

4.0. Research Methodology

- A. The problems were:
- I. Research possible markets for PAI products beyond that of the pharmaceuticals production companies and create a list to deliver to PAI.
 - II. Research possible new methods of delivering the product and decide if these options are feasible for PAI to use for their products. These methods include:
 - a. On a website
 - b. DVD

- B. In order to find new possible markets for PAI products, the team first did general research to find different companies and products that could benefit from the training materials PAI creates. After finding a healthy list of options, the team as a whole refined the list down to a select few for more in depth research. As part of the team was doing more in depth research, other members of the team created a list of criterion with which to rate the select list of companies in order to find two very promising options. Also, a portion of the team researched new venues for marketing the finished product. The research was focused around the possibility of using an ASP website to market the products.
- I. Our goals for this IPRO were to investigate new markets for PAI's unique product. In addition to new markets, we also decided to pursue new product delivery systems that might expand PAI's potential client base.
 - II. The criteria used to determine if an application was a good potential market were as follows.
 - a. The machinery involves specialized techniques, and are difficult or complex to operate.
 - b. There is high cost from lost time, high trainer time and/or safety issues.
 - c. It involves multi-use, multi-purpose equipment.
 - d. There is high user turnover, or operator training is expensive.
 - e. There are routine practices.
 - f. Service industry training for smaller applications utilized by many people.
- C. The testing involved with finding the new markets was simply going over our list of possibilities with PAI and having them decide if our options would work out. After we gathered their feedback, we continued research into our selected topics, and added one new topic.
- D. We compared one training program used in an industry we researched with PAI's training methods, with a PAI representative present, to verify that there is a demand for the product.

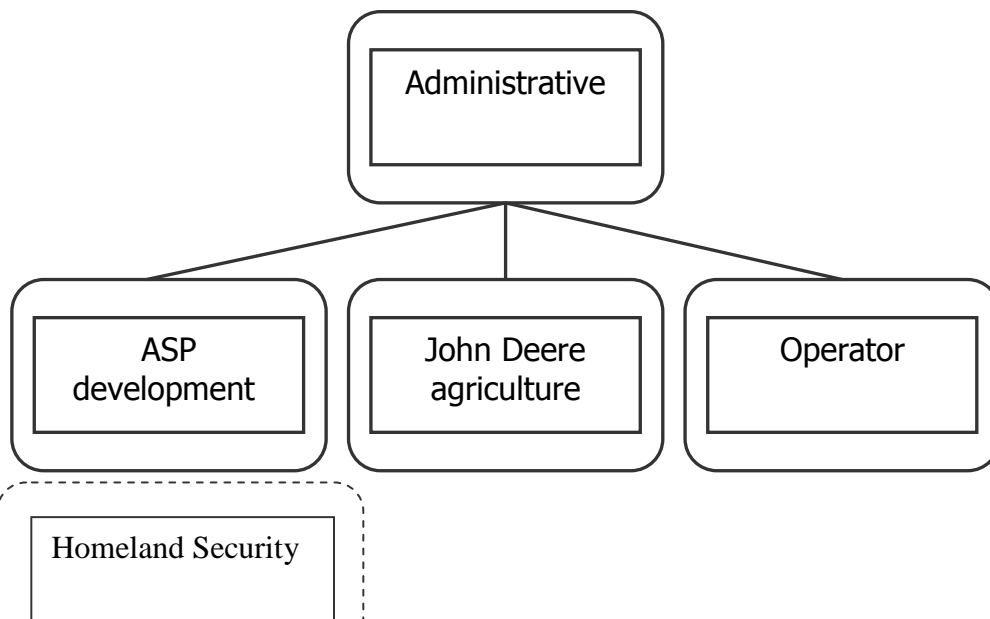
5.0. Assignments

Our group structure has changed significantly twice. Originally we did not have the need for subgroups. We worked to explore many different options individually and used group time to discuss and brainstorm. After finding several promising areas we split into four subgroups for more focused work. These groups consisted of an administrative group that is tasked with collecting subgroup information and producing IPRO deliverables, an ASP group focused on our web based training objectives, and two other groups focused on our main objectives of developing a product from our two most promising research areas.

The second significant change came after PAI expressed an interest in another avenue, that

of training people to use emergency one-time-use equipment. Because of this, we created a fifth subteam. The table below contains our final team structure.

First Name	Last Name	Subgroup	Leader or Member	Other tasks
Ian	Roe	Administrative	Leader	Agenda
Jeffrey	Stanford	Administrative	Member	iGroups
Mark	Malanowski	ASP development	Leader	
Kyle	Knopp	ASP development	Member	Project plan keeper
Erik	Doolittle	John Deere	Leader	Schedule master
Jeong shik	Kim	John Deere	Member	
Nick	Cantoni	Operator Training	Leader	
Erik	Mead	Operator Training	Member	Time keeper, Minutes
Shane	Steward	Emergency Response	Leader	
Ah reum	Jeong	Emergency Response	Member	



6.0. C

At mid... that we faced was research. We hit dead ends, found many companies unresponsive or simply don't know what to look into next. The implementation of subgroups was helpful in focusing our research. We had two or three people working on specific tasks within the group. We also sought research help from the Galvin Library and held one of our meetings with a research librarian who answered questions and showed us some new research tools.

Since then, our main obstacles fall in two categories: technical difficulties, and information difficulties. The ASP subgroup faced the problem of protecting PAI's intellectual property, which they provided to us for the purpose of our proof-of-concept prototype. We wished to ensure that this property would a) be restricted access to authorized users and b) not downloadable. This was mainly a technical issue that was overcome to our satisfaction after

the testing phase. The difficulties faced by the other subgroups all had to do with information. The operator training subgroup had difficulties finding and contacting relevant organizations, and due to time constraints has not gotten many responses. The John Deere subgroup had difficulties gathering information, since much about the training methods John Deere uses, such as the number of users, is confidential. Finally, the emergency response subgroup had the obstacle that there is little information to be found about the training methods used for rescue workers.

7.0. Results and Recommendations

The website subgroup researched the best practices for an ASP website, as it would apply to PAI. They then successfully designed, built, and tested a prototype website designed to prove the concept of an ASP as a content delivery system for flash animations, with various billing methods. A team continuing this would need to implement an interface to manage accounts and available animations. PAI, on the other hand, would be better off outsourcing their application to a third party, which would take care of all security, hardware and logistical issues, allowing PAI to focus on expanding the website with more products, and providing a better service to their clients.

The John Deere subgroup has determined that there is a significant demand for new training methods for the users of John Deere tractors. The new training method that John Deere created, John Deere University, is essentially a voice enhanced powerpoint version of the JD manual. It does not provide technical advice on the maintenance of a tractor, so any technical training will require dealership aid. PAI's simulations can enhance the training significantly, and can incorporate the online catalog of parts. Future teams on this project would need to determine interest in simulation training, and update PAI.

The operator training subgroup concluded that PAI's simulation training could be a cheaper alternative to current training methods, by reducing the amount of time needed on actual construction equipment in training. This would allow for larger classes using less machinery, reducing training costs considerably. Future teams will need to gather more information, and analyze the cost-effectiveness of simulation training against traditional training in this industry.

The emergency response subgroup has found that there is very little information available about rescue worker training. Future teams in this would need to contact the organizations handling rescue worker training, such as Red Cross, and speak to actual training instructors directly.

8.0. References

John Deere Sources

Wade Malcolm

Jackie Caulkins

John Deere Dealerships

Mid State Equipment - Columbus, WI

Faivre Implement - Wesfield, WI

Ballweg Implement Co. - Waupun, WI
Farmers
Mitch Wiedle
Tony Wamboldt
Mike Rickert

The International Union of Operator Engineers
<http://www.iuoe.org/>

John Deere website
<http://www.deere.com/>

The ABCs of ASPs
<http://www.encyclopedia.com/doc/1G1-100173252.html>

The Great ASP Debate
<http://www.encyclopedia.com/doc/1G1-76548950.html>

Directory of ASPs
http://www.dmoz.org/Computers/Software/Business/E-Commerce/Business-to-Business/Application_Service_Providers/

Ryan Fait (for security solution to protecting Flash files)
<http://ryanfait.com>

The PHP API
<http://www.php.net>

9.0. Acknowledgements

We would like to thank the following individuals and groups for their support in this IPRO.

PAI, for patiently supporting us, coming to two of our class sessions and sitting through a John Deere University online class with us, and providing a Flash application example for our ASP prototype.

The representatives of John Deere and the International Union of Operator Engineers, who gave us the information needed for our research.

Prof. Braband for offering guidance and insight.