A Case Study on Developing Simulation-Based Training for Client Assessment Interviewing in Social Work

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ABSTRACT

Creating an experimental prototype simulation involves many project management, design, and development considerations. By highlighting the case of the Client Assessment Practice Simulation (CAPS) and its development from concept to working prototype, the authors hope to provide insight for similar teams undertaking similar projects. CAPS is a simulation for social work students to practice client interviewing skills in a medical setting and also be evaluated on those skills in a recorded and standardized way. Creating it required individuals of multiple disciplines from different university departments to communicate and make decisions. Through literature and existing product review as well as agile communication techniques that involve rapid and paper prototyping, the goals for CAPS came into clarity for all of the stakeholders early on. Frequent and regular communication allowed the stakeholders to stay engaged as the project evolved. The production approach by E2i Creative Studio at the University of Central Florida's Institute for Simulation and Training was also agile in nature. This paper provides an overview of the tools and techniques used to approach CAPS' development so teams with similar goals involving mixed and unique disciplines can gain insight on starting and completing a multidisciplinary simulation project of an experimental nature.

ABOUT THE AUTHORS

Ryan Hill is a doctoral student at the University of Central Florida. He is in his final year of his PhD program in the university's Modeling and Simulation program, which has consisted of a mix of education, engineering, and psychology coursework as well as a graduate research assistantship that led to the simulation design and development project described in this paper. He currently has a MS in Modeling and Simulation from UCF, and a MS in Game Design from Full Sail University. His undergraduate degree is in Business Economics from Wright State University. He has led or participated a large variety of academic and professional projects due to his involvement at the universities he as attended, as well as at the Walt Disney Company.

Alexia Mandeville is currently pursuing her Master of Science degree in Modeling and Simulation, after coming out of the Digital Media program at UCF. Alexia is also a Project Manager/Designer at the E2i Creative Studio, an internal development team inside the University of Central Florida's Institute for Simulation and Training, and led the development work behind the Client Assessment Practice Simulation prototype. In her free time, Alexia attends conferences and game jams to further develop her skills and professional network.

Brian Goldiez, PhD has over 30 years of modeling and simulation experience in industry, government, and academia. As Deputy Director of the UCF's Institute for Simulation and Training, Dr. Goldiez is involved in strategic planning, organizational matters, outreach, and organizing large, multi-discipline research programs. He also teaches and advises modeling and simulation graduate students. Goldiez has a BS in Aerospace Engineering, an MS in Computer Engineering, and was UCF's first recipient of a Ph.D. in Modeling and Simulation. He is also a Certified Modeling and Simulation Professional (Charter Member) and Senior Member of the IEEE.

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INTRODUCTION

The Client Assessment Practice Simulation (CAPS) is currently under development and study at the University of Central Florida's (UCF's) Institute for Simulation and Training (IST). CAPS is meant to help new Master of Social Work students practice and be evaluated on the client assessment skills that they have learned so far in a healthcare setting. The prototype involves a virtual 3D animated client in a hospital environment that can be accessed and interacted with remotely, so CAPS can be used at any time in any location with a computer of sufficient power and an internet connection. Other goals were that the prototype would be less expensive than the use of live actors would allow, it would be intuitive to use, and it would collect transcripts and other data automatically. The learner's essential task is to interact with the virtual client by posing questions or statements and typing them into the inquiry window to enter that question or statement. The virtual client then responds appropriately, and via continued exchanges in this way the student gathers information about the client to develop a biopsychosocial profile, as well as come up with a client follow-up plan and self-reflection about their own attending technique. As one might expect, this project requires individuals with different areas of expertise to work cooperatively to conceptualize, design, develop, assemble, implement, and research/evaluate while maintaining client buy-in along the way. This paper is a case study on how the CAPS team approached this multifaceted challenge, and the implications of that approach. By analyzing this approach, the authors hope to be able to provide valuable insight for readers who have similar goals but would like some ideas on how to approach achieving those goals.

The CAPS project was an inherently interdisciplinary one. UCF's College of Health and Public Affairs (COHPA) approached the IST with a desire for the research and prototyping of game-based training in social work, and they formed a partnership to fund a project that was geared toward improving the online delivery and assessment of social work education through simulation. E2i Creative Studio, a technical production team within the IST, was to be in charge of developing the technical aspects of the simulation's appearance and delivery to users. Those involved in CAPS' creation appropriately have diverse skill sets, including hospital social work experience, instructional design, project management, research, software development, and multimedia design.

Once the project kicked off, the initial challenges were to gather sufficient background information to determine the state of game technology in social work education, ensure the goals of the project were clear to both the project lead and the COHPA supporting faculty, and to determine the prototype's quality requirements for the best chance of meeting the project's goals. Subsequent challenges were to determine a cost-effective way to develop a conversational model for the virtual human, keep all stakeholders up-to-date with changes that occurred during the project, and to ensure each party's goals were being met with each deliverable. Finally, the CAPS prototype was also to be researched to determine its usefulness as an evaluation tool. The efficacy of the prototype is going to be researched at a future time using a sample of learners from the population that would experience the current version of the prototype (though perhaps with some additional improvements should time allow). In order to accomplish all of these goals and overcome all of the challenges, the project adopted an agile approach that involved frequent feedback, learning, and adjustments. This approach may be of interest to those who wish to undertake a project with relatable goals and challenges.

DEFINING GOALS THROUGH RESEARCH AND PROTOTYPING

The very first activities involved in a project of this nature are some of the most important for the project's later success, especially since one of those project activities involves determining what "success" is. The CAPS project was no different than most projects in this regard, but interdisciplinary research involving the development of a prototype involves extra uncertainty. Specifically, initial background literature review and goal development through prototyping in conjunction with short feedback loops were both critical activities undertaken in the first stage of the project.

Reviewing Literature and Comparable Existing Products

Prior to official kickoff of the project, the general area of interest was exposed to the project lead. That pre-kickoff time was taken advantage of by the project lead to take what was already known about simulation in the medical field and expand it into the realm of social work. This was done primarily in two important ways: literature review and examining existing products that led to insights in the design of the simulation prototype.

First, broad literature review was done using a research management tool in conjunction with library resources; this yielded multiple recent scholarly articles about the use of simulation for training social workers and the use of virtual humans as conversational agents. It was quickly found that the field of social work education was interested in the gains that medicine had made through the use of simulation-based training, and had started making headway into using some practice and evaluation techniques that were already in use in medical training, such as the Objective Structured Clinical Examination (OSCE) that utilizes live standardized actors to simulate social work clients (Bogo et al., 2012, Logie et al., 2013). It was also found that such literature in the field of social work was light in comparison to the medical field, meaning that there was a lot of opportunity to contribute in this area. For instance, it was known by the project lead that the CAPS prototype needed to be accessible without live actors and accessible online for remote students; thus, review on the topic of conversational models for virtual humans was also undertaken. This is how the project lead found out that virtual humans were being studied to improve communication between medical professionals during times such as patient hand-offs (Filichia et al., 2011), which ultimately led to the project lead finding out about Rossen and Lok's Human-Centered Distributed Conversational Modeling (HDCM) research (Rossen and Lok, 2012) and the Virtual People Factory conversational model development tool.

The second strategy to develop an understanding of what was possible and desirable was to seek out existing products and attempt to experience demonstrations of them. This technique, while less scholarly, was a good way to see what was already available and what those products did right or were lacking. As expected, no existing product was found that could meet all of the perceived goals of the UCF College of Health and Public Affairs, but a demonstration is worth 10,000 words, and collectively the product review aided in the understanding of the line between existing commercial products and innovation, as well as providing an expedient way to help clarify project goals when they were discussed with the UCF Social Work Department faculty. This type of review also yielded valuable information on some possible tools, such as the Virtual People Factory developed by Dr. Benjamin Lok at the University of Florida, which the CAPS team could use to build at least some parts of the CAPS prototype.

Taken together, these two initial research activities yielded an improved understanding of what would type of solution would be considered cutting-edge as well as insights on how a project team might approach the design and prototyping of such a solution. If scholarly research resources aren't available, reviewing commercial resources may still help quite a bit in building the essential foundation of understanding in the field in which one is trying to innovate. In addition, organizing the findings of one's research with a research management tool speeds up access to it when referencing it in the future.

Clarifying Project Goals through Demonstration and Prototyping

It seems that most people involved in a complex project recognize that a clear understanding of the project's goals and buy-in from all parties involved are critical to a project's success, and the initial approach taken during the CAPS project reflects this recognition. The project lead took an agile approach to building buy-in and developing goals with the UCF College of Health and Public Affairs (OHPA) faculty who were involved in the project as subject matter experts and also as the initial users of the prototype. Instead of a one-time discussion of the project's

goals, the project lead used shorter, more frequent meetings as well as prototypes and demonstrations to develop the goals of the project, including instructional goals and production goals.

The initial broad idea was to end up with a prototype serious game or simulation to enable evaluation of first-semester social worker interviewing skills was to be built and studied for effectiveness. There was no single large kick-off meeting for the CAPS project to establish this; instead, a series of meetings with COHPA allowed the project lead to gather information from multiple sources and allow for refinement of the goals iteratively. The first couple of meetings with the liaisons and department chair of COHPA allowed for the stakeholders to develop a cursory understanding of the general idea underlying the project. To truly define all of the project's goals, however, the project lead scheduled additional meetings and then, using the knowledge from the initial research effort, created some rough pencil and paper mockups of what the project may look like and what features should be included. The paper and pencil mockups at this stage were not meant to be the foundation of the design, because the instructional goals were still not agreed upon and fully conceptualized.

The paper and pencil prototypes, along with some comparisons to demonstrations of existing simulation software, did their job in unifying the understanding of what the CAPS prototype was supposed to accomplish. Instead of working with nebulous ideas, COHPA and the lead producer at the development studio at the University of Central Florida's Institute for Simulation and Training, E2i Creative Studio, had visible mockups of features and navigation that they could react for or against. Additional meetings led to additional mockups and discussion, and before long the COHPA chair and liaisons had an agreed-upon set of learning and production goals. In addition, E2i had a better understanding of the tools and time the development of CAPS might take. Those who are familiar with concept art could consider it something like concept art, except for the features and interface.

One might suspect that using pencil and paper prototypes wouldn't be very useful in determining instructional goals since those goals should be recognized prior to the project's beginning, but in the CAPS project, the experience showed that the mockups and demos were very helpful for refining the list of instructional goals. Simply seeing the flow of the imagined prototype caused the social work faculty to focus on particular learning goals and what they might mean, generating a discussion with each other on which goals they really needed to focus upon in CAPS. The process also helped stakeholder buy-in since the process helped reduce uncertainty and build excitement for what the prototype might look like and do. Solidifying the learning goals not only facilitated efficient goal conceptualization and improved buy-in by stakeholders, it ended up actually reducing the feature list, allowing for additional versions of mockups which were provided to E2i for development purposes. Likewise, the concept art provided by E2i helped the School of Social Work visualize the virtual client that would be such a large part of the simulation. See figures 1 and 2 for the concept art and 3D art of the virtual client; the reader might notice that the sharp and intense look of the virtual client in the concept art was not something that the School of Social Work favored in the virtual client, who is a virtual homeless veteran.

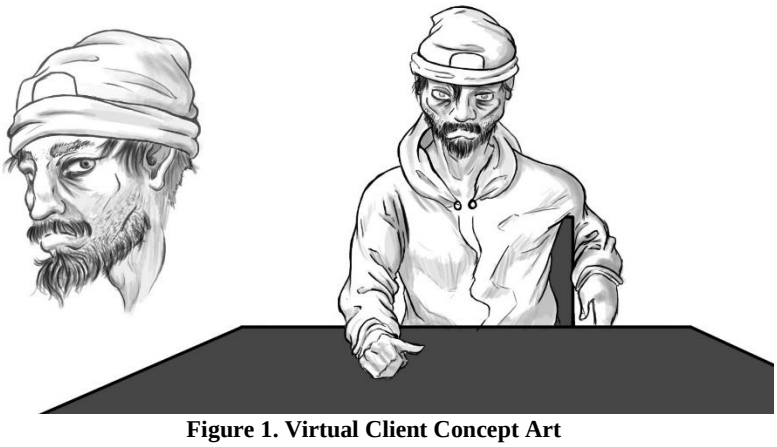

Figure 1. Virtual Client Concept Art

Figure 2. Current 3D Virtual Client and Interface

The look and feel wasn't the only aspect of the simulation to be prototyped; the Virtual People Factory tool previously mentioned also allowed the concept of users entering natural language input to trigger responses from the virtual client to be demonstrated. The lab at the University of Florida that is continuing to develop the Virtual People Factory gave the CAPS prototype a leg up by not only enabling the creators of CAPS to inexpensively and efficiently develop a conversational model, but also demonstrate the model early on. The Virtual People Factory can quickly show how new data from those that test the model can be incorporated, and was a big help in allowing the show and tell of how the conversational model (an unclear concept to many) could be created, could work, and could be systematically improved.

The CAPS project experience is one example of how engaging a project's customer often and early using paper prototypes and demos can help improve the speed of goal conception and the quality of conceptualized goals. The benefits are similar to when concept art is presented early on; in fact, the authors found that this can be an effective strategy even if the paper prototypes are not created by an artist, as was the case in this project. Creating and presenting paper prototypes and comparable demos allow project stakeholders to react against them and may be a valuable set of activities to consider when beginning a project, especially when different stakeholders have vastly different sets of expertise.

Improving the Use of Paper Prototypes and Demos

Paper prototypes and demos were really useful in presenting ideas that the stakeholders could react for or against, and there is little doubt that doing so saved a significant amount of time because unwanted features didn't begin being developed. Because paper prototypes in particular take relatively little time to create, it may have also been useful to mock up larger-scale alternatives to not only demonstrate ideas that were originally uncertain, but also some of the ideas that *were* certain. For instance, the use of freely-entered natural language input instead of multiple choice input was decided upon early after it was demonstrated as a possibility; however, it may have been useful to mock up a multiple choice version of CAPS to provide a juxtaposition of the natural-language approach so that the stakeholders could get a clearer idea of what both systems might entail. It is still likely that they would have chosen the natural-language approach or perhaps a hybrid approach, but in any case the comparison may have provided better insight to all parties as to the costs and benefits of both choices.

AVOIDING WASTE THROUGH AGILE COMMUNICATION

Since the CAPS project involved a prototype that took multidisciplinary research to create and was itself going to be researched for effectiveness, there was a lot of uncertainty involved in its design. To mitigate risk due to uncertainty, an agile communication approach was taken; improved communication in an agile environment has been observed to lead to many benefits, such as higher software quality with fewer defects, and a lower cost in time and effort to achieve the same results (Hummel et al., 2013). To the project's advantage, the UCF COHPA was open to the approach, committing to meeting on at least a weekly basis, with the availability to meet remotely during other times

as necessary. E2i Creative Studio, the development team for CAPS within UCF's IST, already used an agile approach to development within its team and was thus also open to consistent communication and sharing of information. This style of communication helped to continuously engage all parties involved in the creation of the CAPS prototype, allowing for adjustments to avoid wasted work as new developments occurred during the project timeline. Figure 3 illustrates the basic communication feedback loops that were used, and while flexibility was required during the course of the project, all loops were repeated at least once a week. The initial communications involved frequent use of paper prototypes and demonstrations of the tools and simulation approach being considered.

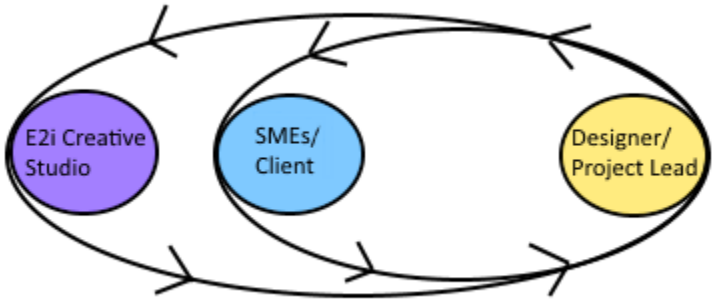

Figure 3. Use of short communication feedback loops allowed faster reaction to information

A good example of this early in the project was how one of the features originally conceived was found to be unnecessary for the project goals. During initial communications, the prototype was framed as a simulation to practice interviewing skills. The project lead, who is also the instructional designer, interpreted this to mean that the simulation would incorporate guided practice and be able to stand on its own as a practice tool. A virtual mentor feature was conceived and included in the initial paper prototype to facilitate this view of the product; however, because of consistent engagement with the social work subject-matter experts this feature was found to be undesirable. The prototype was going to be more useful to COHPA if it did not incorporate that guidance feature, and instead incorporated more evaluative options so it could have more use as a kind of virtual Objective Structured Clinical Examination. By identifying this early on through consistent engagement, the work that would be spent on designing and building the mentor feature was saved, at least until such a feature is deemed desirable in a future permutation of CAPS.

A later example of how consistent engagement helped improve the chance for project success is that the engaged COHPA faculty became aware of the effort it takes to make a conversational model needed for this type of interview simulation. After doing some research, the project lead decided to pursue the development of the conversational model using Human-centered Distributed Conversational Modeling (HDCM), developed by Dr. Benjamin Lok and his Virtual Experiences Research Group (VERG) at the University of Florida (http://verg.cise.ufl.edu). This requires a model editor creating a foundation of the conversational model, and then distributing that foundational model to model testers of various skill levels in the industry in question to interact with the model to accomplish the desired goal. Each tester adds their own idiosyncrasies to the dialogue, and the model is made more robust by incorporating the inputs of each tester. The Virtual People Factory is a tool developed by Dr. Lok and VERG that makes HDCM much easier through its facilitation of the distribution, incorporation, and viewing of model tester input. What it doesn't provide, however, is the pool of testers to distribute the testing to. The best source for those were students and faculty involved in the social work program at UCF, but without COHPA being engaged, approaching them with such a need may have been more difficult. Instead, COHPA knew for weeks ahead of time what the approach to conversational modeling would be, and that a pool of model testers needed to come from the social work program. Participating faculty were thus able to plan their communication of the need to students and incorporate that communication into their courses, which was a key to the distributed effort's success. The IST development team E2i Creative Studio also needed to be aware of the use of the tool and the philosophy behind the development of the conversational model in order to build their platform to be able to use that model, and thus also needed to stay engaged in that development.

By keeping communication consistent and frequent, each party in the development was kept up-to-date on new developments, such as features that were no longer needed or how the conversational modeling effort was going to be approached. Running the project with those agile communication principles from the very beginning likely was important, as it created a culture of communication and flexibility within the parties working on CAPS. This in turn made it no surprise when communication frequency had to increase even further at certain periods due to project needs. While the absolute impact of the agile communication approach is difficult to fully recognize, intuitively it is a helpful approach for a research and prototype project in particular since there is a considerable amount of uncertainty during the course of the project.

Improving the Communication Process

Consistent communication with short feedback loops was helpful in clarifying desired features early on, but there is always room for improvement. If another project like this were undertaken, it would probably be wise to clarify up front what the role and level of authority is for each stakeholder, and possibly even put it in writing. This isn't the same thing as creating strict role boundaries on a development team, which may reduce agility; however, when it comes to stakeholders, knowing who is expected to give what kind of input can help a team design a more efficient communication strategy. This is especially relevant when working with stakeholders in very different disciplines.

PRODUCING THE CAPS EXPERIMENTAL PROTOTYPE

Thus far there has been some anecdotal evidence that the agile approach to design and research in the CAPS project was helpful in avoiding waste and accomplishing goals efficiently compared to a more traditional research and prototyping process. The production team at UCF's Institute for Simulation and Training, E2i Creative Studio, also used agile techniques during the production of CAPS. E2i Creative Studio includes a lab director, project manager, two programmers, and three artists, all housed at the Institute for Simulation and Training. The team is frequently charged with creating engaging simulations used for training and education, and has experience integrating simulations into web applications with various peripherals. Being a small studio, E2i has a close-knit team that has face-to-face communication on a daily basis. The approach taken by E2i Creative Studio may be of interest to teams who are interested in creating simulation prototypes or other experimental serious games.

Project Phases

In the CAPS project as well as other projects, UCF's E2i Creative Studio follows a production pipeline which includes concept, preproduction, production, and post production. For CAPS, the concept phase included identifying the production goals, designing the interface, sketching the character, and designing the technical aspects of the functionality. Preproduction involved research on the unique demands of the CAPS project; unlike previous projects, the CAPS project included utilizing a conversational model created through the use of the Virtual People Factory. The project also involved creating a custom character to interact with the learner in conjunction with this conversational model to achieve an immersive training experience. There were some data tracking requirements that also required additional research in preproduction, plus an art asset list was created for E2i Creative Studio's artists. Other pre-production tasks involved creating a Gantt chart, putting together an internal design document, and creating an experience flowchart of CAPS as it was then conceived.

In production, the conversational model created by the project lead's efforts using the Virtual People Factory was incorporated into Unity using the C# programming language. While the functionality continued to be created during production, the E2i artists made the 3D models in accordance with the art asset list. The artists also worked on the user interfaces during this phase. In post-production, the E2i team created and compiled the necessary media for promotional materials and completed a "post-mortem" review to allow for additional growth and improvement in the E2i Creative Studio production approach.

The names of these project phases are likely familiar to those who work in a game studio, and are useful for keeping the production cycle organized and clear. They create a concept of where the project is, even when dealing with uncertain subjects or circumstances. Each phase is fluid and requires agility, and to achieve agility throughout the phases, tasks were completed with an iterative and incremental approach detailed in the following section.

Iterative Development Approach

The University of Central Florida's E2i Creative Studio development group uses an iterative approach to development. More specifically, this means that E2i uses a series of small steps to incrementally add functionality and components to CAPS and other simulations it is charged with producing. In order to show the project stakeholders progress after a short amount of time, major functional components and visual assets are developed in the first parts of the project. This way, any changes can be identified by the stakeholders in the early steps of the project, and can be handled in an economical way (Keith, 2010). During the CAPS project in particular, the major high-impact components that were prioritized were the user interface, character model, and conversational model functionality. Coming up with this prioritized core functionality was in part a result of the consistent and frequent communication and prototyping that is detailed earlier in this paper. Because core aspects of the CAPS prototype were discussed and designed early on, work was able to begin on them even before the design of some of the lower-priority features of CAPS were done. Doing so allowed not only more time for researching the aspects of that core functionality, but also allowed for more flexibility to fix unforeseen design or production issues earlier on when they take less time to do so.

The E2i production team excels in certain aspects of agile development, which helped the production of CAPS adjust to certain developments such as incorporating a change in the version of the Virtual People Factory during the middle of production. The team has a highly efficient communication system utilizing both remote online and face-to-face methods. Using meeting and communication methods similar to Scrum, the team meets weekly to discuss what tasks are being completed by each member, and if any team members have any issues that are keeping them from completing a task. In addition to face-to-face communication, the team uses online task management software, and version control software to improve communication and understand, and to avoid unnecessary rework. These tools and more are explained in the following section.

Resources Utilized in the Production of CAPS

It may be useful to some readers to note the development tools used by the CAPS prototype production. This section covers both some of the technical aspects of CAPS, as well as the tools used to manage the production process.

To build CAPS, E2i Creative Studio utilized version 5 of the Unity 3D game engine. Unity allows a team to rapidly develop a prototype in a 3D environment, and quickly produce iterations of prototype functionality. Using Unity, E2i utilizes the Virtual People Factory conversational model by exporting the XML script from its web interface. The functionality of how the script is interpreted is coded in C# within Unity. The engine decides which response is appropriate to the user's input by matching the input to trigger words that have been defined by the script in XML. In conjunction with these trigger words, example inquiries are defined in each trigger to assist the engine in its phrase matching.

CAPS is built to be accessible via the web and tracks the learner's data over the internet. The simulation tracks the user's input and conversation by recording the data in a SQL database hosted on an Apache server. This data is available to instructors through a unique instructor-facing interface that enables the search and viewing of records produced by the learner's interaction with CAPS. Each learner has a unique identification record in order to record their input and interactions, which enables both the search functionality of the instructor's interface and research on CAPS' efficacy from a training standpoint.

Various project management resources are utilized in the CAPS project. Table 1 details the project management tools used by E2i, their purposes, and their advantages.

Table 1: Production tools used during prototype development

Tool	Purpose	Advantages
TortoiseSVN	Version Control	Creates a more efficient work flow by allowing team members to work on one project concurrently, and affords improved troubleshooting through ability to revert to previous versions of the prototype build.
LiquidPlanner	Task Management	Allows quick updating and referencing of tasks, so that each member of the production team is aware of all team members' task assignments and status.
Google Drive	Documentation	Allows collaborative work on documentation and stores the documentation in an accessible way prior to it being moved to TortoiseSVN.

CONCLUSION

Creating an experimental prototype of a serious game or simulation can be a daunting task, and teams that have not done so may be wondering how to approach such a project. By detailing some of the approaches and considerations of the CAPS prototype project, the authors hope to be able to provide some insight from a research, design, and production perspective. One of the first important tasks of the CAPS project lead was to review literature and existing products; this laid the groundwork for knowing what was possible, what was on the cutting edge, and what design considerations there were. Once the other stakeholders were brought in, the CAPS project team used a largely agile approach, incorporating the concepts of:

- frequent and regular communication to engage all stakeholders
- prototyping and demonstration in order to clarify ideas and make corrections
- building and testing core features early on to identify issues and achieve the highest quality possible with the time and resources available

The production method used by E2i Creative Studio was also agile in nature, allowing project changes to be reacted to successfully. The project management tools used by them included TortoiseSVN, LiquidPlanner, and Google Drive, which aided in the studio's ability to keep up-to-date and collaborative. CAPS uses the Unity 3D game engine and takes the XML script output from the Virtual People Factory plus the C# code necessary to interpret it to deliver the simulation experience in a 3D environment with a 3D animated avatar capable of a variety of facial expressions and movements.

Key Takeaways

Like many projects, the CAPS project started with a need and could not have reached its current state without that need being thoroughly explored. The CAPS designer explored that need through the use of short communication feedback loops and the use of demos and paper prototypes to allow the different stakeholders to react for or against ideas. When undertaking a project of an experimental nature like CAPS, a project team might want to consider the following:

1. Reviewing literature or existing products from outside of the project's field can help to obtain valuable ideas that can apply to the project, especially if the literature inside the field is light/insufficient.
2. Projects that have multiple stakeholders with different areas of expertise will benefit from a uniform understanding and also being able to see how their ideas affect the outcomes of the project; creating quick paper prototypes can be a big help in getting a stakeholder's ideas in front of their eyes a lot earlier on, allowing for corrections to be made even before development begins.
3. Short feedback loops are the keystone to agile processes, and there is a reason for that: they allow for faster adjustment to changing circumstances than longer feedback loops. Especially in experimental projects, keep focused communications in as short a feedback loop as possible without causing fatigue for stakeholders (including the client/customers, subject-matter experts, and developers).

4. Iterative and incremental development of a prototype can bring the benefits of short feedback loops into the development process. Adjustments can be made when features are prioritized and issues are identified and addressed regularly in an attempt to make sure the appropriate time and attention is spent on the most important aspects of a prototype.

Some additional ideas for improvement based on the CAPS development experience are to clarify the responsibilities of each stakeholder up front and possibly in writing so that there is certainty about who is supporting the project from an approval standpoint as well as from a subject-matter expertise standpoint. Short communication cycles are very helpful, but likely even more so when the right individuals are involved in every communication, as opposed to most communications. Another way to have potentially improved the CAPS project would have been to prototype alternative ideas on paper even when certain ideas were settled on up front. In a project, the more prototyping that can be done by paper, the better clarity that stakeholders can have about their choices and related alternatives.

As of the writing of this paper, the CAPS prototype is largely developed and is undergoing quality testing. Designs can still potentially be modified based on changes in the environment and stakeholder feedback, but CAPS is just about ready for efficacy research. With additional research, testing, and corresponding improvements, CAPS, the Client Assessment Practice Simulation promises to be a foundation on which the university can develop further interview training for the medical and social work disciplines. At the very least, it will lead to insights on the use of virtual conversational agents in simulations meant to train communication and interviewing skills.

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