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(Technical and Financial)
CDRL A001**

For: Safe Surgery Trainer

Prime Contract: N00014-14-C-0066

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Medical Modeling - Safe Surgery Trainer

This Annual Progress Report is provided in accordance with the contract CDRL for the ~2 months of development that occurred during this reporting period.

1) Heading

- a) PI: Curtiss Murphy
- b) Organization: Alion Science and Technology
- c) ONR Award Number: N00014-14-C-0066
- d) Award Title: Safe Surgery Trainer (SST)

2) Scientific and Technical Objectives (No deviations from original plan)

- a) Design, Develop, and Deliver a game-based Safe Surgery Trainer (SST)

According to the Institute of Medicine (IOM), up to 690,000 patients are injured by medical errors each year. Up to 98,000 of which will die from those errors. For the Navy, the causes of these errors are exacerbated by lengthy deployments and reentry training.

We will design, develop, and deliver a prototype game-based trainer for perioperative teams by leveraging scientific discoveries made on prior ONR efforts related to the effectiveness of game-based trainers.

- b) Test the efficacy of the SST among multi-disciplinary perioperative professionals

We will partner with regional healthcare centers within the Military Healthcare System, including Langley Air Force Hospital, Fort Eustis Healthcare Clinic, and the Portsmouth Naval Hospital. We will involve subject matter expertise from healthcare providers, and conduct scientifically valid research to test three hypotheses. First is Knowledge Retention - that a game-based trainer can effectively train team-based patient safety skills. Second is Behavioral Change – that a game-based trainer can assist in the maintenance of targeted patient safety behaviors. Third is Teamwork – that a game-based trainer can impact teamwork through cross-training.

- c) Lay the Groundwork for transition and implementation

We will work closely with military and civilian healthcare institutions to lay the groundwork for long-term transition of the SST prototype and to disseminate our findings across the industry.

3) Approach (No deviations from original plan)

- a) Team SAFETY – We compiled a team of nationally recognized experts with decades of experience in four areas: military training games and M&S solutions; instructional design and story-driven development; learning technology research; and medical safety training.
- b) Learning Objectives – There are hundreds of critical safety protocols and check points in the three stages of perioperative care. From those, we will select key learning objectives which have a significant impact on patient safety among multi-disciplinary professional healthcare teams.
- c) Instructional Design – We will use a unique combination of systems thinking, ADDIE design, and StoryLearn™ to analyze the metrics, structure the learning, develop the cognitive engineering, create the story, and chose the appropriate media, production, and deployment paradigms.
- d) Technical Foundation – We will leverage the award-winning outcomes from prior ONR scientific research demonstrating that the science of why games work can be applied to a variety of training capabilities. We will use COTS technologies to develop a low-cost, deployable training game prototype.
- e) Development Process – We will hit the ground running on day one, combining decades of proven expertise to accomplish two goals: 1) deliver high-quality software that improves the state of Navy medicine and 2) provide cutting edge research that advances both the M&S and medical fields.

4) Concise Accomplishments

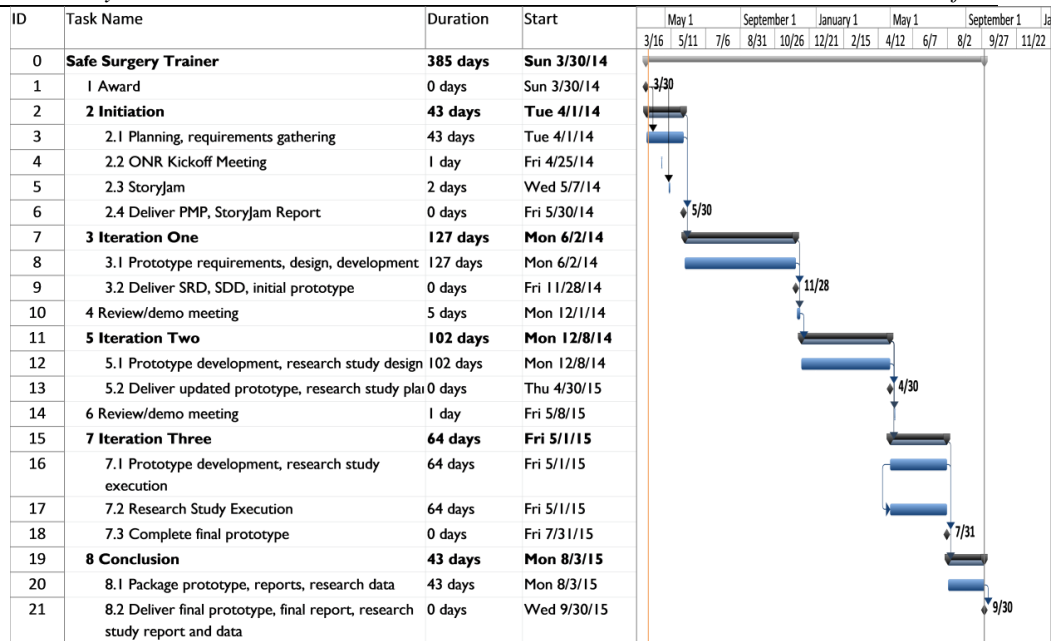
SST began just 2 months prior to the end of this reporting period. In that short time, we kicked off the project, presented to ONR, began designing critical aspects of the effort, reached out to regional healthcare institutions, and laid the foundation for the SST software. We also designed, planned, and coordinated the SST StoryJam, which involved thirty-five representatives from inpatient and outpatient surgery, medical schools, three branches of the Military Health System, and six area hospitals. Participants included physicians, anesthesia providers, nurses, surgical technicians, patient safety managers, clinical educators, developers, and researchers.

5) Expanded Accomplishments

As this project is just beginning, we will refrain from expanding upon our accomplishments until a later report.

6) Work Plan

- a) POA&M – The work plan presented below, has a minor deviation where iteration two was extended by 1 month and iteration 3 shortened by 1 month.



- b) During the coming year, we will complete the Initiation, Iteration One, and Iteration Two phases. We will also begin work on Iteration Three, which includes beginning the execution of our research plan.
- c) During the entire project, Alion will leverage our proven CMMI ML3 project monitoring and control process to ensure timely completion of all deliverables. Alion is one of only six companies in the world to have CMMI ML3 for both Development and Services.
- d) Team SAFETY will work closely together, with actively open channels of communication to advance the scientific interests of the Navy and the health of the warfighter and their families. We will conduct frequent and open design meetings and invite participation from stakeholders at all phases of the effort including requirements, design, implementation, deployment, testing, and conclusion.
- e) We will conduct the following tasks:
 - i) Create and execute a Project Management Plan.
 - ii) Create and submit Technical and Financial Progress Reports.
 - iii) Manage the budget and schedule and conduct stakeholder meetings.
 - iv) Develop the first two phases of the SST prototype training game.
 - v) Perform instructional design activities and provide relevant healthcare subject matter expertise.
 - vi) Define and design the research studies that seek to determine whether SST can be an effective retraining tool.

7) Major Problems

There are no known major problems to report. SST is off to a great start and is currently on schedule and budget.

8) Technology Transfer

The SST team takes technology transfer very seriously. We have dual goals to: 1) transfer our research to partner organizations within the Military Health System and 2) disseminate cutting-edge research that advances both the M&S and medical fields. To that end, Team SAFETY is comprised of recognized industry leaders with decades of proved experience, including three of the original performers for ONR's Damage Control Trainer, which won three national awards and has been covered in dozens of papers, presentations, and periodicals.

Even though SST is barely two months old, we have already established partnerships with healthcare representatives at Langley Air Force Hospital, Fort Eustis Medical Center, and Portsmouth Naval Hospital as well as three regional hospital networks and Eastern Virginia Medical School. We will continue engaging these institutions in the design, development, and testing of SST in order to lay the foundation for long-term transfer.

9) Foreign Collaborations and Supported Foreign Nationals

Though patient safety is the #1 research priority for the World Health Organization, we do not currently have plans to engage foreign collaborations beyond the normal dissemination of research through industry events.

10) Productivity

As SST began just 2 months prior, we have nothing to report regarding articles, chapters, etc...

11) Award Participants

Though we are actively engaged with regional institutions with the Military Health System, there are no military personnel working directly on this effort or receiving salary support.

Safe Surgery Trainer (SST)

Curtiss Murphy, Alion Science and Technology

Objective

- (1) Build a game prototype that addresses patient safety protocols and combats medical skill decay across the Navy and Military Health System (MHS)
- (2) Conduct robust research which advances the state of the art in M&S and medical domains

Approach:

- Compile a team of nationally recognized experts; Select key patient-safety learning objectives; Perform instructional design; Build the SST prototype; Design and execute scientific research

Accomplishments:

- With just 2 months underway, Team SAFETY has: Kicked off the project; designed critical aspects of the scenario; reached out to regional healthcare institutions; Laid a foundation of software; Coordinated the SST StoryJam involving one medical school, four companies, and six hospitals including MHS representatives from the Navy, Army, and AF.

Impact/Transitions

- Laid the foundation for future transition by involving stakeholders from day one.

