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Novel Collaboration and Situational Awareness Environment for Leaders and Their Support Staff via Self Assembling Software

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Abstract

This is the final report on the Sandia Fellow LDRD, project 117865, 08-0281. This presents an investigation of self-assembling software intended to create shared workspace environment to allow online collaboration and situational awareness for use by high level managers and their teams.

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1. What is the Problem?

Software to support collaborative work among distributed team members has become popular. However, policy makers and their support teams face unique challenges, such as the need to rapidly respond to requests for budget and project status, audit trails, compliance status, and data to support decisions. We propose an innovative shared workspace environment that provides a new paradigm for online collaboration and situational awareness tailored for use by high level managers and their teams. Key features of this environment will be (1) providing a single "place" for the team to carry out and view work to support the leader in selected areas of critical importance (2) extreme ease of use (no training courses needed) (3) locks that allow the leader to easily and safely control the visibility of sensitive information based on need to know (4) monitors that alert users when actions of interest occur in the environment (and if necessary block the actions) (5) an alternative to overloaded email inboxes (6) a logbook of all activity that automatically provides an easily searchable record and a compliance/audit trail for the entire activity. The novel environment will be developed by extending the self-assembling software technology being developed here at SNL.

2. Technical Approach

Self-assembling software (SAS) is a revolutionary technology under development at SNL that is aimed at providing all software users with extremely easy to use features as well as powerful capabilities formerly available only to software programmers. Much of the risk of this effort is associated with using SAS to create a networked, multi-user environment for the first time. Additional risk is tied to the novel collaborative capabilities we are proposing. Specific goals of the effort are (1) to implement an efficient and reliable protocol for communication between SAS environments on separate PCs (2) to create user-controlled, self-assembling locks and monitors that have no analog in other software systems (3) to implement an automated logging capability to provide an easily searchable archive of all activities (4) to manage multiple users' simultaneous access to the same data (5) to conduct usability testing.

3. Potential Benefits to Sandia's Mission

This environment would provide a new paradigm for teams to provide support of, and leaders to quickly review, many time critical and mission critical activities at SNL, DOE and DOD. The automated logging capabilities could provide a new automated methodology for recording compliance with ES&H and other DOE requirements, as well as providing easy searchable access to such records by anyone being audited in the future. Additionally, the environment could be used generally as a new tool for SNL project management and oversight, replacing many status vugraphs and meetings with a manager's direct access to all activities in the environment.

4. Progress and Accomplishments

On October 3, 2007, the third day of the fiscal year on which this project began, the PIs (Gordon Osbourn and Ann Bouchard) announced their intention to leave Sandia to form a start-up company to commercialize the self-assembling software technology on which they had been working for the past few years. Within a month, Ann had left Sandia. Gordon archived work and completed pending work before using terminal vacation. In addition, both PIs had days worth of tasks associated with completing the extensive SNL separation checklist, such as archiving and transferring records, cleaning out offices and laboratories, and so forth. John Bartholomew completed the write up and documentation on the codes as well as cleaning up and disposing of Dr. Osbourn's laboratory space.

5. Conclusion

The PIs clearly did not have enough time to finish any of the major milestones of the one-year project. In spite of the brief effort, a significant accomplishment was made toward the project's goals. A key component of creating shared environments was to enable networking so that messages could be sent from one environment to another on a different computer across a network. The environment uses the open-source SDL library to handle events from the operating system, so the first step was to write code to (a) formulate a message, pass it to SDL to send across the network, and (b) receive a message from SDL at the other computer. This code was written and successfully tested in a stand-alone module. However, due to the brief nature of the effort, it was not integrated into the environment.

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Situational awareness (SA) simply refers to being aware of your surroundings. The third level of situational awareness involves the ability to perform future prediction and projection of the given situation and surrounding environment. A critical part of situational awareness is the ability to understand how much time is available. Self-rating. One very simple technique that has been used occasionally is to ask operators to subjectively rate their own SA. Supporting evidence. The investigation carried out by NTSB (1996 [10]) on air disaster involving American Airlines flight 965 enroute to Cali International Airport on December 20, 1995 revealed a situation of clear loss of situational awareness by both the captain and the first officer.