THE VIRTUAL M&S LYCEUM: A CONSORTIUM FOR MODELING AND SIMULATION TECHNOLOGY

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ABSTRACT

This paper addresses the opportunity to put into place a virtual consortium for modeling and simulation. While periodic conferences such as the Winter Simulation Conference are tremendously vital to the continued growth of modeling and simulation research, they do not offer the day-to-day technical exchange that can now be made possible with matured collaborative technologies.

We call this web-based meeting place Virtual M&S Lyceum, after the research institute founded by Aristotle in 335 BC; where young Athenian students were imparted great knowledge and insight by the great minds of the time. (Interestingly enough, the physical Lyceum recently came into the news again after 2300 years, when advance excavation crews, preparing for the construction of the new Museum of Modern Art, unearthed what is believed to be Aristotle's original school). It is in the spirit of this "hall of learning" that we try to create a place – albeit a virtual one – in which great minds can once again impart knowledge and insight to the masses.

1 MOTIVATION

The Air Force Research Laboratory has, for several years now, advocated and sponsored research in enabling technology for modeling and simulation. Focusing primarily on the academic community, the Laboratory has been fortunate to direct the workings of many of the simulation community's most respected members. One of the few pitfalls to the Laboratory's approach to advancing the 'science' of modeling and simulation was that collaboration was primarily restricted between the Laboratory engineer and one of the contracted parties. Rarely did the opportunity occur to get several different researchers and the government together to discuss the synergistic opportunities that may exist between the various initiatives.

Efforts to foster a better exchange resulted in the birth of the Enabling Technology for Modeling and Simulation

Conference held annually at the SPIE Aerosense Symposium in April. This year's conference will be the third opportunity to put representatives of the Air Force's major modeling and simulation initiatives in the same geographical location with those of the basic research community.

The annual face-to-face interaction has tremendous benefits, but still falls short of the day-to-day, dynamic interaction needed to stimulate the positive and continued growth of simulation technology. The maturity of collaborative tools and the impending improvements to web access (i.e., Internet2) can enable a virtual consortium capable of facilitating a lively exchange of information. This paper will provide an overview of some of the capabilities that can be achieved through the virtual modeling and simulation consortium concept and highlight some of the existing tools and technologies that can be brought to bear on this idea.

2 INSIDE THE MODELING AND SIMULATION LYCEUM

The M&S Lyceum has the opportunity to benefit those in academia, industry, and the government alike.

(1) Access to Researchers – As identified in the previous section, the primary motivation and benefit of the M&S Lyceum is that it enables virtual access to a vast and disparate body of researchers in the M&S community. An on-line register of those conducting research would provide an excellent resource for those sponsoring the advancement of simulation techniques.

(2) Distribution of Publications – The time lapse between paper acceptance and the time that it appears in a conference proceeding or journal commonly rests between six months and two years. Electronic availability of publications will significantly reduce the access time to these documents by effectively making them immediately available for reference. On-line publications can also reference information

sources by URL; allowing the reader the option to immediately access the cited reference.

(3) On-line Refereeing – Closely tied to the distribution of publications is the review processes involved with publication acceptance. The consortium as a whole can act as a referee. Electronic publication, browser based forms, and even audio chat capabilities would enable the conveyance of more comments to the authors or to the referring body. Another possibility is 'reader refereeing' where anyone interested in the proposed publication is allowed to comment.

(4) Focused web-searches – A characteristic of modeling and simulation is that it is a pervasive technology and, as such, it is employed [as a tool] across many domains. Because of this, literature searches and other attempts to identify efforts to advance simulation techniques result in many 'hits' where someone is simulating or modeling something, but is doing so with mature technology without attempt to advance simulation itself. For example, within the first twenty expression matches of an AltaVista™ search using the boolean expression: `(modeling or simulation) and techniques,` one will reveal work related to modeling the Earth's magnetosphere, neurosurgery, hot-air ballooning and Medievalist sport fighting.

A dedicated site for simulation research can champion the establishment of a tailored search capability that spans a select microcosm of the web. Research agencies and universities could apply to have the content of their sites included in the search space.

A possible candidate package to enable a controlled search capability would be Excite for Web Servers (EWS). Excite for Web Servers is a software product which, when installed on a web server, helps visitors navigate through a local content of HTML and ASCII documents. EWS's ability to support virtual sites makes it an excellent candidate to support this capability.

(5) Program Reviews – The interactive capabilities of the Virtual Lyceum could allow parties to conduct periodic technical reviews of contracted efforts;

thus, reducing travel costs and allowing more resources (read: money) to be allotted to the research activities.

(6) Simulation Execution – Possibly the most exciting aspect that the World Wide Web (WWW) offers to the simulation community is the opportunity to bring simulations right into the workplace or home. The M&S Lyceum can act as the launch point for any number of simulations by allowing users to enter a 3-D virtual laboratory. Users can virtually walk up to and sit down in front of computer terminals to run a simulation, as shown in Figure 1.

(7) Electronic Conferences / Guest Lecture Series – Electronic conferences work much in the same way as do Internet "mailing lists. An electronic conference is where all messages sent by subscribers are echoed to all current subscribers. This allows the subscriber group (the electronic conference attendees) to come and go without everyone having to update their own mailing lists. In addition, all previous electronic conference messages are archived and made available for retrieval by any participant. This allows new subscribers the opportunity to review prior message traffic in order to catch up on the discussions. These electronic conferences can be open-ended in length or can be active (hopefully, very active) for a short period of time; say one week.

An excellent place to gain a feel for e-conferences is from the Information Technology Service Center (ITSC). From this site, one can participate in a number of electronic conferences related to M&S. Examples include conferences on the Joint Warfare System (JWARS), High Level Architecture (HLA), and the Next Generation Mission Model (NGMM).

A more ambitious venture would be the sponsorship of a guest lecture series whereby the speaker presents his or her material to a geographically dispersed audience using an audio/video stream, interactive whiteboard, and on-line demonstrations.

3   Prototyping the M&S Virtual Lyceum

Mature collaborative tools are sufficiently mature to enable an initial prototype of a virtual consortium. Day one capabilities should include straight-forward mechanisms for linking in web documents (where web documents exist as images, video, audio in addition to the traditional text form), audio and text chat, whiteboard, 3-D object browsing (e.g., Virtual Reality Markup Language – VRML), and email or electronic paging. Also desirable would be some rudimentary security mechanisms for user-to-user chat (i.e., not broadcast to all listeners), and object control such as restricted access to documents.

The Command and Control Multi-User Virtual Environment (C2MUVE) was developed by SAIC under the direction of the Office of Naval Research. The technical objective of this program was to produce a tool to support the activities of a number of geographically dispersed military personnel working on a collaborative task such as Theater-level planning.. The resultant product is a promising web-based management tool constructed upon commercially or shareware available products. By using browser technology, specifically Netscape 4.0.4, C2MUVE offers platform independence. Other software
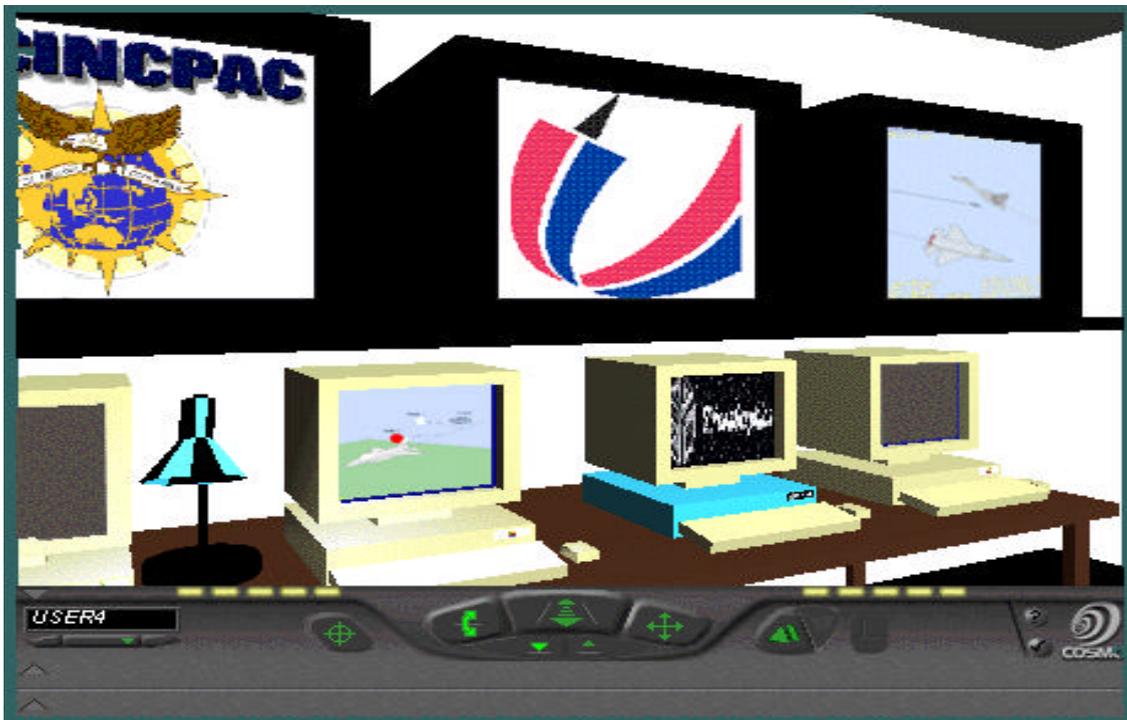
Figure 1: 3-D Virtual Lab Session

requirements include COSMO player for VRML browsing, NCSA's Habanero to enable a whiteboard capability, and the Visual Audio Tool (VAT) plugin for Netscape to allow an audio chat capability.

C2MUVE allows for the development of a virtual workspace constructed of virtual buildings and rooms. Sample room types would include lobbies, libraries, and conference rooms. Figure 2 shows how a simulation library with the 'chat' tool enabled may appear. This room could house a collection of papers, slideshow presentations, audio and video clips, etc. Of course, the actual documents themselves will physically reside on the web servers of those responsible for the production and maintenance of the material.

Future plans for C2MUVE, if brought to fruition, offer many exciting opportunities to further enable our virtual consortium. Proposed upgrades include the abilities to transcribe speech into text for archiving and contextual search as opposed to simply keyword search mechanisms. A guest login capability, on-line tutorials, software requirements and other information about the C2MUVE program are available at sagu.nosc.mil.

4   INTERNET2

The Internet2 program is focused on the development of a new family of advanced applications to meet emerging academic requirements in research, teaching, and learning.

The Internet2 partnership is made up of members from the government, industry, and 127 participating universities across the United States; many of which are active in simulation research. To avoid omissions, we'll employ a rare act of discretion and opt to not list some of the institutions we see as leading the way in simulation research; however, a quick review of participating schools will convince one that the simulation community is well-represented. Ideally the server should be managed and maintained by an academic concern. Current AFRL web policies restrict us from referencing universities from the AFRL web sites unless a formal relationship (e.g., contract, cooperative R&D agreement, etc.) is in place. The academic sponsorship of this site will also facilitate the utilization of the site for activities such as the development of a simulation curriculum; which are not under the mission of the Air Force or its research laboratory.
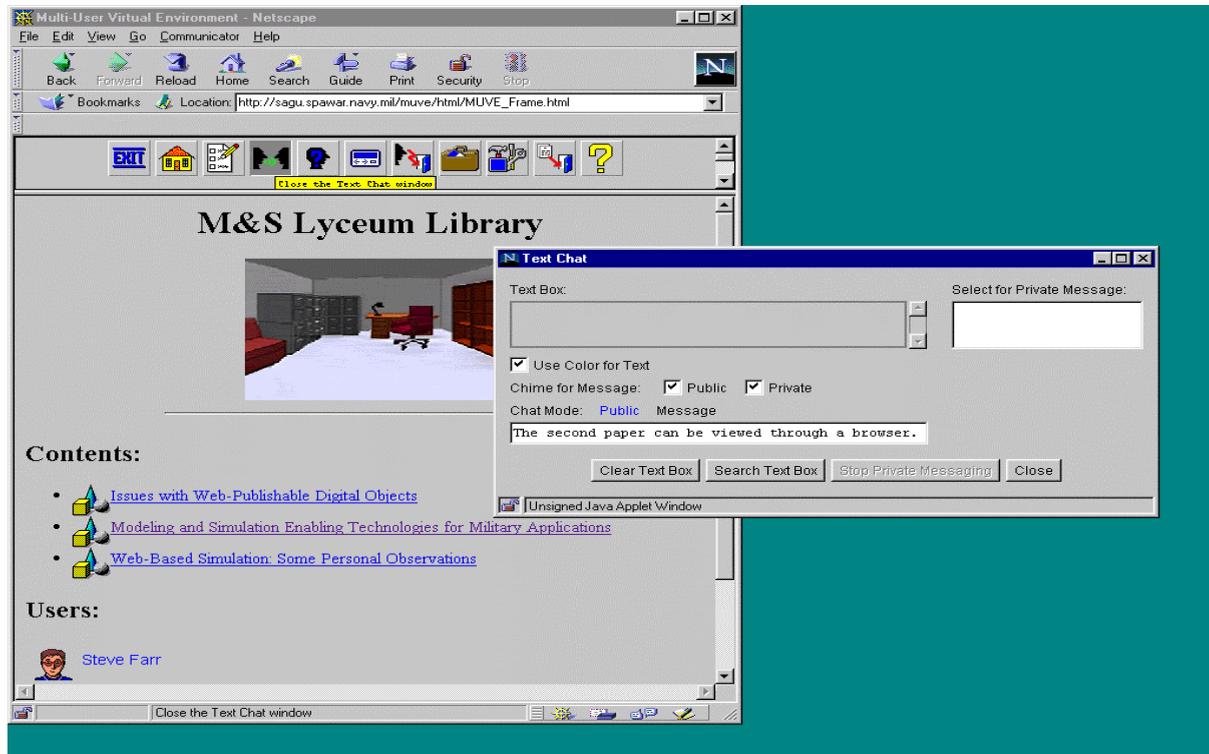
Figure 2: Simulation Library With 'Chat' Room Enabled

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