INDIANA UNIVERSITY

4f – Distributed Visualization Facilities

Action Item Template Response

General Action Item Information

Lead Division/Office: Research Technologies
Action Item Number: 4f
Action Item Short Name: Distributed Visualization Facilities
Dependencies with other EP Action Items: 4e (Centralized Visualization Facilities)
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OVERVIEW

High-end visualization systems such as CAVEs and ultra-resolution display walls are an essential and unique component of cyberinfrastructure, providing both real and intangible impact on scientific, creative, and learning processes and inspiring researchers, artists, and educators to think far "outside the box." However, the ever-growing capabilities, accessibility, and affordability of commodity graphics and display systems cannot and should not be ignored. Since 2001, University Information Technology Services (UITS) / Advanced Visualization Lab (AVL) has actively investigated and adopted commodity compute and display systems as a way to further the adoption of advanced visualization techniques and to provide a technological bridge to high-end facilities. This initiative culminated in the development and NSF-funded deployment of nine John-e-Box systems across the IU system in 2003. In addition, AVL actively investigates and adopts new capability systems such as haptics, motion capture, 3D scanning, 3D printing, and stereo video as another avenue to expand the applicability and impact of its services. Many of these technologies are adopted in response to specific needs of key collaborators or strategic communities and are usually deployed in the labs or buildings of these users to provide best access and utility. This strategy combining centralized, high-end systems and distributed, mid-range systems is formalized in the 2004 Strategic Plan for Visualization for IU.

A vision for this type of technology customization for faculty and scholarly success is described in *Empowering People*: "The university has implemented a program that provides IT devices that are tailored to meet individual faculty requirements. For example, one cultural anthropologist's device includes video and audio editing software and multiple displays. Another faculty member, a visual artist, designs on a high-resolution work surface, scaled for dimensional accuracy, and calibrated for color fidelity. This artist also requires enhanced network connectivity and bandwidth so that she can easily move and process with reduced latency the large datasets that she transmits to colleagues and external displays."

I. DESCRIBE YOUR PLANS FOR IMPLEMENTING THIS ACTION.

Implementation of this goal requires focused activities and investments in two complementary areas:

(1) revising the staffing and support structure in RT-Visualization to better support an expanded user community and distributed hardware infrastructure, and (2) funding for distributed hardware installations and custom technology allocations.

1. Revised staffing and support structure. RT-V services should be revised to have one group for visualization systems support and another for visualization applications support. This will involve the expansion of the current systems support staff from 1 FTE to a total of 3 FTEs (1 manager plus 2 support staff). See implementation plan 4E for details.

2. Distributed Hardware. There are three types of facilities, systems, and resource allocations proposed under this category.

    - Higher-end, permanent visualization installations in non-UITS spaces (referenced with “A” in following items). We are seeing an increased interest in bringing advanced display capabilities - usually multi-screen configurations, stereoscopic, or ultra-resolution screens - into medium-sized classrooms or multi-purpose spaces controlled by other university groups. In many cases, these proposed installations have technology budgets that will cover a significant portion of the cost; the project owners are looking for expert advice, supplemental support, and additional funding to make these ideas a reality. The large visualization installation in the IU Innovation Center is a good example of this new model of collaboration. UITS/RT partnered with the IU Research and Technology Corporation, who had received a Small Business Administration grant to create a space that would enable new levels of research and collaboration. UITS is providing design services, installation oversight, secondary support, and matching funds to create a significant new facility that can be used by any university group. Similar discussions are underway with Informatics, Psychology, and HPER on the Bloomington campus. Opportunities for similar types of arrangements also exist at the Campus Center and with the Purdue School of Engineering and the IU School of Medicine on the IUPUI campus.

    - Mid-range visualization workstations (referenced with “B” in following items). This project is a next-generation version of the successful John-e-Box deployment of affordable and portable visualization systems for groups of 2-12 people. This next generation, with the working title "i3D Station" will utilize recent advances in consumer stereoscopic displays targeted at home 3D cinema, as well as affordable spatial tracking, wireless controllers, and multitouch screens. As an evolutionary step between the one-size-fits all model of the John-e-Box, and the support complexity of full customization for every user, the iVis station will come in three models: (1) a basic stereo display designed for applications of stereo rendering and animation and stereoscopic photography and videography, (2) a visualization model with stereoscopic display with supplementary touch-screen interface and input devices to support scientific visualization, and (3) a virtual reality model that adds full spatial tracking to allow immersive simulation and visualization applications.

    - Specialized resource allocations (referenced with “C” below). It is important to keep IU researchers and artists at the leading edge of their fields and to realize the vision of technologies that are "tailored to meet individual faculty requirements" as well as those of their students and collaborators. UITS has a history of funding (in part or in full) and supporting highly specialized technology resources such as haptic feedback systems, tracked stereoscopic walls, 3D printers, 3D scanners, Second Life islands, and motion capture studios. We propose the establishment of a pool of funding to enable the acquisition and ongoing support of small number of highly customized visualization or spatial input/output technologies for faculty. We propose that UITS/AVL, in cooperation with OVPIT, establish a lightweight, reviewed proposal process to allocate these funds, using programs in OVPR as models.

II. WHAT ARE THE POLICY AND PRACTICE IMPLICATIONS OF YOUR PLANS?

The hardware investments in this category will reside in university departments and will be new examples of "edge and leverage" deployments for UITS and Research Technologies, in that ownership, access, and support will be shared responsibilities between UITS and the faculty's unit or department. For each deployment (whether a permanent higher-end visualization installation, an i3D station, or a fully customized resource) we will execute a signed MOU with the host department that will include the following:

- Daily support mechanisms: Establish responsibilities and communication mechanisms for support tiers, including first (department), second (UITS), and third (vendor) levels. Clarify who is responsible for routine maintenance and software upgrades on the systems.

- Cost recovery structure: For devices with consumables (e.g., 3D and other specialized printers, non-reusable recording media, etc.), is there a cost-recovery model to allow resources to be replaced?

- Upgrades and renewals: Based on widely varying costs and expected lifecycles, what is an appropriate number of years of support to build into the initial purchase? How will upgrades or support renewals be negotiated?

- Access and security: While the primary users of these systems are the researchers and students in the hosting department, it is unlikely that the technology will be fully utilized by any one group. It is highly desirable to have the hosting department create a procedure that will allow use by approved users outside the department while still keeping the technology secure.

Implementation of these systems should leverage standard practices, software tools, and services wherever possible. Specifically:

- Visualization and virtual reality software tools installed on distributed systems (A & B) should be scalable and compatible with the tools installed on centralized visualization systems (see implementation plan 4e).

- Community-building tools, especially for the community of i3D station users, should leverage Hub-zero technologies as pioneered by the CTSI-hub as a way to enable social networking, file sharing, and complementary network visualization service delivery.

III. IDENTIFY STAKEHOLDERS.

The relevant stakeholder communities are the same as for 4e (Large, Centralized Visualization Facilities). For broader deployments (i3D station, custom technology allocations), we will conduct broadly advertised infoshares, demos, and calls for proposals. Significant participation in key events, including the spring 2010 Cyberinfrastructure Days, Statewide IT Conference, GIS Day, and other research-oriented events, will help to increase awareness, garner input, and generate potential collaborators and clients.