

# **Using Internet2 to reengineer, implement and evaluate an on-line version of "The Exercise in Hard Choices"<sup>sm</sup>**

*Dr. John Hirschbuhl  
University of Akron*

*Dr. Thomas Gaylord  
University of Akron*

## **Abstract**

The University of Akron (UA) is partnering with the Committee for a Responsible Federal Budget (CRFB) to provide remote facilitation for the Exercise in Hard Choices via Internet2 locations throughout the country. The research partnership is a collaborative effort between CRFB, the U.S. Congress, and Internet2 universities who host the Exercise, which is a simulation of a U.S. Congressional committee marking up a budgetary bill. UA will create and then test the communication and education effectiveness of on-line versions of the Exercise. The Exercise will be delivered via: synchronous-group, synchronous-individual, asynchronous-individual and synchronous-traditional settings. This ongoing project will be tested in multi-site Internet2 sessions. The project explores five implementation methods: Virtual Community, Synchronous Virtual Round Table, Asynchronous Virtual Round Table, Interactive Citizen, and the Traditional Session. The Internet2 applications will consist of voice, video, and data. The project is testing methods that allow remote administration of the Exercise.

## **Introduction**

How does one go about implementing and testing on-line methods that allow remote administration of the Exercise in Hard Choices? The University of Akron, The Committee for a Responsible Federal Budget, the U.S. Congress, and Internet2 universities who host the Exercise are joined in a research partnership to address this problem. The problem is to ensure effective instruction and clear communication to a diverse audience of all ages and education levels.

Internet2 was selected for the Exercise for the fundamental reasons:

- It delivers high bandwidth content throughout the country
- It meets the need for high reliability
- It meets the need for high quality output
- It's more cost effective and flexible

## **A basic civics lesson – now on-line**

The partnership will provide remote facilitation for the Exercise via Internet2 locations throughout the country. For the past twenty years, CRFB conducted the Exercise through on-site town meetings of politically active citizens in single locations using onsite facilitators. While the

Exercise was a success in this traditional setting, the means of distribution were limited due to time and costs for conducting the Exercises. One year ago it was decided that it might be possible to remotely conduct the Exercise if it was put on a national network. A proposal was written and funding for the project was supplied by the U.S. Department of Education. UA's Internet2 research on streaming and federal partnerships is at the heart of this project. UA redesigned and developed CRFB's Exercise in Hard Choices so as to test the communication and educational effectiveness of an on-line version of the Exercise in group and individual, synchronous and asynchronous settings. This ongoing project is exploring five methods of implementing the Exercise, which is a simulation of a U.S. Congressional committee marking up a bill. The five methods being tested are (1) the traditional Exercise, (2) the virtual community, (3) synchronous virtual round table, (4) asynchronous virtual round table, and (5) the interactive citizen.

### **Methods in detail**

The traditional exercise (1) contains synchronous groups meeting in the same location with on-site facilitation. A central record keeper records group decisions on an electronic scorecard. In the virtual community (2), synchronous groups use on-line communication between groups in different locations to accomplish the Exercise. In this setting, groups are in constant contact with the moderator and, at the end of the session, the groups share their scorecard. The prototype will use a Polycom system. The large-scale version will use an MCU. In the Synchronous virtual round table (3), groups include members who are in different locations. Groups are in constant contact with the moderator. A Flash Communication Server will support video, voice and chat communication. The asynchronous virtual round table (4) includes asynchronous groups with each member in a separate location. The groups communicate and come to consensus on group decisions. The Group chairman enters decisions through an on-line interface. The threaded discussion list will be delivered via WebCT. The interactive citizen (5) is a method in which each individual makes budget choices independent of an actual group. Data collection is simplified. Individuals participate in a self-paced budget exercise. The exercise is an on-line simulation/game. Each of the groups share their scorecard at the end of the session. The scorecard uses Cold Fusion and SQL connects the data from each group to the backend database.

The Internet2 applications consist of multiple streams where streams contain voice, video and data. Each implementation is being evaluated for learner performance and learner satisfaction with video and audio fidelity, as well as cost-effectiveness and efficiency.

### **What resources are needed to do this**

In order to provide such services several resources are required. In order to provide the distance learning connection the signal must pass through Distributed Education services that provide the personnel and communication equipment through which the voice and video must travel. In addition, Network Services must provide the personnel and connections needed to link into Internet2. Telecommunications has to provide the switches and routers to take the data through

the University's fire wall and out to Internet2 and then it recovers the return signals and routes them to the server. Finally, the Design Development Services group must provide the design and development work needed to create the various delivery methods and place the content and groups into the various communication methodologies that are to be tested. They also must create data analysis tools (middle ware) that can be used to analyze the incoming data from the exercise and the participants. This includes building the appropriate instruments for collecting the data.

## **Why Use Internet2**

UA is one of 200 member universities that make up Internet2. The 200 universities span the United States. They can provide access to the Exercise in every region of the country. In addition the communications costs are low and the service reliable. Internet2 provides wide bandwidth network access in an IP format that allows the Exercise to be sent and received in an H.323 format. This format supports high-quality audio and video and massive data files used in research. The Internet2 Commons provides a framework for collaboration throughout the research and education community. This collaboration encourages the large-scale deployment of tools for one-to-one, one-to-group, group-to-group collaborations. You can visit the Common's web page at <http://commons.internet2.edu>

## **Project Description**

The University of Akron's Exercise in Hard Choices project has designed and developed an on-line version of the traditional in-person educational program. The Exercise is an educational program conducted throughout the country each year to help U.S. citizens and students better understand the federal budget process. The on-line version will continue to serve the same population. Each year, results from the Exercise are shared with participants, members of the U.S. Congress, and the media. Launched in 1983, the Exercise is designed as closely as possible to replicate House and Senate Budget Committee mark-ups. Created and owned by the Committee for a Responsible Federal Budget (CRFB), the Exercise is updated regularly to reflect the actual choices Congress and the President are considering in the current fiscal year or may consider in the near-term future. A CD-ROM version was under developed at Oklahoma State University (OSU). In 2001, OSU also developed an Excel spreadsheet scorecard for use during Exercise sessions. The University of Akron (UA) has built on the work of CRFB and OSU to create an on-line version of the Exercise and will test its communication and educational effectiveness in-group and individual (synchronous and asynchronous) settings. The goals are to determine the best way to develop an on-line, synchronous version and to determine the communication and educational effectiveness of the on-line version versus the traditional version. By doing so, the UA Exercise will improve the effectiveness of the Exercise while adding to the research on Internet-based communication and education. The expected outcome of the UA Exercise is a series of on-line versions that can be moderated remotely. Communication and educational effectiveness of the Exercise and reporting of the results from each session are expected to improve. It is hoped that the findings can be generalized to other on-line communication and pedagogy efforts.

## **The Exercise**

During the traditional version of the Exercise, participants are assigned to groups of eight to ten individuals to form “budget committees.” Every effort is made to ensure that each group includes liberals, conservatives, people of different ages from different backgrounds, and those representing different points of view. Each "budget committee" sets a long-term fiscal policy goal for the size of government and decides what type of fiscal discipline they want to impose (e.g., keep the budget on its current long-term path, permanently balance the budget, stabilize the debt to GDP ratio, etc. Then each group must decide which changes, if any, they would make to major areas of the budget (i.e., Social Security, Medicare, etc.); if they have to raise taxes, which taxes they would raise; and what they would do with a projected short-term budget deficits/surpluses.

During the traditional version of the Exercise, the Committee for a Responsible Federal Budget (CRFB) staff members are available to answer questions. At the end of the Exercise, groups report to the entire audience what they have done. At this point there is an opportunity for discussion. At the end of the calendar year, the results from all sessions conducted throughout the country are shared with Exercise participants, members of the federal government, and the media.

The University of Akron will develop an on-line version of the Exercise that will enable it to be run in at several different locations at the same time. The moderator (CRFB staffer) will be located at a remote site. The groups will interact with each other and the moderate via an Internet2 connection. Internet2 is the delivery vehicle of choice because it offers wide bandwidth connections to a community of 200 universities throughout the U.S. that can connect with other area schools, and it can be used in a variety of settings such as hotel conference rooms.

Using the data gathered, conclusions will be made as to the appropriateness and effectiveness of the online versions. Each iteration will be assessed for how well it communicates the information and its pedagogical effectiveness.

The goals of the UA Exercise project are to determine the best way to develop an on-line version of the Exercise in Hard Choices, and to determine the communication and pedagogical effectiveness of the on-line version versus the traditional face-to-face version.

The UA Exercise project is attempting to answer the following questions:

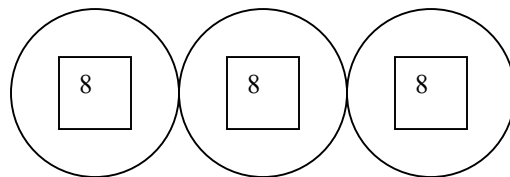
- Is an on-line group decision making exercise as effective as in-person group decision making exercise in conducting the Exercise and which version is more cost effective?
- What is the time it takes each group (on-line vs. off-line) to reach consensus and can they do it within the three-hour time frame?
- Which version of the Exercise (on-line vs. off-line) provides a better quality of decisions?
- Which version of the Exercise (on-line vs. offline) is better at communicating the objectives of the Exercise to the participants?
- Which version of the Exercise (on-line vs. offline) is better at conveying results of the Exercise to participants, the media, and U.S. government members?
- Does a synchronous arrangement better serve communication and performance levels than an asynchronous setting?

## Method

Once an on-line version is developed, it will be tested in three settings: synchronous groups, synchronous individuals, and asynchronous individuals. The control group will be the traditional off-line, non-computer assisted version. Research participants will be drawn from a national population and represent a cross section of voters.

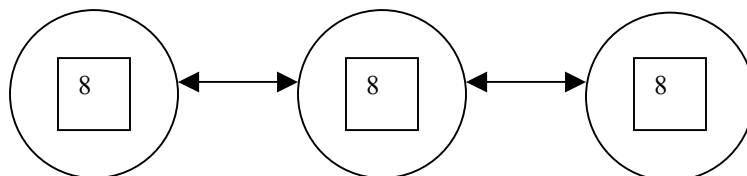
### Control group: Traditional Exercise session (on-site facilitation) – Face-To-Face Groups

**Figure 1**



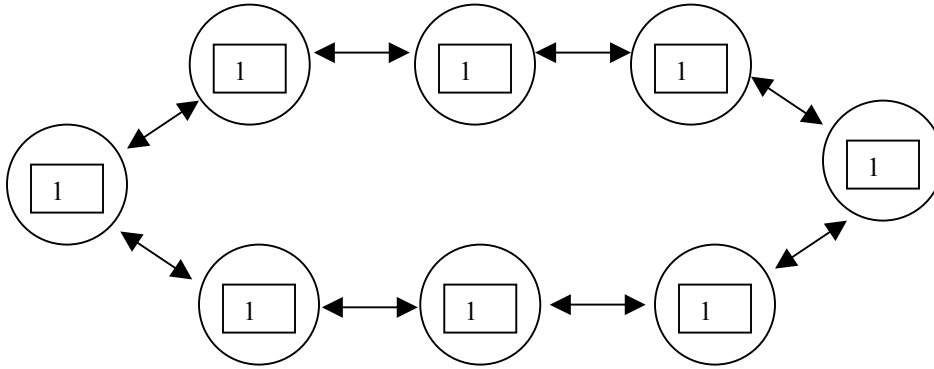
### Virtual Community (Polycom, MCU): Groups of 8 – Synchronous Groups

**Figure 2**



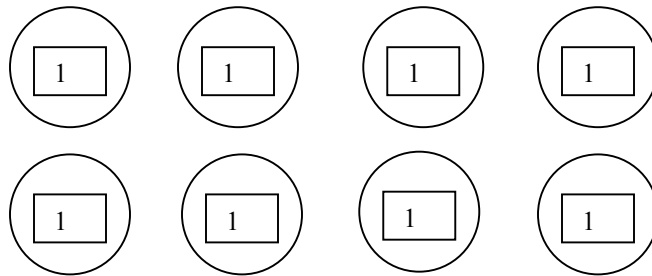
**Synchronous Virtual Round Table (Flash Com): 8 individuals - Synchronous Individuals**

**Figure 3**

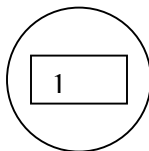


**Asynchronous Virtual Round Table (Web CT): 8 individuals communicate via Threaded discussion – Asynchronous Individuals**

**Figure 4**



**Interactive Citizen: individual goes through a simulated exercise Figure 5**



Once assigned to a group, participants will be pre-tested to determine their level of knowledge regarding the federal budget process. The Exercise will then be administered to all five groups, with the control group participating in the traditional version of the Exercise.

After the sessions, a post-test will be administered to assess the communication and pedagogical effectiveness of each version: synchronous-group, synchronous-individual, asynchronous-individual, and synchronous-traditional.

Pre- and post-test will be administered over a long enough period so as to minimize sensitization of participants to the Exercise information. Enough time will be allowed before post-testing to account for any sleeper effect where participants may “absorb” the information for better recall or may forget the information over a short period of time. However, post-testing will occur early enough after the sessions so as to minimize maturation and mortality effects.

Pre- and post-test may include but not be limited to Symantec Differential and/or Likert Scales, multiple-choice tests, or other knowledge measures to be determined later.

### **Expected outcomes**

By using an on-line version, the Exercise in Hard Choices should improve communication and pedagogy within the various groups of participants. It is expected, based on the traditional version of the Exercise, that groups of 8-10 working at the same time (synchronous) will reach consensus in a shorter period of time. It is expected that at the same as or higher level of quality decisions will be reached using the on-line version of the Exercise. Because of the interaction satisfaction will be higher with the synchronous groups. Because of access to the on-line tools, participants should have a richer recall than groups working off-line.

### **Project Evaluation**

Pre- and Post-tests will be used to measure the effectiveness of the on-line version of the Exercise by evaluating knowledge levels of the participants before going through the Exercise and after working through a session, which runs for approximately three hours in the traditional, in-person, synchronous version.

The University of Akron “Exercise in Hard Choice” will record each training session (video and audio) to help assess communication and pedagogical effectiveness.

The project will evaluate:

- the communication and educational effectiveness of the traditional version of the Exercise
- the communication and education effectiveness of various on-line configurations of the Exercise
- the Quality of Service of the video and audio
- the cost and benefits of the on-line Exercises

## **Outcome**

At this time, UA is collecting data from a variety of sites and systems. Data analysis will begin in the spring of 2003. In general, the Internet2 connections are performing very well and we are confident our goals of providing an on-line Exercise that can be facilitated and synchronously run remotely are in reach.

## **Population to be served**

The on-line version will serve the same population as the traditional version (U.S. citizens including adult, college, and school-age children). Because it is web-based, the on-line version should be able to reach a larger population each year than the traditional version has in past years. This larger population will, by virtue of numbers, will be more diverse than previous populations.

## **Importance or relevance to other institutions**

In this project, we will demonstrate how to implement and test various ways (e.g., voice, video, data) of conducting seminars remotely and yet maintain a high degree of activity, interaction, and involvement. We will demonstrate a variety of real time surveys, evaluations, polling, and calculations using databases. In addition, techniques for archiving and indexing voice video streams via an MCU will be discussed. We will analyze the results and make post hoc recommendations.

## **Contributions for research and educational practice**

The project will provide a working, on-line version of the Exercise that will add to the knowledge base about Internet instruction and on-line communication effectiveness. In addition we will examine The Quality of Service for the video and audio interactions needed for exercise collaboration at a distance and we will determine what technology can actually deliver this service. We will also provide multicasting support for interactions between groups of sites rather than only two endpoints. Our network host will transmit packets destined for a group of hosts rather than a single target computer. The routers in the network will take the responsibility for duplicating the packet as required to get it economically to all of its destinations. This will result in a massive reduction in network traffic loads. These activities require additional research within the networking and educational research communities.

