

Testing Remote Users: An Innovative Technology

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Abstract. Conducting usability tests with remote users require unique approaches and techniques. Remote users often have requirements that differ significantly from local users, as the technology is not wholly contained in a controlled usability lab. Based on the authors' experience with remote usability techniques, this paper provides insights and practical tips about a technology used to host and monitor remote usability tests, users' reactions to the testing technology, and the communication rhythm within the testing organization.

Keywords: Remote Usability, Usability Test, User-Centered Design.

1 Introduction

Remote usability tests are becoming more main stream today. Companies are now developing products and solutions for global users in a global workforce. Gone are the days when it would suffice to get feedback on product designs from users "down the hall." Getting early user feedback from an international audience reduces project schedules and, consequently, costs, and perhaps more importantly removes cultural bias in product design.

Several remote usability tools exist in the market today. But experimentation with these tools has shown that a single all encompassing solution to run effective remote usability tests does not exist. There are several factors to be considered to successfully running formative and summative remote usability tests,

- Can the test evaluator watch users interacting with prototypes in real time?
- Is there a security mechanism in place to authenticate users and prevent screen scraping (an issue where screenshots are taken without the test evaluator's knowledge)
- Can the test evaluator record in real time a user's voice, mouse clicks, and keyboard strokes?
- Is the recording in true color (uses 64-bit color or higher) with the audio and video integrated?
- Can highlight videos be easily made and distributed?

Vasnaik and Longoria [1] provided a remote usability infrastructure solution which addresses some of the issues stated above. They combined a number of tools (Citrix

GoToAssist¹, Windows² Active Directory, Windows Live Meeting, and Windows Net Meeting) to produce a comprehensive remote solution. This solution although complex in nature worked well for many but not every situation. The solution was cost effective and provided good data. However, while it worked well for thin-client solutions (prototypes on the web) it could not be used for live thin-client and thick client (Windows, Unix³, etc.) applications.

Usability testing live thin and thick client applications forms an intrinsic part of the Software Development Lifecycle (SDLC), especially for enterprise organizations. Bringing customers' onsite or traveling to customer sites is a very expensive proposition. Enterprise organizations have customers widely dispersed and work on product offerings that are complex to install and set up.

Brush, Ames, and Davis [3] and Hartson, Castillo and Kelso [4] have determined that significant differences between remote usability tests (both synchronous and asynchronous) and traditional tests do not exist, in terms of the number of usability issues found, their types, or their severities.

The case study presented here builds on the work done by Vasnaik and Longoria [1], providing a technical solution where thin and thick client applications can be remotely tested.

2 Remote Usability: Challenges and Requirements

Testing thick client applications remotely offers challenges that are logistical, political, and technical in nature. We needed a methodology that would meet the following requirements:

- Require minimal installation of software on users' machines
- Is accessible to users within their company firewalls (the solution should be accessible to both the test evaluator and the end user)
- Allow the test administrator to view user actions in real-time
- Record voice and screen interactions (mouse clicks and keyboard strokes) simultaneously and store those recordings as a single integrated file
- Host multiple sessions of the software application being tested on different operating systems
- Be maintained by technical personnel within the authors' organization, outside of CA's User-Centered Design (UCD) group
- Have 24x7 technical support for the test administrator
- Is accessible to developers for installation of test software – that is, it allows installation of software to be done by individual development teams rather than requiring UCD team members to perform software installations.

After testing several applications, we decided to use a combination of Citrix hosting software, Unicenter Remote Control⁴, Microsoft Live Meeting, and VMWare⁵.

¹ Trademark or registered trademark of Citrix Corp.

² Trademark or registered trademark of Microsoft Corp.

³ Trademark or registered trademark of The Open Group.

⁴ Trademark or registered trademark of CA, Inc.

⁵ Trademark or registered trademark of VMWare Inc.

Citrix was used to create a secure hosting solution outside the firewall. Unicenter Remote Control was used to allow users access individual VMWare sessions. By using VMWare, we were able to host multiple sessions with different operating systems and applications – Unix, Windows, etc. sessions could all exist on the Citrix server simultaneously. In addition, the VMWare sessions could be created on a separate server that developers could access to install software before the sessions were uploaded to the Citrix server. Unicenter Remote Control allowed us to view the users' interaction with the VMWare sessions in real-time. Microsoft Live Meeting was used to record the voice and screen interactions simultaneously and store the result in a single integrated file that could be downloaded. Keyboard strokes and mouse click data were not collected.

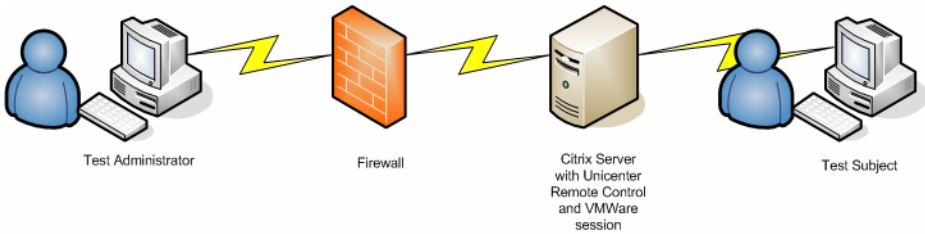


Fig. 1. Remote Usability Test Environment

The Customer Service Center at CA took over responsibility for maintaining the Citrix server. They agreed to provide technical support for the test sessions as they were scheduled, ensuring someone was on call during the test in case any technical issues arose.

3 Case Study: An Enterprise Network and Systems Management Application Remote Usability Test

The product chosen for our case study was an enterprise network and systems management thick-client application. (Windows and Unix). This product is an interface designed for an enterprise administrator that manages enterprise systems and applications from a single user interface. The first step in evaluating this product involved conducting a usability test of the current application to understand the usability issues users faced while interacting with the application. The target users were enterprise administrators located in the Netherlands, Turkey, and the United States.

3.1 Finding Users and Design Partnership Program

The most important challenge of usability testing process is to recruit users from different enterprises. This can be particularly difficult since users are busy with their jobs and often have no time to participate. From this perspective, we are lucky to have very active user pool. We started a program called Design Partnership program (<https://connectprimary.ca.com/webac/wac/usabilitylogin.asp>). The goal of this program is to

reach our users by soliciting their feedback and experience when using our products. We made users understand that they form an integral part of the design process. The Design Partnership program was one of the many channels we used to reach users for this test. We also worked close with product management and training teams to reach users.

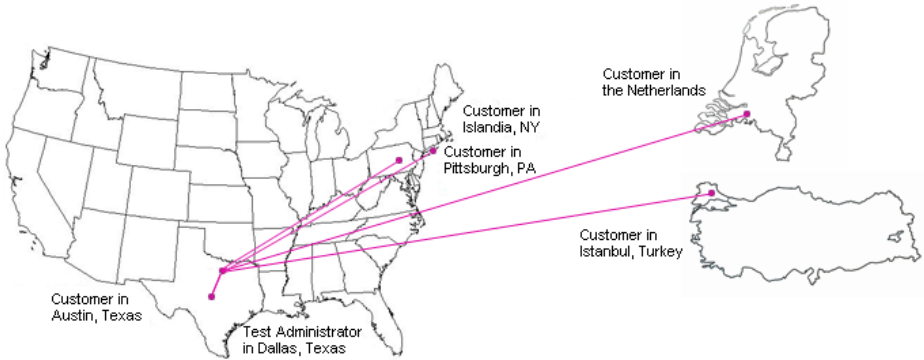


Fig. 2. Geographical distribution of users and test moderator

Eight users from four customer organizations participated in the remote usability test. These users were located in five different locations including the Netherlands, and Istanbul, Turkey. The use cases being tested required users to have a system administrator background, which in turn limited the number of users we had accessible to us. We contacted the users by email. Participation was strictly voluntary and no incentives were provided. In addition, we asked users to sign an Informed Consent Form prior to the test. This form stated that we had permission to record the users and use the data for product improvement. It further guaranteed their anonymity as a tester.

3.2 Test Preparation

To prepare for the tests, we had to:

- Create a schedule of the tests for Customer Service Center to ensure availability of support. The Customer Service Center administered the hardware and hosting software for our tests. As a result, we needed to ensure they were available during the tests in case an issue arose due to the infrastructure.
- Create and configure a VMWare session. A VMWare session is an image – or virtual representation – of a machine. This image could be a Windows NT server or a Linux PC, etc. The Customer Service Center provided generic images for our use of any operating system/hardware combination we required.
- Arrange for the development team to install the enterprise software on the VMWare session. We uploaded the image we got from the Customer Service Center to a server and provided basic communication information (such as IP addresses) and software (such as Unicenter Remote Control). We then contacted the

development team and had them install the enterprise software to ensure that it was configured correctly.

- Provide the configured VMWare session to the Customer Service Center to be uploaded to the Citrix server. Once the session was configured with the software to be tested, we contacted the Customer Service Center and had them upload the session onto the infrastructure outside the firewall.
- Create a session in the Remote Control local address book for both the testers Citrix ID and the users Citrix ID. Remote Control allows users to access computers (in this case, VMWare sessions) on remote machines. You must either know the IP address of the machine you wish to access or you must have shortcuts set up in a local address book. We created shortcuts to make accessing the VMWare session through remote control easier.
- Run a pilot test on the Citrix server to validate test steps, test language, and response time.

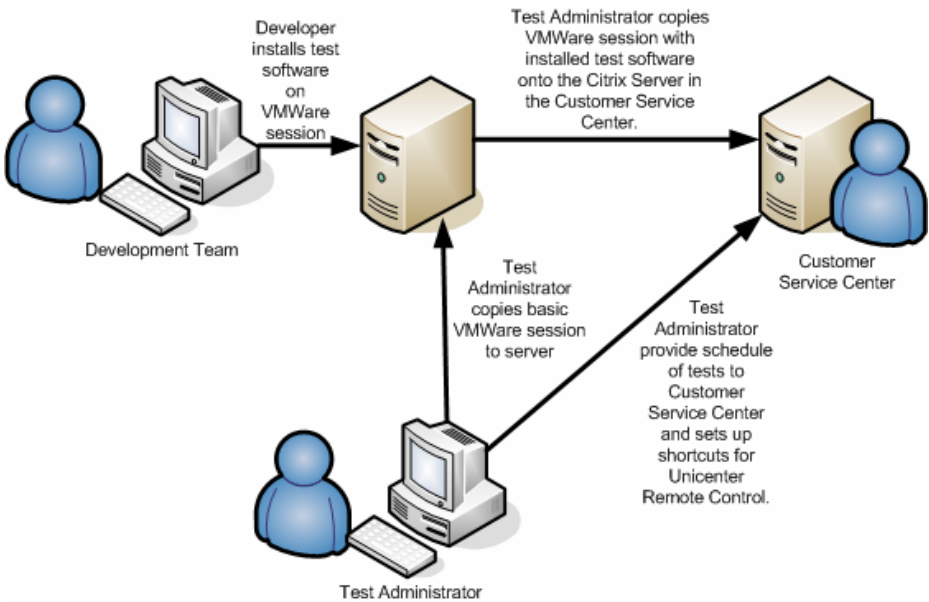


Fig. 3. Remote Usability Setup

3.3 User Preparation

Before the test, users received an instruction email that provided them the time and date of their test. They were asked to have the following items ready before the test started::

- Access to a computer with:
 - Internet Explorer 5.5 browser or higher
 - Java 1.4 or higher

This software was necessary for the user to be able to access our Citrix software.

- Access to a speaker phone or a headset, with toll free access. Because the test required the use of a mouse and keyboard, we asked that the users have a way to communicate with us without encumbering their hands.
- A printed copy of the task list. We wanted the users to access the software in a full screen mode, which made it necessary for them to have a printed copy of the tasks.
- A copy of the Informed Consent Form faxed to the test administrator. Because we were recording the sessions, we needed to have permission from the testers. The Informed Consent Form provided notification that they were to be recorded and gained their permission, in a legal fashion for the use of that recording for product development purposes.

3.4 Test Instructions

Users were asked to follow these steps to connect to the test:

1. Using a speaker phone or headset, dial into the following conference number:
2. At this point, they were greeted by the test administrator who confirmed that we had received the informed consent form and walked the user through the remaining setup steps.
3. Go to <http://www.ca.com/wwsolutions> and logon using the following information:
UserID: xxx01
Password: wwx
4. Double click the URC icon in the applications box.
5. If prompted for access to local user files, Choose No Access to Client Files and Never Ask me again. Click OK. Remote Control Explorer appears.
6. Expand the Viewer branch in the left hand tree and click Local Address book. On the right, double click the *SESSION NAME* icon.
7. A Connect screen appears. Do not change any of the information on this screen. Click Connect.
8. On the toolbar, select the computer icon to switch to full screen mode for the test.

3.5 Test Results

Once users accessed the product VMWare session, the test moderator started the recording. This involved recording the users' screens and the audio conversation. The test then proceeded like a traditional usability test. During the test, users performed seven tasks over the period of an hour. No difference between the performance of the test application and the actual application were found – two users made the comment that the test application ran more quickly than the one they had installed on their local machine. Recordings of the test had good visual resolution and excellent audio quality. The test administrator was able to review the test sessions while analyzing the test results and post the recordings on an internal company website for review by the development team. Support was needed from the Customer Service Center once – the problem was an issue with the user's machine that was quickly resolved.

4 Results: Advantages and Disadvantages

Advantages and disadvantages of remote testing over traditional usability lab testing have been summarized in previous studies[1], [2]. They found that remote testing provided significant savings, reduced the amount of time required to arrange the tests, provided a greater diversity in the user base, and increased the comfort level of the testers. They also found that some users were concerned with security issues, that the technological compatibility of systems could cause problems, that users could become distracted by their environment or be compromised by reading tasks early, that the recording quality was not as high as that found in labs, and that the inability to physically observe the users may cause loss of data.

This technique improved on previous studies by addressing both the issues of user security and technological compatibility. In addition, it provided a method of testing thick client applications with the same alacrity as thin client applications.

This method did not address the issue of “screen scraping” (users taking screenshots of the interface). This was not an issue for this test as all users were existing customers with an ongoing relationship with CA.

5 Cost Analysis

The following traditional usability evaluation cost exercise is adapted to this paper from the previous paper written by Vasnaik and Longoria [1]. A previously completed traditional usability evaluation of another enterprise application was analyzed in terms of cost. One UCD group member visited two domestic customer locations. Only eight users could participate in that evaluation. The entire exercise took about ten business days and travel costs alone were about \$5000. Because of prohibitive travel costs only a single UCD group member could travel to the customer sites and the product team could not participate in the process.

Eight users in five customer locations spread across three continents participated in the remote usability evaluation of the thick client applications. This exercise was completed in one and a half business days. If this test had to be conducted traditionally it would have taken about 6 business days. Travel cost for the test moderator and product manager would have been in the region of \$15,000 which is a conservative estimate. This remote usability evaluation resulted in shortening the development cycle by two weeks and significant monetary saving. The additional time was better utilized to perform more design iterations and test with additional users. In addition, the remote usability evaluation enabled testing the interface with a diverse user population including international users. In addition, the initial expenditure for the remote usability infrastructure was negligible when compared to maintaining a traditional usability lab.

6 Conclusions: Findings and Future Research

This case study showed the feasibility of the proposed remote usability technology, from technological, logistical, and political standpoints.

Logistically, users found little difference between using the application on their local machines and using it remotely on the test machine. Further studies need to be done to determine how and whether the results from remote tests such as these vary significantly from tests performed in a lab setting [3].

Politically, reliability of support from other teams within CA was very good but could be improved by providing standard instructions for processes (how/when to contact the Customer Service Center, how developers can access the VMWare sessions, etc.). By formalizing the processes, we expect to be able to establish solid expectations between groups, and hence a greater sense of responsiveness and responsibility.

Technologically, the applications provided a stable environment for testing with few integration issues. Due to the relatively large number of applications used to create the environment, the initial learning curve for UCD members to set up and run a test was higher than desired. Standard VMWare templates and detailed instructions helped to some degree, but further training materials would improve this area.

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