Remote Usability Testing For Software & Web Applications

TC 512 Final Research Project

Remote usability testing is a methodology to conduct usability tests across geographical boundaries using telecommunications and Internet technology to connect the researcher and the user. Remote testing is cost-effective, while at the same time allowing researchers to reach a broad base of users. In this report, we describe the methodology of remote usability testing (specifically in the context of testing software and Web applications), describe some methods used to conduct such tests, and provide some recommendations about which method could be undertaken by researchers, based on the resources and time available.

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Remote Usability Testing for Software & Web Applications

1. Remote Usability Testing: A Primer

Remote usability testing is product testing where the researcher and the user are separated by space and maybe even time (Andreasen, Nielsen, Schroder, & Stage, 2007). Through this testing, researchers can cost-effectively test users from geographically remote locations. Therefore, it could be beneficial when entering a new market or when striving to penetrate a known market.

Remote usability testing is done through asynchronous and synchronous testing methods. Asynchronous testing occurs when the researcher is “separated from the user both temporally and spatially” (Andreasen, Nielsen, Schroder, & Stage, 2007, p. 1506). In synchronous testing, the research and user are only separated by location. Both these methods are quite effective; however, asynchronous methods can be more time-consuming because the observation and analysis takes place after the user has completed the tasks, and there is no room for clarification or follow up. Synchronous testing is more similar to traditional lab testing, in that researchers can use the familiar think aloud protocol (Andreasen, Nielsen, Schroder, & Stage, 2007).

Remote user testing is not only beneficial for testing users, but can be important when a development team is geographically non-collocated. In this case, researchers can perform what is better known as a “cognitive walkthrough”—expert testing where researchers can involve the entire team, and maybe some experts from the organization. While this is a good strategy for identifying bugs, it usually occurs before any formal user testing and thus, our paper will not focus on this type of testing.

A key attribute of good design is the iterative aspect of the process. In iterative design, usability is a critical component that is very effective when integrated into the design process from the beginning, rather than as an afterthought. Especially when customers are geographically non-collocated, remote usability testing is suited to a fast-paced iterative design environment. According to Scholtz (2001), in-house (traditional lab) testing can be expensive and can limit the diversity of the user group, particularly when on a short timeline.

Finally, in-house testing does not test the users in their natural setting and researchers cannot get at the users’ tacit knowledge, natural habits, or hardware and software configurations. In working with users, tacit knowledge can be at the heart of what makes a product usable or unusable, which can significantly affect customer satisfaction and loyalty. However, tacit knowledge is difficult to gather. Through context-based testing (at home, in a natural environment), researchers are more likely to elicit important tacit knowledge. Similar to traditional usability testing, users identify and report the critical incidences they experience; however, in remote testing, users have the advantage of being in control with little training/guidance from the researcher. Anytime people are aware of observation, they are inclined to act differently. However, this behavioral change becomes heightened when users are being observed in a traditional lab setting, where the all-seeing eye of the researcher is watching them and even hearing their thoughts at all times!

As many organizations are striving to reach an international audience, the use of remote user testing can be crucial in the success of localization and globalization efforts within an organization. But as organizations venture into new markets or go deeper into known ones, many project managers (and money handlers) are not being generous with...
user-centered design budgets (Dray & Siegal, 2004). Through this paper, we will highlight the benefits, drawbacks, some methods, a few innovations related to remote usability testing, and attempt to provide a few broad suggestions for the methods available to an organization depending on its resources and time at hand.

**Reasons for Remote Usability Testing**

There are many reasons to opt for remote usability testing. Remote usability testing is conducive to reducing costs, including specialized and diverse user groups, and allowing participants to be in their natural environment.

**Cost Effective**

As with any project, the bottom line is always important. Project managers (and people controlling the budgets) are constantly concerned with producing the best product for the lowest cost; however, this mindset can be counterproductive if the dollars allocated to testing the product are cut back or in the worst case, eliminated. Therefore, an alternative to traditional lab testing is remote testing. Through remote testing, travel costs and costs associated with the establishment and upkeep of in-house labs in multiple locales are eliminated. If a team is geographically non-collocated, remote user testing is advantageous for involving the entire team, rather than select researchers; this practice is more inclusive (Bartek & Cheatham, 2003; Andreasen, Nielsen, Schroder, & Stage, 2007). Essentially, when using remote Web or software-testing, content can be distributed to users via the Web or virtual environments, which eliminates the need for a dedicated facility (Dray & Siegal, 2004).

**Specialized Users**

Access to local specialized users can be limited. Through remote testing, researchers can find a global representation of specialists. Furthermore, in considering that specialists are people with very little spare time on their hands, remote testing may be a minimally time-invasive option, in that it cuts out travel time for participants as well (Bartek & Cheatham, 2003). Niche users such as bleeding-edge software developers can be elicited for feedback from diverse locales with remote testing methods.

**Diversity of Participant Pool**

An important aspect of usability testing is to have a realistic representation of the target user population. Gathering diverse representation can be difficult, especially in homogenous locales. According to Bartek and Cheatham, through remote testing, researchers depend less on local users, which results in better representation from a worldwide audience (2003). Maybe more importantly, remote testing lends itself to the inclusion of a larger and more diverse pool of participants (Bartek & Cheatham, 2003; Andreasen, Nielsen, Schroder, & Stage, 2007). For example, Seattle is considered a more technologically savvy city than most, and therefore, testing on a population of “Seattleites” may skew the results of a test.

**Natural Environment**

During remote user testing, participants are typically located in their natural environment or the real world, rather than in a lab setting. In a traditional lab setting, there is more potential for user anxiety due to observation and use of new (not their own) hardware and software. When users are in their natural setting, researchers help to reduce participant’s anxiety (Bartek & Cheatham, 2003). Furthermore, there is the potential to have users perform natural everyday tasks, rather, than fictitious “lab” tasks (Scholtz, 2001), which increases the possibility to attain some of the users’ tacit knowledge.
Remote usability testing now sounds perfect, especially to managers opting for cheaper alternatives to in-house testing. However, in examining its potential, one must holistically examine the drawbacks as well.

**Time Barrier**
Even though remote testing eliminates the need for travel, researchers should remember that not all temporal aspects are removed from the picture. The testing may still require the same time associated with prep and administrative tasks as lab testing. For example, arrangement and set up, scheduling of participants, content preparation (translation/localization, if needed), or organizing technology (Dray & Siegal, 2004). Finally, in remote testing, the time zones may differ, so observation may take place at odd hours to accommodate the users’ daytime (Dray & Siegal, 2004).

**Language Barrier**
When remote testing is conducted in a locale with a different language than the researcher’s native language, it adds a layer of complication and a language “filter,” which needs to be considered. Although interpreters can be invaluable in such cases, the information chain is not directly one-to-one (user-researcher).

**Cultural Barrier**
Whenever researchers are dealing with a different culture, it is important to consider cultural differences. Culture can impact the types of responses elicited. Therefore, before entering a new cultural market it is essential to develop a cultural model through which all researchers can better understand the market culture. For example, some cultures may be more hesitant to provide criticism than others.

**Technology Barrier**
Technology is not very homogenously spread throughout the world. For example, when testing is done via the Web, it may require users to have broadband access. This requirement is not so deterring in highly developed countries, but researchers must remember that not all home users have high-speed Internet access. But when aiming for globalization, if users are limited to those with broadband access, it severely limits the diversity of a user population (Dray & Siegal, 2004). Therefore, the data is not truly representative. So, the use of online testing tools should be used only when both ends (viz., researcher and user) have fast connection speeds (Bartek & Cheatham, 2003). Of course, there could also be scenarios where your target audience needs to be very tech-savvy; in which case, the fact that technology is not evenly distributed becomes an advantage in weeding out non-users.

Furthermore, in remote testing there is the potential for issues with technology compatibility and stability; therefore, researchers should be prepared to remote troubleshoot and possibly do so through translation into another language (Dray & Siegal, 2004).

**Participant’s Environment**
During remote testing, there is potential for losing control of the users’ environment. Although the users may be in their natural environment, they may still be subject to normal distractions (e.g., phone ringing, people), whereas in a traditional lab setting, distractions are fewer, but the user is not in control, the researcher is (Bartek & Cheatham, 2003). A balance of users’ control over their environment and the intrusiveness of a researcher can be reached with appropriate remote testing methods.
**PARTICIPANT CUES**

During remote testing, researchers cannot interact directly with the user and cannot truly experience the user’s environment; therefore, any tensions are difficult to detect. So, critical nonverbal (facial expressions, body language) and paraverbal (not really words, more like sounds and utterances reflecting the user’s state of mind) cues can be missed. Therefore, it is difficult to know if users are tired, frustrated, or confused. To thwart this issue, researchers can use traditional think-aloud protocols (Bartek & Cheatham, 2003). When participants think aloud, researchers can get at some emotional aspects through the sound and speed of the user’s voice. Another way to negate this issue is to use video equipment, but this option may increase costs and intrusiveness of the test.

If the test is cross-lingual and an interpreter is being used, the user’s state of mind is limited to what the interpreter reports. The use of an interpreter brings up many other issues. For example, a true linguistic interpreter follows a strict protocol of reporting only what they hear, so cultural richness is lost. However, the use of cultural and linguistic interpreters can help circumvent this issue, but such interpreters are more expensive and such interpretation is difficult to do on-the-fly at a rapid speed. By nature, anytime an interpreter acts as an intermediary, there is potential for lost translation. It is important to remember that remote testing adds a layer of filtering, the researcher is a layer removed from the user (Bartek & Cheatham, 2003; Dray & Siegal, 2004).

**SECURITY CONCERNS**

If and when users download and/or view content (e.g. beta software or prototype Web site) on their personal computer, proprietary knowledge and security-related concerns need to be addressed. There are two ways to address this issue: one is to remind participants of the confidential nature of the content and another is to use virtual systems (Bartek & Cheatham, 2003) that allow users to “look, but not touch.”

**THE UNEXPECTED**

Whenever a researcher is dealing with users and technology, they have to be prepared for the unexpected. But this issue is compounded in a remote setting; therefore, researchers must be thoroughly prepared (Dray & Siegal, 2004). For example, users may refuse to cooperate or may wish to discontinue testing. Or perhaps a piece of technology may break down, causing frustration and waste of time. Researchers must have contingency protocols in place for such events.
2. METHODS FOR REMOTE USABILITY TESTING

Although there are numerous routes one can take when choosing a remote testing solution, we will describe three popular ones, namely: surveys, live site tests, and “traditional” remote usability tests. We have chosen these three, as they are a good representative of the types of testing solutions available to generate feedback based on two aspects—reach and simplicity. Reach implies the number of users that could be potential participants, whereas simplicity refers to the complexity of the process and its setup to conduct the test. We have organized the three solutions by decreasing reach and increasing complexity.

SURVEYS

Perhaps the most common, “quick and dirty”—not to mention cost-effective—solution for conducting remote usability tests are surveys. Surveys can be administered asynchronously, without the researcher, or synchronously with the researcher in the users’ presence. We can broadly divide surveys into two sub-categories; we will use the terms “solicited” and “unsolicited” surveys for our purposes.

Solicited surveys are surveys where users are explicitly “solicited,” either in person by a researcher or indirectly by a third party entity (such as classifieds advertisements) and users proactively accept the request for feedback. In such cases, the user is implicitly required to complete the survey. Surveys like these usually have some incentive tied to them, to motivate users to provide feedback. An example of solicited surveys could be a questionnaire that users fill out at the end of a lab test (also an example of a synchronous survey), to augment the feedback already acquired from the actual usability test or users responding to an ad for a study from the popular classifieds Web site, Craigslist.com.

Unsolicited surveys can come in all shapes and forms. An example of these would be a request for feedback when a user is simply surfing a target Web site. Figure 1 shows a popup survey that shows up as soon as you visit the Microsoft Dynamics Web site (also a good example of an asynchronous survey).

![Figure 1: Example of an Unsolicited Popup Survey on the Microsoft Dynamics Web Site.](http://www.microsoft.com/dynamics/default.mspx)

Besides being quick and cheap, surveys have a very broad reach, especially unsolicited surveys. This reach can be international and users from diverse geographical regions can be surveyed (Rosenbaum & Kantner, 2008). The ability to capture the users’ thoughts in situ or in context of their use is very valuable to researchers, as behavior of
users can be captured in a “natural” setting, where users have their own equipment configured to their own needs and preferences. In situ surveying also removes the presence of a researcher, whose goals may taint the information collected (Spyridakis, Wei, Barrick, Cuddihy, & Maust, 2005). Timely surveys are valuable as they capture users’ thoughts while they are still “fresh” in their minds (Hartson, Castillo, Kelso, & Neale, 1996).

Surveys are also not limited to Web applications, as they can be embedded into software packages as well. For example, an event such as task completion or maybe the expiry of ‘x’ number of days could trigger a survey to elicit feedback about usability, features, or appearance of a particular software product after having given users a chance to use it in context of their normal activities. These responses can be collected from all users of the product and sent to the research or development team for that particular product (Hartson, Castillo, Kelso, & Neale, 1996).

Although surveys are far-reaching and cost-effective, they are limited in the type and level of feedback that they elicit from users. Reasoning and rationale behind users’ responses is hard to get from surveys (Rosenbaum & Kantner, 2008). Also, the responses of users to the survey may differ from their actual practices while using a particular product. Jakob Nielsen’s summary of his first rule of usability states, “pay attention to what users do, not what they say. Self-reported claims are unreliable, as are user speculations about future behavior” (2001).

**Live Site Tests**

Another method for conducting remote usability tests is live site testing, which involves putting experimental stage designs on a live public-facing Web site for gathering user data. There are two options that researchers have in conducting a live site study.

One option is to entirely replace the existing Web site/pages with the experimental ones to be tested. The other option is to conduct a comparative test (sometimes known as “A/B testing”), where different versions of a page(s) are presented to users at random. For example, one user may see version A of a design, whereas another may see version B of the same page. A/B tests are especially useful in indentifying usability issues with specific elements on a page like navigation bars, or the discoverability of a search bar, for example.

Spyridakis et al. account for the feasibility of such research methods to the increased penetration of computers and the Internet. In other words, such methods can be implemented and generate credible results while negating some common pitfalls in sampling (such as sample size, target sample, geographical spread) only because of the relative homogeneity of computer setups (hardware and software) and Web standards around the world—of course, as mentioned before, technology itself is not homogenously spread. Spyridakis et al. also reference the fact that a large sample size allows researchers to weed out possible outliers in terms of results and have a solid base of “systematic deviations,” while retaining the ability to “generate inferences from the sample to a larger population” (2005).

Various tools can be used to obtain feedback. Users’ click streams (trail of mouse clicks) can be tracked in this type of test, allowing researchers to study the paths users take to reach the desired information, and how they interact with the Web site’s interface. A survey could also be part of the experiment and could appear at the end of task completion, which in the case of live site tests could be success using content or reaching a predetermined Web page from the main homepage.

Advantages of live site tests are similar to those of surveys, in that the sample size can be very large (up to the number of visitors to the site itself—i.e. bigger the site, bigger the sample size.), and users are again in their context-of-use environment. Another advantage is that although it is not as cost-effective as surveys—since it
requires systems that can track user activity on the site—live site testing is relatively inexpensive compared to actual lab-set usability tests.

**“TRADITIONAL” REMOTE USABILITY TESTS: A CASE STUDY APPROACH**

When it comes to the richness of data and information about user experience, a traditional usability test is the way to go. Nielsen finds that laboratory tests are the most effective method of eliciting usability data from users (1993). These tests can be very expensive, and conducting them across geographical borders makes them even more expensive to conduct. Besides, acquiring the hardware and lab setup in other countries is not always a viable option. Sample size needs to be relatively small in such tests, and geographically limited to the immediate vicinity of the researcher’s organization or laboratory. These are large drawbacks compared to the previously mentioned two methods, but the tradeoff is in the depth of information obtained.

Enter remote usability tests. There can be different setups for such tests, but we will focus on a setup with which one of us is familiar, and has some experience. The scenario involves conducting an international test for a Web-based product, developed in the United States, but needs to be localized for Japan. The following are brief high-level steps in the process, just to get an understanding of the level of complexity, planning, and resources involved.

Step 1. Develop and test prototype in the United States, based on U.S. and English-centric design.
Step 2. Localize prototype—*content only* (complete with graphics and text) into Japanese.
Step 3. Get prototype verified and approved by Japanese subsidiary.
Step 5. Request resources—man power and computer systems for international testing from Japanese subsidiary.
Step 6. Pilot test the setup and make tweaks as necessary.
Step 8. Conduct round of testing with one participant.
Step 9. Debrief with interpreters.
Step 10. Repeat steps 8 & 9 for other participants.
Step 11. Analyze data.

In this scenario, the researcher and two interpreters were based out of the U.S. Only the participant and an “ usher” were based out of Japan. One of the interpreters acted purely as a translator (*translating interpreter*), whereas the other interpreter acted as a moderator for the participant (*moderating interpreter*). The participants were asked to perform some tasks with the prototype system, while their screens were captured and relayed in real time to the researcher in the U.S. A think-aloud protocol was also implemented, where the participants would voice their thoughts and the interpreter in the U.S. would translate. This scenario is a good example of a *synchronous* type of testing. As we can see, a great deal of planning was involved. Costs were high since two interpreters were required, and all of the prototype text and images had to be *localized* into Japanese. Aspects of the method like recruiting participants, defining the tasks, and the content of the prototypes themselves did not change from an in-house usability test, only the method of observing and interacting with the participants changed.

The information gathered was almost as rich as in-house usability data, and better than survey or live site data (both of which were also conducted), but the language and cultural barrier reduced the fidelity of the information. The “debrief” with the interpreters helped, but the information still suffered from the lack of the researcher’s prior knowledge of the product and its users.
3. Innovations in Remote Usability Testing

There are many genuine innovations and “workarounds” study designers use to circumvent some inherent gaps in remote usability testing. Although language and cultural barriers can be difficult hurdles, technology is one that can be easily jumped. In this section, we will describe two of the many innovations that are relevant to remote testing. One of these innovations is the use of virtualized environments, which is a solution that the hardware and software industry provides, and the other is a case study of how an instant messaging tool was used as part of the toolkit for conducting a usability study.

Elegance of Form and Function: Virtualized Environments

Virtualized environments are safe “sand boxes” in which users can play around to their heart’s content, without having to worry about the computer resources they consume or any damage that they do, since the environment is simulated on their system. Examples of such environments for the consumer market are: Parallels for Apple computers, allowing users to run a Windows operating system within Apple’s native OS X. On the Windows side, there is Microsoft’s Virtual PC, which supports other Windows operating systems, Linux (with a little tweaking), and Mac OSs. Figure 2 is an example of a Windows Vista-based computer running a virtual environment with Windows XP installed. The XP environment is the sand box environment, where users can play around without affecting the host computer’s Vista setup.

In the context of remote usability testing, these environments are very useful for a few reasons:

- **Safe**: Since these environments are simulated, users can manipulate it as they want to, without having to worry about damaging their own systems in the process. On the researching organization’s side, these
environments keep intellectual property and proprietary information inside this closed sandbox, therefore, protecting their assets.

- **Flexible:** Virtualized environments allow users to test operating systems or software packages without having to install them on their physical machines. This ability is especially useful when conducting usability on beta versions of products, or to test the integration of a product with the operating system and other products before it is officially deployed. Bugs can be caught within this simulated environment.

- **Cost-effective:** Virtualized environments can be run off of ordinary machines, and no dedicated systems need to be purchased. Virtual environments can be run remotely, whereby users do not need to worry about their system configurations and requirements mandated for the software.

- **Accessible:** Depending on the setup, virtualized environments can be accessible from anywhere in the world with an Internet connection, thus providing a global reach to what would otherwise have been a local usability test. Take the case of software developers. Peer developers may be spread out too far and few for a lab usability study. But a virtual environment can be deployed where peer developers could work and provide feedback (Hartson, Castillo, Kelso, & Neale, 1996).

Although these environments are limited today, they are catching on really fast, and will be a great boon to testing software in situ with users. Hardware manufacturers also have proprietary technology built for their chipsets that allows for virtualization at the hardware level, essentially giving virtual environments access to the host’s hardware. An example of this hardware virtualization is Intel’s Virtualization Technology (VT) that allows for the consolidation of multiple virtual environments and their abstraction from the server or PC’s hardware (Intel Corporation).

**UNUSUAL INNOVATIONS: EVERYDAY APPLICATIONS TO CONDUCT REMOTE TESTS**

This innovation is more of a novel workaround for a common problem. Again, it is a case study with which one of us has experience. The study mentioned in the “Traditional” Remote Usability Tests: A Case Study Approach section describes a scenario where the researcher is U.S.-based, and the users are Japan-based. The same study was conducted in Spain and Germany as well. But the software used by the researcher for those two locales was not available in Japanese; therefore, some improvisation was needed. The problem was streaming the user’s screen from Japan to the U.S. in real time, while sharing control of the remote machine with the user. Without the specialized software, this ability would not be possible. Fortunately, this researcher managed to use Windows’ “Remote Assistance” feature through Live Messenger—an instant messaging application. This feature allowed the researcher to share complete control of the remote system with the user, while streaming the user’s screen in real time!

Another benefit of using Live Messenger was that because of the test setup, the *moderating interpreter* had to be separated from the researcher and the *translating interpreter*, since she had to be on voice call with the participant non-stop without distractions. So how does the researcher communicate with the moderator without using voice and disturbing the participant as well? Instant messaging proved to be a good solution for this problem! Now, the researcher could simply send an IM to the moderator to instruct the user.

Thus, the use of everyday workarounds and ingenuity on the part of the researcher is vital in conducting remote testing, in case things go awry.
AVAILABILITY OF MAINSTREAM SOFTWARE TO CONDUCT REMOTE TESTS

Besides such innovations, there are also dedicated usability testing systems available in the market that allow researchers to stream the user’s screen, take notes, record audio/video, and analyze the information, all from one software package. One such example is Morae. We will not go into detail about such systems for our project, but would like to acknowledge their existence. Such software is relatively inexpensive compared to purchasing dedicated lab setups.
4. **CONCLUSION**

We have covered the definition of remote usability testing, some advantages and disadvantages to remote testing, a few methods commonly used, and innovations—both genuine technological innovations, as well as not-so-common innovations by the researcher. There is no **right** method to conduct remote testing. Time, budget, resources, and scope must be taken into account for selecting what type of testing needs to be done and is feasible. Here are some general recommendations we came up with for organizations trying to decide which avenue of user research they want to pursue.

- Small organizations with scarce resources should pursue a method that does not break the bank, but still yields good information. In this case, they should try and focus on their primary users and use low-cost high-reach methods like surveys or live site tests.
- Small organizations with enough time and resources may opt to pursue formal usability testing, although their size may be prohibitive in setting up a dedicated usability lab. In this case, outside vendors and consultants can be brought in, and with some amount of training, they can be leveraged to conduct usability research. Dedicated usability software packages may be a good investment here in lieu of dedicated lab setups.
- Larger organizations may or may not have dedicated testing labs, in which case they may seek the help of vendors as well. But such organizations should focus on reach since more often than not, their user base will be quite broad due to their size. Perhaps some formal remote usability testing method would be appropriate.
- The type of product may also warrant a different method of testing. For example, ITPro and developer users could perform code-testing or beta-testing in virtualized environments, with some kind of specialized feedback-gathering system built into the virtual environment.
- Surveys are especially handy, regardless of an organization’s size and resources. They have a very broad reach and can be viral or focused at a target user population. They should be part of any study that is conducted.

A logical next step to this paper could be to conduct some further research into case studies, to get a better idea of how industry decides which method of remote usability testing to implement in developing and testing their products. Further research into the tools available and their capabilities may also prove to be fruitful in augmenting these recommendations.
5. REFERENCES


