



Usability Evaluation

REDCOM Sigma Client Application for Windows Final Report

HCIN-630 Usability Testing

Abhishek M, Chandan M, Khushboo A,
Nidhi Palan, Zhuoxin Xu, Zheng Zhang

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EXECUTIVE SUMMARY

The Sigma Client Windows Application allows secure communication between several users via chat, voice and video calls using two types of accounts, XMPP and SIP. The study was designed to ensure that the users could easily understand and use the key features of the application like saving a contact, making a call and sending messages. Collaborative features like making a conference call was also tested. Due to technical difficulties could test only the XMPP account. Since the application provides a secure network unlike other similar popular applications, its targeted user group consists of the government and military. We tested the application with under graduate and graduate students as alternatives.

Ten RIT students who had some experience with voice and video applications were recruited via flyers. We did not receive any response from ROTC members hence we could not recruit them. Each participant took part in the one hour long study at the usability testing lab where they had to perform five tasks on calling and messaging. They were given a \$25 gift card as compensation for their participation.

Quantitative data was collected during the test using 5 point Likert Scale and SUS questionnaires that are illustrated through pie charts and bar graphs. Qualitative data was also collected by using post-task questions and debriefing sessions.

Our findings are based on the assessment of the overall performance of users for several types of tasks like calling, sending text messages and making conference calls. The evaluation revealed that most participants could easily save a contact and make a call. At the same time, most found it difficult to make a conference call.

The results of this study propose some recommendations that could improve the user experience of REDCOM Sigma client application which reduces the cognitive load on the users. First, the icons and widgets can be made externally consistent with other similar applications. A good error recovery message system can be provided to guide users and prevent errors. Technical captions can be replaced with more common captions that easily understood. An overall user interface update can be used to highlight only the key features of the application.

Further research involves testing the finer aspects of the application in detail. A focused military user group can be used to find more accurate usability data.

INTRODUCTION

The Sigma Client Windows Application is a communication application for chat, voice and video calls. As a part of the Usability Testing class at Rochester Institute of Technology, we worked with the REDCOM team to conduct Heuristic Evaluation and run Usability Test on their Sigma Client application. Our primary goal was to study user interaction and identify areas in which users may encounter problems while completing basic tasks on the Sigma Client application.

Objective

The main purpose of this usability study is to recognize important usability issues with the product and to determine if all the components of the application are functioning well. This is important as glitches can prevent the application from working properly and the users might, therefore, face more challenges while using the product.

The primary goals were to:

- Assess the overall performance of users for various types of essential tasks.
- Understand the expectations of the users.
- Analyze the system usability on a scale.
- Find important heuristic and usability issues.
- Recommend certain alterations to fix the design problems in order to clarify the use of the application.

Research Questions

We came up with the following research questions based on the heuristic evaluation we conducted. The research questions also accounted for client concerns and our primary goals.

- How many incorrect attempts do the participants make to call to another user?
- How long does it take for users to realize if they have selected the correct option (XMPP/SIP) while adding a contact to the list?
- How easily can the participants change the wrong number or a wrongly spelled contact after typing it in the search bar?
- Will participants be able to understand the buttons/icons on the screen during a call?
- Are participants able to change the settings in the application?
- Are participants comfortable not having a save button in the options menu after they have changed a few settings?
- Were the users able to find chat icon to send a message?
- What are the difficulties faced by the participant while making a conference call?
- In one-to-many communication, can a user identify if another user has joined the call or left it?
- What additional features or options do participants want in this application?
- How well does it compare with other similar communication applications?
- What does the participant think about the user interface and design of the application?

METHODOLOGY

This study examined the usability and user experience of the REDCOM Sigma Client Application for Windows. We conducted a within-subjects test where each participant went through a session of 1 hour where 15 minutes were used for introducing the study, signing consent forms, filling post-task and post-test questionnaires. The remaining session of 40 minutes was dedicated to usability testing and debriefing.

Location and Set-up

We conducted the testing in the HCI usability testing lab (figure 1 and figure 2) at B. Thomas Golisano College of Computing and Information Sciences building, RIT. The lab has two rooms; one is the testing room which has a one-way mirror and the other room is the observation room. The usability test with the participants was conducted in the testing room. We set up one webcam and one microphone to record the participant in the testing room.

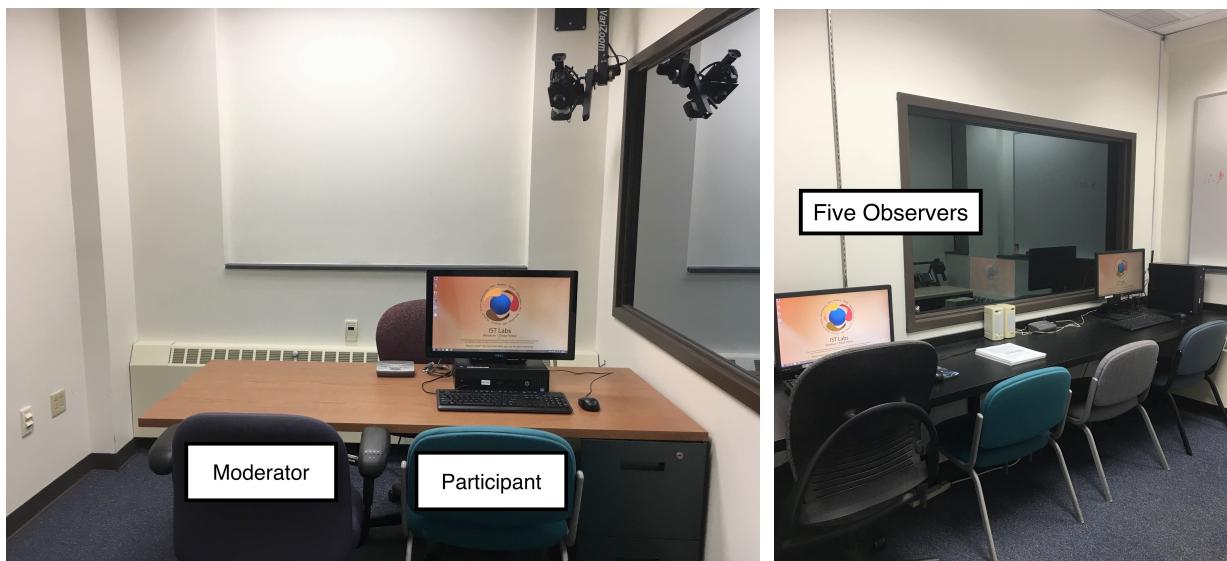


Figure 1 (left). Participant (recorder) room

Figure 2 (right). Observer room

The lab computer with a Windows 7 operating system was used to run the Redcom Sigma client application and Morae recorder software; the computer screen was recorded as the participant performed each task to see how the participant interacted with the application. The webcam was used to record the participant's facial expression while performing a task in the application. One microphone was used to listen and record

information in the testing room. The data from the webcam and microphone was fed to the observation room's computer, which was running the Morae observer software.

Test Personnel Roles

In our study, each team member was assigned either the role of moderator, observer and recorder. During the test session, there were always 4-observers, 1-moderator and 1-recorder. The observers also took part in some of the scenarios in this study.

Moderator

The role of the moderator was to guide the participant during the study in the testing room. The moderator had to greet the participant, and then go over the consent form which the participant had to sign.

If necessary, the moderator would intervene during a task in order to help the participant in case of issues or ask additional questions to get better feedback. Finally, the moderator also did the debriefing and made sure the participant was paid.

Observers

The observers served as the primary point of contact with moderator during the study. They made notes of participant comments as well as logged their own observations. One of the observers also organized the documentation collected during the study.

Recorder

The recorder was responsible for setting up and adjusting the devices used to record each session. The recorder used Morae to flag video timestamps of user tasks, errors, and additional events designated by first observer.

Date range of study

Study Timeline	Date
Flyers were posted	19 th April, 2017
Screener Questions were emailed to participants	24 th April, 2017
Selected participants were send invite to book their available time for study using “youcanbook.me” calendar	27 th April, 2017
Usability Test was performed	28 th - 29 th April, 2017

Table 1. Date range table.

Participants

There were 9 participants (Table 2) who took part in the usability study. 6 out of 9 participants 6 were male and 3 females. All participants were students, except for one participant who was a working professional.

We appointed 1 participant as our pilot test subject, to check if the scenarios were properly formulated and understood by the participant. We also wanted to see if the data collected in the pilot study was right for our study.

Participants	Age	Gender	Occupation	Education
1	19-22	Female	Student	High school
2	23-27	Male	Student	Under graduate
3	19-22	Male	Student	High school
4	19-22	Female	Student	High school
5	19-22	Female	Student	High school
6	23-27	Male	Student	Under graduate
7	23-27	Male	Student	Graduate
8	23-27	Male	Student	Under graduate
9	23-27	Male	Professional	Graduate

Table 2. Grouping of participants with respect to characteristics

Participant recruitment

The main objective of the recruitment process was to get 9 participants who fit our requirements. The recruitment process had three steps.

- Step 1: Flyers (Appendix A) were posted at Rochester Institute of Technology to attract potential participants. The flyers included information about the test, compensation, location, timeframe and contact information. Flyers were posted during the month of April 2017 at frequently populated places on RIT's campus:
 - Gleason Circle;
 - The Wallace Center;
 - Student Alumni Union;
 - Eastman Kodak Quad;
 - RIT bus station;
 - Resident Hall;
 - Lewis P. Ross Hall;
- Step 2: Each potential participant filled out a screener questionnaire. This helped the team to screen the participants according to the inclusion and exclusion criteria.
- Step 3: Participants who were eligible to participate in the study were contacted through email to schedule the study. The participants then selected suitable time slots for the study based on their preference.

Procedure

The study took place on the 28th and 29th of April, 2017 at RIT's usability lab in the B. Thomas Golisano College of Computing and Information Sciences building. In the testing room, the participant sat alongside the moderator while the other team members monitored the participant from the observation room. After pre-session set-up, the moderator greeted the participant and read the orientation script. The participant was then handed the consent form to review and sign (Appendix C). The participant then completed a pre-test questionnaire. After that, the moderator asked the participant to think aloud and describe their thought process while performing tasks in the application during the study.

The participant performed five tasks with the Sigma Client application, where each task was based on a scenario. After each task, the moderator handed the participant a post-task questionnaire (see Task and Scenarios). Each participant's interactions with the Sigma Application on the computer screen were recorded with the help of Morae recorder. After the tasks were completed the participant had to complete a post-test questionnaire (Appendix F). The moderator then debriefed the participant.

At the end of each study session, every participant was provided with a \$25 gift card (Restaurant gift card or an Amazon gift card) and was required to sign a payment receipt. Acknowledging that they had received the incentive for their participation in the usability study of REDCOM Sigma Client Application for Windows.

Phase	Time allotted	Details
Introduction	2 Minutes	Read out the orientation script.
Review & Sign Consent form	2 Minutes	Handout the consent forms. Get it signed after reviewing.
Pre-Test Questionnaire	5 Minutes	Fill out background information.
Tasks	40 Minutes	Perform series of tasks through Redcom Sigma client application (see Table 4)
Post-test Questionnaire	5 Minutes	Fill out the System Usability Scale form
Debriefing	5 Minutes	Answer any participant questions, give the gift card to the participant and hand over the gift card receipt

Table 3. Session outline.

Task and scenarios

1) It's your first week at work, you are working on a report that has to be dispatched by the end of the day. You need advice from your manager - Jennifer on the report but she is away. You know that the office uses SIGMA windows client for secured communication and decide to use it.

For calling Jennifer, the software first needs you save her contact.

Please contact Jennifer on obiwankenobi@hcin630.ist.rit.edu

[Evaluator who answers will acknowledge the call and ask them to record the conversation. Later ask the participant to move to the next scenario]

2) You forgot to ask a question but Jennifer is busy. You have to leave her a message asking about relevance of "Table 6 on page 2 in the report". Please let me know when you are done with the task.

3) To Auto-start REDCOM Sigma when computer restarts. You have to make changes to the software settings. Please let me know when you are done.

4) You have to schedule a meeting with your manager Jennifer and John at the same time so that you can talk to them together. You have the contact information of Jennifer. Contact information of John is *emperorpalpatine@hcin630.ist.rit.edu*. Please let me know when you are done with the task.

5) Jennifer from the research team will call the participant. The participant should be able to accept this call. John calls Jennifer and acknowledges the participant while David also joins the call without verbally informing the participant.

(This scenario was not given to the participant in writing as the research team directly initiated it. We intended to test whether the participant could accept both the calls and know when someone had joined the call without being told. We also recorded the conversation and checked whether the participant realized that he or she is being recorded)

Tasks	Time Period	Scenarios
Task1: Save contact and call Jennifer	8 Minutes	To save contact, call a contact and record conversation.
Task 2: Send a text message to Jennifer	6 Minutes	Send a text message to Jennifer
Task 3: Make changes in the settings	6 Minutes	Make changes in the software settings
Task 4: Make conference call	10 Minutes	Make conference call with two other contacts
Task 5: Receive conference call	10 Minutes	Receive conference call from one of the contacts

Table 4. Tasks for the Study

Test design

The usability test was conducted to evaluate Redcom Sigma Client application for Windows, with 8 RIT students and 1 professional person. The participants ranged in age from 19 to 27 years. It was a within-subjects study that had 5 tasks and 9 participants. The study consisted of 6 Male and 3 Female participants, all of which were users of some voice or video application that they used for communication. Each participant performed the tasks in the same sequence as we were not concerned about any possible transfer of learning effect between tasks.

Participants	Tasks				
P1	T1	T2	T3	T4	T5
P2	T1	T2	T3	T4	T5
P3	T1	T2	T3	T4	T5
P4	T1	T2	T3	T4	T5
P5	T1	T2	T3	T4	T5
P6	T1	T2	T3	T4	T5
P7	T1	T2	T3	T4	T5
P8	T1	T2	T3	T4	T5
P9	T1	T2	T3	T4	T5

Table 5. Exploratory design matrix, where P_n = Participants and T_n = Tasks;

$T1$ = Save contact and call Jennifer / $T2$ = Send a text message to Jennifer / $T3$ = Make changes in the settings / $T4$ = Make conference call / $T5$ = Receive conference call.

Measurements taken

Evaluation of the system was done based on usability goals which includes

Effectiveness: how well a system does what it is supposed to do

Efficiency: the way a system supports users in carrying out their tasks

Satisfaction: relates to the subjective responses users have to the system.

Quantitative data

Our team collected quantitative data in the following manner:

- Likert Ratings
- Likert Scale was used to capture ease of use of the application.
- Time taken to complete a task
An observer recorded the time taken by a participant to complete each task.
- System usability scale (SUS)
- SUS was used to measure usability of the system

Qualitative data

Our team collected qualitative data in the following manner:

- Verbal feedback gathered during the study
- Participants were asked to think aloud while performing the task. Participants might also ask questions, doubts, or comments about the application. All this data was recorded and analyzed as qualitative data.
- Post Questionnaire
- We asked participants to answer some questions about their experience while using the Sigma client software.
-

Deviation from test plan

- As you can see in Test plan, we selected 9 participants for the study. We had planned to recruit two ROTC military personnel to take the usability test. But due to fewer responses from professionals and no response from military personnel, we recruited other participants (students at RIT) who were interested in the study. Many professionals who had shown interest were not able to take part in the study due to their busy schedule and prior commitments.
- Due to complexity and problems faced in setting up both XMPP and SIP, we were not able to test this function for the main study. Since one of the cell phone did not support SIP due to technical issues, we could not connect the calls between 2 cellphones. That's why we decided to use only XMPP. In the pilot study conducted, we could see that this was the cause for concern and definitely a problem as the research team also faced challenges in using this function.
- After the pilot test, we realized that some scenarios were confusing for the participants and we therefore updated our scenarios. We updated scenario number 5 because it consumed a lot of time so we decided to reduce its complexity by reducing the number of people involved in a conference call from 5 to 4. We also included recording the conversation in scenario 5 to test one more functionality of the software. We decided to check for the more serious heuristic and usability issues so that most of our research questions could be answered within the allocated study time.
- We also ran into some technical difficulties like connecting calls and add to contact feature during the first study, so we were not able to ask a few post-task and debriefing questions for the first participant.

FINDINGS

Pre-test Questionnaire

Participants were given a pretest questionnaire so that we would gather basic demographic information. The pre-test also helped us get an idea what chat, voice and video applications participants used, how frequently they used these applications and the devices on which these applications were used.

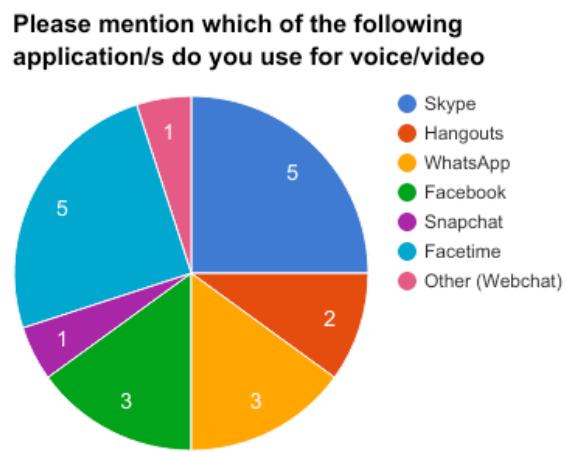


Figure 3. Participant use of various applications

The data showed that 5 out of 9 participants used Skype and Facetime for communication, with Facebook and WhatsApp following second at 3 participants out of 9. Other applications like Hangout and snapchat were used by only 2 participants.

Have you used voice and video applications to communicate with people?



Figure 4. Participant frequency of use of audio and video applications to communicate with people (time period)

3 out of 9 participants (Figure 4) used voice and video communication applications at least once a day with not more than two participants using it several times in a few months. This goes to indicate that the users may not be frequent users of such applications hence the learning curve may be high.

2 out of 9 participants (Figure 5) used mobile devices more than laptops.

Which device do you use for video/voice calling?

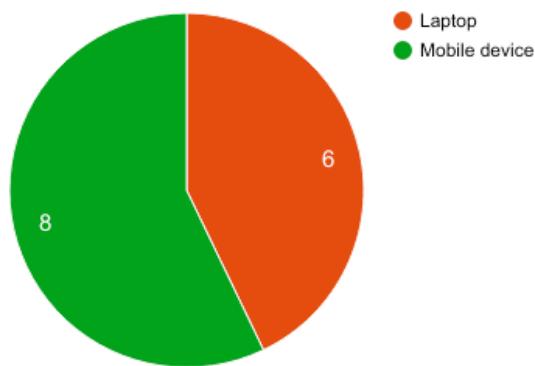


Figure 5. Participant use of various devices for calling purpose

How frequently do you use chat or messaging feature?

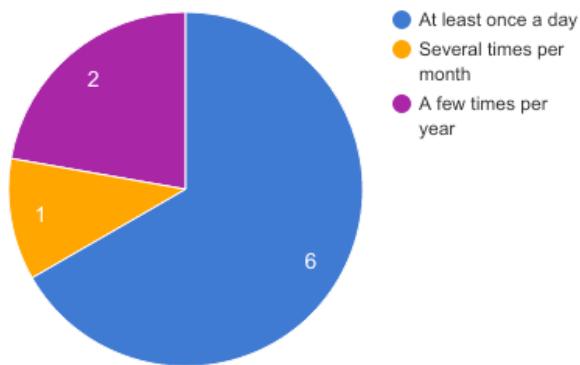


Figure 6. Participant use of messaging feature (time period)

6 out of 9 participants (Figure 6) used chat features at least once a day which shows the significance of having chat as a primary function.

Qualitative and Quantitative Metrics

Participants were asked to fill up a post-task questionnaire at the end of every task. Likert scale was used to evaluate for different questions in each of the tasks.

Very Difficult	Neutral	Very Easy		
1	2	3	4	5

Participants were asked to assess how easy or difficult it was to complete the task on a 5 point Likert Scale. They were also asked to write about what made the task easy or difficult.

Task 1: To save contact, call a contact and record conversation.

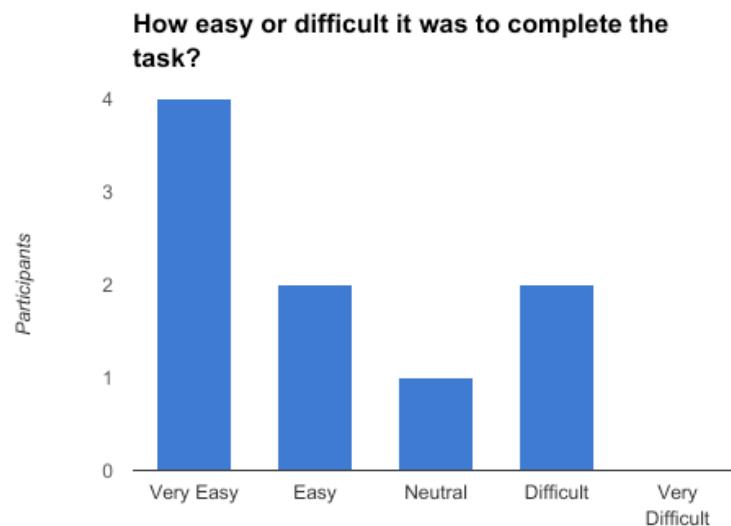


Figure 7. Bar chart of participant ratings of perceived difficulty completing the whole task from saving to calling Jennifer's number.

4 out of 9 participants (Figure 7) found the task very easy to complete with only two participants finding it difficult. The mode was that the task was very easy with the mean being an easy task to perform.

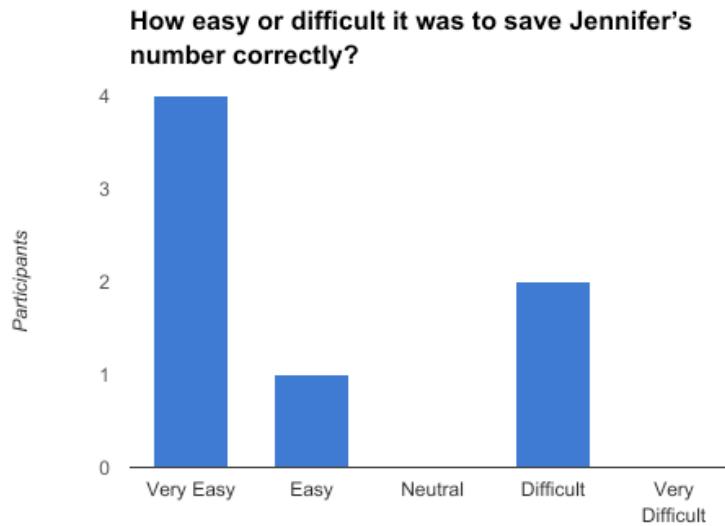


Figure 8. Bar chart of participant ratings of perceived difficulty saving Jennifer's number task.

4 out of 9 participants (Figure 8) found the task of saving Jennifer's number very easy to complete with only two participants finding it difficult. On an average all participants found it easy to save a contact.

Qualitative metrics for Task 1: To save contact, call a contact and record conversation.

Participant	What made task: Easy	What made the task: Difficult
P1	On-hover captions on icon and buttons	
P2	Familiarity with other similar applications	
P3	Intuitive Layout	
P4	Add contact button was well positioned	Record button should have caption

P5		No idea how to add a new contact
P6	Adding contact was easy	Recording the conversation was difficult
P7	Familiarity with other similar applications	
P8		No feedback to show that correct email address was entered.
P9		Calling icon was not very visible

Table 6. Qualitative metrics of participants' opinion over task 1.

Participant's Comments: "The saving contact part was easy but recording the conversation was a little hard as the buttons were not colored"

Observation: Following were some common mistakes or difficulties the user faced while performing task 1.

- Send a text message because it was easier to locate than the call button.
- Clicked on new account option instead of new contact.
- Typed Jennifer's name in search bar to view her contact details.
- Hover-on and read the captions of all the available options to locate the record button.

- **Task 2:** Send a text message to Jennifer

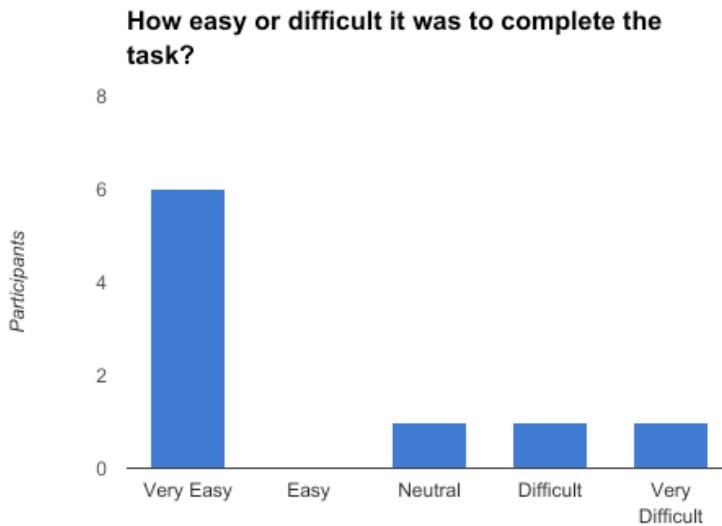


Figure 9. Bar chart of participant ratings of perceived difficulty completing the Messaging Jennifer task.

6 out of 9 participants found the task of sending a text message very easy to complete with average deviation of 1. This task was observed to be the easiest to perform out of all the other tasks.

Qualitative metrics for Task 2: Send a text message to Jennifer

Easy: Most of the participants found this task to be easy.

Difficult: Few participants found it that difficult to locate the chat icon.

Participant's Comments: "There was no "send" button"

Observation: Following were some common mistakes or difficulties the user faced while performing task 2.

- Participants were not sure if the icon was for chat (even if they were pointing on correct icon).
- Looked for the send button to send the text to Jennifer.

Task 3: Make changes in the software settings

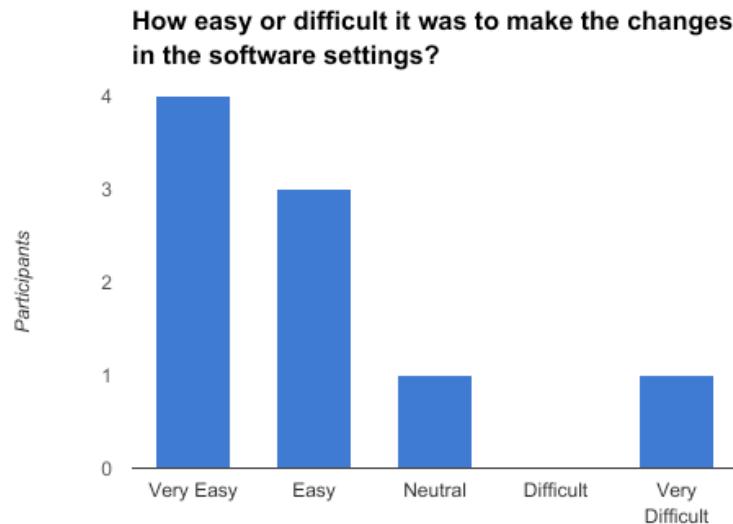


Figure 10. Bar chart of participant ratings of perceived difficulty completing the *Changing software settings* task.

4 out of 9 participants (Figure 10) found the task of changing software settings very easy to complete while 3 participants out of 9 found it easy. The mode was that the task was very easy with the mean being an easy task to perform. Only one participant found the task very difficult. Though on an average 4 participants found it very easy, they still spent considerable time in hunting the correct option down.

Qualitative metrics for Task 3: Make changes in the software settings

Easy: Some participants figured the changes to be made very quickly while some struggled to look for the correct option to select under software settings. Some of the participants mentioned that the familiarity with other similar software made this task easy for them and hence they could discover the auto-start option easily.

Difficult: Many of the participants started looking for the required setting under each tab.

Participant's Comments:

“Preferences are in a logical location and did not take too long to find”

“Can't find it, so many options in menu, most of them are rarely needed.”

“I assumed it to be under “Advanced” setting tab”

Observation: Following were some common mistakes or difficulties the user faced while performing task 3.

- Started looking for Auto-start option from left of Options (starting from Advanced -> General). Most of the participants glanced through all the options on the advanced tab.
- Participants who managed to find the auto-start option scrolled down on the general tab to look for save button to save the changes that they made to the settings.
- The participants were not sure whether they finished the task as there was no feedback from the system to notify that the changes were saved.

Task 4: Make conference call with two other contact

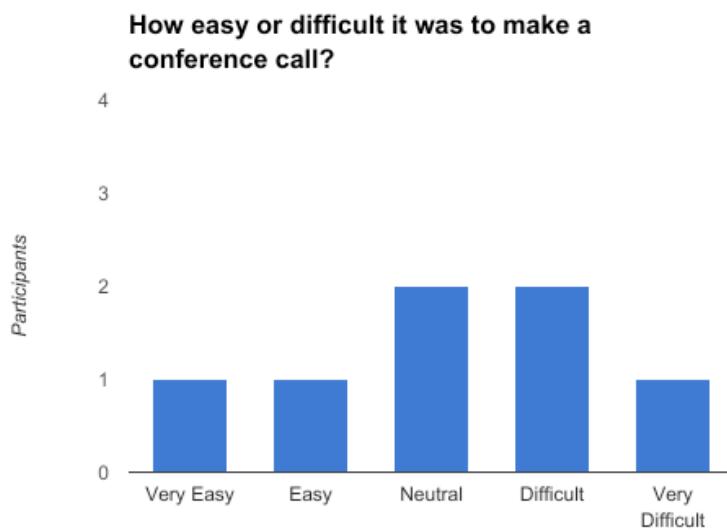


Figure 11. Bar chart of participant ratings of perceived difficulty completing the Conference call task.

This was the most complex task that involved the participant to save one more contact and make a call to two contacts at the same time. About 3 participants (Figure 11) found it difficult to complete the task while only 2 found it easy. On an average, all participants perceived the task to be neither easy or difficult.

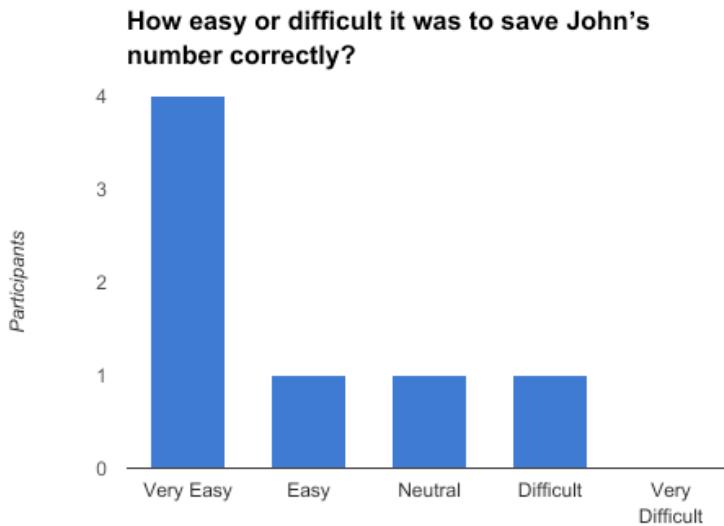


Figure 12. Bar chart of participant ratings of perceived difficulty completing the saving John's number correctly task.

4 out of 9 participants (Figure 12) found the task of saving John's number very easy to complete with a mean deviation of 1 participant. Since the participants had already saved Jennifer's contact, this was easy for them the second time.

Qualitative metrics for Task 4: Make conference call with two other contact

Easy: Only one participant found this task as easy.

Difficult: Most of the participant found the task to be difficult for the following reasons:

- Confused because group and conference call are not the same thing.
- No feedback.
- There should be a Conference call button below Add Contacts buttons.

Participant's Comments:

“I wish I could make a conference call directly from group chatting.”

“A bit difficult because it didn't tell me the error specifically.”

Observation: Following were some common mistakes or difficulties the user faced while performing task 4.

- Many tried creating groups for Jennifer and John first and then tried to initiate a call from the group. There was no option to call all the members from the group.
- From those who created groups, many faced difficulty while adding contacts to the groups.
- Some looked to initiate the conference call from the chat window by trying to create a group chatting.
- Once or Twice the conference call didn't go through due to technical difficulties because the system showed failed to call.
- The participants had to invite and add each person to start the conference call which confused a few participants.

Task 5: Receive conference call from one of the contacts

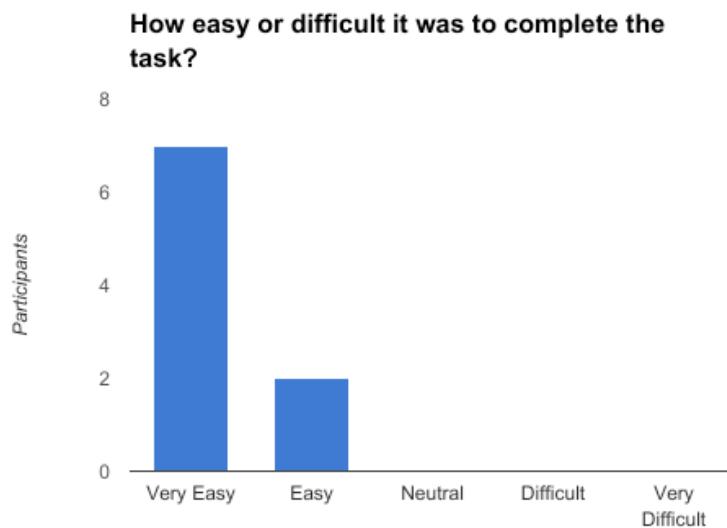


Figure 13. Bar chart of participant ratings of perceived difficulty completing the receiving conference call from one of the contacts task.

This task scenario wasn't given to the participant. The evaluation team set up a conference call where we called the participant. The participant's role was to simply answer the call. The bar graph (Figure 13) shows that all participants found it easy to answer the call.

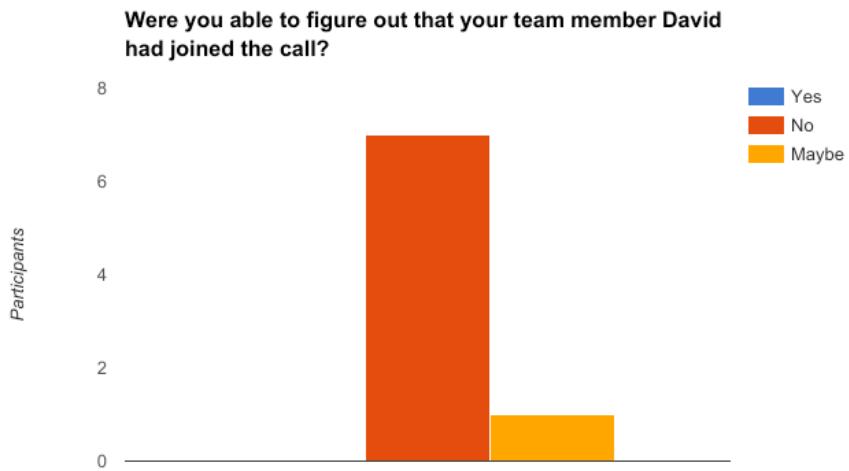


Figure 14. Bar chart of participant's response if they figure out David joined the call.

In the 4 people conference the team initiated, only 2 out of 3 people acknowledged their presence to the participant. David was the third person on the call who did not speak and the participant was asked if he/she knew David was on the call. The bar graph (Figure 14) shows the no participant was aware of David being on the call. The system did not provide any notification to the user for number of people on a conference call.

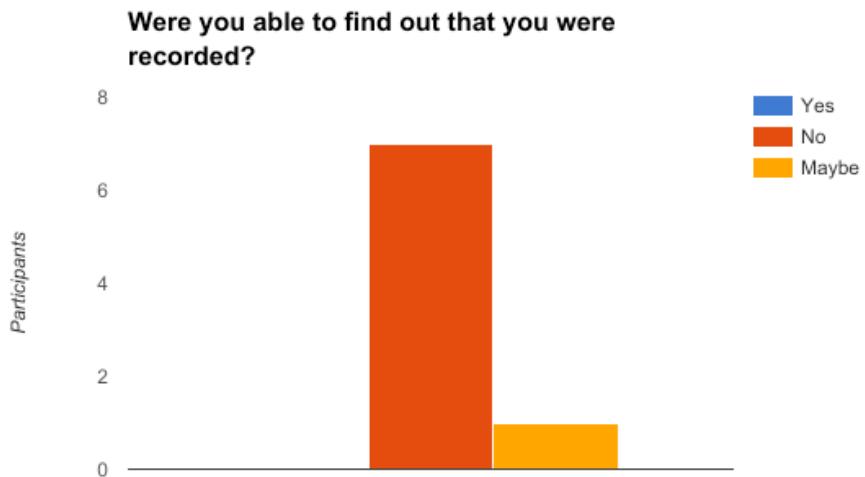


Figure 15. Bar chart of participant's response if they figure out they were recorded.

The team also recorded the conference call with the Toggle record button. The participant was asked if they knew they were being recorded. The Figure 15 illustrates that no participant was aware of being recorded. This was because the system did not provide any notification of being recorded.

Qualitative metrics for Task 5: Receive conference call from one of the contacts

Easy: Most of the participants found the first part of the task to be very easy, which was to receive the call from Jennifer.

Difficult: A lot of participants mentioned that it was difficult to identify that someone joined the call.

And also, it was difficult to know that the conversation was being recorded

Participant's Comments:

"Receiving call was easy"

"Answering the call was easy because there were only 2 choices. I wasn't aware that David was on the call. I didn't know it was being recorded."

Observation: Following were some common mistakes or difficulties the user faced while performing task 5

- All participants answered the call easily.
- Participants were surprised when they suddenly heard John's voice in the conference call because they first spoke to Jennifer.
- Participants looked on the calling screen but couldn't figure out that John and David had joined the call.

The data for all the tasks was evaluated by calculating the Median, Mode and IQR for the data.

Tasks	Median	Mode	IQR
Task 1: How easy or difficult it was to complete the task?	4	5	2
Task 1: How easy or difficult it was to save Jennifer's number correctly?	5	5	2
Task 2: How easy or difficult it was to complete the task?	5	5	2
Task 3: How easy or difficult it was to make the changes in the software settings?	4	5	2
Task 4: How easy or difficult it was to make a conference call?	3	3	1.5
Task 4: How easy or difficult it was to save John's number correctly?	5	5	0.75
Task 5: How easy or difficult it was to complete the task?	5	5	0

Table 7. Median, Mode and IQR of all the tasks

Median: The median value tells what the ‘average’ participant think about the severity of the task.

Mode: The mode value tells the most frequently occurring number found in a set of responses from the participants for each task.

IQR: The IQR is a measure of dispersion, it shows whether the responses of participants are clustered together or scattered across the range of possible responses.

Debriefing

The responses of participants were formatted.

Participant What additional features would you like to see in the application?	
P1	N/A
P2	Pop-up for following: 1. To indicate that I was being recorded. 2. To show who joined the call. 3. To show who left the call
P3	List of contacts
P4	There should be no need to add email id and name of the user again if someone wants to add the existing contact in a group
P4	Icons are should be little large with captions
P5	UI should be colorful and add contacts, Call and Video Call should have clear icons (for example iPhone icons) Green call icon to receive and Red icon to hang up the call.
P6	In conference call, there should be suggestions or an option to call people who are on the contact list.
P6	Record button should look like a regular red radio button with a dot and green button to receive call and Red button to hang up the call.
P7	No Comments
P8	UI to be more user friendly. So many speed dials are not required.
P9	Instead of speed dial buttons, the space can be utilized to show name of contacts.

Table 8. The responses of participants

How does it compare with other applications like Skype or Hangouts?

Similar to other application – 4/9

Better than other application – 0/9

Worse than other application – 5/9

- “There are a lot of button on UI, which makes me think where should I search for contact name.”
- “Here the search bar is below the button, hiding down, usually search bar in on the top”
- “Skype and hangouts look a lot more streamlined and user friendly”
- “For professional it is fine”
- “Creating group didn’t make sense. Since you have to click and write their contact all over again which didn’t make sense”
- “It will take me a long time to learn this application”
- “It can be more colorful”
- “I don’t like it”
- “It looks like a calculator”
- “It was hard to figure out how to add a new contact”

System Usability Scale (SUS)

The system usability scale is an industry standard tool that is used for measuring the usability of a system. It has been in use for around 30 years. The SUS consists of a 10-item questionnaire with 5 response options.

Participant	SUS Score
1	62.5
2	72.5
3	75
4	75
5	55
6	17.5
7	82.5
8	27.5
9	65
Average	59.17

Table 9. SUS table.

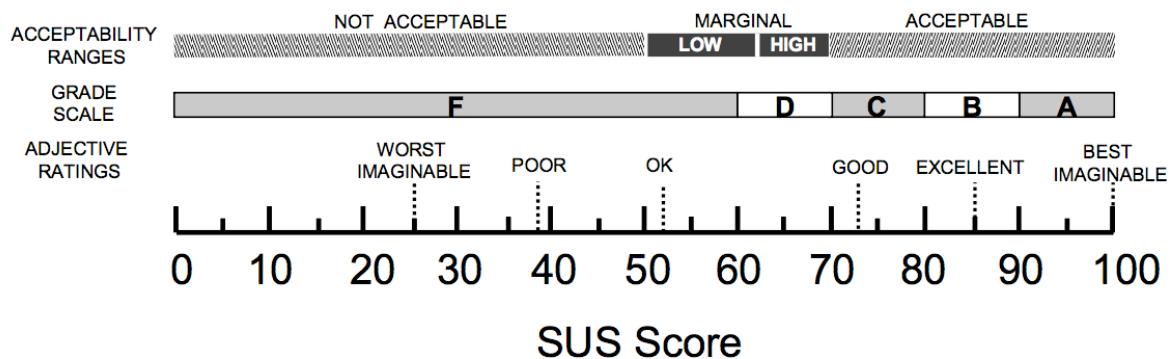


Figure 16. Grade rankings of SUS scores from “Determining What Individual SUS Scores Mean: Adding an Adjective Rating Scale,” by A. Bangor, P.T. Kortum, and J.T. Miller, 2009, *Journal of Usability Studies*.

Based on research, the average SUS score is 68. A SUS score above 68 would be considered above average and anything below 68 is below average. Since the Sigma Client application got an average SUS score of 59.17, it is definitely below average and gets F grade. This could be a cause of concern as it shows that the software is below par in terms of usability when compared to other systems.

RECOMMENDATIONS

We provide several recommendations based on our findings from the study. These recommendations could help developers, designers and product managers. We mention the more important bugs (and errors) we have encountered in the application, provide design considerations and suggest workflow ideas.

Bugs and Errors

- Call icon was not visible for a contact to the participants all the times.
- The conference call feature did not work a few times.
- We were unable to make SIP calling work between all the accounts.
- Authorization request sometimes did not go through.
-

Design

- Optimally, it is best to ensure icons on buttons are externally consistent with other similar applications.
- The chat message window can have an enter or send button to provide a better visual aid for the user.
- The SIP and XMPP labels could be simplified so that it is understood by users.
- The users require feedback while they are searching or typing incorrect numbers or names (after the contact has been saved).
- The application could try notifying the user if someone has joined or left the conference call.
- It could also show a user all the members in the conference call.
- A user can be notified if he is being recorded by another user while on a call to help bring the user's attention to it.
- There could be a save button (for validation) after settings have been changed in the options menu to provide helpful positive feedback for the users.
- The main window could have separate and bigger buttons for the contacts and the call history.
- Groups created can have more options, like the feature to make calls to all members.
-

Workflow

- The Sigma Application could have a better onboarding flow.
- There can be an improved notification system for conference calls. For example, the current call drop sound can be annoying.
- The group chat and conference call feature could be easily accessible from the main window to help users access it faster.

SUMMARY

We found several usability issues with the REDCOM Sigma Client for Windows application based on the tasks conducted by the participants for the study. The findings from the study highlight some of the important usability issues such as -

- Setting up a conference call.
- No notification sound when users join a call (as it is difficult to identify when someone joins a call).
- No send button in chat message window.
- No save button in options menu (after changing settings).
- Name of all the members in a conference call is not visible to every member.
- Buttons in call windows need to have better captions.
- Adding a contact.

Although we did find usability issues, we noticed that many users felt that this application was like other applications (like Hangouts or Skype). One of the users mentioned that this application was “pretty set”, while another said that “for professional it is fine”. Most of the participants were also able to successfully complete their tasks without any help or assistance from the moderator.

We also provided design and workflow recommendations that could help improve the usability of the application. The design and user interface considerations suggested can make the application more “colorful” and useful.

FUTURE RESEARCH

We tested only the key features of the Sigma Client application and further study is required for the other aspects of the application. Technical problems can be resolved so that the SIP account can also be evaluated. Research can be conducted with a more focused user group like military personnel in a suitable environment to provide accurate usability results.

APPENDIX A: RECRUITMENT FLYER

R.I.T | cias R.I.T
A Technological University
of Applied Sciences



**RECEIVE
\$25
GIFT CARD**

PARTICIPANTS NEEDED

FOR USABILITY STUDY

WHERE	WHEN	WHAT
Golisano College of Computing and Information Sciences, RIT	April 2 nd - April 24 th Duration: 45 Minutes	Use a Chat Application

If you are interested
Contact us at sigmaclienttest@gmail.com

sigmaclienttest@gmail.com

sigmaclienttest@gmail.com

sigmaclienttest@gmail.com

sigmaclienttest@gmail.com

sigmaclienttest@gmail.com

sigmaclienttest@gmail.com

APPENDIX B: SCREENER

The following set of questions helped us understand the background of the people in order to determine whether a participant would qualify for usability testing, that we are conducting on Redcom Sigma desktop calling and messaging application.

***Please note: These are only screener questionnaires to get a better understanding of the participants and not the task questionnaires.**

What is your current age?

- A. under 18
- B. 19-24
- C. 25-30
- D. 31-40
- E. 41-50
- F. over 50
- G. I don't wish to specify my age.

Please select your gender

- A. Male
- B. Female
- C. Other
- D. I don't wish to specify my gender.

What best describes your employment status? (Please pick one answer.)

- A. Student
- B. Employee
- C. Government or Military
- D. Self - Employed
- E. Retired
- F. Out of Work / Unemployed
- G. Unable to Work
- H. Other

Are you a part of Army ROTC at RIT?

- A. Yes
- B. No

For how long have you been a part of Army ROTC at RIT? (Skip this question if you are not a part of Army)

- A. less than one year
- B. 1-2 years
- C. 3-4 years
- D. More than 5 years

Have you used voice and video applications (like Skype) to communicate with people?

- A. At least once a day
- B. Several times per week
- C. Several times per month
- D. Once every few months
- E. A few times per year
- F. Never

What is the highest level of education you have completed?

- A. High school
- B. Undergraduate School
- C. Graduate School
- D. Ph. d
- E. Vocational School
- F. Other:

Do you have any form of hearing, vision, physical or cognitive disability?

- A. Yes
- B. No

If your answer to the previous question is YES, please specify the type of disability.

Please mention the languages that you know apart from English.

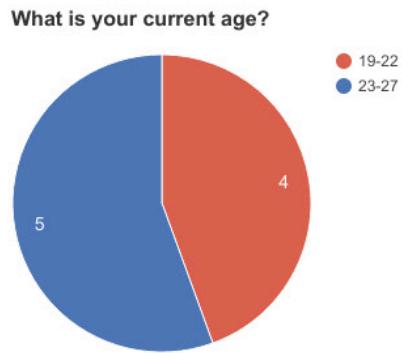


Figure 16. Pie chart to show participant's age group.

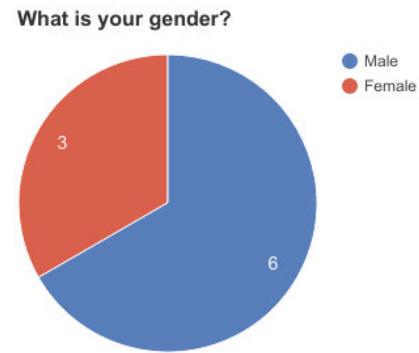


Figure 17. Pie chart to show participant's gender

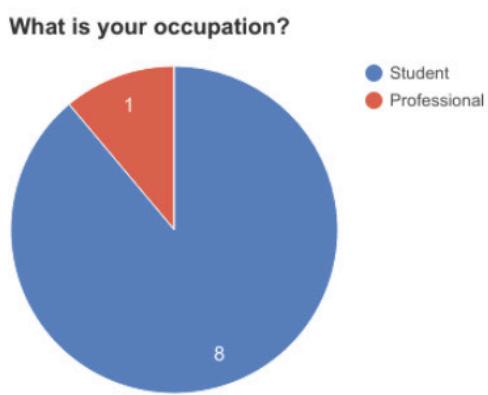


Figure 18. Pie chart to show participant's occupation.

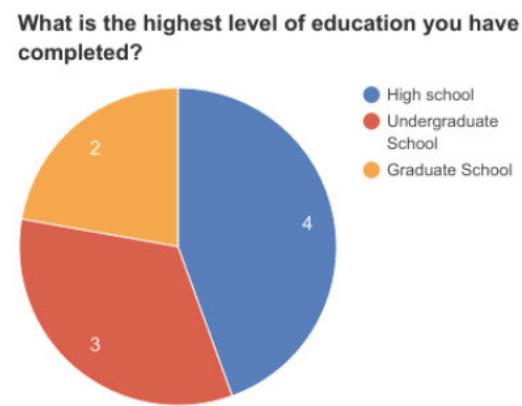


Figure 19. Pie chart to show participant's qualification.

APPENDIX C: INFORMED CONSENT

ROCHESTER INSTITUTE OF TECHNOLOGY

INFORMED CONSENT FORM

Introduction

Thank you for volunteering to be a part of this usability study. In this usability testing, we are evaluating the use of Redcom Sigma client, a communication application for Windows.

Information

The Redcom Sigma Client Windows Application allows communication between n-number of users via chat, voice and video calls.

Primary objectives of this study are to find usability issues in the application. The study will take no more than forty-five (45) minutes to complete. During the study, you will be asked to use the application. You will be given a series of task scenarios. I will remain in the room with you throughout the duration of this session. There are several other members of the research team in the adjacent room. They will be observing through the one-way mirror behind me. We will be recording your interaction while using this application. Also, during your participation in this study, we will video record all the activities. This is not of you or your abilities but to get a better understanding of the application and its functionality.

The evaluators may stop the study or remove you from the study at any time they see appropriate. They can do this without your consent. You can stop participating at any time without loss of benefits.

Risks

There are no anticipated risks related to participating in this study.

Benefit To Taking Part IN The Study

There are no anticipated direct benefits to you for participating in this study. Findings from this study will be used by Redcom sigma client communication application for windows, to improve the design of future versions.

Confidentiality

Your name will not be used when data from this study is published. Every effort will be made to keep your research records and all other personal information confidential.

You will be assigned a participant number, only the participant number will be recorded on the test instruments. No personally identifiable information will be recorded on the test instruments nor stored within the software you use today. Participant identities will not be made part of any published findings resulting from this study. We will hold your personal information as confidential (such as name and phone number) and use it only for data analysis purposes, to link data to the subject. The only connection between your participation in this study and the study itself will be this signed consent form.

Incentives

At the conclusion of the study session, you will be given a \$25 Panera bread or some other shops' gift card.

Your Rights As A Research Participant

Participation in this study is voluntary. You have the right not to participate at all or to leave the study at any time. Deciding not to participate or choosing to leave the study will not result in any penalty or loss of benefits to which you are entitled.

Contact

If you have any questions about the study or the procedures, you may send us an email at sigmaclienttest@gmail.com

Consent of Participant

Signature of Participant or Representative

Date

APPENDIX D: PRE-TEST QUESTIONNAIRE

Have you used voice and video applications to communicate with people?

- A. At least once a day
- B. Several times per week
- C. Several times per month
- D. Once every few months
- E. A few times per year
- F. Never

Please mention which of the following application/s do you use for voice/video call? Check all that apply

- A. Skype
- B. Hangouts
- C. WhatsApp
- D. Facebook
- E. Snapchat
- F. Facetime
- G. Other (Please specify) _____

What do you use video calls for? Check all that apply.

- A. Work
- B. Personal
- C. Other (Please specify) _____

Which device do you use for video/voice calling? Check all that apply.

- A. Desktop computer
- B. Laptop
- C. Tablet
- D. Mobile device
- E. Other (Please specify) _____

How frequently do you use chat or messaging feature?

- A. At least once a day
- B. Several times per week
- C. Several times per month
- D. Once every few months
- E. A few times per year
- F. Never

APPENDIX E: POST-TASK QUESTIONNAIRE

Task 1

1. Please rate on a scale of 1 to 5, how easy or difficult it was to complete the task?
(Please mark your desired choice.)

Very Difficult	Neutral	Very Easy		
1	2	3	4	5

2. Please rate on a scale of 1 to 5, how easy or difficult it was to save Jennifer's number correctly? *(Please mark your desired choice.)*

Very Difficult	Neutral	Very Easy		
1	2	3	4	5

3. What made the task easy or difficult?

Task 2

4. Please rate on a scale of 1 to 5, how easy or difficult it was to complete the task?
(Please mark your desired choice.)

Very Difficult	Neutral	Very Easy		
1	2	3	4	5

5. What made the task easy or difficult?

Task 3

6. Please rate on a scale of 1 to 5, how easy or difficult it was to make the changes in the software settings? (*Please mark your desired choice.*)

Very Difficult	Neutral			Very Easy
1	2	3	4	5

7. What made the task easy or difficult?

Task 4

8. Please rate on a scale of 1 to 5, how easy or difficult it was to make a conference call?

Very Difficult	Neutral			Very Easy
1	2	3	4	5

9. What made the task easy or difficult?

10. Please rate on a scale of 1 to 5, how easy or difficult it was to save John's number correctly? (*Please mark your desired choice.*)

Very Difficult	Neutral			Very Easy
1	2	3	4	5

Task 5

11. Please rate on a scale of 1 to 5, how easy or difficult it was to complete the task?
(Please mark your desired choice.)

Very Difficult	Neutral	Very Easy		
1	2	3	4	5

12. Were you able to figure out that your team member David had joined the call?

Yes	No	Maybe
-----	----	-------

13. Were you able to find out that you were recorded?

Yes	No	Maybe
-----	----	-------

14. What made the task easy or difficult?

APPENDIX F: POST-TEST QUESTIONNAIRE

1. I think that I would like to use this system frequently.

Strongly Disagree	Neutral	Strongly Agree		
1	2	3	4	5

2. I found the system unnecessarily complex.

Strongly Disagree	Neutral	Strongly Agree		
1	2	3	4	5

3. I thought the system was easy to use.

Strongly Disagree	Neutral	Strongly Agree		
1	2	3	4	5

4. I think that I would need the support of a technical person to be able to use this system.

Strongly Disagree	Neutral	Strongly Agree		
1	2	3	4	5

5. I found the various functions in this system were well integrated.

Strongly Disagree	Neutral			Strongly Agree
1	2	3	4	5

6. I thought there was too much inconsistency in this system.

Strongly Disagree	Neutral			Strongly Agree
1	2	3	4	5

7. I would imagine that most people would learn to use this system very quickly.

Strongly Disagree	Neutral			Strongly Agree
1	2	3	4	5

8. I found the system very cumbersome to use.

Strongly Disagree	Neutral			Strongly Agree
1	2	3	4	5

9. I felt very confident using the system.

Strongly Disagree	Neutral		Strongly Agree	
1	2	3	4	5

10. I needed to learn a lot of things before I could get going with this system.

Strongly Disagree	Neutral		Strongly Agree	
1	2	3	4	5

APPENDIX G: DEBRIEFING

1. What additional features would you like to see in the application?
2. How does it compare with other applications like Skype or Hangouts?
3. Did you have any other questions for us?

APPENDIX H: PAYMENT RECEIPT

Redcom Sigma Client Application Compensation Receipt Form

By signing below, you acknowledge that you have participated in the Redcom Sigma Client Application usability evaluation conducted by students of the Usability Testing-HCI course at RIT and have received a \$25 gift card from Panera bread.

Print Name (First Last): _____

Signature: _____

Today's Date: _____