1. Informed Consent

a. Email a PDF of the consent form to participants. Encourage them to read and sign it before they arrive, if possible (NOTE: Otherwise, it takes a while to read it to them).

b. Complete informed consent process.

If they arrive with a signed consent form:

- **"**Did you have any questions about the consent form?"
    - If so, answer questions

- Collect the signed consent form.

- Offer them a hard copy of the consent form to keep. (NOTE: Always carry an extra copy of the consent form for each participant.)

If they arrive without a signed consent form:

a. Give participants the consent form when they arrive.

    - Participants read the consent form

- "Do you have any questions about the consent form?"
    - If so, answer questions

- "If you would like to participate, I need you to sign the consent form."

- Collect the signed consent form.

- Offer them a hard copy of the consent form to keep. (NOTE: Always carry an extra copy of the consent form for each participant.)

2. Study Overview

a. Read general instructions to users.

- "Thank you for participating in our study. Testing will occur in **Two Phases**. During the **first Phase**, you will listen to and answer questions about sounds that were designed to alert computer users about security situations. During the **second phase**, you will perform multiple tasks while navigating a webpage, and you may encounter security situations as you do so. At the beginning of each stage, you will be read instructions about your tasks for that stage."

- "Please note that we are not testing you; we are testing the sounds. Our goal is to improve the design of the sounds. Accordingly, we need and appreciate your honest feedback. If you have any questions during the study, please ask."

- "Do you have any questions so far?"

Phase 1: General Instructions

a. Read general instructions to users.

- "We shall now begin with **Phase 1** of our testing. I will first read the description of security threats that we are trying to create the audio alerts for. You may ask me to repeat the description if it is unclear to you. After this step, we will proceed to other stages of Phase 1".

- "Again, I would like to remind you that we are not testing you; we are testing the sounds. Our goal is to improve the design of the sounds. Accordingly, we need and appreciate your honest feedback. If you have any questions during the study, please ask."

- "Do you have any questions so far?"

- Read the Description of Threats on Next Page:

Name: *Phishing*

An example: Web users received emails supposedly from eBay, which claimed that the users' accounts were about to be suspended unless they clicked on the provided email link and updated their credit card information. When users clicked the link, they were taken to the attackers' Web site where they entered their credit card information. Another, most common variation to phishing is that, you are being redirected to an unsafe Webpage.

What would our system do? Our system would play a sound to warn users that someone is trying to trick them into giving them personal information *or* when they are redirected to a reportedly unsafe webpage.

Name: *Malware Downloading*

An example: Users download what they think is a new game. Unbeknownst to them, the game contains a program that deletes all of the files on their computers or allows attackers to spy on them.

What would our system do? Our system would play a sound to discourage users from downloading any malicious file.

Name: *Form Filling*

An example: To make a purchase, an online shopping site prompts users for their usernames and passwords. Normally, the system would visually display a series of dots as users type their passwords.
If, however, users mistakenly type their passwords into the incorrect field, then their password would be visible to people around them.

What would our system do? Our system would play a sound to notify users that the information that they are about to enter can be seen by people around them.

Stage 1. Measure Identifiability, Pleasantness, and Urgency

a. Read instructions to users.

- "During this **first** stage of testing, you will hear a sound and I will then ask you what security situation you thought the sound conveyed, and to briefly explain your choice. We have created several sounds for each security situation, so you can use the same answer multiple times. I will then ask you to rate the sound's pleasantness and urgency. After that, we will move on to the next sound. If you would like me to replay a sound or have questions, please let me know."

b. Present 1 randomly selected sonification to the user. NOTE: Be sure to randomize the sounds ahead of time. NOTE: Replay the sound if participants ask you to do so. NOTE: Be sure to record the random orders that are used.

c. Ask user which threat/cue was conveyed, and to explain why.

- "What security situation do you think the sound conveyed?"
- "Why do you think the sound represented [insert their answer]?"

After this step tell them whether they were right or wrong.

d. If user does not select the intended security situation, tell the intended meaning, and ask user for feedback.

- "The sound was supposed to convey [insert correct answer]."

e. Replay the sonification.

f. Ask user to rate the sonication's pleasantness and urgency.

- "How pleasant is this sound on a scale of 1 to 5, with 1 being 'extremely unpleasant' and 5 being 'extremely pleasant?"
- "How compelled would you be to react to this sound on a scale of 1 to 5, with 1 being 'I would definitely ignore it' and 5 being 'I would definitely react to it?"

g. Repeat steps above for *other sonifications* in a **random order**.

h. After all sonifications have been tested, let the participant take a quick break.

Stage 2: Select Best Sonification for Each Threat/Cue

a. Read instructions to users.

- "Now we begin with the **second** stage of testing. During this stage, you will hear a set of sounds that were all supposed to convey the same meaning. I will ask you to identify the sound that you think best represents the intended meaning, and to explain why. We will then move on to the next set of sounds. If you would like me to replay sounds or have questions, please let me know."

Present 1 randomly selected set of sonifications to the user. NOTE: Be sure to randomize the sounds ahead of time. NOTE: The order of sonifications within each set should be randomized as well. NOTE: Replay sounds if users ask you to do so. NOTE: Be sure to record the random orders that are used.

b. Ask user which sonification best conveyed the intended meaning, and to explain why.

- "Which sound do you think best conveyed [insert name of threat/cue]?"
- "Why do you think the sound represented [insert their answer]?"

c. Repeat steps above for other sets in a random order.

Stage 3: Measure Memorability

a. Read instructions to users.

- "We now begin with **third stage** of our testing. During this stage of testing, you will hear the same sounds that you heard before. I will ask you to tell me if you remember what the sound was supposed to mean. We will then move on to the next sound. If you would like me to replay a sound or have questions, please let me know."

b. Present 1 randomly selected sonification to users. NOTE: Be sure to randomize the sounds ahead of time. NOTE: Replay sounds if users ask you to do so.

c. Ask user to recall the sonification's intended meaning. NOTE: After they answer, users may ask if their answers were correct. If they do, tell them that you cannot answer that until after the testing is complete.

- "Do you remember what this sound was supposed to mean?"

d. Repeat steps above for the other sonifications in a random order.

Debriefing Statement: Phase 1

- "That concludes the **Phase 1** of our testing. If you would like to have a short break of 2-3 minutes before we move on to **Phase 2** of our study then please let me know."