Rapid Iterative Test, 12-13 July 2016

# NGI 2.0 Beyond Concept
# NGI 2.0 Horizon Remix Concept

A/B Test Results

# Introduction

This usability study is an A/B user test conducted with 12 participants using a think aloud methodology. The study examined two alternative interaction design models presenting content and navigating the HMI system. The two designs were prototyped as interactive presentations with clickable areas.

Each participant was presented with one prototype, either the Beyond Concept (version “A”) or the Horizon Remix Concept (version “B”). Each prototype was tested six times.The study was conducted using a laptop and mouse for eight participants, as well as, a touch monitor for four participants.

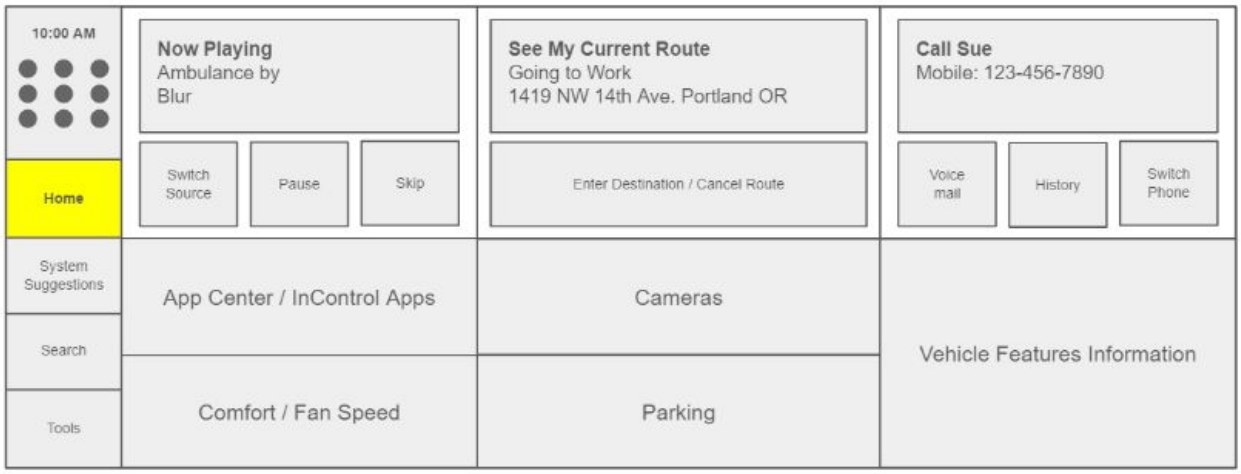



*Figure 1: Beyond concept (Variant A)*

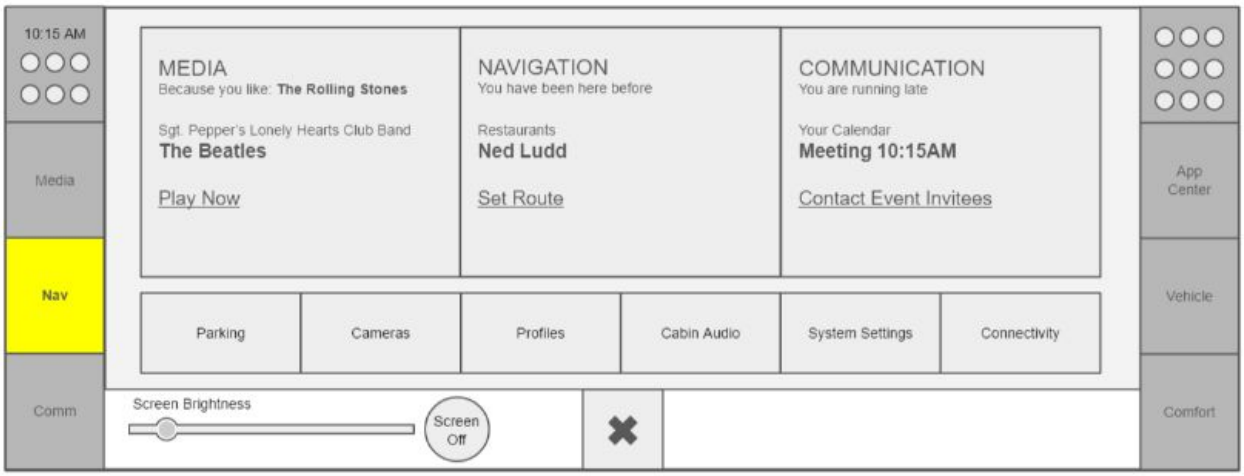



*Figure 2: Horizon Remix concept (Variant B)*

# Method

Participants were asked to complete 12 tasks and to give feedback on the system they were using. Participants were encouraged to voice their thoughts, questions, and concerns out loud while completing each task.

Each participant also completed a Jaguar Land Rover (JLR) modified system usability scale (SUS) scoresheet. The JLR SUS differs from the standard SUS by replacing standard SUS usage of the word “system” with the word “feature.” A passing SUS score is 68 or better.

# SUS Scores

Beyond Concept Average SUS

65.00

Horizon Remix Concept Average SUS

78.33

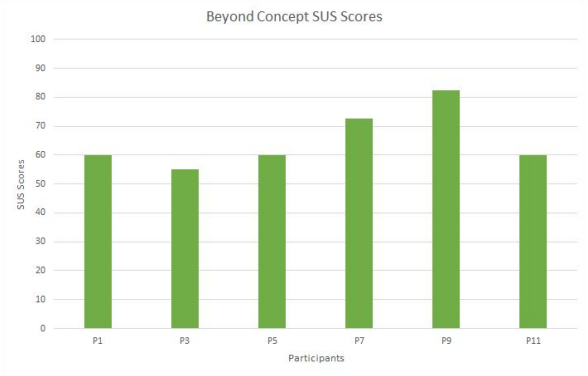



*Figure 3: Beyond Concept participant SUS scores.*

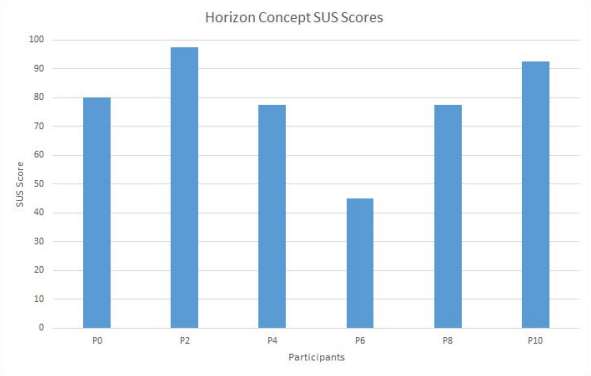



*Figure 4: Horizon Remix participant SUS scores.*

Larger charts can be found in “Reference 2: Supporting Graphs.”

# Task Breakdown and Results

Participants were asked to complete 12 tasks during their test. The tasks are documented in Reference 1: Test Tasks. These tasks were designed to assess usability and learnability, as well as to gather qualitative feedback on the prototypes. Both concepts had high task pass rates.

The Beyond Concept had a 81.93% pass rate. Four tasks were failed and five were passed with difficulty. The Horizon Remix concept had a 87.49% pass rate. Two tasks were failed and three were passed with difficulty.

Such a high level of passed tasks suggests participants were able to easily navigate the system as it was presented to them, with no help from moderators. While this understanding is a good sign for both prototypes, the high task completion should not be taken alone as an indication of a good system.The qualitative feedback given by the participants should also be considered when assessing the system as a whole.

> One participant, stated the Horizon Remix concept was **"easier than the current system"**

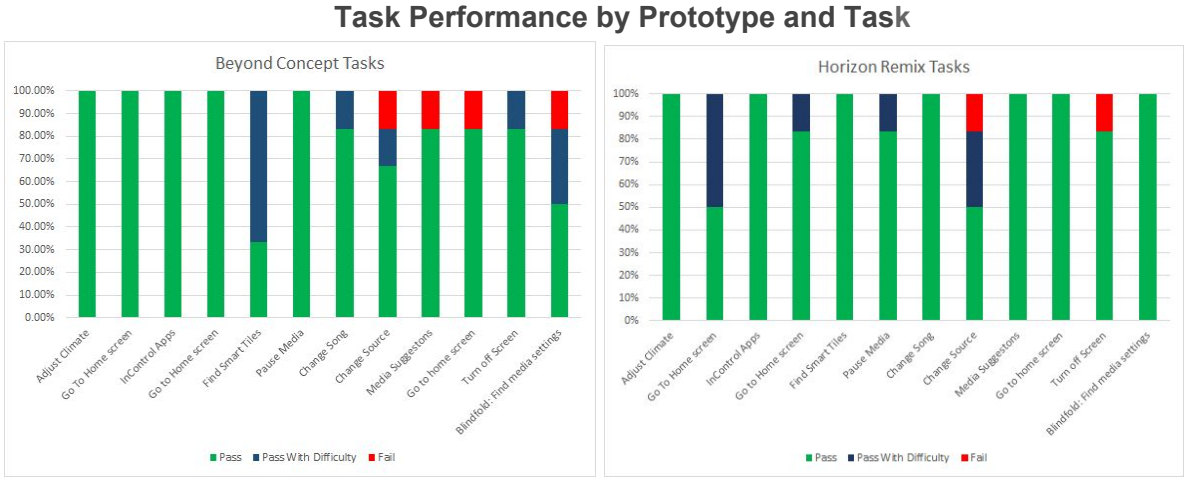



*Figure 5,6: task completion rates (larger versions in Reference 2: Supporting Graphs)*

Overall, participants seemed to understand how to navigate the systems presented. One participant, who drives JLR vehicles frequently as part of their job, stated the Horizon Remix concept was "easier than the current system" in the vehicles available at OSTC. Participants response to the system for both groups were consistent with one another. Their feedback is separated by concept below.

## User Study Findings Beyond Concept (Variation A)

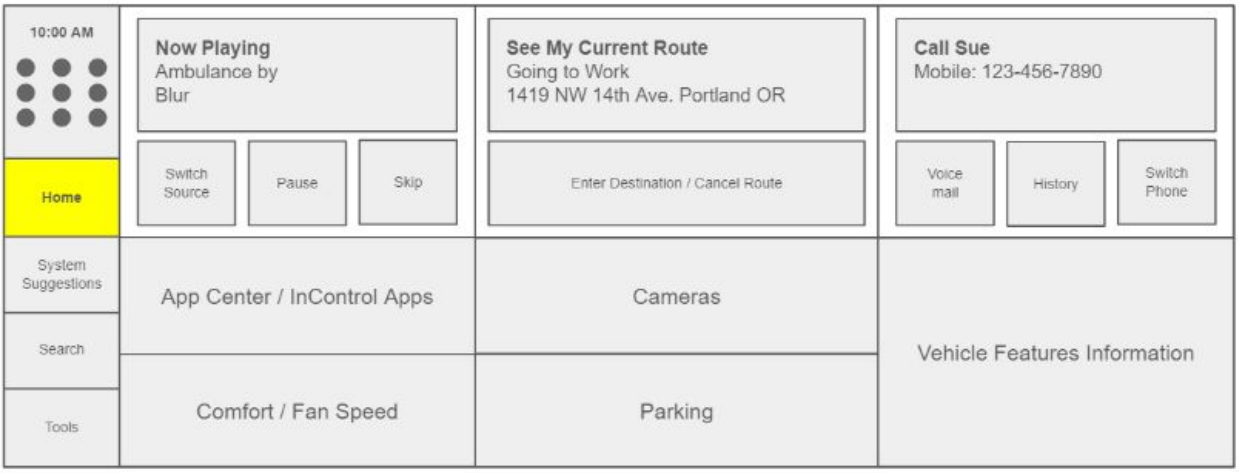



*Figure 8: Beyond concept home screen (Variation A)*

Participants started by being presented with the home screen. Participants described the home screen as busy.  One participant stated, “whoa, there’s a lot of stuff to touch. It’s a little overwhelming.” The participant went on to say they could have been influenced by the number of boxes, where visual design might solve for the “cluttered” nature of the wireframe.

Many participants saw this screen as a status screen. Two of the three main content sections are vehicle status, while the third is a recommendation to “call Sue.” Some participants took this to mean they had done something to prep the system in a way that it would prompt them to make a phone call; none of the participants recognized it as a recommendation, nor did they expect a recommendation of a contact. “It wouldn’t prompt me to call Sue if I wasn’t about to be doing that.”

When asked to find smart tiles, four of the six participants went to the specific feature center for the recommendations they were asked to find (in this case, media recommendations). Only two of the six participants went to the system suggestions screen, a few commented on the name of the screen, stating they did not understand what a system suggestion might be. One participant said they “never expected” recommendations in system suggestions, rather they expected tutorials.  They related the term “system” to more low-level functionality, such as settings.

A minority of participants didn't see the three main home tiles as interactive elements, and therefore did not dig deeper into the system. This is something likely solved through visual design, however it is worth noting that participants were looking for another cue to find their way to the various features.

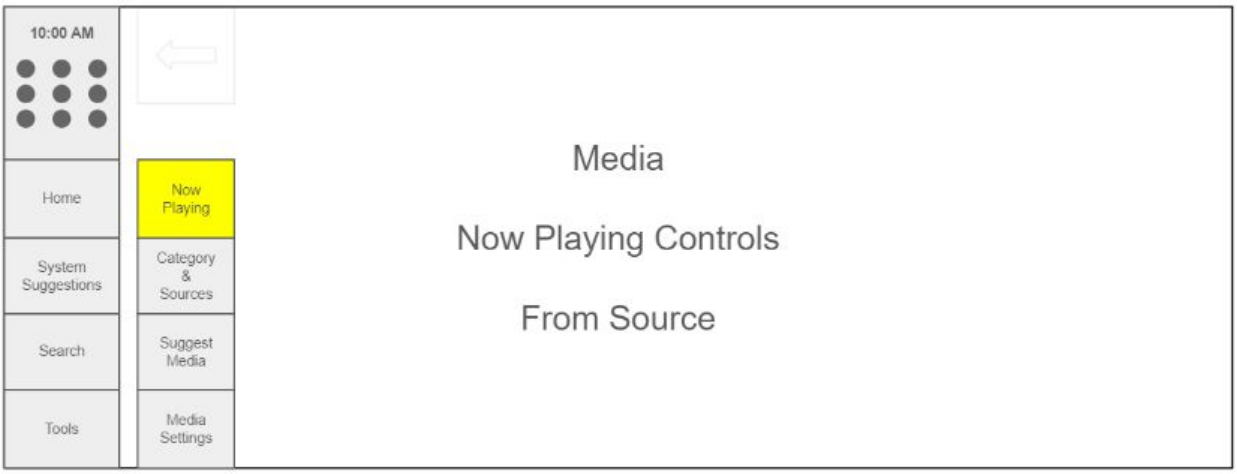



*Figure 9: Beyond concept interior screen*

Most participants did find their way deeper into the system, where they understood the navigation structure as it was presented. Many participants attempted to click the barely-visible "back" button, but found it did not work.  They preferred it to the home button, as a home button is seen as a "reset" on the task at hand - a button forcing them to start over completely from the top of the system.

# User Study Findings Horizon Remix Concept (Variation B)

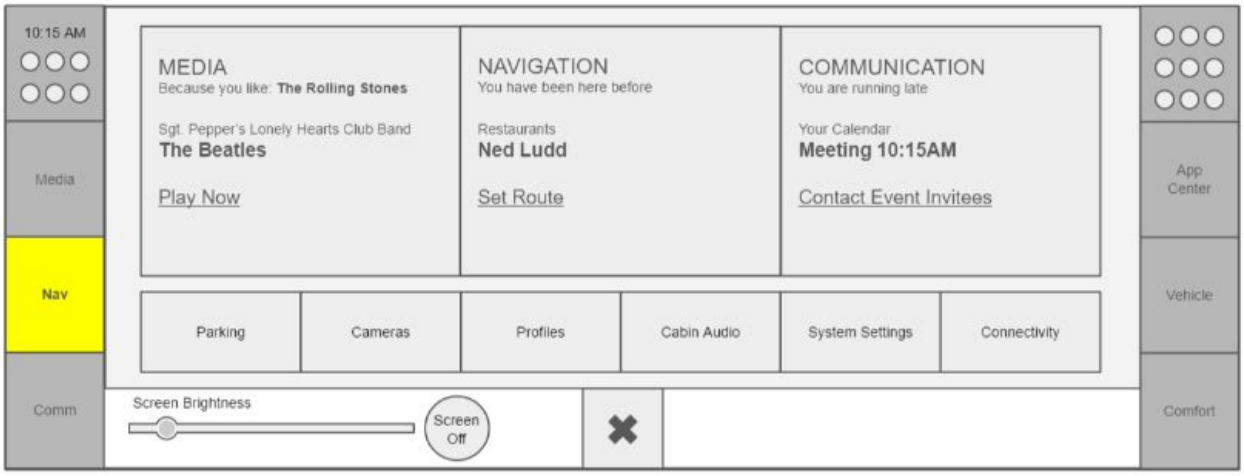



*Figure 6: Horizon Remix home drawer (Variation B). The home page has a row of system navigation vertically on each side, with the content in between them.*

Participants viewed the home screen as a unique page within the system, and took some time to realize it was a overlay. Participants saw this screen as a unique location in the system, not as a drawer accessible from anywhere in the system. One participant stated it “looks pretty standard. Seems obvious, which is a good thing.” The same participant went on to say that it “seems navigation is selected.”

In the case presented above, if the user were to tap the X, the drawer would close and they would find themselves in the navigation section. When participants did tap on the X button, they were surprised to find themselves somewhere in the system they did not expect to be.  One participant was “not sure what the X is intending to do.” They went on to say, “When I clicked on [the X] it went to the last selected screen.” Other participants expected the X to be a power off button. Only one participant realized they were looking at a tray rather than a page.

Some participants expected the screen power to be available on this screen while other participants did not expect it to be here at all. One participant noted that the screen power was positioned such that it could be accidentally touched, which could cause some confusion.

On the home page (figure 6) we can see three large tiles containing recommendations. These tiles were seen as system status tiles by five of the six participants who tested this concept. Many also expected these to be interactive.

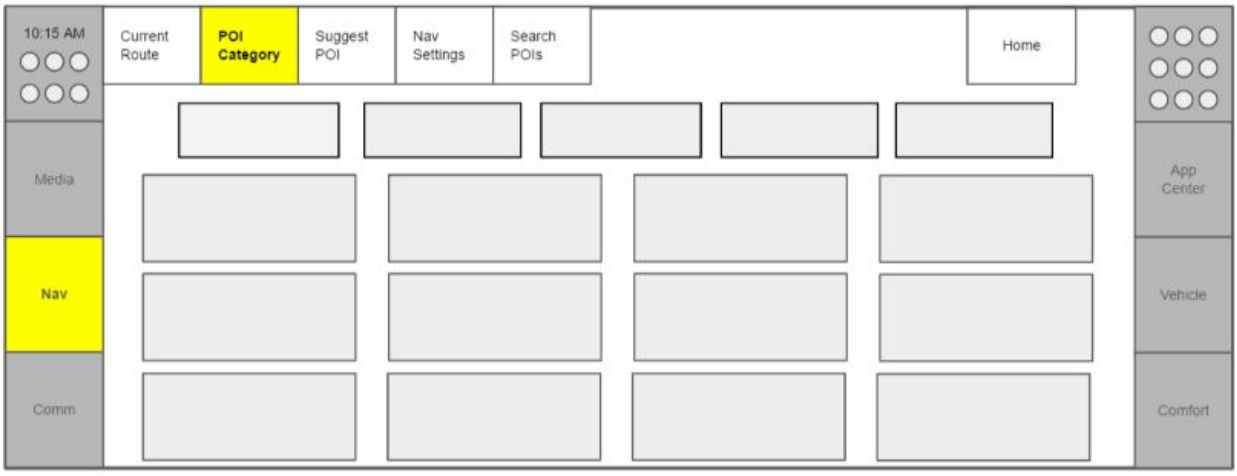



*Figure 7: Horizon Remix interior page (variation B)*

Participants were instructed to close the home drawer, when asked to return to the home screen, half of the participants were able to complete the task easily. The remaining half struggled to complete the task, earning a “pass with difficulty” rating. The difficulty likely stems from the participants’ notion that the home screen was a page and not a tray.

# System Intelligence

Participants had varying expectations for what might be recommended by a system, or even whether or not a system should be recommending things to them. Largely, they felt certain types of recommendations were valuable, with the caveat that it can be turned off.

Participants expressed a desire to have their favorite apps provide their media suggestions, especially among younger participants. They wanted their media apps to be well integrated into the IVI and to be able to share controls between their phone and their app. Spotify and Pandora were the most mentioned music providers, and participants strongly desired to continue using their recommendation engines in the vehicle. Some participants didn’t want recommendations at all. When asked what type of recommendations they expected from the media section of the IVI, participants overwhelming mentioned music. A small minority mentioned video services such as Netflix.

For media, participants had a desire for recommendations to be provided based on recency rather than frequency. They postulated that mood can be determined by the last five to ten songs, averaged out over the lifetime of data collected about their preferences. For example, a participant might be in the mood for punk rock and be listening to the new blink-182 album. The system recognizes that the user’s musical interests are more varied, but at the moment they are in the mood for music that is a little more energetic.

Other factors mentioned by participants that could influence recommendations were time of day, sources, new music similar to what is currently playing, new radio stations similar to the current station, and other sources or apps. Participants expected recommendations to come from their favorite services, such as Pandora and Spotify.

Elsewhere in the system, participants were less interested in recommendations. Largely, participants felt that if they wanted recommendations for restaurants or points of interest they would ask for them.

Participants were even less keen to receive recommendations for contacts or calendar events. For calendar events participants stated they did not want recommendations at all. Horizon remix had a recommendation based on the vehicle's occupant being late to a meeting; the recommended prompt was to contact the event's invitees, but participants honed in on the part where they were late: "I already know I am late."

Other participants suggested this type of notification should be handled as a pop up or notification overlay. Further research may be necessary to determine if future participants would see a value in a recommendation to contact meeting attendees with a different presentation. Participants pointed out that their phones do an effective job of letting them know by when they need to leave their location to make it to a meeting with an associated address, and didn't seem to value the vehicle repeating what their phones will be telling them.

# Recommendations

**Phone and App Integration**
Participants felt very strongly that their phones should be well integrated into the system. They wanted the apps they are used to on their vehicle, and they felt the phone should offer additional controls of their IVI. Several participants described a desire to be able to share content from their phones to their IVI, or to have groups of vehicle occupants share content. They described an experience similar to the Google Chromecast, allowing people to send content into a single queue. There is an opportunity here for the bring your own device (BYOD) project to shine through into the user's desires.

Strong app integration was also mentioned frequently. Participants strongly desired their favorite media apps to be present in the system, and some went so far as to expect their media recommendations to come from those apps. Specifically Pandora and Spotify, but others were also mentioned, such as Netflix.

**Home is not a Tray**
This recommendation is specific to the Horizon Remix concept, participants didn't understand that home was a tray, not a unique page. The addition of a large "X" icon didn't help clarity. The Beyond concept utilized a static home page, which worked well for the participants. Home

should be a static page with system status, not recommendations, as participants neither expected nor understood why the system was recommending things to them at the home page.

**System Intelligence**
System intelligence should be used to augment an already good experience. Participants were largely interested in media recommendations, especially for music and from their favorite music services. Though, while participants were interested, there should be a way to opt out.

For intelligence outside of media, participants were less interested. Participants stated they would rather request recommendations from the IVI when they felt they needed them. There are opportunities, for system intelligence to be subtly worked into the navigation experience. For example, if a driver sets a long navigation route, the vehicle could offer gas station locations near the edge of the predicted range. There could be a way for the vehicle occupants to get POI or restaurant recommendations while traveling as well.

Further research will be needed to determine how system intelligence could be used for contacts. Participants largely didn't understand why a contact was being recommended to them, and thought it was something they had already initiated. The phone feature could have a "frequently contacted" area in lieu of recommendations. Calendar events were seen as something that should be a notification, not a recommendation. If the call to action is to "contact event invitees," the recommendation needs to be presented in a way different from how it was presented in the Horizon Remix prototype.

# Reference 1: Test Tasks

**Home Page:**

| Task | PDF |
|---|---|
| What can you tell me about what is being displayed here? | |
| What do you think of this page? What do you think you can do here? Where do you think you are in the system? | |
| How would you adjust the climate controls? | |
| -- navigate back to the previous page | |
| Where would you find your InControl Apps? | |
| -- navigate back to the previous page | |

**Find Smart Tiles:**

| Task | PDF |
|---|---|

| | |
|---|---|
| If you wanted to find recommendations for media where would you go? | |
| What other types of recommendations would you expect here? | |
| How would you expect your vehicle to recommend content to you? | |

**Control Media:**

| Task | PDF |
|---|---|
| How would you pause your currently playing media? | |
| Is this where you would expect to find media controls? | |
| How would you change the song? | |
| How would you change the source? | |
| How would expect media suggestions to be generated? | |
| If you wanted to find media suggestions, where would you look? | |
| How would you get back to the page you began at (HOME)? | |

**Screen Power:**

| Task | PDF |
|---|---|
| If you wanted to turn off the screen, how would you? | |
| Did you expect to find that here? What else would you expect to find here? | |

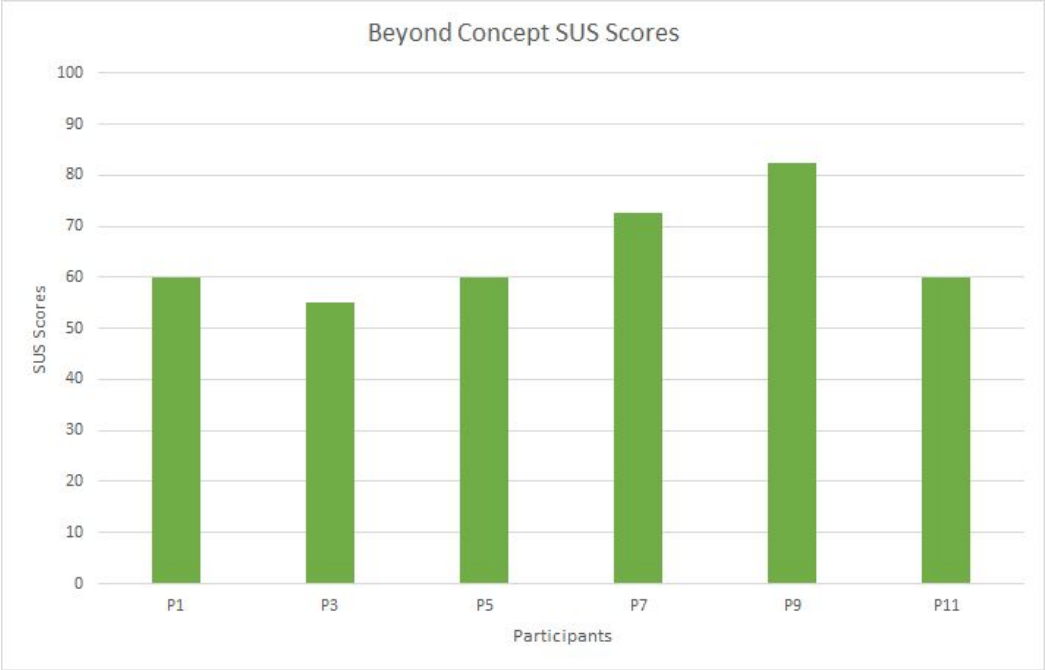
**Blindfold Task**

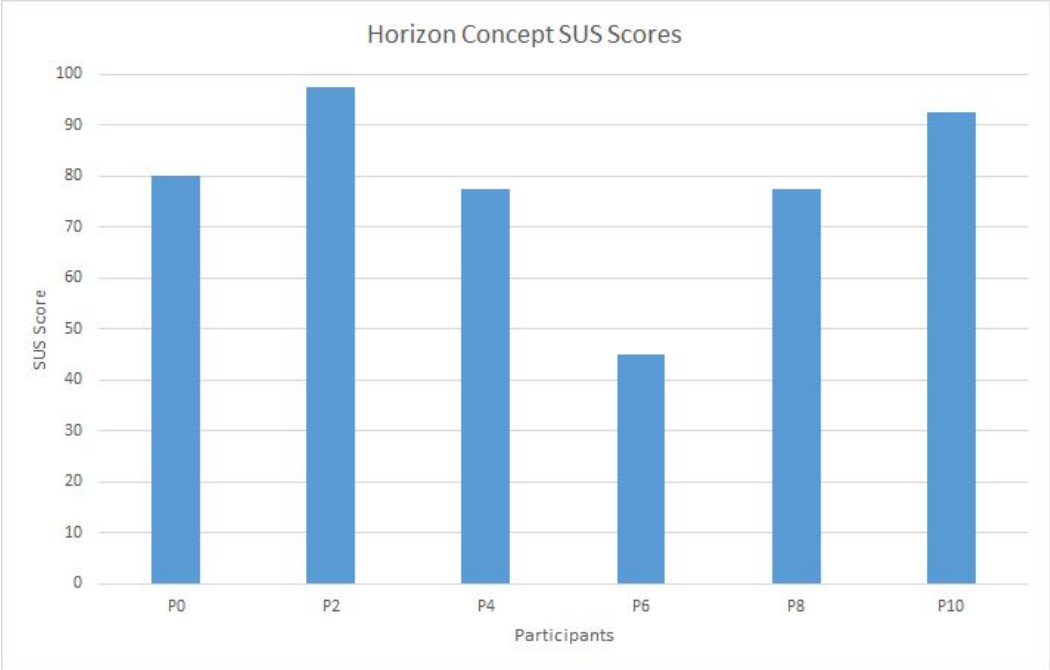
Ensure the participant's eyes are closed, then navigate to search results
[A: for (recent search)] // [B: for communication search contacts]

| Task | PDF |
|---|---|
| Where are you in the system? | |
| If you wanted to get back to media settings, how would you? | |

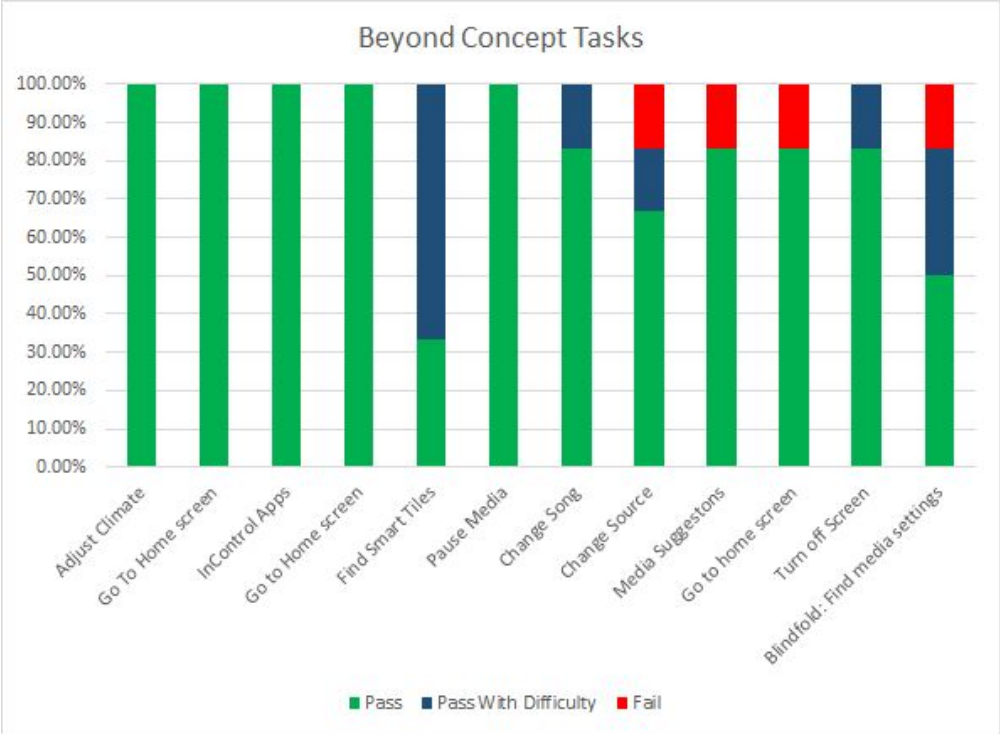
# Reference 2: Supporting Graphs

SUS Graphs:



Task Graphs:


Beyond Concept Tasks
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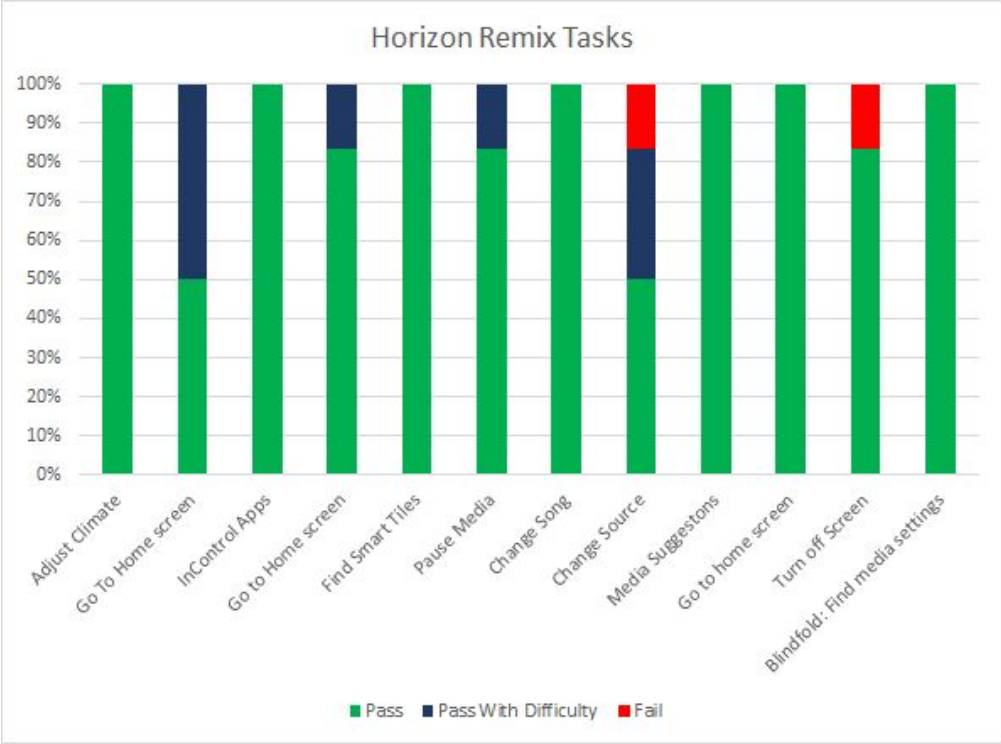
Adjust Climate
Go To Home screen
InControl Apps
Go to Home screen
Find Smart Tiles
Pause Media
Change Song
Change Source
Media Suggestons
Go to home screen
Turn off Screen
Blindfold: Find media settings
Pass
Pass With Difficulty
Fail


Horizon Remix Tasks
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10%
0%
Adjust Climate
Go To Home screen
InControl Apps
Go to Home screen
Find Smart Tiles
Pause Media
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Change Source
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