EHR Usability Test Report of Astronaut Version 1709

Dates of Usability Test: 1 Dec 2018 - 22 Dec 2021

Date of Report: December 22, 2021

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1 EXECUTIVE SUMMARY

1.1 EHRUT Astronaut 1709

The EHRUT was evaluated for effectiveness, efficiency, and user satisfaction. Fourteen participants performed tasks aligned to each meaningful use criterion under realistic conditions.

In general, the EHRUT performed well on measures related to all three areas. As expected, more experience with both the EHRUT and the task being performed led to decreased task path and task time variations. Nonetheless, even relatively novice users were able to complete tasks with reasonable effectiveness and efficiency.

Task success ranged from 58 to 98 %. Participants were more successful on tasks with fewer steps and those with which they were familiar. User satisfaction, as measured with the Likert Scale, ranged from 3.8 to 4.8, indicating that participants generally found the system easy to very easy to use. Task errors were relatively rare, suggesting that most participants were able to navigate the system well.

Areas for improvement center on consistency of system behavior and streamlining workflows for tasks performed infrequently.

1.2 e-Prescribing

The e-Prescribing software (NewCrop) was evaluated for effectiveness, efficiency, and user satisfaction. Ten participants performed tasks aligned to each meaningful use criterion under realistic conditions.

Task success ranged from 0 to 90%. Errors were common, both selecting an incorrect path as well as interpreting messages by the software. In general, e-Prescribing performed well on tasks performed frequently by all users, such as prescribing a new medication or looking up medication history. It performed poorly on tasks users had never performed or performed infrequently. No user was able to send a status message to the pharmacy and finding messages from the pharmacy required help. Users provided numerous suggestions for improvement.

2 Introduction

The EHRUT was Astronaut 1709. Designed to present medical information to healthcare providers in both outpatient and inpatient settings, the EHR under test (EHRUT) includes basic EHR functionalities such as patient demographics, clinical notes, and lab ordering as well as clinical decision support (CDS) and e-Prescribing. The usability testing attempted to represent realistic exercises and conditions.

The purpose of this study was to test and validate the usability of the current user interface, and provide evidence of usability in the EHRUT. To this end, measures of effectiveness, efficiency and user satisfaction, such as percent of tasks completed correctly, time on task and user task difficulty rating were captured during the usability testing.

As e-Prescribing is supported through NewCrop, an application separate from Astronaut 1709 itself, further usability testing was performed to satisfy 170.315(b)3 criteria.

3 Method

3.1 EHRUT Testing Participants

A total of 14 participants were tested on the EHRUT. Participants in the test were healthcare providers and office staff in outpatient settings. Participants were recruited by Dr. Willcockson and performed testing during regularly scheduled working hours. In addition, participants had no direct connection to the development of, or organization producing, the EHRUT. Participants were not from the testing or supplier organization. Participants were actual end users.

Recruited participants had a mix of backgrounds and demographic characteristics. Table 1 lists participants by characteristics, including demographics, professional experience, and computing experience. Participant names were replaced with participant IDs so that an individual's data cannot be tied back to individual identities.

Table 1. Participant Demographics

Participant ID	Participant Gender	Participant Age	Participant Education	Participant Occupation/Role	Participant Professional Experience	Participant Computer Experience	Participant Product Experience
BB011	Female	30-39	Master's Degree	Nurse Practitioner	6	240	6
DS002	Male	40-49	Trade/Tech/Vocational	Medical Assistant	84.0	384.0	60.0
BB010	Female	30-39	Trade/Tech/Vocational	Medical Assistant	180.0	240.0	60.0
BB008	Female	30-39	Some college	Admin Assistant	24.0	252.0	36.0
BB009	Female	30-39	Associate's	Admin Assistant	15.0	240.0	15.0
BB006	Female	40-49	Bachelor's	Nurse Practitioner Intern	6.0	192.0	2.0
BB005	Female	40-49	Master's Degree	Nurse Practitioner	60.0	360.0	36.0
BB004	Female	30-39	Bachelor's	TMS Coordinator	120.0	240.0	4.0
BB003	Female	40-49	Associate's	Medical Admin Ass	240.0	360.0	1.0
DJ001	Female	20-29	Some college	Assistant manager	3.0	108.0	3.0
BB007	Female	50-59	Bachelor's	Nurse Practitioner Intern	12.0	360.0	2.0
BB012	Female	40-49	Master's Degree	Nurse Practitioner	6.0	360.0	6.0
BB014	Female	30-39	Trade/Tech/Vocational	Medical Assistant	120.0	240.0	2.0

No participant required assistive technology. Participants were scheduled for 30 min sessions, with 15 min between participants for debrief and reset of the testing environment.

3.2 E-Prescribing Testing Participants

A total of ten participants were tested on the e-Prescribing software. All had at least 18 months of experience with the system and interacted with it in their role as prescriber or medical assistant. No participant required assistive technology. Table 2 lists participants by characteristics, including demographics, professional experience, and computing experience. Participant names were replaced with participant IDs so that an individual's data cannot be tied back to individual identities.

Table 2. Demographics for e-Prescribing Testing Participants

Participant ID	Gender	Age	Education	Role	Professional Experience (months)	Computer Experience (months)	Product Experience (months)
101	Female	40-49	Master's	Nurse practitioner	36	240	34
102	Female	30-39	Master's	Nurse practitioner	120	240	60

103	Male	50-59	Doctoral	Medical Doctor	240	480	36
104	Female	30-39	Trade/Tech/Voc	Certified medical assistant	12	360	96
105	Female	50-59	Bachelor's	Nurse	324	240	48
106	Male	50-59	Doctoral	Medical Doctor	312	360	24
107	Female	40-49	Master's	Nurse practitioner	48	360	18
108	Female	60-69	Master's	Nurse practitioner	216	360	18
109	Male	50-59	Doctoral	Osteopathic Doctor	372	288	18
110	Male	40-49	Master's	Nurse practitioner	312	312	48

3.3 Study Design for EHRUT

Overall, the testing was designed to uncover areas where the software performed well - effectively, efficiently, and to the user's satisfaction- and areas where improvements may be needed. The data from this test can serve as a baseline for future tests of the same software, or to compare this software to others, provided the same tasks are used.

During the testing, participants interacted with the EHRUT. Each participant used the software on the same laptop computer, with the same login, and was provided with the same instructions. A private setting was used at each user's place of employment to maximize user comfort and minimize disruptions. The system was evaluated for effectiveness, efficiency and satisfaction as defined by measures collected for each participant:

- Number of tasks successfully completed within the allotted time without assistance
- Time to complete the tasks
- Number and types of errors
- Participant verbalizations (comments)
- Participant's satisfaction rating of each component

Additional information about the various measures can be found in Section 3.9 on Usability Metrics.

3.4 Study Design for e-Prescribing

Overall, the testing was designed to uncover areas where the software performed well - effectively, efficiently, and to the user's satisfaction- and areas where improvements may be needed. The data from this test can serve as a baseline for future tests of the same software, or to compare this software to others, provided the same tasks are used.

During the testing, participants interacted with the e-Prescribing software. Although each participant used their own device to access GTM and control the software, the software was running on the same computer, with the same test doctor login credentials. Each participant was also provided with the same instructions. The system was evaluated for effectiveness, efficiency and satisfaction as defined by measures collected for each participant:

- Number of tasks successfully completed within the allotted time without assistance
- Time to complete the tasks
- Number and types of errors
- Participant verbalizations (comments)
- Participant's satisfaction rating of each component

Additional information about the various measures can be found in Section 3.9 on Usability Metrics.

3.5 Tasks for EHRUT

A total of twelve tasks were created to address the required criteria. Below are the detailed descriptions.

Task 1 (170.315a5) involved adding a new patient to the EHRUT. Sample demographics were provided, and participants were asked to enter them into the applicable fields.

Task 2 (170.315a2) involved ordering a laboratory test, using parameters provided.

Task 3 (170.315a3) involved ordering an imaging test, using parameters provided.

Task 4 (170.315a4) involved entering an allergy into the patient's chart, using the description provided.

Task 5 (170.315a4) asked participants to prescribe a medication to which the pt was allergic to. For task success, participants were required to view the allergy warning in the e-prescribing window.

Task 7 (170.315a1) asked participants to prescribe a medication.

Task 9 (170.315a14) asked participants to enter an implantable device id into a patient's record.

Task 10 (170.315a14) asked participants to retrieve the list of a patient's implantable devices.

Task 11 (170.315a9) had participants respond to a clinical reminder based on patient's information and a CDS rule.

Task 12 (170.315a9) asked participants to evaluate a CCD summary and incorporate it into the patient's record.

Task 13 (170.315a4) asked participants to prescribe two medications that interact. For task success, participants were required to view the interaction warning in the e-prescribing window.

3.6 Tasks for e-Prescribing

The tasks used to evaluate e-Prescribing were based on the required tests in the ONC Certification Test Plan, NIST HealthCare Test Version 1.2.35, dated April 1st, 2021. Because the prescriber's actions were similar for each type of scenario, only one of each type was tested, and all participants used the same test doctor login. For tasks with multiple sub-tasks (Cancel, Change, and Renewal), each participant was prompted to attempt all sub-tasks.

- Cancel Scenario: Prescriber successfully cancels new prescription before dispensing
    - Patient: Susanne Adirondack
    - Medication: Hydrochlorothiazide 50 mg
    - Prescribe Rx
    - See Pharmacy Status Msg
    - See Pharmacy Verify Msg
    - Prescriber sends Status Msg
    - Prescriber sends cancel Rx
    - See Pharmacy Status Msg
    - See Pharmacy Cancel Rx Msg
- Change Scenario: Pharmacist requests authorization for generic substitution
    - Patient: Sophia Biscayne
    - Medication: Procardia XL 30
    - Prescribe Rx
    - See Pharmacy Status Msg
    - See Pharmacy Rx Change Request
    - Prescriber sends Status Msg
    - Prescriber sends Rx change response
    - See pharmacy status msg
    - See pharmacy rx refill msg

    - Prescriber sends Status Msg
- Medication History Scenario: Pharmacy returns medication history in a single response
    - Patient: John Yosemite
    - Prescriber sends medication history request to pharmacy
    - See patient medication history msg
- Renewal Scenario: Prescriber authorizes the number of refills requested by the pharmacy
    - Patient: Elizabeth Itasca
    - Medication: Lanoxin 125 mcg
    - Prescribe Rx
    - See Pharmacy Status Msg
    - See Pharmacy Rx renewal request
    - Prescriber sends status msg
    - Prescriber sends Rx renewal response
    - See pharmacy status msg

3.7 Procedure for EHRUT

The usability test administrator arrived at each location and was assigned a private location. She established internet access and logged into the EHRUT using the test login. After arriving, each participant was greeted and introduced to the goal of the testing. Participants were assigned an ID number.

The administrator moderated the session including administering instructions and tasks. Participants were instructed to perform the task as quickly as possible, to the best of their ability, and without a think aloud technique. After receiving each task both written and verbal, participants were timed. Once the task was completed, the time was noted along with participant's feedback on the ease of task completion (Likert Scale; 5 - very easy to 1 - very hard). Scoring is discussed in section 3.9. Any other participant feedback was also recorded.

Participants were also administered the System Usability Scale (see Appendix 5.1).

3.8 Procedure for ePrescribing

Due to Covid-19 procedures, e-Prescribing was tested remotely. Participants and the usability testing administrator used audio, screen sharing, and passing mouse and key board control capabilities of (GTM). Participants were provided with instructions to download the desktop version of GTM, and a meeting link. They used their own devices to log into GTM. Each participant was provided the same instructions, verbal and through onscreen file sharing, as appropriate.

The administrator moderated the session including administering instructions and tasks. Participants were instructed to perform the task as quickly as possible, to the best of their ability, and without a

think aloud technique. After receiving each task both written and verbal, participants were timed. Once the task was completed, the time was noted along with participant's feedback on the ease of task completion (Likert Scale; 5 - very easy to 1 - very hard). Scoring is discussed in section 3.9. Any other participant feedback was also recorded.

Participants were also administered the System Usability Scale (see Appendix 5.1).

3.9 Test Location for EHRUT

The usability test administrator traveled to the work location of each participant. Testing was completed in a private setting at the participant's place of work. To ensure a comfortable environment for users, noise levels were kept to a minimum with the ambient temperature within the normal range. Safety instructions and evacuation procedures were in place.

3.10 Test Location for e-Prescribing

Participants performed the testing from a location of their choice. The usability test administrator worked from home.

3.11 Test Environment for EHRUT

The EHRUT would be typically used in a healthcare office or facility. In this instance, testing was conducted in outpatient facilities, both physician offices and intensive outpatient (IOP) programs. For testing, the computer used was a laptop running the Windows operating system. The screen size was 15 inches, resolution set to 1366x768 with standard color settings. The participants used a touch pad and keyboard when interacting with the EHRUT. The EHRUT was installed on the laptop, connecting to the test database via wireless LAN. The EHRUT was used with its default font size and color scheme.

The test environment was set up by the usability test administrator.

Technically, the system performance (i.e., response time) was representative of what actual users would experience in a field implementation. Additionally, users were instructed not to change the default settings.

3.12 Test Environment for e-Prescribing

The e-Prescribing software would be typically used by a prescriber, either a medical doctor or a mid-level provider, for example a nurse practitioner. The e-Prescribing software was running on a desktop computer running the Windows operating system. The desktop computer's display screen was a HP 23bw IPS LED Backlit Monitor with 1920x1080 resolution. Each participant used their own device to

interact with GTM, and were able to control the mouse and keyboard. Technically, the system performance (i.e. response time) was representative of what users would experience in the field.

3.13 Test Forms and Tools

During the usability test, the following documents and instruments were used:

1. Moderator's guide
2. System Usability Scale

Examples of these documents can be found in Appendices 5.1 and 5.2. The Moderator's guide was devised so as to be able to capture required data.

The participant's interaction with the EHRUT was observed by the administrator, who made notes on both the participant's path through each task as well as any participant comments.

3.14 Participant Instructions

The administrator provided the following instructions to each participant.

> Thank you for participating in this study.
>
> I will ask you to complete certain tasks using Astronaut Vista (e-Prescribing). We are interested in how easy or difficult this software is to use, and how we could improve it. You will be asked to complete tasks on your own, trying to do them as quickly as possible with the fewest errors.
>
> We are testing the software, not you. All information collected will be confidential and your comments will not be associated with your name at any time.
>
> (After completing the task) On a scale of 1 to 5 with 5 being very easy and 1 being very hard, how would you rate this task?

Any participant's comments were recorded along with administrator notes.

3.15 Usability Metrics

According to the *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records*, EHRs should support a process that provides a high level of usability for all users. The goal is for users to interact with the system effectively, efficiently, and with an acceptable level of satisfaction. To this end, metrics for effectiveness, efficiency and user satisfaction were captured during the usability testing.

The goals of the test were to assess:

1. Effectiveness of Astronaut VistA/e-Prescribing by measuring participant success rates and errors
2. Efficiency of Astronaut VistA/e-Prescribing by measuring the average task time and path deviation
3. Satisfaction with Astronaut VistA/e-Prescribing by measuring ease of use ratings.

3.15.1 Data Scoring

Table 2 details how tasks were scored, errors evaluated, and the time data analyzed.

Table 2

Measures	Rationale and Scoring
Effectiveness: Task Success and standard deviation	A task was counted as "Success" if the participant was able to achieve the correct outcome. The total number of successes were calculated for each task and then divided by the total number of times that task was attempted. The results are provided as a percentage.
Effectiveness: Average # of errors and standard deviation	If the participant entered data into the wrong field or forgot to enter required data, this was counted as an error. The average number of errors and the standard deviation are reported for each task.
Efficiency: Task Path Deviations	The participant's path through each task was observed. Deviations occur if the participant, for example, went to the wrong screen, clicked on an incorrect menu item, or interacted incorrectly with an on-screen control. Path deviations were recorded quantitatively. The average number of steps taken was subtracted from the average optimal number of steps.
Efficiency: Task Time Deviation	Each task was timed from when the administrator said "Start" to when the participant either stated "Done" or the administrator observed task completion. Task times were only recorded for tasks that were completed successfully. The optimal task time was subtracted from each participant's time to obtain task time deviation. Average and standard deviation are reported.

Satisfaction	5 point scale of ease of use rating (5 very easy to 1 very hard), collected for each task.

3.15.2 Systems Usability Scale Scoring

The Systems Usability Scale (SUS) was scored as described by Brooke. To calculate the SUS score, the score contributions from each item was first summed. Each item's score contribution ranged from 0 to 4. For items 1,3,5,7,and 9 the score contribution is the scale position minus 1. For items 2,4,6,8 and 10, the contribution is 5 minus the scale position. Then, the sum of the scores was multiplied by 2.5. SUS scores have a range of 0 to 100.

4 Results

4.1 Data Analysis and Reporting for EHRUT

4.1.1 Task 1 (170.315a5) involved adding a new patient to the EHRUT.

Table 3. Results for Task 1

Measure	Results
Effectiveness: Task Success	95 % (SD = 7.8)
Effectiveness: Task Errors	1 (SD = 1)
Efficiency: Observed # of Steps	9.8 (SD= 1.2)
Efficiency: Optimal # of Steps	9
Efficiency: Task Path Deviation	0.8 (SD = 1.1)
Efficiency: Observed Task Time (sec)	268 (SD = 76.4)
Efficiency: Optimal Task time (sec)	190
Efficiency: Task Time Deviation (sec)	78.4 (SD = 76.4)
Satisfaction	4.8 (SD = 0.4)

Comments: Participants with limited experience entering detailed demographics made errors related to entering race and ethnicity.

4.1.2 Task 2 (170.315a2) involved ordering a laboratory test, using parameters provided.

Table 4. Results for Task 2

Measure	Results
Effectiveness: Task Success	98 % (SD = 4.2)
Effectiveness: Task Errors	0.3 (SD=0.7)

Efficiency: Observed # of Steps	4.4 (SD = 0.7)
Efficiency: Optimal # of Steps	4
Efficiency: Task Path Deviation	0.4 (SD = 0.7)
Efficiency: Observed Task Time (sec)	63.8 (SD = 22.5)
Efficiency: Optimal Task time (sec)	26
Efficiency: Task Time Deviation	37.8 (SD = 22.5)
Satisfaction	4.7 (SD = 0.7)

Comments: None

4.1.3 Task 3 (170.315a3) involved ordering an imaging test, using parameters provided.

Table 5. Results for Task 3

Measure	**Results**
Effectiveness: Task Success	97 % (SD = 7.1)
Effectiveness: Task Errors	0.3 (SD=0.5)
Efficiency: Observed # of Steps	7.6 (SD = 0.7)
Efficiency: Optimal # of Steps	7
Efficiency: Task Path Deviation	0.6 (SD = 0.7)
Efficiency: Observed Task Time (sec)	60.9 (SD = 17.8)
Efficiency: Optimal Task time (sec)	41
Efficiency: Task Time Deviation	20 (SD = 17.8)
Satisfaction	4.4 (SD = 0.7)

Comments: None

4.1.4 Task 4 (170.315a4) involved entering an allergy into the patient's chart, using the description provided.

Table 6. Results for Task 4

Measure	**Results**
Effectiveness: Task Success	91 %(SD = 7.4)
Effectiveness: Task Errors	1.2 (0.6)
Efficiency: Observed # of Steps	10.5 (SD = 1.1)
Efficiency: Optimal # of Steps	9
Efficiency: Task Path Deviation	1.5(SD = 1.1)
Efficiency: Observed Task Time (sec)	98.8 (SD = 30.3)
Efficiency: Optimal Task time (sec)	34
Efficiency: Task Time Deviation	65 (SD = 30.3)

Satisfaction	4.1 (SD = 1.1)

Comments: None

4.1.5 Task 5 (170.315a4) asked participants to prescribe a medication to which the pt was allergic to. For task success, participants were required to view the allergy warning in the e-prescribing window.

Table 7. Results for Task 5

Measure	**Results**
Effectiveness: Task Success	58% (SD = 50.1)
Effectiveness: Task Errors	0.1 (SD=0.3)
Efficiency: Observed # of Steps	5.3 (SD = 0.9)
Efficiency: Optimal # of Steps	5
Efficiency: Task Path Deviation	0.3(SD = 1.0)
Efficiency: Observed Task Time (sec)	56.7 (SD = 34.5)
Efficiency: Optimal Task time (sec)	65
Efficiency: Task Time Deviation	-8 (SD = 34.5)
Satisfaction	4.0 (SD = 1.5)

Comments: Users with prescribing experience did not like the absence of a warning window when prescribing a medication to which pt is allergic. Other users failed to see the allergy warning due to its position in the window, which led to lower average task success. e-Prescribing software vendor NewCrop has updated its interface to make allergy information more apparent.

4.1.6 Task 7 (170.315a1) asked participants to prescribe a medication.

Table 8. Results for Task 7

Measure	**Results**
Effectiveness: Task Success	95.8 % (SD = 6.7)
Effectiveness: Task Errors	0.08 (SD=0.3)
Efficiency: Observed # of Steps	7.1 (SD = 0.3)
Efficiency: Optimal # of Steps	7
Efficiency: Task Path Deviation	0.1(SD = 0.3)

Efficiency: Observed Task Time (sec)	102 (SD = 44.5)
Efficiency: Optimal Task time (sec)	65
Efficiency: Task Time Deviation	29.2 (SD = 51.1)
Satisfaction	4.8 (SD = 0.5)

Comments: Participants unfamiliar with the prescribing interface had more difficulty navigating it.

4.1.7 Task 9 (170.315a14) asked participants to enter an implantable device id into a patient's record.

Table 9. Results for Task 9

Measure	**Results**
Effectiveness: Task Success	86.4 % (SD = 5)
Effectiveness: Task Errors	0.1 (SD=0.3)
Efficiency: Observed # of Steps	13.2 (SD = 0.6)
Efficiency: Optimal # of Steps	13
Efficiency: Task Path Deviation	0.2(SD = 0.6)
Efficiency: Observed Task Time (sec)	91 (SD = 21.8)
Efficiency: Optimal Task time (sec)	61
Efficiency: Task Time Deviation	30.4 (SD = 21.8)
Satisfaction	4.4 (SD = 0.8)

Comments: Participants with clinical experience liked the ability to record implantable devices.

4.1.8 Task 10 (170.315a14) asked participants to retrieve the list of a patient's implantable devices.

Table 10. Task 10 Results

Measure	**Results**
Effectiveness: Task Success	91.8 %(SD = 4)
Effectiveness: Task Errors	0.1 (SWD=0.3)
Efficiency: Observed # of Steps	4.1 (SD = 0)
Efficiency: Optimal # of Steps	4
Efficiency: Task Path Deviation	0 (SD = 0)

Efficiency: Observed Task Time (sec)	17.5 (SD = 8.2
Efficiency: Optimal Task time (sec)	18
Efficiency: Task Time Deviation	-0.5 (SD = 8.2)
Satisfaction	4.6 (SD = 0.5)

Comments: None

4.1.9 Task 11 (170.315a9) had participants respond to a clinical reminder based on patient's information and a CDS rule.

Table 11. Results for Task 11

Measure	Results
Effectiveness: Task Success	88 %(SD = 7.5)
Effectiveness: Task Errors	0.1 (SD=0.3)
Efficiency: Observed # of Steps	9.2 (SD = 0.6)
Efficiency: Optimal # of Steps	9
Efficiency: Task Path Deviation	0.2 (SD = 0.6)
Efficiency: Observed Task Time (sec)	99 (SD = 26.4)
Efficiency: Optimal Task time (sec)	88
Efficiency: Task Time Deviation	11 (SD = 26.4)
Satisfaction	4.6 (SD = 0.5)

Comments: Users with clinical experience liked being able to record smoking status of patients.

4.1.10 Task 12 (170.315a9) asked participants to evaluate a CCD summary and incorporate it into the patient's record.

Table 12. Results for Task 12

Measure	Results
Effectiveness: Task Success	87 % (SD = 7.9)
Effectiveness: Task Errors	0.1 (SD=0.3)
Efficiency: Observed # of Steps	15.4 (SD = 0.8)
Efficiency: Optimal # of Steps	15

Efficiency: Task Path Deviation	0.4 (SD = 0.8)
Efficiency: Observed Task Time (sec)	102 (SD = 43.9)
Efficiency: Optimal Task time (sec)	57
Efficiency: Task Time Deviation	44.7 (SD = 43.9)
Satisfaction	4.5 (SD = 0.5)

Comments: None

4.1.11 Task 13 (170.315a4) asked participants to prescribe two medications that interact. For task success, participants were required to view the interaction warning in the e-prescribing window.

Table 13. Results for Task 13

Measure	**Results**
Effectiveness: Task Success	100 %(SD=0)
Effectiveness: Task Errors	0.2 (SD=0.4)
Efficiency: Observed # of Steps	13.4 (SD = 0.8)
Efficiency: Optimal # of Steps	13
Efficiency: Task Path Deviation	0.4 (SD=0.8)
Efficiency: Observed Task Time (sec)	113 (SD = 43.4)
Efficiency: Optimal Task time (sec)	97
Efficiency: Task Time Deviation	15.8 (SD=43.4)
Satisfaction	4.8 (SD=0.4)

4.1.12 Cancel Scenario

Measure	**Results**
Effectiveness: Task Success	0
Effectiveness: Task Errors	N/A
Efficiency: Observed # of Steps	N/A
Efficiency: Optimal # of Steps	9
Efficiency: Task Path Deviation	N/A
Efficiency: Observed Task Time (sec)	N/A
Efficiency: Optimal Task time (sec)	N/A

Efficiency: Task Time Deviation	N/A
Satisfaction	3.6 (SD=1.2)

Comments: While all participants were able to send a prescription to the pharmacy successful, no participant was able to send a status message to the pharmacy. One participant tried using the Pharmacist Message on the prescription screen to send a message to the pharmacy, which was judged not appropriate for canceling the prescription. Two participants used the discontinue (D/C) function instead of cancel. Only one participant commented that they had seen the cancel button previously.

4.1.13 Change Scenario

Measure	**Results**
Effectiveness: Task Success	0
Effectiveness: Task Errors	N/A
Efficiency: Observed # of Steps	N/A
Efficiency: Optimal # of Steps	10
Efficiency: Task Path Deviation	N/A
Efficiency: Observed Task Time (sec)	N/A
Efficiency: Optimal Task time (sec)	N/A
Efficiency: Task Time Deviation	N/A
Satisfaction	3.9 (SD=1.4)

Comments: While all participants were able to send a prescription to the pharmacy successful, no participant was able to send a status message to the pharmacy. One participant commented that the ACCEPT button in the change request should be larger. Another comment was that the list of messages includes messages for all providers, not just the person who is logged in.

4.1.14 Medication History Scenario

While no participant sent a message to the pharmacy, nine out of ten were able to retrieve the complete medication history of the patient. The table below reflects this.

Measure	**Results**
Effectiveness: Task Success	90 %
Effectiveness: Task Errors	0.5 (SD=0.9)
Efficiency: Observed # of Steps	3.3
Efficiency: Optimal # of Steps	3
Efficiency: Task Path Deviation	N/A
Efficiency: Observed Task Time (sec)	62.9 (SD=29.5)
Efficiency: Optimal Task time (sec)	32
Efficiency: Task Time Deviation	38.7 (SD=29.5)

Satisfaction	4.5 (SD=0.9)

Comments: Seven out of ten participants completed this task effectively and efficiently on their own, one participant required a little help, one did not complete the task. Two participants commented that the Surescripts link stands out. The participant who was unsuccessful looked for the information under the tabs (Compose Rx, Review/Transmit, etc).

4.1.15 Renew Scenario

Measure	**Results**
Effectiveness: Task Success	0
Effectiveness: Task Errors	N/A
Efficiency: Observed # of Steps	N/A
Efficiency: Optimal # of Steps	9
Efficiency: Task Path Deviation	N/A
Efficiency: Observed Task Time (sec)	N/A
Efficiency: Optimal Task time (sec)	N/A
Efficiency: Task Time Deviation	N/A
Satisfaction	3.6 (SD=1.6)

Comments: While all participants were able to send a prescription to the pharmacy successful, no participant was able to send a status message to the pharmacy. Six participants did find the pharmacy renewal message, one was able to reply.

4.1.16 Systems Usability Scale

Table 14. Results for EHRUT Systems Usability Scale

Measure	Results
Average	87.0
Standard Deviation	11.7
Minimum	62.5
Maximum	100

Comments: None

Table 17. Results for e-Prescribing Systems Usability Scale

Measure	Results
Average	60
Standard Deviation	30.6
Minimum	12.5
Maximum	100

Comments: Some participants rated the e-Prescribing software as easy to use despite being unable to complete three out of four tasks.

4.2 Narrative interpretation of task results

The EHRUT performed well overall in effectiveness. Effectiveness was measured using two criteria, task success and task errors. In general, effectiveness was high. Efficiency, measured using task path deviation, was good. Efficiency as measured through task time deviation was more variable. Participants with little prior experience for a given task took longer to complete it than those with more experience.

A patient has to be registered in the EHRUT before any other task can be completed. Patient registration is performed by staff with a wide variety of education and experience. The high task success and high satisfaction suggest that this EHRUT supports this function well.

Ordering a lab test and an imaging procedure proved both effective and efficient. However, entering an allergy into the patient's record was more difficult for novice users. The ability to right click in the Allergy field is not obvious, and there are several required fields in the allergy screen that could be overlooked.

Prescribing a medication relies on New Crop software. While the task success for tasks 7 and 13 was high, the task success for task 5 was much lower. Since testing began, NewCrop has updated its interface to make allergy information easier to find and more apparent. Note that medication reconciliation for this EHRUT is accomplished using the prescribing to a test pharmacy function in NewCrop. Therefore it was not tested explicitly separately, as it is the same as Task 7.

None of the participants had prior experience with implantable devices. Retrieving the implantable device id was easy, recording the id proved more challenging. Another function participants were unfamiliar with was clinical reminders, specifically the tobacco use screening reminder. However, because it uses a common workflow with other types of clinical notes, it was both effective and efficient.

Task 12 required working with a CCD reading software as well as Astronaut. Since it used otherwise familiar workflows, most participants found it fairly easy to perform the task.

In contrast, the effectiveness of the e-Prescribing software was much lower. Tasks involving sending messages to the pharmacy were not completed. Displaying a patient's complete prescribing history proved both effective and efficient, although participants used Surescripts and PDMP rather than messaging the pharmacy to complete the task. Work-arounds for the cancel, change, and renew scenarios mentioned included having the patient request a refill, calling the pharmacy to cancel or change a prescription, and generally responding to faxes and emails from the pharmacy.

4.3 Major findings for EHRUT

Several major findings emerged from the testing of this EHR. Firstly, tasks which are performed frequently and by a variety of users are well supported. These include registering patients, ordering tests, and medication-related tasks. Tasks which are performed rarely and/or by few users are less well supported. These include for example implantable device recording.

Secondly, satisfaction with the EHRUT was high for all tasks, regardless of the length of time users had experience with the software. The task with the lowest user satisfaction was task 5, related to prescribing a medication to which a pt is allergic. Since this task is performed in NewCrop, the lower satisfaction related more to the NewCrop interface than to the EHRUT.

4.4 Major findings for e-Prescribing

Several major findings emerged from the testing of this e-Prescribing software. Users had experience prescribing medication and looking for a patient's prescription history. These tasks were completed efficiently and effectively. Messaging between the provider and pharmacy was difficult to find and

respond to. Ambiguity in wording led some users to mis-interpret system messages. The software does not provide enough prompting and status messages for less experienced users.

4.5 Areas for Improvement for EHRUT

Two areas for improvement are noted, related to system behavior and user interaction consistency as well as workflow simplification. For example, the cover sheet is sometimes updated as soon as the user performs the action, for other actions, it requires a manual 'Refresh patient information' step. For efficiency, having the EHR automatically update the cover sheet once a user preforms any action would be preferable. User interaction inconsistency is exemplified by the EHR's response to right clicking the mouse. Right clicking does not produce consistent results, which can be confusing for novice users. Creating consistent right click interaction would be helpful. This was apparent for users trying to enter an allergy, for example.

The workflows for tasks performed less frequently tended to involve many steps and require users to remember how to interact with certain fields. As the number of users increases, these workflows need to be streamlined such that users can be both effective and efficient with minimal training requirements.

4.6 Areas for improvement for e-Prescribing

The software requires clinicians to find incomplete tasks rather than presenting them with a personalized list. Messaging from the pharmacy should be more obvious, with response options clearly indicated. Overall navigation should be improved, with a clearer distinction between buttons and links from the rest of the text on the screen.

5 Appendices

5.1 Systems Usability Scale

	Strongly disagree				Strongly agree
1. I think that I would like to use this system frequently	1	2	3	4	5
2. I found the system unnecessarily complex	1	2	3	4	5
3. I thought the system was easy to use	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	1	2	3	4	5
5. I found the various functions in this system were well integrated	1	2	3	4	5
6. I thought there was too much inconsistency in this system	1	2	3	4	5
7. I would imagine that most people would learn to use this system very quickly	1	2	3	4	5
8. I found the system very cumbersome to use	1	2	3	4	5
9. I felt very confident using the system	1	2	3	4	5
10. I needed to learn a lot of things before I could get going with this system	1	2	3	4	5

5.2 Moderator Guide

Orientation (2 min)

Thank you for participating in this study.

I will ask you to complete certain tasks using Astronaut Vista. We are interested in how easy or difficult this software is to use, and how we could improve it. You will be asked to complete tasks on your own, trying to do them as quickly as possible with the fewest errors.

We are testing the software, not you. All information collected will be confidential and your comments will not be associated with your name at any time.

Demographics (5 min)

Participant Identifier: _____

Age: _____

Gender: _____

Education:
- No high school degree
- High school graduate, diploma or the equivalent (for example: GED)
- Some college credit, no degree
- Trade/technical/vocational training
- Associate degree
- Bachelor's Degree
- Master's Degree
- Doctorate degree (e.g., MD, DNP, DMD, PhD)

Role/Job:

Professional Experience (time in months):

Astronaut Experience (time in months):

Computer Experience (time in months):

Assistive Technology:

Task 1 - Add a new patient to Astronaut (170.315a5)

Add the following patient to Astronaut.

Name: zztest, meaningful, _____ (Participant first and last initial)

DOB: _____ (Moderator generated)

SSN: System generated

Gender: Male

Race: White

Ethnicity: Non-Hispanic

Preferred language: English

Sexual Orientation: Heterosexual

Gender Identity: Male

Success: **Comments:**

☐ Easily Completed
☐ Completed with difficulty or help
☐ Not Completed
Task time _____min _____sec

Optimal Task Time: 190 sec

Optimal Path: Patient Selection Screen --- Add new patient ----Enter data ---- Add Patient --- Ok --- Patient button on cover sheet ---- edit patient demographics ----- enter data ---- Click Apply

Observed # of Steps:
Optimal # of Steps: 9 **Comments:**
# of errors:

Observed Errors and Verbalizations:

Task Rating (5 - Very easy to 1 - very hard): _____

Task 2 - Order a lab (170.315a2)

For the patient created in task 1, order a BUN test using default settings.

_____

Success: **Comments:**

☐ Easily Completed
☐ Completed with difficulty or help
☐ Not Completed
Task time _____min _____sec

Optimal Task Time: 26 sec

Optimal Path: Cover sheet ---Orders tab ---Lab test on left menu -- enter BUN in popup --- Accept Order

Observed # of Steps:
Optimal # of Steps: 4 **Comments:**
# of errors:

Observed Errors and Verbalizations:

Task Rating (5 - Very easy to 1 - very hard): _____

Task 3 - Order an imaging procedure (170.315a3)

For the patient created in task 1, order an abdomen 1 view, desired today, reason pain.

_____

Success: **Comments:**

☐ Easily Completed
☐ Completed with difficulty or help
☐ Not Completed
Task time _____min _____sec

Optimal Task Time: 41 sec

Optimal Path: Cover sheet ---Orders tab ---Imaging on left menu -- select general radiology---select abdomen 1 view --- enter date and reason --- accept order.

Observed # of Steps:
Optimal # of Steps: 7 **Comments:**
# of errors:

Observed Errors and Verbalizations:

Task Rating (5 - Very easy to 1 - very hard): _____

Task 4 - Enter an allergy (170.315a4)

For the patient created in task 1, add an allergy to aspirin. The patient stated that he has had hives and itches in the past.

_____

Success: **Comments:**

☐ Easily Completed
☐ Completed with difficulty or help
☐ Not Completed
Task time _____min _____sec

Optimal Task Time: 34 sec

Optimal Path: Cover sheet ---Right click in allergy field -- select enter new allergy -- enter first few letters-- select aspirin--check historical--nature of reaction allergy--select itching and hives --- click ok.

Observed # of Steps:
Optimal # of Steps: 9 **Comments:**
# of errors:

Observed Errors and Verbalizations:

Task Rating (5 - Very easy to 1 - very hard): _____

Task 5 - Prescribe aspirin (170.315a4)

For the patient created in task 1, attempt to prescribe aspirin.

_____

Success: **Comments:**

☐ Easily Completed
☐ Completed with difficulty or help
☐ Not Completed
Task time _____min _____sec

Optimal Task Time: 65 sec

Optimal Path: Cover sheet --- Tools - EPrescribing - View Imported Allergies -- STOP

Observed # of Steps:
Optimal # of Steps: 5 **Comments:**
# of errors:

Observed Errors and Verbalizations:

Task Rating (5 - Very easy to 1 - very hard): _____

Task 6 Add a problem to the problem list (170.315a6)

For the patient created in task 1, add depression to pt problem list.

_____

Success: **Comments:**

☐ Easily Completed
☐ Completed with difficulty or help
☐ Not Completed
Task time _____min _____sec

Optimal Task Time: 40 sec

Optimal Path: Cover sheet --- Problems tab -- type depression--select depression--enter depression in ICD search window--select major depressive, recurrent severe without psychosis--click ok--click ok.

Observed # of Steps:
Optimal # of Steps: 9 **Comments:**
# of errors:

Observed Errors and Verbalizations:

Task Rating (5 - Very easy to 1 - very hard): _____

Task 7 - Prescribe trazodone (170.315a1)

For the patient created in task 1, prescribe trazodone, 50 mg, 1x/day, at night.

_____

Success: **Comments:**

☐ Easily Completed
☐ Completed with difficulty or help
☐ Not Completed
Task time _____min _____sec

Optimal Task Time: 65 sec

Optimal Path: Cover sheet --- Tools - EPrescribing - type first few letters --click search--select trazodone 50 mg --select QHS----select 30 day supply--review--transmit.

Observed # of Steps:
Optimal # of Steps: 7 **Comments:**
# of errors:

Observed Errors and Verbalizations:

Task Rating (5 - Very easy to 1 - very hard): _____

Task 9 - Implantable Device (170.315a14)

Enter an implantable device id.
(01)12345678901234(17)140102(11)100102(10)A1234(21)1234

Success: **Comments:**

☐ Easily Completed
☐ Completed with difficulty or help
☐ Not Completed
Task time _____min _____sec

Optimal Task Time: 61 sec

Optimal Path: Cover sheet --Notes--new note--select first template--click ok--click Encounter--health Factors tab--Other health factors button--uid pacemaker--switch windows to desktop--copy device id --paste device id into comment box - click ok

Observed # of Steps:
Optimal # of Steps: 13 **Comments:**
# of errors:

Observed Errors and Verbalizations:

Task Rating (5 - Very easy to 1 - very hard): _____

Task 10 - Implantable Device (170.315a14)

Retrieve a patient's implantable device id.

Success: **Comments:**

☐ Easily Completed
☐ Completed with difficulty or help
☐ Not Completed
Task time _____min _____sec

Optimal Task Time: 18 sec

Optimal Path: Cover sheet -- tools--view implantable devices--view device characteristics

Observed # of Steps:
Optimal # of Steps: 4 **Comments:**
# of errors:

Observed Errors and Verbalizations:

Task Rating (5 - Very easy to 1 - very hard): _____

Task 11- CDS (170.315a9)

Receive a CDS intervention based on data in patient record.

_____

Success: **Comments:**

☐ Easily Completed
☐ Completed with difficulty or help
☐ Not Completed
Task time _____min _____sec

Optimal Task Time: 194 sec

Optimal Path: Cover sheet - notes - new note - tobacco cessation --- fill out-- Encounter -- view Entries under selected health factors -- cover sheet -- refresh patient information -- verify that reminder is not shown on cover sheet

Observed # of Steps:
Optimal # of Steps: 9 **Comments:**
# of errors:

Observed Errors and Verbalizations:

Task Rating (5 - Very easy to 1 - very hard): _____

Task 12- CDS (170.315a9)

View CCD in viewer software and use it to perform a CDS intervention, then import the CCD.

_____

Success: **Comments:**

☐ Easily Completed
☐ Completed with difficulty or help
☐ Not Completed
Task time _____min _____sec

Optimal Task Time: 57 sec

Optimal Path: Open Backbeach software - open CCD file-- shrink window so both Backbeach and Astronaut are visible -- Cover sheet --check for current allergy information --notes tab--new note --select first template--click ok--click add attachment--select other--select file.xml--upload-sign note--verify that attachment is visible.

Observed # of Steps:
Optimal # of Steps: 15 **Comments:**
# of errors:

Observed Errors and Verbalizations:

Task Rating (5 - Very easy to 1 - very hard): _____

Astronaut, LLC.

ASTRONAUT

ELECTRONIC HEALTH RECORD FOR THE NEXT FRONTIER

Version 1709

2024 EHR Usability Test

(b)(11) Addendum Report

Safety Enhanced Design 170.315 (g){3} - November 2024

Report based on ISO/IEC Common Industry Format for Usability Test Reports

Astronaut EHR- Safety Enhanced Design

Date of Usability Test: Started September 4, 2024 - Concluded November 17, 2024

Date of Report: November 24, 2024

Report Prepared By: EMR Advocate

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Executive Summary

Usability tests of Astronaut version 1709 were conducted at various times during the development cycle, the last session for which was held on November 17th, 2024. The purpose of these tests was to test and validate the usability of the current user interface, and provide evidence of usability of the EHR Under Test (EHRUT).

During the usability test, a combination of test participants and clinicians matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

This study collected performance data on 14 tasks typically conducted in the EHR:

Decision Support Intervention (Evidence Based and User-supplied Predictive)

- Configuration/enablement
- Source attribute management record and change
- DSI Selection and access
- Feedback loop entries and report export (Evidence Based Only)

Tasks were selected based on their frequency of use, criticality of function, and those that may be most troublesome for users. Tasks were constructed in light of the study objectives. A detailed list of the tasks provided to the participants can be accessed from Appendix B.

During the 65-minute, one-on-one, remote usability test, each participant was greeted by the. Participants were then assigned a participant ID and asked to review and sign an informed consent/release form. Participants were read an overview of the test, its intended purpose, general instructions, and then advised that they could withdraw at any time. Participants had no prior experience with the EHR.

The administrator introduced the test, and instructed the participant to complete a series of tasks (given one at a time) using the EHRUT. During the testing, the administrator timed the test and, along with the data logger(s) recorded user performance data on paper and electronically. The administrator did not give the participant assistance in how to complete the task.

The test session, including participant screens, user workflow, and audio, was recorded for subsequent analysis.

The following types of data were collected for each participant:

- Number of tasks successfully completed within the allotted time without assistance
- Time to complete the tasks
- Number and types of errors
- Path deviations
- Participant's verbal feedback
- Participant's task effort ratings of the system using a Likert Scale

All participant data was de-identified so that no correlation could be made from the identity of the participant to the data collected. Following the conclusion of the testing, participants were asked to complete a post-test questionnaire. Participants were not compensated for their time.

Various recommended metrics, in accordance with the examples set forth in the NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records, were used to evaluate the usability of the EHRUT. Following is a summary of the performance and rating data collected on the EHRUT

Introduction

This study is the result of usability testing performed on Astronaut version 1709, which is designed to collect, track, and report medical information collected from healthcare providers in an ambulatory setting. The application consists of solutions for a range of services including medical, dental, vision, and behavior allowing practices to provide patient care for all their services.

The usability testing attempted to represent realistic exercises and conditions. The purpose of this study was to test and validate the usability of the current user interface, and provide evidence of usability to support certification according to criteria outlined in Safety Enhanced Design §170.31S(g){3), specifically:

- § 170.315 (b)(11) Clinical decision support - Evidence Based

- § 170.315 (b)(11) Clinical decision support – User-supplied Predictive

Method

Participants

A total of ten (10) participants were tested on the EHR. Participants in the test included doctors, medical assistants, clinic managers, and test participants general office aptitude for technology. Volunteer participants were recruited by and were not compensated for their time.

Participants had no direct connection to the development of or organization producing the EHR, and they were not from or affiliated with, and did not need any orientation or training as they all were experienced EHR users.

For test purposes, end-user characteristics were identified and translated into a recruitment screener used to solicit potential participants.

Participants had a mix of backgrounds and demographic characteristics. The following is a table of participants by characteristics, including demographics, professional experience, computing experience, and user needs for assistive technology. Participant names were replaced with Participant IDs so that an individual's data cannot be tied back to their identity.

User ID	Sex	Age	Education	Occupation/Role	Professional Experience (Months)	Computer Experience (months)	Product Experience (Months)	Assistive Technology
1	Male	60-69	Doctorate degree	MD - Family Medicine	240	200	0	No
2	Female	40-49	Masters degree	Health IT Consultant	192	120	0	No
3	Female	20-29	Some college credit, no degree	Front Office Administrator	168	136	0	No
4	Male	30-39	Bachelors degree	Registered Nurse	132	264	0	No
5	Female	40-49	Bachelors degree	Healthcare Policy Analyst	180	120	0	No
6	Male	40-49	Masters Degree	Physician Assistant	204	204	0	No
7	Female	60-69	Doctorate degree	Physician/ Physiatry	240	228	0	No
8	Female	30-39	Associates degree	Medical Assistant	156	120	0	No
9	Male	20-29	Associates degree	Medical Assistant	102	96	0	No
10	Male	50-59	Doctorate degree	Clinical Psychologist	168	150	0	No

10 participants participated in the usability test. 0 participants failed to show for the study.

Participants were scheduled for 65-minute sessions with 5 minutes in between each session for debrief by the administrator and data logger, and to reset systems to proper test conditions. A spreadsheet was used to keep track of the participant schedule and included each participant's demographic characteristics as provided by the participant.

Study Design

Overall, the objective of this test was to uncover areas where the application performed well – that is, effectively, efficiently, and with satisfaction – and areas where the application failed to meet the needs of the participants. The data from this test may serve as a baseline for future tests with an updated version of the same EHR and/or comparison with other EHRs provided the same tasks are used. In short, this testing serves as both a means to record or benchmark current usability, but also to identify areas where improvements must be made.

During the usability test, participants interacted with one EHR. Each participant used the system in the same development environment and was provided with the same instructions. The system was evaluated for effectiveness, efficiency and satisfaction as defined by measures collected and analyzed for each participant:

- Number of tasks successfully completed within the allotted time without assistance
- Time to complete the tasks
- Number and types of errors
- Path deviations
- Participant's verbalizations (comments)
- Participant's satisfaction ratings of the system

Additional information about the various measures can be found in the Section on Usability Metrics.

Tasks

In support certification according to criteria outlined in Safety Enhanced Design §170.315(g)(3), 14 tasks were constructed that would be realistic and representative of the kinds of activities a user might conduct with the EHR, in the following overall categories:

- Decision Support Intervention - Evidence Based
- Decision Support Intervention – User-supplied Predictive

Tasks were selected based on their frequency of use, criticality of function, and those that may be most troublesome for users. Tasks were designed to meet the study objectives. A detailed list of the tasks provided is included in Appendix B.

Procedures

Remote testing was conducted via a Zoom session by a proctor with 10+ years' experience with the EHRUT. A Remote testing methodology was selected to both for convenience to accommodate the volunteer participants but also because that technology includes recording of the screen-sharing and audio for subsequent review and analysis.

Participants were advised to choose a quiet location to participate in the study using their own computers, and to:

- Complete the tasks as quickly as possible, using their normal workflow

- Complete the tasks without assistance except to clarify task details, if necessary

All test sessions were recorded by Zoom and subsequently analyzed. While participants completed the tasks, an observer monitored task times, obtained post-task rating data, and took notes on participant comments, and the data logger and took notes on task success, path deviations, number and type of errors, and comments.

Participants' demographic information, task success rate, time on task, errors, deviations, verbal responses, and post test questionnaire were recorded into a spreadsheet. Participants were thanked for their time.

Test Location

Test sessions were conducted remotely via a Zoom meeting. The test administrator, observers, and participant logged into the session from their various locations. All observers and the data logger could see the participant's screen, and listen to the audio of the session.

Test Environment

The EHRUT would be typically be used in a healthcare office or facility. In this instance, the testing was conducted remotely via a Zoom meeting from the participants location origin. For testing, the proctor hosted the EHRUT as a Microsoft Remote Desktop Application running on Windows Server 2016.

The participants used their own hardware including; computer, keyboard, and mouse when testing.

Test Forms and Tools

During the usability test, various documents and instruments were used, including:

- Proctor Guide
- Participant Guide

The Proctor's Guide was devised to be able to capture required data. The participant's interaction with the EHR application was captured and recorded via the Zoom meeting technology.

Participant Instructions

The proctor read the following instructions to each participant:

Thank you for participating in this study. Your input is very important. Our session today will last about 65 minutes. During this time, you will be using the current version of the EHR. I will ask you to complete a few tasks using this system and answer some questions. You should complete the tasks as quickly as possible, making as few errors as possible. Please try to complete the tasks on your own following the instructions very closely. Please note that we are not testing you, rather, we are testing the system.
Therefore, if you have difficulty all this means is that something needs to be improved in the system. I will be here in case you need specific help, but I am not able to instruct you or provide help in how to use the application.

Overall, we are interested in how easy (or possibly how difficult) this system is to use, what in it would be useful to you, and how we could improve it.

> *Please be honest with your opinions. All the information that you provide will be kept confidential and your name will not be associated with your comments at any time.*
> *Should you feel it necessary, you are able to withdraw at any time during the testing.*

Following the procedural instructions, participants were logged into the EHRUT and then given tasks to complete based on their role, and the administrator gave the following instructions:

> *For each task, I will read the description to you and say, "Begin.,, At that point, please perform the task and say, "Done,,, once you believe you have successfully completed the task. I will ask you your impressions about the task once you are done.*

Participants were then given their tasks to complete.

Usability Metrics

Name:

National Institute of Standards and Technology Internal Report

Description:

NISTIR 7741 outlines the User-Centered Design (UCD) process for improving the usability of health IT systems, and the ONC SED (Safety-Enhanced Design) testing ensures certified EHRs comply with usability and safety standards to enhance user experience and reduce errors.

Citation:

https://www.nist.gov/publications/nistir-7741-nist-guide-processes-approach-improving-usability-electronic-health-records

According to the *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records,* EHRs should support a process that provides a high level of usability for all users. The goal is for users to interact with the system effectively, efficiently, and with an acceptable level of satisfaction. To this end,

metrics for effectiveness, efficiency and user satisfaction were captured during the usability testing. The goals of the test were to assess:

- Effectiveness of the EHR by measuring participant success rates and errors
- Efficiency of the EHR by measuring the average task time and path deviations
- Satisfaction with the EHR by measuring ease of use ratings

Data Scoring

The following table details how tasks were scored, errors evaluated, and the time data analyzed.

Measures	Rationale and Scoring
Effectiveness: Task Success	A task was counted as a "Success" if the participant was able to achieve the correct outcome, without assistance, within the time allotted on a per task basis. The total number of successes were calculated for each task and then divided by the total number of times that task was attempted. The results are provided as a percentage. Task times were recorded for successes. Observed task times divided by the optimal time for each task is a measure of optimal efficiency. Optimal task performance time, as benchmarked by expert performance under realistic conditions, is recorded when constructing tasks.
Effectiveness: Task Failures	If the participant abandoned the task, did not reach the correct answer or performed it incorrectly, or reached the end of the allotted time before successful completion, the task was counted as an "Failures." No task times were taken for errors. The total number of errors was calculated for each task and then divided by the total number of times that task was attempted. Not all deviations would be counted as errors. This should also be expressed as the mean number of failed tasks per participant. On a qualitative level, an enumeration of errors and error types should be collected.

Measures	Rationale and Scoring
Efficiency: Task Deviations	The participant's path, i.e., steps through the application, was recorded. Deviations occur if the participant, for example, went to a wrong screen, clicked on an incorrect menu item, followed an incorrect link, or interacted incorrectly with an on-screen control. This path was compared to the optimal path. The number of steps in the observed path is divided by the number of optimal steps to provide a ratio of path deviation. It is strongly recommended that task deviations be reported. Optimal paths (i.e., procedural steps) should be recorded when constructing tasks
Efficiency: Task Time	Each task was timed from when the administrator said "Begin" until the participant said, "Done." If he or she failed to say "Done," the time was stopped when the participant stopped performing the task. Only task times for tasks that were successfully completed were included in the average task time analysis. Average time per task was calculated for each task. Variance measures (standard deviation and standard error) were also calculated.

Measures	Rationale and Scoring
Satisfaction: Task Rating	Each participant's subjective impression of the ease-of-use of the application was measured by administering a simple post-task question. After each task, the participant was asked to rate "Overall, this task was easy:" on a scale of 1 (Strongly Agree) to 5 (Strongly Disagree). This data was averaged across participants. Common convention is that average ratings for systems judged easy-to-use should be 3.3 or below. To measure participants' confidence in and likeability of Patient Pattern overall, the testing team administered using a verbal confirmation of the Likert ranking.

Risk (Pre-test)

Before conducting the usability testing for the designated capabilities within the Certified Electronic Health Record Technology (CEHRT), it is essential to assess the pre-test risks associated with each task. This risk assessment will help identify potential user safety concerns and usability issues that may arise during the testing process.

The pre-test risk assessment will consider factors such as the complexity of the tasks, potential for user error, and the impact of any identified risks on patient safety and care quality. By evaluating these risks, we can implement appropriate mitigation strategies to enhance the effectiveness of the user-centered design (UCD) processes.

Below is the pre-test risk assessment and rationale, providing an understanding of how these factors contribute to the overall safety and usability of the system being tested. Our post-test risk is included and discussed in the results that follow.

Task #	***Task/Risk Level***	***Risk Rational***
1	User configures evidence-based DSI	Failure to configure evidence-based DSI properly could lead to inaccurate decision-making, affecting clinical outcomes.
	Moderate	
2	User records source attributes for evidence-based DSI.	Minimal risk as it involves recording data elements already part of clinical workflows.
	Low	
3	User changes source attributes for evidence-based DSI.	Changes to source attributes may affect the accuracy of clinical recommendations, leading to inappropriate care.
	Moderate	
4	User accesses source attributes for evidence-based DSI.	Misinterpretation of source attributes could result in errors in clinical decision-making.
	Moderate	
5	User selects Decision Support Intervention(s) based on any of the required elements	Selection based on predefined elements reduces the likelihood of user error.
	Low	
6	Access source attributes for selected evidence-based DSI.	Accessing source attributes involves reviewing existing data, with a low likelihood of user error impacting clinical outcomes
	Low	
7	Provide feedback for a triggered evidence-based DSI.	Feedback is non-intrusive and primarily involves confirming previously recorded actions, which limits the risk.
	Low	
8	User exports feedback data in a computable format, including the data identified in (b)(11)(ii)(C) at a minimum.	Exporting data is a routine task, with minimal risk of affecting clinical outcomes.
	Low	
9	Configures Predictive DSI using the required USCDI data elements.	Incorrect configuration could result in poor predictive outcomes, impacting patient care.
	Moderate	

10	User records user-defined source attributes for a Predictive DSI. Low	Low risk, as this task involves recording predefined data elements.
11	User changes user-defined source attributes for a Predictive DSI. Moderate	Incorrect interpretation of user-defined attributes could lead to inaccuracies in the predictive model.
12	User accesses user-defined source attributes for a Predictive DSI. Low	Low risk, since this is a basic access task with minimal potential for error.
13	User selects a user-supplied Predictive DSI. Moderate	Selection errors could result in incorrect clinical predictions, affecting patient management.
14	Access and reviews source attributes for selected user-supplied Predictive DSI. Low	Reviewing attributes carries minimal risk, as it typically involves verifying already recorded data.

Results

The results of the usability test were calculated according to the methods specified in the Usability Metrics section. Participants who failed to follow session and task instructions had their data excluded from the analysis. There was no testing irregularities recorded.

The usability testing results for the EHRUT are detailed below. The results should be seen in light of the objectives and goals outlined in section on Study Design. The data should yield actionable results that, if corrected, yield material, positive impact on user performance.

The results from the Likert scale scored the subjective satisfaction with the system based on performance with these tasks to broadly interpreted. Scores under 3 represent poor usability and scores over 3 would be considered above average.

§170.315 (b)(11) Decision Support Intervention – Evidence Based DSI

Data Analysis and Reporting

Task #	Task	Scale	Task Rating	Task Rating - Std Dev.	Task Time - Mean(s)	Task Time - Standard Deviation(s)	Time - Observed/Optimal	Task Success - Mean (%)	Task Success - Std. Deviation(s)	Task Errors - Mean (%)	Task Error - Std. Deviation (%)	Observed - (# of Steps)	Optimal (# of Steps)
1	User configures evidence-based DSI using any of the required elements alone or in combination.	Likert	5	0	44.5	6.81	44/40	100	0	0	0	11	11
2	User records source attributes for evidence-based DSI.	Likert	5	0	26.6	4.39	27/22	100	0	0	0	3	3
3	User changes source attributes for evidence-based DSI.	Likert	5	0	57.9	8.43	57.5/50	100	0	0	0	6	6
4	User accesses source attributes for evidence-based DSI.	Likert	5	0	28.8	4.01	28.78/25	100	0	0	0	4	4
5	User selects Decision Support Intervention(s) based on any of the required elements alone or in combination.	Likert	4	.5	37	4.70	37/30	100	0	0	0	3	3

6	User accesses source attributes for selected evidence-based DSI.	Likert	5	0	43.7	5.27	43/35	100	0	0	0	3	3
7	User provides feedback for a triggered evidence-based DSI.	Likert	5	0	122.3	22.81	122/100	100	0	0	0	4	4
8	User exports feedback data in a computable format, including the data identified in (b)(11)(ii)(C) at a minimum.	Likert	5	0	56.6	10.06	56/40	100	0	0	0	3	3

Efficiency

Tasks in this group were generally completed efficiently, with users finding the interfaces intuitive. However, tasks that required detailed feedback (Task 7) or involved system-dependent actions (Task 8) occasionally led to delays. Minor interface inefficiencies, such as dropdown responsiveness and field navigation, were noted.

Effectiveness

All participants successfully completed the tasks (100% overall), demonstrating a clear understanding of objectives and processes. The intuitive design of most tasks supported error-free execution.

Satisfaction

Users expressed high levels of satisfaction, particularly for tasks with well-structured interfaces. Feedback highlighted simplicity and clarity as key strengths, though there were calls for improvements in system responsiveness and visual guidance.

Major findings

These tasks showed a consistent ability to meet objectives, with minor variability in task completion times. Tasks involving feedback or export functions revealed opportunities for optimization, especially in terms of system performance.

Post Test Risk Assessment and Remarks

Task #	*Task/Pre-test Risk Level*	*Test Error Percentage*	*Discussion*
1	User configures evidence-based DSI. Moderate	0%	No errors recorded. The configuration of the DSI was completed successfully, validating that users can accurately set up evidence-based interventions without issues.
2	User records source attributes for evidence-based DSI. Low	0%	Zero errors observed. Users effectively recorded source attributes, supporting the assumption that this task carries minimal risk when recording pre-defined data elements.
3	User changes source attributes for evidence-based DSI. Moderate	0%	No issues noted. The process of changing source attributes was done without error, demonstrating that changes can be made safely, maintaining clinical decision-making integrity.
4	User accesses source attributes for evidence-based DSI. Moderate	0%	No errors were encountered. The users successfully accessed source attributes, confirming the low likelihood of user misinterpretation or errors in clinical settings.
5	User selects Decision Support Intervention(s) based on any of the required elements. Low	0%	No errors observed. Selection of DSIs based on predefined elements was straightforward, reinforcing the minimal risk for user error during this task.
6	Access source attributes for selected evidence-based DSI. Low	0%	Task completed without errors. Users were able to access source attributes with ease, affirming that this is a low-risk task involving existing data.
7	Provide feedback for a triggered evidence-based DSI. Low	0%	Zero errors observed. Users were able to provide feedback without issues, confirming the task's low risk and the non-intrusive nature of this functionality.
8	User exports feedback data in a computable format, including the data identified in (b)(11)(ii)(C) at a minimum. Low	0%	No errors recorded. Selection of DSIs based on C-CDA data went smoothly, indicating the system's ability to ensure accurate and up-to-date information from clinical documents.

Areas for improvement

Enhance system performance for data export (Task 8).

Streamline feedback forms with pre-filled fields or auto-completion options (Task 7).

Improve dropdown menu responsiveness and field labeling for easier navigation (Task 5).

Consider adding tooltips and quick-access features to simplify attribute selection and review processes (Tasks 1, 6).

§170.315 (b)(11) Decision Support Intervention – User-supplied Predictive DSI

Data Analysis and Reporting

Task #	Task	Scale	Task Rating	Task Rating - Std Dev.	Task Time - Mean(s)	Task Time - Standard Deviation(s)	Time - Observed/Optimal	Task Success - Mean (%)	Task Success - Std. Deviation(s)	Task Errors - Mean (%)	Task Error - Std. Deviation (%)	Observed - (# of Steps)	Optimal (# of Steps)
9	User configures Predictive DSI using the required USCDI data elements.	Likert	4	0	138.8	29.07	138/120	100	0	0	0	4	4
10	User records user-defined source attributes for a Predictive DSI.	Likert	5	.5	87.6	14.52	87/75	100	0	0	0	3	3
11	User changes user-defined source attributes for a Predictive DSI.	Likert	5	0	30.6	4.09	30/25	100	0	0	0	3	3
12	User accesses user-defined source attributes for a Predictive DSI.	Likert	5	0	70.7	10.27	70.74/60	100	0	0	0	3	3
13	User selects a user-supplied Predictive DSI.	Likert	5	.35	28.4	4.63	28.42/22	100	0	0	0	3	3
14	User accesses and reviews source attributes for selected user-supplied Predictive DSI.	Likert	5	0	80.5	14.03	84.47/70	100	0	0	0	3	3

Discussion of Findings

Efficiency

These tasks, particularly those requiring configuration or detailed review (Tasks 9, 14), were more time-consuming due to the complexity of predictive elements and detailed user-defined attributes. Tasks involving access and selection (Tasks 11, 13) were completed more quickly and consistently.

Effectiveness

All participants successfully completed these tasks (100% overall), though some required additional time for configuration and attribute changes. Tasks involving user-defined attributes showed a higher learning curve but were still effective.

Satisfaction

Users were generally satisfied with the clarity of instructions and the straightforward nature of most tasks. However, tasks with more complexity (Tasks 9, 14) received feedback suggesting the need for more interactive guidance or step-by-step instructions.

Major findings

The complexity of predictive DSI tasks led to longer completion times and more variability in user performance. Tasks related to accessing or modifying user-defined attributes were straightforward but could benefit from enhanced visual grouping.

Post Test Risk Assessment and Remark

Task #	***Task/Pre-test Risk Level***	***Test Error Percentage***	***Discussion***
9	Configures Predictive DSI using the required USCDI data elements. Moderate	0%	No errors were recorded. Configuration of the predictive DSI using USCDI data elements was successful, demonstrating that users can perform this moderately complex task without negatively impacting patient care.
10	User records user-defined source attributes for a Predictive DSI. Low	0%	Task completed without error. Users were able to record user-defined source attributes without issues, confirming the low risk associated with this task
11	User changes user-defined source attributes for a Predictive DSI. Moderate	0%	No errors observed. Accessing user-defined attributes was done smoothly, validating the system's ability to reduce the likelihood of misinterpretation during this process.

12	User accesses user-defined source attributes for a Predictive DSI. Low	0%	Zero errors. As expected, this basic task was completed without any challenges, supporting the minimal potential for error in this process.
13	User selects a user-supplied Predictive DSI. Moderate	0%	No errors were noted. Selection of a user-supplied Predictive DSI was performed correctly, minimizing the risk of incorrect clinical predictions affecting patient management.
14	Access and reviews source attributes for selected user-supplied Predictive DSI. Low	0%	No issues occurred. Users successfully reviewed source attributes, confirming the task's low risk as it typically involves verifying previously recorded

Areas for improvement

- Simplify the configuration process for predictive DSI by breaking it into smaller, guided steps (Task 9).
- Improve field labels and consider adding a search function to assist with attribute changes (Task 12).
- Provide visual summaries and highlight key attributes to streamline review processes (Task 14).
- Enhance grouping and contextual help for user-defined attributes (Task 10).

Appendices

Appendix A - Trademarks

Astronaut® is a registered trademark

[Appendix B - Tasks]

§170.315 (b)(11)- Decision Support Intervention – Evidence Based

Task No.	Description
1	**Configure and enable Evidence-based DSI** Verify that users can configure an evidence-based DSI using any required elements such as problems, medications, allergies, intolerances, or any combination thereof.
	Actor
	Clinic Manager (Admin)
	Steps
	1. Start Login - Visit https://ehr.justtest.in/account/login. 2. Log in with the credentials: ● Username: (provided to test participant) ● Password: (provided to test participant) 3 Click 'Select Facility.' 4 In 'Patient Search,' enter 'Tom' in the 'First Name' field and click 'Search.' 5 Select 'Tom Harry' from the results. 6 Click 'Launch DSI App' (it will open in a new tab). 7. Enter the login credentials for the app: ● Username: provider ● Password: provider 8. Click 'Yes, Allow' on the next page. 9. Click 'Evidence Based Alerts' to start configuration of Evidence-based DSI for the patient. 10. Select DSI launch for combination of problems, labs and allergies. 11. Select “Evidence Based Alert’ to finish the task
	Observations

Task Success	Path Deviations	Errors	Effort: (1) v. high, (5) v. low	Time to Complete
☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	40 secs

Comments
Click here

Task No.	Description
2	**User records source attributes for evidence-based DSI.** Confirm that users can record and store source attributes for evidence-based DSIs
	Actor
	Clinic Manager (Admin)
	Steps

1. From current page select ‘Evidence Based Alerts’ and select ‘Edit’ navigate to the source attributes section.
2. Examine the required evidence-based source attributes (bibliographic citation, developer information, etc.).
3. ‘Save’ the record and verify the attributes are stored correctly.

Observations

Task Success	Path Deviations	Errors	Effort: (1) v. high, (5) v. low	Time to Complete
☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	22 secs

Comments

Click here

Task No.	Description
3	**User changes source attributes for evidence-based DSI** Ensure users can modify the source attributes for a configured DSI.

Actor

Clinic Manager (Admin)

Steps

1. From the current page use the navigation “Back” function or arrow
2. From current page select ‘Evidence Based Alerts’ and select ‘Edit’ navigate to the source attributes section.
3. Examine the required evidence-based source attributes (bibliographic citation, developer information, etc.).
4. Modify the bibliographic citation by typing “JAMA” over the existing field
5. Modify the existing source attribute “revision date” to 2024.
6. Save changes on the bottom of the screen

Observations

Task Success	Path Deviations	Errors	Effort: (1) v. high, (5) v. low	Time to Complete
☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	50 secs

Comments

Click here

Task No.	Description
4	**User accesses source attributes for evidence-based DSI** Verify that users can access the modified source attributes of an evidence-based DSI

Actor

Clinic Manager (Admin)

Steps

1. From the current page use the navigation “Back” function or arrow
2. From current page select ‘Evidence Based Alerts’ and select ‘Edit’ to navigate to the source attributes section.
3. Visually inspect the source attribute fields.

	4. Confirm that all attributes are available for review and that Bibliographic Reference now says “JAMA” and the Revision Date says “2024”

Observations

Task Success	Path Deviations	Errors	Effort: (1) v. high, (5) v. low	Time to Complete
☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	25 secs

Comments

Click here

Task No.	Description
5	**User selects Decision Support Intervention(s) based on any of the required elements alone or in combination** Confirm that users can select DSIs based on a combination of required elements for problems, medications, and allergies.

Actor

Clinic User

Steps

1. Log in as an authorized user.
2. Select a DSI based on multiple required elements (e.g., problems + medications + allergies).
3. Activate the DSI and verify it triggers appropriately during patient interaction.

Observations

Task Success	Path Deviations	Errors	Effort: (1) v. high, (5) v. low	Time to Complete
☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	30 secs

Comments

Click here

Task No.	Description
6	**User accesses source attributes for selected evidence-based DSI** Ensure that source attributes for a selected evidence-based DSI are accessible.

Actor

Clinic Manager (Admin)

Steps

1. Select an active evidence-based DSI.
2. Navigate to the source attributes section.
3. Verify that the relevant source attributes are accessible and up to date. Review each field.

Observations

Task Success	Path Deviations	Errors	Effort: (1) v. high, (5) v. low	Time to Complete
☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	35 secs

Comments

Click here

Task No.	Description
7	**User provides feedback for a triggered evidence-based DSI** Ensure that users can provide feedback on a triggered DSI
	Actor
	Clinic User
	Steps
	1. Select “Evidence Based DSI” for any patient 2. Select “Evidence Based Alerts” 3. To the left of the respective alert provide feedback in the following fields: feedback, action, intervention, and remarks. 4. Ensure fields are populated and that text is “sticky”
	Observations

Task Success	Path Deviations	Errors	Effort: (1) v. high, (5) v. low	Time to Complete
☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	100 secs

Comments
Click here

Task No.	Description
8	**Generate feedback in computable export with specific fields** Verify that feedback data can be exported with required fields and in a computable format
	Actor
	Clinic Manager (Admin)
	Steps
	1. From the current screen select “Export” for any of the alerts 2. Ensure the file for Feedback Export download commences in a computable format (.json) 3. Review the file for the following fields: user, date, location, action, intervention, and feedback/remarks
	Observations

Task Success	Path Deviations	Errors	Effort: (1) v. high, (5) v. low	Time to Complete
☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	40 secs

Comments
Click here

§170.315 (b)(11)- Decision Support Intervention – User-supplied Predictive

Task No.	Description
9	**User configures Predictive DSI using the required USCDI data elements** Verify that users can configure predictive DSIs using USCDI data elements such as demographics, problems, and vital signs.
	Actor
	Clinic Manager (Admin)
	Steps
	Log in as a user with administrative rights. Navigate to the "Predictive DSI" section. Configure a predictive DSI using patient demographics, problems, and vital signs. Activate the DSI and verify that it uses the required USCDI data elements.
	Observations

Task Success	Path Deviations	Errors	Effort: (1) v. high, (5) v. low	Time to Complete
☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	120 secs

Comments
Click here

Task No.	Description
10	**User records user-defined source attributes for a Predictive DSI** Ensure users can record custom source attributes for a predictive DSI.
	Actor
	Clinic Manager (Admin)
	Steps
	1. Select a predictive DSI and navigate to the source attributes section. 2. Record user-defined attributes, such as the intended use, developer details, and purpose of the DSI. 3. Save the attributes and confirm they are recorded correctly.
	Observations

Task Success	Path Deviations	Errors	Effort: (1) v. high, (5) v. low	Time to Complete
☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	75 secs

Comments
Click here

Task No.	Description

11	**User changes user-defined source attributes for a Predictive DSI** Confirm that users can change the source attributes defined for a predictive DSI.
	Actor
	Clinic Manager (Admin)
	Steps
	1. Access a configured predictive DSI. 2. Navigate to the source attributes section and record a user-defined attributes. 3. Verify all attributes are visible and up to date based on the previous modification/edit.
	Observations

Task Success	Path Deviations	Errors	Effort: (1) v. high, (5) v. low	Time to Complete
☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	25 secs

Comments
Click here

Task No.	Description
12	**User accesses user-defined source attributes for a Predictive DSI.** Confirm that users can access user defined source attributes defined for a predictive DSI.
	Actor
	Clinic Manager (Admin)
	Steps
	• Access a configured predictive DSI. • Navigate to the source attributes section and change 1 of the user-defined attributes. • Verify all attributes are visible and up to date.
	Observations

Task Success	Path Deviations	Errors	Effort: (1) v. high, (5) v. low	Time to Complete
☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	60 secs

Comments
Click here

Task No.	Description
13	**User selects a user-supplied Predictive DSI.** Verify that users can select a predictive DSI configured with user-supplied attributes
	Actor
	Clinic User or Admin
	Steps
	1. Log in as a user with predictive DSI access. 2. Select a predictive DSI from the list of available interventions. 3. Confirm the DSI activates and generates recommendations based on user-supplied data.

	Observations				
	Task Success	**Path Deviations**	**Errors**	**Effort: (1) v. high, (5) v. low**	**Time to Complete**
	☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	22 secs
	Comments				
	Click here				

Task No.	**Description**				
14	**User accesses and reviews source attributes for selected user-supplied Predictive DSI.** Ensure that users can access and review source attributes for selected user-supplied predictive DSIs.				
	Actor				
	Clinic User				
	Steps				
	1. Select a user-supplied predictive DSI. 2. Access the source attributes related to the intervention. 3. Review the attributes (e.g., developer information, intended use) and confirm that they are accurate.				
	Observations				
	Task Success	**Path Deviations**	**Errors**	**Effort: (1) v. high, (5) v. low**	**Time to Complete**
	☒ Pass ☐Fail	☒ No ☐Yes	☒ No ☐Yes	☐1 ☐2 ☐3 ☐4 ☒5	70 secs
	Comments				
	Click here				

Appendix C - Consent to Remote Testing

Consent Form: Remote Usability Test

Please read and sign this form.

During this usability test I agree to participate in an online session using my computer and telephone. During the session I will be interviewed about the site, asked to find information or complete tasks using the site and asked to complete an online questionnaire about the experience.

I understand and consent to the use and release of the recording by . I understand that the information and recording are for research purposes only and that my name and image will not be used for any other purpose. I relinquish any rights to the recording and understand the recording may be copied and used by without further permission.

I understand that participation is voluntary, and I agree to immediately raise any concerns you might have.

If you have any questions after today, please contact us directly.
Please sign below to indicate that you have read and understand the information on this form and that any questions you might have about the session have been answered.

Please print your name:

_____

Please sign your name:

_____

Participant's Signature or eSignature

Today's Date:_____

Thank you!

We appreciate your participation.

Test: ___/___/_____ *to* ___/___/____

Authorized Representative of the CEHRT

Signature: _____

Printed Name: _____

Date:_____