EHR Usability Test Report of BlueEHS

Report based on ISO/IEC 25062:2006 Common Industry Format for Usability Test Reports

BlueEHS Version 2.0

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Usability Centered Design

Introduction:

The main reason for applying usability techniques when developing a software system is to increase user efficiency and satisfaction and, consequently, productivity. According to ISO 9241, Part 11, usability is "the extent to which a product can be used by specified users to achieve specific goals with effectiveness, efficiency, and satisfaction in a specified context of use." We use Cognitive System Design to achieve usability in blueEHR.

Before we start building our tasks, we collect information about the people who will use the tool:

- Who are the system users?

- What will they need to accomplish?

- What will they need from the system to accomplish this?

- How should the system supply what they need?

We use the following methods in our development process to increase usability of the application.

- Analysis

- Design

- Prototyping

- Evaluation

Analysis:

There are two methods to analyze the requirements, user perspective and task perspective.

User analysis - Our team will analyze the end users who will be using the system. This will be done either by directly visiting the user or through online meetings. We will observe their current system and how they are using the system. The most important thing about user analysis is to record, structure, and organize the findings. We will be documenting their method of usage and the drawbacks of the current system.

Task analysis - Next step is task analysis. We analyze tasks because we can use the located tasks to drive and test UI design throughout the product development cycle. Task analysis ends when we evaluate the discovered task set, which is best done collaboratively with users. We

suggest prioritizing the set of tasks by importance and frequency to get a small task set. This approach guarantees that you'll build the most important functionalities into the system

Usability Design:

Once we have analyzed the tasks our system will support, we can make a first attempt at the UI's conceptual design.

Conceptual design - During the conceptual design phase, we define the basic user–system interaction and the objects in the UI and the contexts in which interaction takes place. The findings of the user and task analysis are the basis for the conceptual design. The deliverables from this phase are typically wire frames or screen mockups, and a specification, which describes the UI's behavior.

Visual design - Having completed the conceptual design, the final step in our process is visual design, where we define the UI's appearance. This covers all details, including the layout of screens and dialog boxes, use of colors and widgets, and design of graphics and icons.

Prototyping:

Prototypes are built based on the visual designs. Prototype built will have all the working components. Prototypes built will be shared with end users. On constant discussion with the end users, any changes will be made in the prototype to further increase the usability of the application. End users will come up with suggestions and difficulties they faced in the prototype. The corrections will be made according to the input from the end users. Once the prototype is approved we move on to the next phase which is the actual development process. Most of the usability issues will be taken into account in these steps. But there can be still some changes during the development process. There will be a final usability evaluation once the development is completed and tested for any issues.

Usability evaluation:

Usability evaluation is a central activity in the usability process. It can determine the applications' usability level and whether the design works.

Usability testing - Usability testing will be conducted by end users. Once the application is completed and tested, a beta version of the application will be released to the end users. Beta version might not be used by all the end users. A team of developers, end users, application or domain experts will conduct usability testing. Apart from efficiency,

one advantage is that people with multiple perspectives and expertise examine the test object. Another advantage is that the participating developers build skills and know-how about how to make software more usable.

COGNITIVE DESIGN

What is Cognitive Design ?

- Cognitive design is defined as the crafted impact a piece of writing has on its audience. Central to this design are the **subject** and **theme** of the work. The subject is what the work is about. The theme is the attitude the author has taken toward the subject or the perspective on that subject.

- A modern Design movement which seeks to put the latest findings of cognitive science to work and translate them into design experiences that offer personal transformation by guiding behavior.
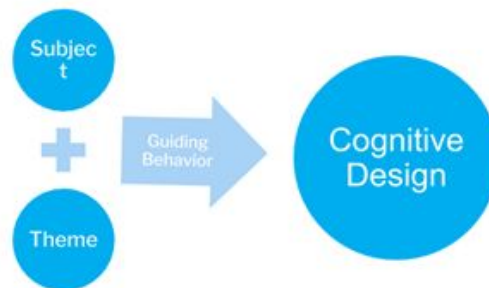
Cognitive Science

The study of thought, learning, and mental organization, which draws on aspects of psychology, linguistics, philosophy, and computer modeling.
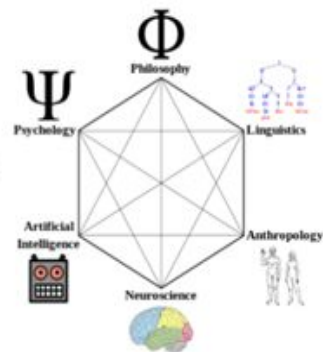
Cognitive Load

Cognitive load refers to the total amount of mental effort being used in the working memory.
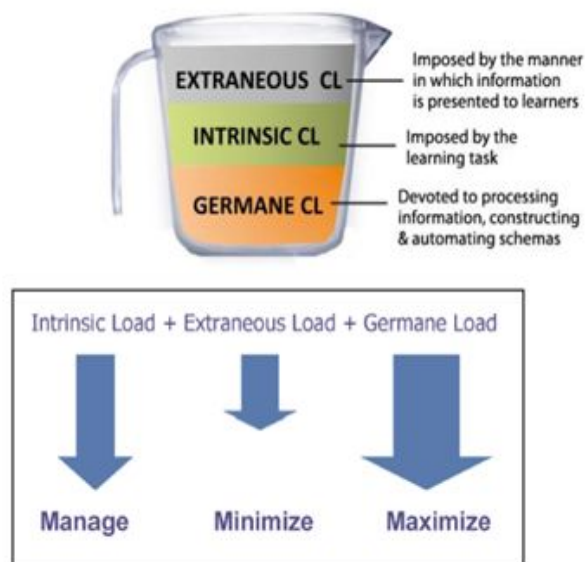
Types of Cognitive Load

- *Intrinsic*
  This is the complexity that is inherently involved in certain tasks or materials. Simply put, some activities are harder to learn and to master than others. If they are more difficult, then they have the potential to cause an intrinsic cognitive overload.

- *Extraneous*
  This form of cognitive load consists of non-relevant, unimportant elements, such as activities or instructional materials that make the learners use their mental processes. For example, if you use a graph that requires extra information processing, but isn't really necessary, this would be an example of extraneous cognitive overload.

- *Germane*
  These elements enable the learners to devote their cognitive mental resources to the learning process and help to facilitate the development of a learner's knowledge base.
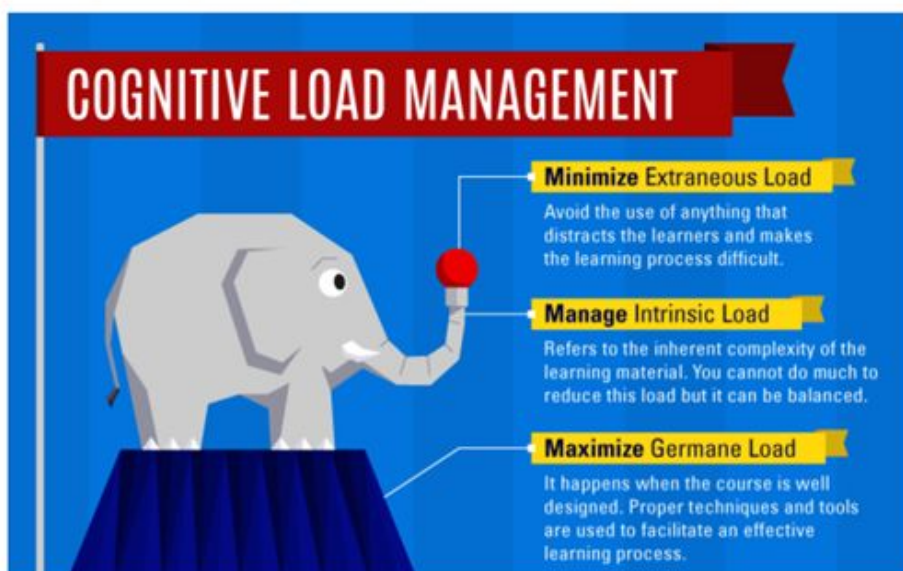
Cognitive Load Theory

Cognitive Load theory states that each person has a mental 'schema', which is a series of structures that enable us to solve problems and think.

Cognitive Load Theory suggests that learners can absorb and retain information effectively only if it is provided in such a way that it does not "overload" their mental capacity. In other words, our short term memory, or working memory, can only retain a certain amount of information simultaneously (rather than an infinite supply of data).

Memory

The two main types of memory are short-term memory and long-term memory; however, short-term memory has become better understood to be working memory.

Short Term Memory (working memory)

defined as the ability to remember information in the face of distraction. The famously known capacity of memory of 7 plus or minus 2 is a combination of both memory in working memory and long term memory.

Long Term Memory

information can be stored for long periods of time. While short-term and working memory persists for only about 18 to 30 seconds, information can remain in long-term memory indefinitely.
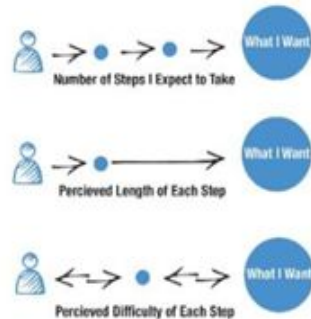
How do we Process Information?

Information from your sensory memory passes into your working memory, where it is either processed or discarded. Working memory can generally hold between five and nine items (or chunks) of information at any one time. This is central to Cognitive Load Theory, as you will see.
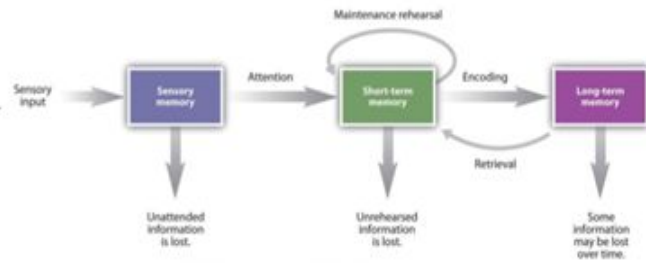
When your brain processes information, it categorizes that information and moves it into long-term memory, where it is stored in knowledge structures called "schemas." These organize information according to how you use it. So, for example, you have schemas for different concepts such as dog, cat, mammal, and animal.

You also have behavioral schemas for actions like hitting a ball, riding a bicycle, ordering food at a restaurant and so on. The more practiced you become at using these schemas, the more effortless these behaviors become. This is called "automation." Schemas are also significant to Cognitive Load Theory. Let's find out why.

Cognitive Barriers

1. Number of steps

Understand that it's equally important to know when to add steps as it is when to remove them. Five easy, short steps often impose a lower cognitive barrier than one long, difficult step.

Number of Steps I Expect to Take

2. Length of steps

Design pragmatic step lengths based on how motivated the user is to achieve his goal. Users will spend longer with sites, tools, apps, and products they enjoy than they will with ones they're simply required to interact with. Users tend to prefer short steps that only ask them to resolve the immediate issue they're faced with.

Percieved Length of Each Step
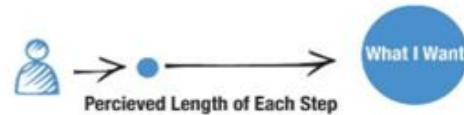
3. Difficulty of steps

Don't create unnecessarily difficult steps, but don't immediately discount adding difficulty to limit conversion and increase the quality of the converted. Remember, users will be more likely to complete difficult steps if they understand why the step needs to be so difficult.

Percieved Difficulty of Each Step

2. Length of steps

Design pragmatic step lengths based on how motivated the user is to achieve his goal. Users will spend longer with sites, tools, apps, and products they enjoy than they will with ones they're simply required to interact with. Users tend to prefer short steps that only ask them to resolve the immediate issue they're faced with.

Percieved Length of Each Step

The Gerhardt-Powals Cognitive Principles

1. Automate unwanted workload.
    1. Free cognitive resources for high-level tasks.
    2. Eliminate mental calculations, estimations, comparisons, and unnecessary thinking.
2. Reduce uncertainty.
    3. Display data in a manner that is clear and obvious.
3. Fuse data.
    4. Reduce cognitive load by bringing together lower level data into a higher-level summation.
4. Present new information with meaningful aids to interpretation..
    5. Use a familiar framework, making it easier to absorb.
    6. Use everyday terms, metaphors, etc.
5. Use names that are conceptually related to function..
    7. Context-dependent
    8. Attempt to improve recall and recognition.
    9. Group data in consistently meaningful ways to decrease search time.

6. Limit data-driven tasks.
    1. Reduce the time spent assimilating raw data.
    2. Make appropriate use of color and graphics.
7. Include in the displays only that information needed by the user at a given time.
    3. Guiding the user one step at a time means providing the relevant information in small releases. Instruction manuals adopt this step process and for good reason.
8. Practice judicious redundancy.
    4. Carefully applied redundancy of information is important to ensure that you leave nothing "out". This keeps consistency and prevents confusion or ambiguity.

Cognitive Design Guidelines

1. Screen readability and image quality
2. Manipulation and input devices
3. Supporting accurate mental model formation
4. Learning by doing
5. Minimizing attentional and cognitive load
6. Using images and icons

Methods For Reducing Cognitive Load

1. Avoid unnecessary elements
2. Leverage common design patterns
3. Eliminate unnecessary tasks
4. Minimize choices
5. Display choices as a group
6. Strive for readability
7. Use iconography with caution

Executive Summary

Ten usability tests of BlueEHS Version 2.0 EMR application were conducted starting on March 18th,2020 and ending on March 27th,2020 with a total of ten testers. An additional testing day was set up for April 22nd,2020 to accommodate for 2 more tasks.

The test users had a variety of roles in the medical field; Certified Nursing Assistants,Licensed Practical Nurses,Medical Office Receptionists,Medical Assistants and Care Coordinators .

The purpose of this test was to test and validate the usability of the current user interface, and provide evidence of the current user interface and provide evidence of usability in the EHR Under Test(EHRUT).

During the usability test, 10 healthcare workers served as participants and used the EHR in simulated, but representative tasks. This study collected performance data on 11 tasks typically conducted on an EHR.

- 170.315 (a)(1) Computerized provider order entry (CPOE) – medications
- 170.315 (a)(2) Computerized provider order entry (CPOE) – laboratory
- 170.315 (a)(3) Computerized provider order entry (CPOE) – diagnostic imaging
- 170.315 (a)(4) Drug-drug, drug-allergy interaction checks for CPOE
- 170.315 (a)(5) Demographics
- 170.315 (a)(6) Problem list
- 170.315 (a)(7) Medication list
- 170.315 (a)(8) Medication allergy list
- 170.315 (a)(14) Implantable device list
- 170.315(a)(9) Clinical Decision Support
- 170.315(b)(2) Reconciliation

Prior to the usability test participants were asked to review and sign an informed consent/release form(included in Appendix 3); they were instructed that they could withdraw at any time.

Participants were also instructed to watch training videos prior to the usability test. These videos were provided by ZH Healthcare, and gave an overview of how to conduct each test. Each participant had prior experience with the EHR as they all use it on a daily basis.

During each one-on-one usability test, the participant was greeted by the facilitator. The facilitator introduced the test and recorded user performance data on paper and electronically. The facilitator did not give the participant assistance in how to complete the task. A screen video capture of each testing session was recorded and provided to the team at ZH Healthcare.

The following types of data were collected for each participant:
- Number of tasks successfully completed without assistance
- Number and types of errors
- Path deviations
- Participant's verbalizations
- Participant's satisfaction ratings of the system

All participant data was de-identified - no correspondence 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. 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.

Tasks	Performance Evaluation		
	Effectiveness	Efficiency	Satisfaction
CPOE-Medications	Yes	4	Excellent
CPOE-Laboratory	Yes	3	Good
CPOE-Diagnostic Imaging	Yes	3	Good
Drug-drug,drug-allergy interaction checks for CPOE	Yes	5	Excellent
Demographics	Yes	5	Excellent
Problem List	Yes	4	Excellent
Medication List	Yes	4	Excellent
Medication Allergy List	Yes	4	Excellent
Implantable Device List	Yes	4	Excellent
Clinical Decision Support	Yes	5	Excellent
Reconciliation	Yes	5	Excellent

The results from the SUS (System Usability Scale) scored the **subjective satisfaction** with the system based on performance with these tasks in the table below. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

DISCUSSION OF THE FINDINGS

The following is a discussion of the major areas in which the EHRUT was evaluated (a detailed list of findings from the testing and recommendations may be found in the Results section on pg. 11).

EFFECTIVENESS

Overall effectiveness was above average. Most tasks were completed by all testers . Some of the instructions provided were not clear enough but the testers were able to figure out what to do to make sure they completed the task.

EFFICIENCY

Overall efficiency was high although there were some path deviations on some of the tasks performed. The EHRUT was verbally reported to be user friendly by all testers. Specifically testers found that the UI was very intuitive and mentioned that the EMR is one of the easiest that they have used.In testing there were some process inefficiencies such as: missing terms after entering in prompt, allergies not included in the allergy list,some medications not showing in the medication list through the rx link, etc. Minor improvements and additional changes are recommended to be addressed related to quality, time, and user interface for this platform to be more efficient. As stated before, the testers main complaint was that some of the instructions provided were not clear.

SATISFACTION

Satisfaction rating was evaluated for all ten testers. All of them evaluated the EHRUT on the SUS questionnaire with scores over 80. Information from this test should be taken into consideration when undertaking future testing and system development.

INTRODUCTION

The EHRUT tested for this study was BlueEHS Version 2.0. Designed to present medical information to healthcare providers in all facility types. In this case, a Pulmonary medicine medical office was used for testing purposes.The EHRUT consists of demographics, vitals, medication prescribing and management, medical device management. 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 EHR Under Test (EHRUT). To this end, measures of effectiveness, efficiency and user satisfaction, such as time to complete tasks, number of deviations from tasks and overall impression of tasks were captured during the usability testing.

METHOD

PARTICIPANTS

A total of 10 participants were tested on the EHRUT(s). Participants in the test were medical professionals with experience using Electronic Medical Record software. Participants were recruited by the testing team, participation was voluntary with no incentive given to participants. In addition, participants had no direct connection to the development of or organization producing the EHRUT(s). Participants were given the opportunity to have the same orientation and level of training as the actual end users would have received. Recruited 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 individual identities.

Demographics	Tester 1	Tester 2
Gender	Male	Female
Age Range	20-29	20-29
Race/ Ethnicity	Latino	Caucasian
Occupation/Role	Medical Assistant	Medical Assistant
Professional Experience	18 months	4 months
Computer/ HIT Experience	48 months	24 months
Experience with similar software	48 months	24 months
Assistive Technologies used	N/A	N/A
Usability Testing Experience	None	None

Demographics	Tester 3	Tester 4
Gender	Female	Female
Age Range	40-49	40-49
Race/ Ethnicity	Caucasian	Caucasian
Occupation/Role	Licensed Practical Nurse	Medical Assistant/CNA
Professional Experience	72 months	150 months
Computer/ HIT Experience	96 months	144 months
Experience with similar software	96 months	144 months
Assistive Technologies used	N/A	N/A
Usability Testing Experience	Yes, several years ago	None

Demographics	Tester 5	Tester 6
Gender	Female	Female
Age Range	30-39	40-49
Race/ Ethnicity	Caucasian	Caucasian
Occupation/Role	Medical Receptionist	Medical Receptionist
Professional Experience	24 months	150 months
Computer/ HIT Experience	24 months	144 months
Experience with similar software	24 months	144 months
Assistive Technologies used	N/A	N/A
Usability Testing Experience	None	None

Demographics	Tester 7	Tester8
Gender	Female	Male
Age Range	40-49	10-19
Race/ Ethnicity	Caucasian	Latino
Occupation/Role	Medical Biller/Coder	Care Coordinator
Professional Experience	144 months	18 months
Computer/ HIT Experience	144 months	18 months
Experience with similar software	144 months	18 months
Assistive Technologies used	N/A	N/A
Usability Testing Experience	None	None

Demographics	Tester 9	Tester 10
Gender	Male	Female
Age Range	20-29	50-59
Race/ Ethnicity	Latino	Caucasian
Occupation/Role	Care Coordinator	Respiratory Therapist
Professional Experience	12 months	120 months
Computer/ HIT Experience	12 months	120 months
Experience with similar software	12 months	120 months
Assistive Technologies used	N/A	N/A
Usability Testing Experience	None	None

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 1 EHR. Each participant used the system in a laptop or desktop 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
- Number and types of errors
- Path deviations
- Participant's verbalizations
- Participant's satisfaction ratings of the system

TASKS

A number of tasks were constructed that would be realistic and representative of the kinds of activities a user might do with this EHR, including:
- 170.315 (a)(1) Computerized provider order entry (CPOE) – medications
- 170.315 (a)(2) Computerized provider order entry (CPOE) – laboratory
- 170.315 (a)(3) Computerized provider order entry (CPOE) – diagnostic imaging
- 170.315 (a)(4) Drug-drug, drug-allergy interaction checks for CPOE
- 170.315 (a)(5) Demographics
- 170.315 (a)(6) Problem list
- 170.315 (a)(7) Medication list
- 170.315 (a)(8) Medication allergy list
- 170.315 (a)(14) Implantable device list
- 170.315(a)(9) Clinical Decision Support
- 170.315(b)(2) Reconciliation

PROCEDURES

Prior to the test each participant reviewed and signed an informed consent form (See Appendix 2) as well as responded to a demographics questionnaire (See Appendix 1). The facilitator moderated the session including administering instructions and tasks. The facilitator also obtained post-task rating data. A second person served as the data logger and took notes on task success, path deviations, number and type of errors, and comments.

Participants were instructed to perform the tasks (see specific instructions below):
- As instructed by the facilitator. The facilitator read aloud the documented tasks step-by step
- . The tester was also provided with the written documentation of instructions.
- Without further assistance. The facilitator observed the tester, and did not give additional assistance unless the tester could not complete the test as specified by instructions.

- Complete the task as specified before commenting on functionality and ease of use.

For each task, the participants were given a written copy of the task. Task timing began once the facilitator introduced the question. The task time was stopped once the participant had successfully completed the task. Scoring is discussed below.

Following the session, the administrator gave the participant the post-test questionnaire (e.g., the System Usability Scale, see Appendix 3) and thanked each individual for their participation.

Participants' task success rate, time on task, errors, deviations, verbal responses, and post-test questionnaire were recorded.

TEST LOCATION/ENVIRONMENT

The test was conducted on premises using ActivePresenter Screen Recording software which was used for its screen capturing features. All 10 participants were at 1038 W. North Blvd. Suite.102 Leesburg,FL 34748 which is a physician's office.The test facility was a quiet office which was used as a testing room. Only the participant and the facilitator were in the test room at the time of each testing session.

For testing, the computers used were a Dell Desktop running Windows 10 with the Mozilla Firefox/Google Chrome browser and a Lenovo laptop running Windows 10 with Mozilla Firefox/Chrome. The participants used the laptop's keyboard and trackpad or a wireless mouse provided when interacting with the EHRUT as well as an external monitor which was a Dell U2412M Color Profile,D6500 with a resolution of 1920 x 1200. A LAN network was used for connectivity purposes.
The test application was set up by the vendor ZH HealthCare according to the vendor's documentation describing the system set-up and preparation. The application itself was web-based using a test database. Technically, the system performance (i.e., response time) was representative to what actual users would experience in a field implementation. Additionally, participants were instructed not to change any of the default system settings (such as control of font size).

TEST FORMS AND TOOLS

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

1. Demographic Questionnaire
2. Informed Consent
3. System Usability Scale
4. G-3 Testing Workflows

PARTICIPANT INSTRUCTIONS

The facilitator reads the following instructions aloud to the each Participant:

Thank you for agreeing to participate in this study. Your input is very important. Our session today will last about 30-60 minutes. During that time you will use an instance of an electronic health record in a test database. I will ask you to complete a few tasks using this system and answer some questions. You should complete the tasks as I instruct you. Please try to complete the tasks in full before commenting on the system. Please note that we are not testing you, we are testing the system, therefore if you have difficulty all this means is that something needs to be improved in the system. Overall, we are interested in how easy (or how difficult) this system is to use, what in it would be useful to you, and how we could improve it. I did not have any involvement in its creation, so please be honest with your opinions. All of 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. This testing will be recorded so we can review the results at a later date.

Following the procedural instructions, participants were shown the EHR and given their first task, orally by the facilitator. Each task was done consecutively. Overall impressions of the EHR were also asked of each participant and recorded. Participants were then given 10 tasks to complete

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 BlueEHS by measuring participant success rates and errors.

> 2.Efficiency of BlueEHS by measuring the average task time and deviations

> 3. Satisfaction with BlueEHS by measuring ease of use ratings

DATA SCORING

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

Measures	Rational 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 the task was attempted. The results were provided as a percentage. Task times were recorded during both testing exercises.
Effectiveness: Task Failures	If the participants 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 a "Failure". 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.
Effectiveness: Task Deviations	The participant's path(ie.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.
Effectiveness Errors	If the system did not perform as to be expected these errors in the system would be recorded and tallied.
Satisfaction: Task Rating	Participant's subjective impression of the ease of use of the application was measured by administering the System Usability Scale(SUS) post-test questionnaire. Questions included, "I think I would like to use this system frequently", "I thought the system was easy to use", and "I would imagine that most people would learn to use this system very quickly". See full System Usability Scale questionnaire in the Appendix.

RESULTS

DATA ANALYSIS AND REPORTING

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. Participants who failed to follow session and task instructions had their data excluded from the analyses. None of the participants failed to follow the session or task, so no data was excluded. The usability testing results for the EHRUT are detailed below:

Tasks	# of testers	Task success Yes	Path Deviations	Task Time(sec)	Task Time Deviations	Errors	Task Rating (5-easy)
		Mean/ SD	Observed/ Optimal	Mean/(SD)	Observed Secs/ Optimal Time for Task	Mean/ (SD)	Mean/ (SD)
CPOE-Medications	10	100|0	18|18	291s/ 5s	289s/280s	0|0	4.5|0.5
CPOE-Laboratory	10	100|0	26|23	382s/ 17.56s	388s/376s	0|0	4|0.4
CPOE-Diagnostic Imaging	10	100|0	21|18	233s/ 9.40s	224s/215s	0|0	3|0.45
Drug-drug,drug-allergy interaction checks for CPOE	10	100|0	14|14	181s/ 6.89s	185s/178s	0|0	4|0.4

Demographics	10	100|0	7|7	139s/ 7.40s	142s/137s	0|0	5|0
Problem List	10	100|0	11|11	292s/ 7.27s	296s/286s	0|0	4.5|0.5
Medication List	10	100|0	20|20	232s/ 9.59s	239s/228s	0|0	4.5|0.5
Medication Allergy List	10	100|0	15|15	228s/ 10.23s	221s/215s	0|0	4|0.4
Implantable Device List	10	100|0	7|7	132s/ 5.64s	132s/127s	0|0	4.5|0.5
Clinical Decision Support	10	100|0	10|8	168s/ 64.2s	167s/165s	0|0	5|0
Reconciliation	10	100|0	17|17	114s/ 32.31s	113s/110s	0|0	5|0

The results from the SUS (System Usability Scale) scored the **subjective satisfaction** with the system based on performance with these tasks in the table below. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

Tasks		Overall Evaluation
System Usability Scale		86

MAJOR FINDINGS & RECOMMENDATIONS

-All participants mentioned that the UI was very easy to navigate and intuitive. No major complications during the testing.

-Some of the workflow documents were not too specific which caused some testers to spend more time that usual performing the specific task. Once they were able to realize what they were supposed to do,they completed the task as expected.

-All the testers mentioned that the demographic as well as the e-rx Medication modules were the easiest

-Although, we only tested 10 specific areas in the EMR. ALL users mentioned that they were very comfortable navigating the EMR and that it was easy to use.

-Overall,the testers presented little to no problems with the EMR while testing.

APPENDICES

APPENDIX 1: DEMOGRAPHICS QUESTIONNAIRE

Tester #1

Demographics Questionnaire:

1. What is your gender? M

2. Have you participated in a focus group or usability test in the past 6 months? No

3. Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)? No

4. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company? No

5. Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older) 23-39

6. Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic. Latino

7. Do you require any assistive technologies to use a computer? (if so, please describe) No

8. What is your current position and title? Medical assistant

9. How long have you held this position? 1.5 years

10. Describe your work location (or affiliation) and environment? Medical office

11. Which of the following describes your highest level of education? (e.g., high school graduate/GED, some college, college graduate (RN,BSN), post graduate(MD/PhD), other)
B.S degree

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.) EMR

13. About how many hours per week do you spend on the computer? 40 hours

14. What computer platform do you usually use? (e.g. Mac, Windows, etc) Windows

15.What Internet Browser do you usually use? (e.g. Mac, Windows, etc.) Chrome

16. In the last month, how often have you used an electronic health record? 5 days/week

17. How many years have you used an electronic health record? 4 years

18. How many Electronic Health Records do you use or are familiar with? 1

19. How does your work environment handle patient records? electronically

Demographics Questionnaire:

1.What is your gender?

Female

2.Have you participated in a focus group or usability test in the past 6 months?

no

3.Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

no

4.Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company?

no

5.Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

23 to 39

6.Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

white

7.Do you require any assistive technologies to use a computer? (if so, please describe)

no

8. What is your current position and title?

MA

9. How long have you held this position?

A months

10. Describe your work location (or affiliation) and environment?

great, medical office

11. Which of the following describes your highest level of education? (e.g., high school graduate/GED, some college, college graduate (RN,BSN), post graduate(MD/PhD), other)

Asso. Degree

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.)

EMR

13. About how many hours per week do you spend on the computer?

10

14. What computer platform do you usually use? (e.g. Mac, Windows, etc)

Windows

15.What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

~~Crome~~
Chrome

16. In the last month, how often have you used an electronic health record?

3days aweek.

17. How many years have you used an electronic health record?

2

18. How many Electronic Health Records do you use or are familiar with?

1

19. How does your work environment handle patient records?

electronically great

Demographics Questionnaire:

1.What is your gender?

Female

2.Have you participated in a focus group or usability test in the past 6 months?

No

3.Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

No

4.Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company?

No

5.Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

6.Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

7.Do you require any assistive technologies to use a computer? (if so, please describe)

No

8. What is your current position and title?

Nurse- LPN

9. How long have you held this position?

6 yrs

10. Describe your work location (or affiliation) and environment?

Medical Office

11. Which of the following describes your highest level of education? (e.g., high school graduate/GED, ~~some college~~, college graduate (RN,BSN), post graduate(MD/PhD), other)

LPH-ASN

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, ~~shopping/banking~~, digital pictures, programming, ~~word processing.~~)

Work

13. About how many hours per week do you spend on the computer?

20 hrs.

14. What computer platform do you usually use? (e.g. Mac, ~~Windows~~, etc)

15. What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

Chrome

16. In the last month, how often have you used an electronic health record?

days 5/WK

17. How many years have you used an electronic health record?

8 yrs.

18. How many Electronic Health Records do you use or are familiar with?

3

19. How does your work environment handle patient records?

Electronically

Demographics Questionnaire:

1.What is your gender? *female*

2.Have you participated in a focus group or usability test in the past 6 months? *yes*

3.Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)? *no*

4.Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company? *no*

5.Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older) *40-59*

6.Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic. *Caucasian*

7.Do you require any assistive technologies to use a computer? (if so, please describe) *no*

8. What is your current position and title? *Medical Assistant /CNA*

9. How long have you held this position? *4 months*

10. Describe your work location (or affiliation) and environment? *Clinical office*

11. Which of the following describes your highest level of education? (e.g., high school graduate/GED, some college, college graduate (RN,BSN), post graduate(MD/PhD), other) *Some College*

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.) *access EMR, research, reading, banking, music, word processing.*

13. About how many hours per week do you spend on the computer? *35 hrs*

14. What computer platform do you usually use? (e.g. Mac, Windows, etc) *Windows*

15.What Internet Browser do you usually use? (e.g. Mac, Windows, etc.) *Chrome*

16. In the last month, how often have you used an electronic health record? 28 days

17. How many years have you used an electronic health record? 12 years

18. How many Electronic Health Records do you use or are familiar with? 2

19. How does your work environment handle patient records? electronically

Demographics Questionnaire:

1.What is your gender? F

2.Have you participated in a focus group or usability test in the past 6 months? NO

3.Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)? NO

4.Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company? NO

5.Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

6.Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

7.Do you require any assistive technologies to use a computer? (if so, please describe) NO

8. What is your current position and title?

Front Desk

9. How long have you held this position? *2 years +*

10. Describe your work location (or affiliation) and environment? *Medical*

ollowing describes your highest level of education? (e.g., high school
me college, college graduate (RN,BSN), post graduate(MD/PhD), other)

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records) (esearch, reading news, shopping/banking, digital pictures, programming, word processing.)

13. About how many hours per week do you spend on the computer? *40 hours*

14. What computer platform do you usually use? (e.g. Mac, Windows, etc)

15.What Internet Browser do you usually use? (e.g. Mac, Windows, etc.) *Crome*

16. In the last month, how often have you used an electronic health record? 5 days a week

17. How many years have you used an electronic health record? 2 years

18. How many Electronic Health Records do you use or are familiar with? 1

19. How does your work environment handle patient records? Electronidly

Demographics Questionnaire:

1.What is your gender?

female

2.Have you participated in a focus group or usability test in the past 6 months?

no

3.Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

no

4.Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company?

no

5.Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

40 to 59

6.Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

Caucasian

7.Do you require any assistive technologies to use a computer? (if so, please describe)

no

8. What is your current position and title?

Front Desk - Customer Service Liasion

9. How long have you held this position?

1⁺yr

10. Describe your work location (or affiliation) and environment?

private office / Urban area

11. Which of the following describes your highest level of education? (e.g., high school graduate/GED, some college, college graduate (RN,BSN), post graduate(MD/PhD), other)

College Graduate A.A.

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.)

Med Records, scanning, printing, archiving, create documents, windows Suite

13. About how many hours per week do you spend on the computer?

40⁺

14. What computer platform do you usually use? (e.g. Mac, Windows, etc)

Windows Office 365

15.What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

Google Chrome

16. In the last month, how often have you used an electronic health record?

20 days

17. How many years have you used an electronic health record?

12^+ years

18. How many Electronic Health Records do you use or are familiar with?

3

19. How does your work environment handle patient records?

electronically

Demographics Questionnaire:

1.What is your gender?

female

2.Have you participated in a focus group or usability test in the past 6 months?

NO

3.Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

NO

4.Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company? *NO*

5.Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

6.Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

7.Do you require any assistive technologies to use a computer? (if so, please describe)

NO

8. What is your current position and title?

Medical Biller / coder

9. How long have you held this position?

12 yrs.

10. Describe your work location (or affiliation) and environment?

Medical office

11. Which of the following describes your highest level of education? (e.g., high school graduate/GED, some college, college graduate (RN,BSN), post graduate(MD/PhD), other)

Some College

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.)

13. About how many hours per week do you spend on the computer?

50 hrs

14. What computer platform do you usually use? (e.g. Mac, Windows, etc)

15.What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

Chrome or firefox

16. In the last month, how often have you used an electronic health record?

5 days a week

17. How many years have you used an electronic health record?

12 yrs.

18. How many Electronic Health Records do you use or are familiar with?

3

19. How does your work environment handle patient records?

Electronically

Demographics Questionnaire:

1.What is your gender?

Male

2.Have you participated in a focus group or usability test in the past 6 months?

no

3.Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

no

4.Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company?

no

5.Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

17

6.Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

Caucasian / latino

7.Do you require any assistive technologies to use a computer? (if so, please describe)

no

8. What is your current position and title?

rpm

9. How long have you held this position?

1 year 6 months

10. Describe your work location (or affiliation) and environment?

nice office + family enviroment

11. Which of the following describes your highest level of education? (e.g., high school graduate/GED, some college, college graduate (RN,BSN), post graduate(MD/PhD), other)

high schoo   vnte

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.)

excel   powerpoint
word   pm emr

13. About how many hours per week do you spend on the computer?

40

14. What computer platform do you usually use? (e.g. Mac, Windows, etc)

Window

15.What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

Chrome

16. In the last month, how often have you used an electronic health record?

every work day

17. How many years have you used an electronic health record?

1year and a half

18. How many Electronic Health Records do you use or are familiar with?

One

19. How does your work environment handle patient records?

electronically

Demographics Questionnaire:

1.What is your gender?

Male

2.Have you participated in a focus group or usability test in the past 6 months?

NO

3.Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

NO

4.Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company?

No

5.Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

20

6.Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

Latino

7.Do you require any assistive technologies to use a computer? (if so, please describe)

No

8. What is your current position and title?

Calling/CCM

9. How long have you held this position?

1yr

10. Describe your work location (or affiliation) and environment?

~~systems, MCe~~ medical office

11. Which of the following describes your highest level of education? (e.g., high school graduate/GED, some college, college graduate (RN,BSN), post graduate(MD/PhD), other)

Ged

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.)

calling

13. About how many hours per week do you spend on the computer?

40

14. What computer platform do you usually use? (e.g. Mac, Windows, etc)

windows

15.What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

Chrome

16. In the last month, how often have you used an electronic health record?

~~a lot~~ 5 days a week

17. How many years have you used an electronic health record?

1

18. How many Electronic Health Records do you use or are familiar with?

1

19. How does your work environment handle patient records?

~~very well~~
electronicly

Demographics Questionnaire:

1.What is your gender?   Female

2.Have you participated in a focus group or usability test in the past 6 months?

NO

3.Do you or anyone in your home, work in marketing research, usability research, web design (...etc.)?

NO

4.Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company?

NO

5.Which of the following best describes your age? (23 to 39; 40 to 59; 60 to 74; 75 and older)

40-59

6.Which of the following best describes your race or ethnic group? (eg. Caucasian, Asian, Black/African American, Latino(a) or Hispanic.

Caucasian

7.Do you require any assistive technologies to use a computer? (if so, please describe)

NO

8. What is your current position and title?

RT

9. How long have you held this position?

10 yrs

10. Describe your work location (or affiliation) and environment?

Medical office

11. Which of the following describes your highest level of education? (e.g., high school graduate/GED, some college, college graduate (RN,BSN), post graduate(MD/PhD), other)

college

12. Besides reading email, what professional activities do you do on the computer? (e.g. access Electronic Medical Records, research, reading news, shopping/banking, digital pictures, programming, word processing.)

13. About how many hours per week do you spend on the computer?

20

14. What computer platform do you usually use? (e.g. Mac, Windows, etc)

Windows

15.What Internet Browser do you usually use? (e.g. Mac, Windows, etc.)

Chrome

16. In the last month, how often have you used an electronic health record?

5 days per w/k

17. How many years have you used an electronic health record?

10 yrs

18. How many Electronic Health Records do you use or are familiar with?

2

19. How does your work environment handle patient records?

Electronically

TESTER	TIME SPENT
TESTER#1	1 hour 10 minutes and 31 seconds
TESTER#2	53 minutes 18 second
TESTER#3	40 minutes 53 seconds
TESTER#4	41 minutes 12 seconds
TESTER#5	33 minutes 03 seconds
TESTER#6	35 minutes 48 seconds
TESTER#7	35 minutes 51 seconds
TESTER#8	31 minutes 21 seconds
TESTER#9	32 minutes 45 seconds
TESTER#10	33 minutes 11 seconds

APPENDIX 2: INFORMED CONSENT FORM

Consent Form: Remote Usability Test (Adult)

Tester#1

Please read and sign this form.

During this usability test I agree to participate in an online session using my computer or 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 a questionnaire about the experience. I understand and consent to the use and release of the recording to the testing team for ZH Healthcare.

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 the testing team at ZH Healthcare without further permission.

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

If you have any questions after today, please contact Pablo M. Dapena(pablodapena1992@gmail.com)

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.

Date: 03/18/20

Please print your name: Joshua Otero

Please sign your name:

Thank you!

We appreciate your participation!

Please read and sign this form.

During this usability test I agree to participate in an online session using my computer or 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 a questionnaire about the experience. I understand and consent to the use and release of the recording to the testing team for ZH Healthcare.

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 the testing team at ZH Healthcare without further permission.

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

If you have any questions after today, please contact Pablo M. Dapena(pablodapena1992@gmail.com)

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.

Date: 03/20/20

Please print your name: Ashley Young

Please sign your name:

Thank you!

We appreciate your participation!

Please read and sign this form.

During this usability test I agree to participate in an online session using my computer or 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 a questionnaire about the experience. I understand and consent to the use and release of the recording to the testing team for ZH Healthcare.

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 the testing team at ZH Healthcare without further permission.

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

If you have any questions after today, please contact Pablo M. Dapena(pablodapena1992@gmail.com)

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.

Date: 03/23/20

Please print your name: PAMELA Johnson

Please sign your name: _Pam Johnson_

Thank you!

We appreciate your participation!

Please read and sign this form.

During this usability test I agree to participate in an online session using my computer or 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 a questionnaire about the experience. I understand and consent to the use and release of the recording to the testing team for ZH Healthcare.

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 the testing team at ZH Healthcare without further permission.

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

If you have any questions after today, please contact Pablo M. Dapena(pablodapena1992@gmail.com)

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.

Date: 03/23/20

Please print your name: Michelle Tipton

Please sign your name: Michelle Tipton

Thank you!

We appreciate your participation!

Please read and sign this form.

During this usability test I agree to participate in an online session using my computer or 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 a questionnaire about the experience. I understand and consent to the use and release of the recording to the testing team for ZH Healthcare.

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 the testing team at ZH Healthcare without further permission.

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

If you have any questions after today, please contact Pablo M. Dapena(pablodapena1992@gmail.com)

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.

Date: 03/23/20

Please print your name: _Christine Honning_

Please sign your name: _Christine Honnig_

Thank you!

We appreciate your participation!

Please read and sign this form.

During this usability test I agree to participate in an online session using my computer or 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 a questionnaire about the experience. I understand and consent to the use and release of the recording to the testing team for ZH Healthcare.

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 the testing team at ZH Healthcare without further permission.

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

If you have any questions after today, please contact Pablo M. Dapena(pablodapena1992@gmail.com)

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.

Date: 03/23/20

Please print your name: Lisa J. Reams Adams

Please sign your name: _____

Thank you!

We appreciate your participation!

Please read and sign this form.

During this usability test I agree to participate in an online session using my computer or 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 a questionnaire about the experience. I understand and consent to the use and release of the recording to the testing team for ZH Healthcare.

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 the testing team at ZH Healthcare without further permission.

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

If you have any questions after today, please contact Pablo M. Dapena(pablodapena1992@gmail.com)

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.

Date: _03/24/20_

Please print your name: ___Danielle Moore___

Please sign your name: ___Danielle Moore___

Thank you!

We appreciate your participation!

Please read and sign this form.

During this usability test I agree to participate in an online session using my computer or 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 a questionnaire about the experience. I understand and consent to the use and release of the recording to the testing team for ZH Healthcare.

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 the testing team at ZH Healthcare without further permission.

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

If you have any questions after today, please contact Pablo M. Dapena(pablodapena1992@gmail.com)

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.

Date: 03/26/20

Please print your name: _Ethan Diaz_

Please sign your name: _____

Thank you!

We appreciate your participation!

Please read and sign this form.

During this usability test I agree to participate in an online session using my computer or 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 a questionnaire about the experience. I understand and consent to the use and release of the recording to the testing team for ZH Healthcare.

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 the testing team at ZH Healthcare without further permission.

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

If you have any questions after today, please contact Pablo M. Dapena(pablodapena1992@gmail.com)

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.

Date: 03/27/20

Please print your name: _Ian   Diaz_____

Please sign your name: _____

Thank you!

We appreciate your participation!

Please read and sign this form.

During this usability test I agree to participate in an online session using my computer or 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 a questionnaire about the experience. I understand and consent to the use and release of the recording to the testing team for ZH Healthcare.

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 the testing team at ZH Healthcare without further permission.

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

If you have any questions after today, please contact Pablo M. Dapena(pablodapena1992@gmail.com)

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.

Date: 03/27/20

Please print your name: Kim Roof

Please sign your name: Kim Roof

Thank you!

We appreciate your participation!

APPENDIX 3: SYSTEM USABILITY SCALE QUESTIONNAIRE

Tester #1

Participant ID: J.O   Site: Blue EHR   Date: 03 /18 /20

System Usability Scale

①

Instructions: For each of the following statements, mark <u>one</u> box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Tester #2

Participant ID: AY   Site: Blue EHR   Date: 03 / 20 / 20

(2)

System Usability Scale

Instructions: For each of the following statements, mark <u>one</u> box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Participant ID: _Ksj_   Site: _Blue EHR_   Date: _03/23/20_

④

System Usability Scale

Instructions: For each of the following statements, mark <u>one</u> box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

None

3 Participant ID: 4114   Site: _Blue EHR_   Date: 05 /23 /20

System Usability Scale

Instructions: For each of the following statements, mark <u>one</u> box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Participant ID: CH   Site: _Blue EHR_   Date: 03/23/20

(5)

System Usability Scale

Instructions: For each of the following statements, mark <u>one</u> box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Participant ID: ʃ.R.A.   Site: _BlueEHR_   Date: 03 / 23 / 20

⑥

System Usability Scale

Instructions: For each of the following statements, mark <u>one</u> box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Participant ID: _DM_   Site: ___Blue EHR___   Date: _03 / 24 / 20_

System Usability Scale

Instructions: For each of the following statements, mark <u>one</u> box that best describes your reactions to the website *today*.

		Strongly Disagree				Strongly Agree
1.	I think that I would like to use this website frequently.	☐	☐	☐	☐	☑
2.	I found this website unnecessarily complex.	☑	☐	☐	☐	☐
3.	I thought this website was easy to use.	☐	☐	☐	☐	☑
4.	I think that I would need assistance to be able to use this website.	☑	☐	☐	☐	☐
5.	I found the various functions in this website were well integrated.	☐	☐	☐	☐	☑
6.	I thought there was too much inconsistency in this website.	☑	☐	☐	☐	☒ DM
7.	I would imagine that most people would learn to use this website very quickly.	☐	☐	☐	☑	☐
8.	I found this website very cumbersome/awkward to use.	☑	☐	☐	☐	☐
9.	I felt very confident using this website.	☐	☐	☐	☑	☐
10.	I needed to learn a lot of things before I could get going with this website.	☑	☐	☐	☐	☐

Please provide any comments about this website:

N/A

Participant ID: _EIJ_   Site: _BlueHR_   Date: _03 / 26 / 20_

System Usability Scale

Instructions: For each of the following statements, mark <u>one</u> box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Participant ID: _IU_   Site: __BlueEHR__   Date: 03/27/20

⑨

System Usability Scale

Instructions: For each of the following statements, mark <u>one</u> box that best describes your reactions to the website *today*.

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

Please provide any comments about this website:

Participant ID: _LK_   Site: _BlveEHR_   Date: _03 / 27/ 20_

(0)

System Usability Scale

Instructions: For each of the following statements, mark <u>one</u> box that best describes your reactions to the website *today*.

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

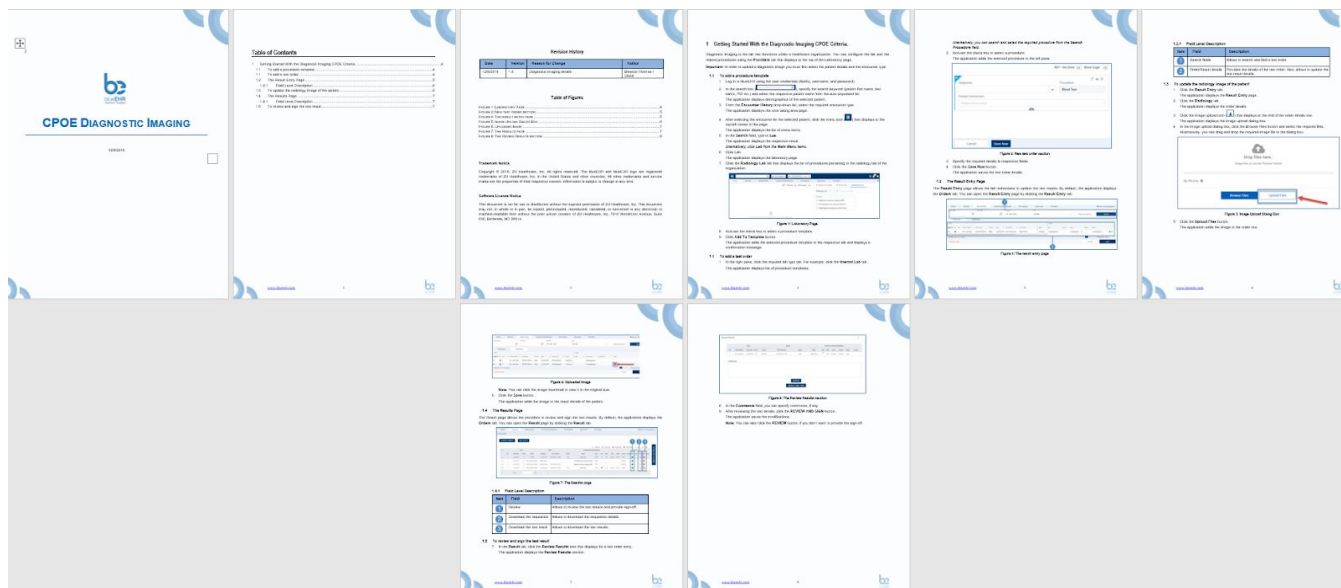Please provide any comments about this website:
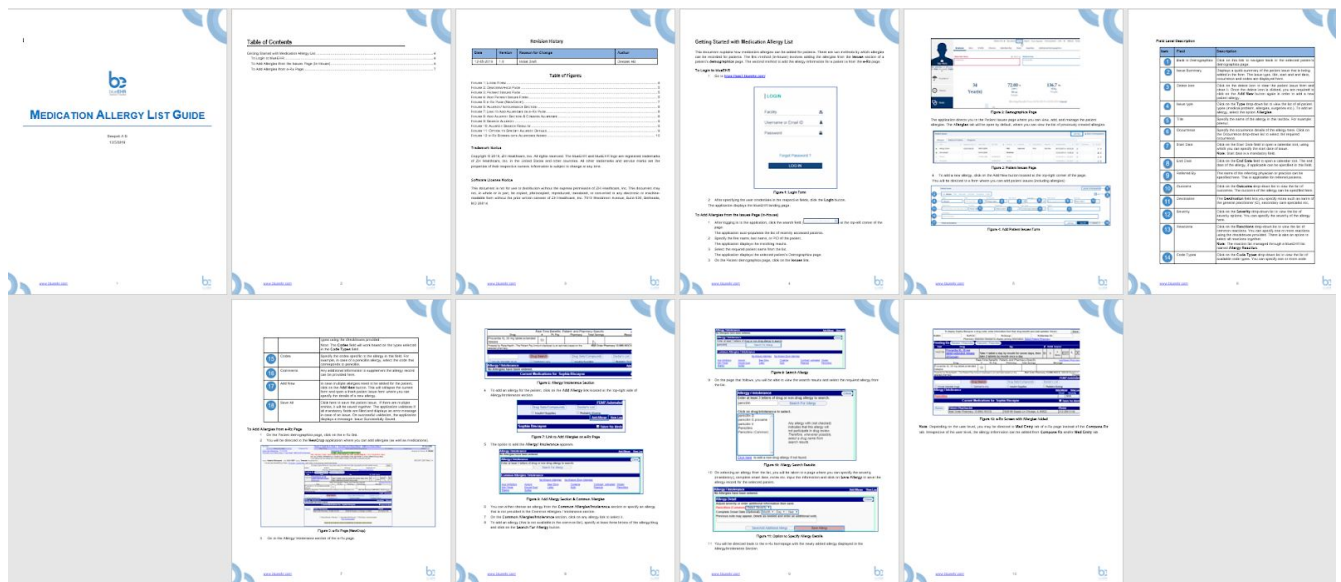
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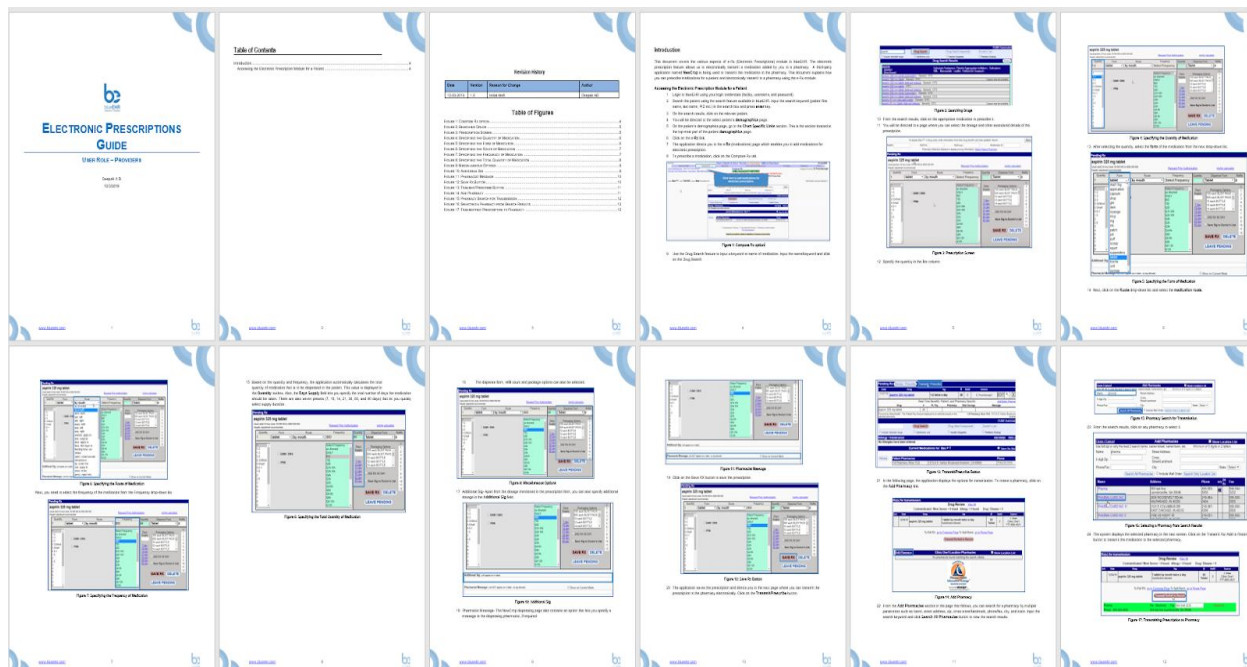
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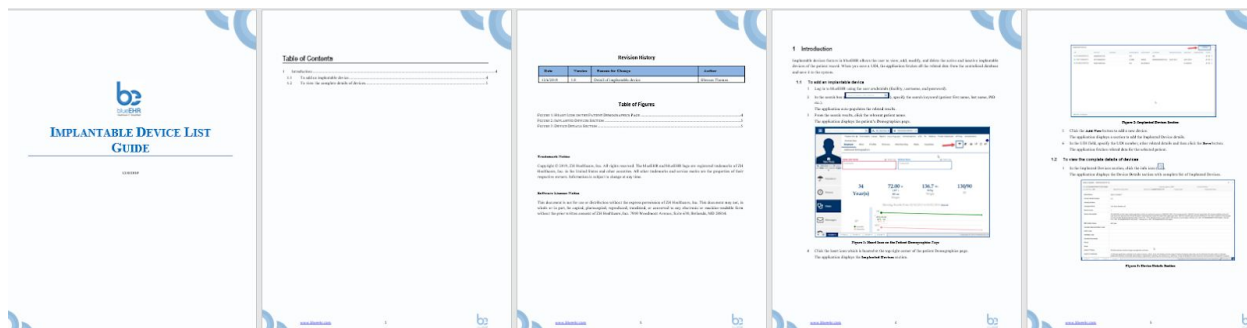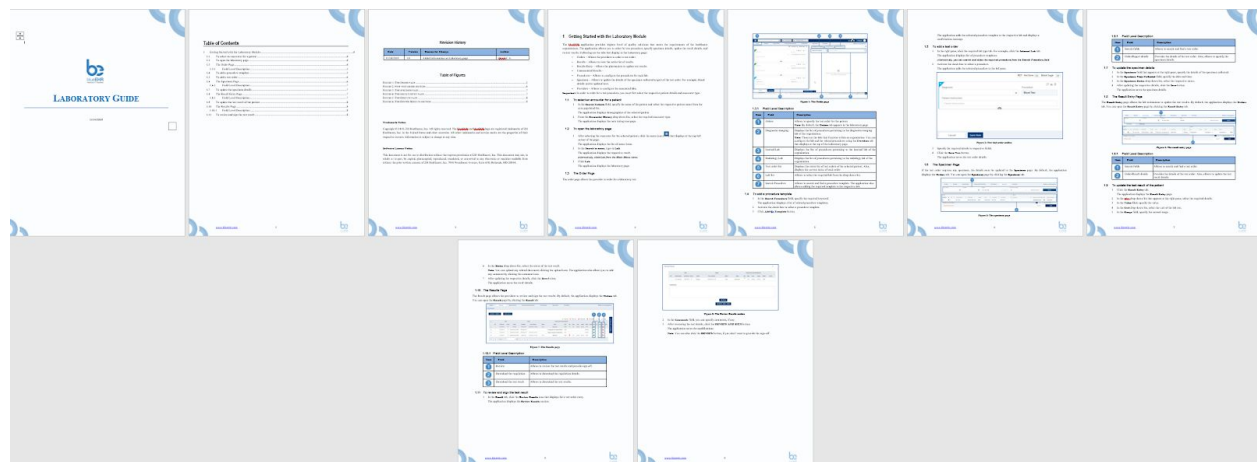
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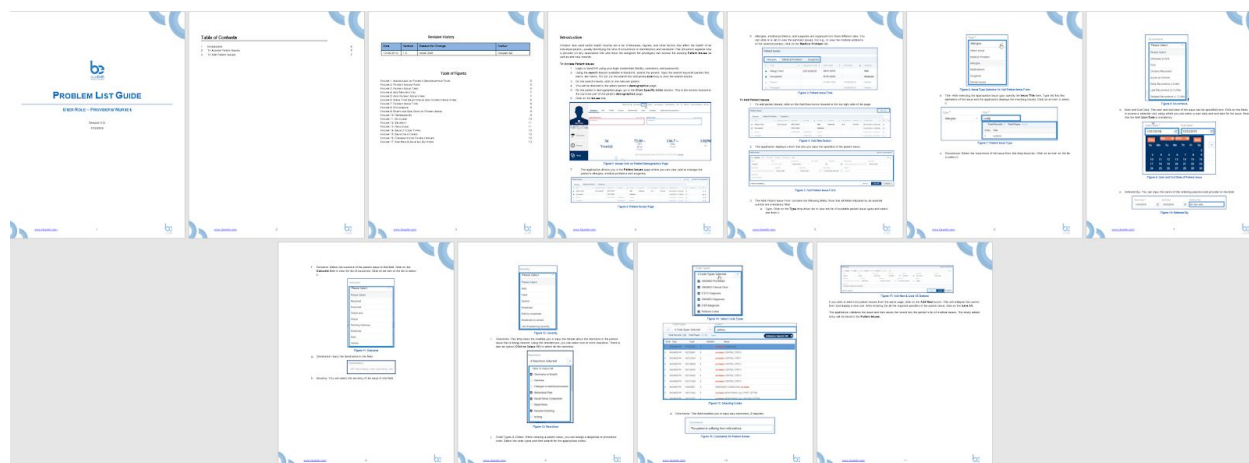
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CPOE MEDICATION LIST GUIDE WORKFLOW

CPOE DEMOGRAPHICS WORKFLOW

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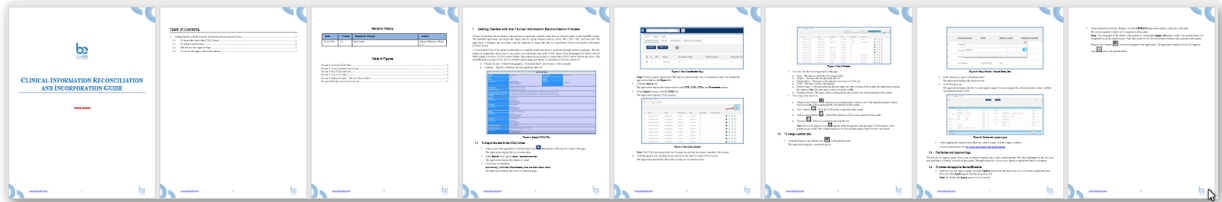
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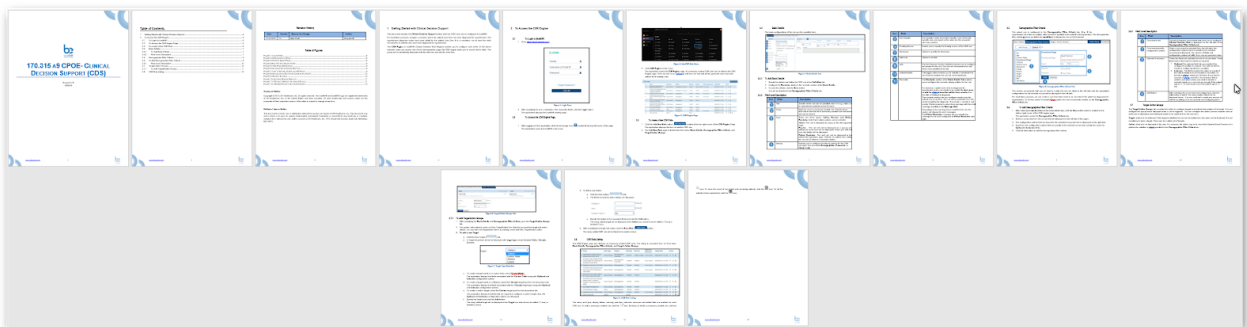
CPOE PROBLEM LIST WORKFLOW

CLINICAL INFORMATION RECONCILIATION AND INCORPORATION GUIDE

CPOE CLINICAL DECISION SUPPORT(CDS)

https://docs.google.com/document/d/18pCi3eLLH4Omf_LbcCegHfTK0lWbsnDsCX8gI4obYlQ/edit

REFERENCES

1. Tullis, T. & Albert, W. (2008). Measuring the User Experience. Burlington, MA: Morgan Kaufman (p. 149). Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

2. Tullis, T. & Albert, W. (2008). Measuring the User Experience. Burlington, MA: Morgan Kaufman. Also see www.measuringusability.com. Errors have to be operationally defined by the test team prior to testing.

3. Tedesco and Tullis (2006) for a comparison of post-task ratings for usability tests.

4. Tedesco, D. & Tullis, T. (2006) A comparison of methods for eliciting post-task subjective ratings in usability testing. Usability Professionals association Conference, June 12 – 16, Broomfield, CO. The SUS survey yields a single number that represents a composite measure of the overall perceived usability of the system. SUS scores have a range of 0 to 100 and the score is a relative benchmark that is used against other iterations of the system.

5. Tullis, T. & Albert, W. (2008). Measuring the User Experience. Burlington, MA: Morgan Kaufman (p. 149).