EHR Usability Test Report of MOSAIQ version 2.70

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

MOSAIQ v. 2.70

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EXECUTIVE SUMMARY

Usability tests of MOSAIQ version 2.70 were conducted between April and July 2018 via online meeting tools by Elekta. The purpose of this test was to test and validate the usability of the current user interface, and provide evidence of usability in the EHR Under Test (EHRUT). During the usability test, four healthcare providers and seven System Administrators matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks. This study collected performance data on 12 tasks typically conducted on an EHR:

- § 170.315(a)(1) Computerized provider Order entry – Medications
- § 170.315(a)(2) Computerized provider Order entry - Laboratory
- § 170.315(a)(3) Computerized provider Order entry – Diagnostic Imaging
- § 170.315(a)(4) Drug-drug, Drug-allergy Interaction Checks
- § 170.315(a)(5) Demographics
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- § 170.315(a)(7) Medication List
- § 170.315(a)(8) Medication Allergy List
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- § 170.315(a)(14) Implantable Device List
- § 170.315(b)(2) Clinical Information Reconciliation and Incorporation
- § 170.315(b)(3) Electronic Prescribing

During the approximately 60-minute one-on-one usability test, each participant was greeted by the administrator. Participants had prior experience with the EHR[4].
The administrator introduced the test and instructed participants to complete a series of tasks (given one at a time) using the EHRUT. During the testing, the administrator recorded user performance data on paper and electronically. The administrator did not give the participant assistance in how to complete the task.

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[4] No new training or help materials were provided specific to the tasks tested.

The following types of data were collected for each participant:

- Number of tasks successfully completed without assistance
- Time to complete the tasks
- 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 answer a post-test questionnaire and were compensated with no money or other incentives 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. The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks.

In addition to the performance data, the following qualitative observations were made:

- Major findings
  - Users reacted positively to ease of lab, radiology and medication ordering
  - Users reacted positively to workflows for clinical decision support and incorporation of clinical information
  - Users applied knowledge from previous tasks to successfully complete subsequent tasks, per the application's consistent style
  - Users reported a high rate of system satisfaction regarding ease of use, confidence using the system, system function integration
  - System Administrators were able to configure FBD alerts and CDS alerts very quickly and efficiently.

- Areas for improvement
  - More visible access to order comments
  - Reduce number of items on selection lists
  - Limit items on selection lists to only relevant options
  - Improve consistency for accessing options (buttons, menu, RMC, screen style)
  - Improve visibility of required Allergy ID date

- Improved naming distinction needed between similarly labeled fields

INTRODUCTION

The EHRUT tested for this study was MOSAIQ version 2.70.

Designed to present medical information to healthcare providers in free standing and/or hospital-based Oncology practices the EHRUT consists of a comprehensive, Oncology specific EMR that facilitates medical and radiation oncology planning and treatment. 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 ability to complete task and knowledge of multiple task completion options, were captured during the usability testing.

The System Usability Scale (SUS) used is a common industry tool for fast and inexpensive usability testing and is a widely-accepted tool. It was constructed and first published by DEC (Brooke, J. (1996). SUS: a 'quick and dirty' usability scale. In P.W. Jordan, B. Thomas, B.A. Weerdmeester, & A.L. McClelland. *Usability Evaluation in Industry*. London: Taylor and Francis.) and has been used and validated many times since its inception (for a review, see: Bangor, A., Kortum, P.T. and Miller, J.T. (2008). An Empirical Evaluation of the System Usability Scale. *International Journal of Human-Computer Interaction* 24(6): 574–594.).

The NASA Task Load IndeX (NASA-TLX) that was used is a well-established tool for assessing workload in human performance tasks. It is also not named in the above standard but is widely accepted. It was constructed and first published by NASA (Hart, S.G., & Staveland, L.E. (1988). Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. *Advances in psychology, 52*, 139-183.) and has been used and validated many times since its inception (for a review, see: Hart, S.G. (2006). NASA-task load index (NASA-TLX); 20 years later. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting,* 50(9), 904-908.).

Elekta uses these tools during the final development process when there is enough functionality in the system to complete the tasks. This usability study was completed prior to the release of version 2.70 to beta testing.

METHOD

PARTICIPANTS

MOSAIQ v. 2.70 is intended for use by physicians, clinical and administrative staff to support medical and radiation oncology treatment and planning. The system may also be used by hematology physicians who are often affiliated with oncology practices.

A total of 11 participants were tested on the EHRUT(s). Participants in the test were Providers and System Administrators. Participants were recruited by Elekta and were compensated $0.00 for their time. In addition, participants had no direct connection to the development of or organization producing the EHRUT(s). Participants were not from the testing or supplier organization. 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, and product experience. Participant names were replaced with Participant IDs so that an individual's data cannot be tied back to individual identities.

Participant ID	Age	Education	Occupation/ Role	Specialty	Professional Experience	Product Experience	Computer Experience
1	60-69	Bachelor's Degree	Health Informatacist/Analyst, RN	Med/Rad Oncology	60 months	60 months	420 months
2	20-29	Bachelor's Degree	Health Informatacist	Med/Rad Oncology	36 months	54 months	240 months
3	50-59	Master's Degree	Director of Education and Practice, RN	Radiation Oncology	336 months	156 months	264 months
4	40-49	Bachelor's Degree	Informatics Educator, RN	Med/Rad Oncology	120 months	120 months	300 months
5	50-59	Bachelor's Degree	Director of Informatics, RN	Med/Rad Oncology	120 months	216 months	120 months
6	30-39	MD	Physician	Hematology/ Medical Oncology	60 months	60 months	360 months
7	20-29	Master's Degree	Physician Assistant	Hematology/ Medical Oncology	24 months	24 months	240 months
8	20-29	High School Graduate	Project Manager/EMR Coordinator	Med/Rad Oncology	48 months	60 months	120 months
9	40-49	MD	Physician	Hematology/ Medical Oncology	120 months	72 months	240 months
10	40-49	MD	Physician	Radiation Oncology	168 months	168 months	408 months
11	50-59	Bachelor's Degree	Director of Quality & Implementation	Med/Rad Oncology	324 months	120 months	240 months

Eleven participants (matching the demographics in the section on Participants) were recruited and eleven participated in the usability test. No participants failed to show for the study. Participants were scheduled for 75 minute sessions. Debriefing and data reset occurred during the continuous session.

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 location (via remote meeting tool) 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 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

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:
1. Find, enter and change patient's medications and allergies; recognize and appreciate drug interaction warnings and references
2. Find, enter and change patient's medication orders, lab orders, and diagnostic test orders
3. Access e-Prescribing
4. Check and incorporate clinical information from an external provider
5. Understand and act on CDS alerts
6. Configure CDS alerts and FDB warning level
Tasks were selected based on their frequency of use, criticality of function, and that may be most troublesome for users. 6 Tasks were constructed in light of study objectives.

PROCEDURES

Upon joining the virtual meeting participants were greeted and their identity was verified. Participants were then assigned a participant ID.[7]

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[6] Constructing appropriate tasks is of critical importance to the validity of a usability test. These are the actual functions, but most tasks contain larger and more fleshed out context that aligns with the sample data sets available in the tested EHR. Please consult usability references for guidance on how to construct appropriate tasks. [7] All participant data must be de-identified and

kept confidential.

To ensure consistency, one usability administrator conducted all tests, and compiled and reviewed the data. This usability administrator has 13 years experience with this EHR, in roles including: education, consulting and account management. The test administrator holds a BA, and prior certifications in medical information. Past specialized training/experience includes electronic health record coding and analysis. The administrator moderated the session including administering instructions and tasks. The administrator also obtained post-task rating data and took notes on participant comments. The administrator 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 quickly as possible making as few errors and deviations as possible.
- Without assistance; administrators were allowed to give immaterial guidance and clarification on tasks, but not instructions on use

For each task, the participants were verbally given the task description and goal of the task. Scoring is discussed below in the Data Scoring section.
Following the session, the administrator gave the participant the post-test questionnaire, (e.g., the System Usability Scale, see Appendix 4), and thanked each individual for their participation.
Participants' demographic information, task success rate, errors, deviations, verbal responses, and post-test questionnaire were recorded into a spreadsheet.

TEST LOCATION

The test was performed via an online conference meeting tool and conference call. The test was performed using remote access to a server housed in Sunnyvale, CA. The participants are located throughout the US, but were all tested using the same server, application, and database.
Only the administrator was in the conference meeting. To ensure that the environment was comfortable for users, participants were able to join from their own office or conference room and use their own workstation and work environment.

TEST ENVIRONMENT

The EHRUT would be typically be used in a healthcare office or facility.

In this instance, the testing was conducted via online conference meeting tools from the participants' own workstation. For testing, the participants accessed a remote server (housed in Sunnyvale, CA) running MOSAIQ 2.70 on a Windows Server Standard 2008 operating system. The participants used a mouse and keyboard when interacting with the EHRUT.

MOSAIQ v.2.70 used standard MOSAIQ display and font characteristics with a screen size dependant on the participants' own standard workstation.

The application was set up by Elekta according to the vendor's documentation

describing the system set-up and preparation. The application itself was running on a Windows Server 2008 operating system using a test database. The application was installed locally with a local SQL Server. Technically, the system performance (i.e., response time) was representative to what actual users would experience in a field implementation. Additionally, participants were not given the option 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. Participant Demographics
2. Elekta Moderator's Guide
3. Elekta Usability Scale Questionnaire
4. System Usability Scale Questionnaire

Examples of these documents can be found in Appendices 1-4

respectively. The Moderator's Guide was devised so as to be able to

capture required data. The participant's interaction with the EHRUT

was captured and documented. Verbal comments were included in

this documentation.

PARTICIPANT INSTRUCTIONS

The administrator reads the following instructions aloud to the each

participant (also see the full moderator's guide in Appendix):

> *Thank you for participating in this study. Your input is very important. Our session today will last about 60 minutes. During that time you will use an instance of an electronic health record. I will ask you to complete a few tasks using this system and answer some questions. Please try to complete the tasks on your own following the instructions very closely. 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. 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 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.*

Following the procedural instructions, participants were shown the EHR and given the following instructions:

> *For each task, I will read the description to you. I will ask you your impressions about the task once you are done.*

Tasks are listed in the Elekta Moderator's Guide in Appendix 2. Tasks are

performed in a combination of Risk Order and natural progression of skills (i.e., add an order, than modify it).

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 MOSAIQ v.2.70 by documenting participant success and errors; represented by low scores in Performance and Effort in the NASA-TLX Measures questionnaire
2. Efficiency of MOSAIQ v.2.70 by documenting path deviations and alternate completion options; represented by low scores in the categories of Mental / Physical / Temporal Demand as well as low scores in Frustration in the NASA-TLX Measures questionnaire
3. Satisfaction with MOSAIQ v.2.70 by documenting ease of use ratings; represented by high scores on the positive questions, and low scores on the negative questions in the SUS Measures and Scale questionnaire

DATA SCORING

The data was collected using well known, common industry tools for usability testing: the NASA Task Load IndeX and the System Usability Scale.

The NASA Task Load IndeX (NASA-TLX) is a well-established tool for assessing workload in human performance tasks. It was constructed and first published by NASA and has been used and validated many times since its inception (for a review, see: Hart, S.G. (2006). NASA-task load index (NASA-TLX); 20 years later. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting,* 50(9), 904-908.).

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The following table details how tasks were scored and errors evaluated.

NASA-TLX Measures	Rationale and Scoring
Mental Demand	How mentally demanding was the task? • Based on a scale of 1 to 10 o 1= Very Low; 10 = Very High
Physical Demand	How physically demanding was the task? • Based on a scale of 1 to 10 o 1= Very Low; 10 = Very High
Temporal Demand	How hurried or rushed was the pace of the task? • Based on a scale of 1 to 10 o 1= Very Low; 10 = Very High
Performance	How successful were you in accomplishing the task you were asked to do? • Based on a scale of 1 to 10 o 1= Very Low; 10 = Very High
Effort	How hard did you have to work to accomplish your level of performance? • Based on a scale of 1 to 10 o 1= Very Low; 10 = Very High
Frustration	How insecure, discouraged, irritated, stressed and annoyed were you • Based on a scale of 1 to 10 o 1= Very Low; 10 = Very High

SUS Measures and Scale
I think that I would like to use this system frequently • Based on a scale of 1 to 5   o 1 = Strongly Disagree; 5 = Strongly Agree
I found the system unnecessarily complex • Based on a scale of 1 to 5   o 1 = Strongly Disagree; 5 = Strongly Agree
I thought the system was easy to use • Based on a scale of 1 to 5   o 1 = Strongly Disagree; 5 = Strongly Agree
I think that I would need the support of a technical person to be able to use this system • Based on a scale of 1 to 5   o 1 = Strongly Disagree; 5 = Strongly Agree
I found the various functions in this system were well integrated • Based on a scale of 1 to 5   o 1 = Strongly Disagree; 5 = Strongly Agree

I thought there was too much inconsistency in this system
• Based on a scale of 1 to 5   ○ 1 = Strongly Disagree; 5 = Strongly Agree
I would imagine that most people would learn to use this system very quickly
• Based on a scale of 1 to 5   ○ 1 = Strongly Disagree; 5 = Strongly Agree
I found the system very cumbersome to use
• Based on a scale of 1 to 5   ○ 1 = Strongly Disagree; 5 = Strongly Agree
I felt very confident using the system
• Based on a scale of 1 to 5   ○ 1 = Strongly Disagree; 5 = Strongly Agree
I needed to learn a lot of things before I could get going with this system
• Based on a scale of 1 to 5   ○ 1 = Strongly Disagree; 5 = Strongly Agree

RESULTS - § 170.315(a)(1) Computerized provider order entry

Order Medication

Participant ID	Avg	# 1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Mental Demand	2.7	4	4	1	1	1	4	4	2	1	5
Physical Demand	1.5	2	1	1	1	1	1	1	1	1	5
Temporal Demand	1.6	2	1	1	1	1	1	3	1	1	4
Performance	9.5	9	8	10	10	10	10	9	10	10	9
Effort	2.7	5	4	1	1	1	3	3	3	1	5
Frustration	2.4	4	2	1	1	1	6	3	1	1	4

Based on scale of 1 - 10. (1 = Very Low; 10 = Very High)

RESULTS - § 170.315(a)(2) Computerized provider order entry

Order Lab

Participant ID	Avg	# 1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Mental Demand	1.7	3	2	1	1	1	1	3	1	1	3
Physical Demand	1.3	2	1	1	1	1	1	1	1	1	3
Temporal Demand	1.6	2	1	1	1	1	1	3	1	1	4
Performance	9.8	10	10	10	10	10	10	9	10	10	9
Effort	1.4	1	1	1	1	1	1	3	1	1	3
Frustration	1.7	1	1	1	1	1	4	2	2	1	3

Based on scale of 1 - 10. (1 = Very Low; 10 = Very High)

RESULTS - § 170.315(a)(3) Computerized provider order entry

Diagnostic Imaging

Participant ID	Avg	# 1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Mental Demand	1.5	3	2	1	1	1	1	2	1	1	2
Physical Demand	1.1	1	1	1	1	1	1	1	1	1	2
Temporal Demand	1.2	1	1	1	1	1	1	3	1	1	1
Performance	10	10	10	10	10	10	10	10	10	10	10
Effort	1.3	2	1	1	1	1	1	2	1	1	2
Frustration	1	1	1	1	1	1	1	1	1	1	1

Based on scale of 1 - 10. (1 = Very Low; 10 = Very High)

RESULTS - § 170.315(a)(4) Drug-Drug, Drug-Allergy
Interaction Checking

Participant ID	Avg	# 1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Mental Demand	2.2	5	2	1	1	1	1	4	2	1	4
Physical Demand	1.5	2	1	1	1	1	1	1	1	1	5
Temporal Demand	1.6	2	1	1	1	1	1	3	1	1	4
Performance	9.9	10	10	10	10	10	10	10	10	10	9
Effort	2.6	5	2	1	2	1	1	4	3	1	6
Frustration	2.1	3	1	1	1	1	1	4	2	1	6

Based on scale of 1 - 10. (1 = Very Low; 10 = Very High)

RESULTS - § 170.315(a)(5) Demographics

Participant ID	Avg	# 1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Mental Demand	2.6	3	1	1	1	1	7	5	2	1	4
Physical Demand	1.3	2	1	1	1	1	1	1	1	1	3
Temporal Demand	1.7	2	1	1	1	1	1	4	2	1	3
Performance	8.2	9	10	10	8	10	5	7	10	5	8
Effort	4.1	3	1	1	2	1	7	7	4	8	7
Frustration	4.3	4	1	1	1	1	10	7	2	8	8

Based on scale of 1 - 10. (1 = Very Low; 10 = Very High)

RESULTS - § 170.315(a)(6) Problem List

Participant ID	Avg	# 1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Mental Demand	2.5	3	1	1	1	1	3	8	1	1	5
Physical Demand	1.5	3	1	1	1	1	1	1	1	1	4
Temporal Demand	1.6	2	1	1	1	1	1	3	1	1	4
Performance	9.8	10	10	10	10	10	10	9	10	10	9
Effort	2.3	2	1	1	1	1	1	6	2	1	7
Frustration	2.1	2	1	1	1	1	1	6	1	1	6

Based on scale of 1 - 10. (1 = Very Low; 10 = Very High)

RESULTS - § 170.315(a)(7) Medication List

Participant ID	Avg	# 1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Mental Demand	3	3	1	1	2	1	4	6	3	1	8
Physical Demand	1.8	2	1	1	1	1	1	1	1	1	8
Temporal Demand	1.8	2	1	1	1	1	1	3	2	1	5
Performance	9.3	10	10	10	9	10	8	9	8	10	9
Effort	3.3	4	1	1	2	2	4	6	4	1	8
Frustration	3.1	2	1	1	1	1	5	7	3	1	9

Based on scale of 1 - 10. (1= Very Low; 10 = Very High)

RESULTS - § 170.315(a)(8) Medication Allergy List

Participant ID	Avg	# 1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Mental Demand	2.3	3	2	1	2	1	3	3	2	1	5
Physical Demand	1.5	2	1	1	1	1	1	1	1	1	5
Temporal Demand	1.7	2	1	1	1	1	1	3	2	1	4
Performance	9.9	10	10	10	10	10	10	9	10	10	10
Effort	2.5	3	1	1	2	1	4	5	2	1	5
Frustration	2.2	3	1	1	1	1	4	4	1	1	5

Based on scale of 1 - 10. (1 = Very Low; 10 = Very High)

RESULTS - § 170.315(a)(9) Clinical Decision Support

Participant ID	Avg	# 1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Mental Demand	4.1	5	4	2	3	1	5	7	3	5	6
Physical Demand	1.9	2	1	1	1	1	1	2	2	3	5
Temporal Demand	1.9	3	1	1	1	1	1	3	2	2	4
Performance	8.5	8	8	10	8	10	7	7	8	10	9
Effort	3.7	5	4	1	3	1	5	7	3	2	6
Frustration	3.6	8	2	1	1	1	5	6	2	5	5

Based on scale of 1 - 10. (1= Very Low; 10 = Very High)

RESULTS - § 170.315(a)(14) Implantable Device List

Participant ID	Avg	# 1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Mental Demand	2.3	3	2	1	1	2	5	4	1	1	3
Physical Demand	1.2	2	1	1	1	1	1	1	1	1	2
Temporal Demand	1.4	2	1	1	1	1	1	3	1	1	2
Performance	9.5	10	10	10	10	8	10	8	10	10	9
Effort	2.8	2	1	1	1	3	4	7	3	1	5
Frustration	2.7	3	1	1	1	3	4	6	1	1	6

Based on scale of 1 - 10. (1= Very Low; 10 = Very High)

RESULTS - § 170.315(b)(2) Clinical Information Reconciliation and Incorporation (CCDA)

Participant ID	Avg	# 1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
Mental Demand	2.6	-	1	1	1	1	5	6	3	1	5	2
Physical Demand	1.4	-	1	1	1	1	1	1	1	1	5	1
Temporal Demand	1.6	-	1	1	1	1	1	3	2	1	4	1
Performance	9.3	-	10	10	10	10	7	7	10	10	9	10
Effort	2.6	-	1	1	2	1	5	4	5	1	5	1
Frustration	3.3	-	1	1	1	1	10	6	3	1	6	3

Based on scale of 1 - 10. (1= Very Low; 10 = Very High)

RESULTS - § 170.315(b)(3) Electronic Prescribing

Participant ID	Avg	# 1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Mental Demand	3.3	4	2	1	1	1	7	6	3	1	7
Physical Demand	1.5	2	1	1	1	1	1	1	1	1	5
Temporal Demand	1.9	2	1	1	1	2	1	3	2	1	5
Performance	9.1	10	10	10	10	10	5	7	10	10	9
Effort	3.2	3	2	1	1	1	5	6	4	1	8
Frustration	3.1	4	2	1	1	1	7	5	1	1	8

Based on scale of 1 - 10. (1= Very Low; 10 = Very High)

Note: The Effort measure average, per task, on the above TLX questions, was used for the Task Rating, per task, on the SED Summary Spreadsheet.

RESULTS - System Usability Scale (SUS)

Participant ID	Avg	# 1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
Would like to use system frequently	3.3	3	3	5	4	5	2	3	3	1	3	4
Found the system unnecessarily complex	2.9	5	3	1	2	1	4	4	3	5	3	1
System was easy to use	3.9	4	4	5	4	5	3	3	3	5	2	5
Would need the support of a technical person to be able to use this system	2.5	3	1	1	1	1	5	5	1	3	5	1
Various functions in this system were well integrated	3.5	1	4	5	4	5	1	3	2	4	4	5
Too much inconsistency in this system	2.5	5	2	1	2	1	5	4	2	1	4	1
Most people would learn to use this system very quickly	3.1	2	3	5	4	3	3	2	1	3	3	5
Found the system very cumbersome to use	2.4	5	2	1	2	1	2	4	2	3	3	1
Felt very confident using the system	3.8	3	4	5	4	5	2	2	5	4	4	4
Needed to learn a lot of things before I could get going with this system	2.3	4	2	1	1	1	5	4	1	1	4	1

Based on scale of 1 - 5. (1 = strongly disagree; 5 = strongly agree)

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.

The usability testing results for the EHRUT are detailed above. The results should be seen in light of the objectives and goals outlined in Study Design. The data yielded actionable results that could yield positive impact on user performance. This data will be included in consideration for future development.

The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these tasks.

DISCUSSION OF THE FINDINGS

EFFECTIVENESS

Based on the user success score averages, the MOSAIQ functionality overall is usable for the tasks identified. Users were most successful with the tasks of CPOE Laboratory, CPOE Radiology and CPOE Medications. Some users did not understand the selection features in Demographics.

EFFICIENCY

Based on the user success score averages, the MOSAIQ functionality overall is efficient for the tasks identified. Users' efficiency was high for the CPOE ordering of a lab and radiology test.

SATISFACTION

Based on the TLX ratings and the SUS results data, the satisfaction average scores indicate that using the MOSAIQ functionality overall is a positive experience for the tasks identified. Per the SUS, the highest satisfaction was indicated for ease of system use, confidence while using system, and functions in sytem were well integrated. For the TLX ratings, users overall reported a high level of confidence in conjunction with low levels of demand for tasks.

MAJOR FINDINGS

- o Per the System Usability Scale (SUS) results, users found the system easy to use and scored the system an average of 3.9/5
- o Per the System Usability Scale (SUS) results, users felt confident using the system, scoring the system an average of 3.8/5
- o Per the System Usability Scale (SUS) results, users found the system functions well-integrated, and scored the system an average of 3.5/5
- o Users reacted positively to ease of test, lab and medication ordering and were successful in accomplishing these tests with confidence
- o Users applied knowledge from previous tasks to successfully complete subsequent tasks, per the application's consistent style
- o System Administrators were able to identify configuration for FBD alerts and CDS alerts very quickly and efficiently.

AREAS FOR IMPROVEMENT

- o Distinction of drug interaction warnings from other text
- o Reference material for CDS alerts are not required based on Physician training
- o More visible access to order comments
- o Reduce number of items on selection lists
- o Limit entries on selection list to most relevant options
- o Improve consistency for accessing options (buttons, menu, RMC, screen style)
- o Improve visibility of required Allergy ID date

GW3 – Risk Assessment

Tasks Prioritized in Accordance with Risks Associated with User Errors

<u>Anticipated Lowest Risk to Highest Risk Tasks, Associated with User Errors:</u>

1-Demographics
2-Implantable Device List
3-CPOE-Diagnostic Imaging
4-CPOE-Labs
5-CDS Alerts
6-Incorporate Clinical Info/CCDA
7-ePrescribing
8-Problem List
9-CPOE-Medications
10-Medication List
11-Medication Allergy List
12-Drug-Drug, Drug-Allergy Interaction Checking

According to test results, the most frequent mis-steps were seen in Demographics, CDS Alerts and CPOE-Medications. For Demographics, some users were challenged to revise a response part of a multi-selection list of choices which allowed for more than one response. Users initially revised and discovered they had two responses, instead of the requested, single response. For CPOE-Medications, some users struggled when revising the medication frequency. These users understood the correct response but were challenged with the functionality of the frequency choice fields.

Demographic errors, as noted during this testing, are likely to occur. However, the Demographics task was rated as the lowest risk. While having more than one Sexual Identity response may be an incorrect response for a given patient, it is less likely to create risk to medical care decisions.

CPOE-Medications task challenged users when revising frequency. The tasks had been highly rated for risk, as associated with user error. Errors with frequency entry are likely to occur, as the functionality seemed tricky, even for seasoned MOSAIQ users. The adverse consequence or frequency errors is patient safety. Patients potentially could receive an incorrect dose of medication, resulting in health problems.

For the CDS Alerts, some providers struggled with items such as understanding the differences between ignoring and deferring alert messages. As these messages provide valuable directives for patient care, it is important that providers know how and where the alerts will appear in the system and be used for communication. I see the likelihood of this error continuing, as providers would benefit from additional education regarding the terminology. Not addressing the CDS Alerts in a proficient manner could affect patient care decisions. Various alerts include directives related to reviewing/considering important information or placing orders.

Based upon recent testing, I could slightly revise the list of tasks:

Lowest Risk to Highest Risk Tasks, Associated with User Errors:

1-Demographics
2-Implantable Device List
3-CPOE-Diagnostic Imaging
4-CPOE-Labs
5-Incorporate Clinical Info/CCDA
6-ePrescribing
7-Problem List
8-CDS Alerts
9-CPOE-Medications
10-Medication List
11-Medication Allergy List
12-Drug-Drug, Drug-Allergy Interaction Checking

APPENDICES

The following appendices include supplemental data for this usability test report. Following is a list of the appendices provided:

1. Participant demographics
2. Elekta Moderator's Guide
3. Elekta Usability Scale Questionnaire
4. System Usability Scale Questionnaire

Appendix 1: PARTICIPANT DEMOGRAPHICS

The following demographics survey was obtained for each participant.

Participant Information

Participant #: _____

To better understand the results of this study, Elekta would like to ask you a small amount of information about you and your experience.

Age: ☐ 20-29

                ☐ 30-39

                ☐ 40-49

                ☐ 50-59

                ☐ 60-74

                ☐ 75 and older

Educational Level:_____

Profession: What is your professional title/role? Are you a nurse? For physicians - what is your specialty?

Years of experience in this profession:_____

Years of experience using MOSAIQ:_____

Years of computer experience:_____

Elekta

Appendix 2: ELEKTA MODERATOR'S GUIDE

Usability Test CPOE – Laboratory

CPOE – Lab (a)(2) Introduction

Thank you for participating in this study. Your input is very important. This portion of our session today will last about 10 minutes. During that time you will use an instance of MOSAIQ. 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. The aim is that by following the steps below the user can achieve the task(s) outlined below successfully. The intention of this test is not to test you or your skills but to test how usable MOSAIQ is with the current implementation.

During the test procedure, I will ask you to 'speak out loud', so that all the thoughts, questions and comments that are going through your mind while you follow the steps outlined below, can be recorded. This is very useful information to determine the efficacy and usability of MOSAIQ current implementation.

I will be here in case you need specific help, buy I am not able to instruct you or provide you with help in how to use the application.

Test Instructions

Goals:
Order lab tests
Change lab test orders
Access lab test orders

Patient: Test, Formulary

Steps: (3)
1. Order Lab Test
    a. Start in Chart workspace, Orders widget
    b. Add Order > Quick Orders
    c. Order a CBC w/Diff and Basic Metabolic Panel for today's date
    d. Return to the orders widget
2. Change Lab Test Orders
    a. Change the start date of the order to tomorrow's date
    b. Return to the orders widget
3. Access Lab Test Orders
    a. View lab orders for patient

Elekta

Usability Test CPOE – Diagnostic Imaging

CPOE – DI (a)(3) Introduction

Thank you for participating in this study. Your input is very important. This portion of our session today will last about 10 minutes. During that time you will use an instance of MOSAIQ. 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. The aim is that by following the steps below the user can achieve the task(s) outlined below successfully. The intention of this test is not to test you or your skills but to test how usable MOSAIQ is with the current implementation.

During the test procedure, I will ask you to 'speak out loud', so that all the thoughts, questions and comments that are going through your mind while you follow the steps outlined below, can be recorded. This is very useful information to determine the efficacy and usability of MOSAIQ current implementation.

I will be here in case you need specific help, buy I am not able to instruct you or provide you with help in how to use the application.

Test Instructions

Goals:
Order radiology orders
Access radiology orders

Patient: Test, Formulary

Steps: (2)
1. Order Radiology Orders
    a. Start in Quick Orders
    b. Order a CT Brain for today's date
    c. Return to the orders widget
2. Access Radiology Orders
    a. View Radiology Orders for patient
    b. Point to the order just created

Elekta

Usability Test CPOE – Medications

CPOE – Meds (a)(1) Introduction

Thank you for participating in this study. Your input is very important. This portion of our session today will last about 10 minutes. During that time you will use an instance of MOSAIQ. 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. The aim is that by following the steps below the user can achieve the task(s) outlined below successfully. The intention of this test is not to test you or your skills but to test how usable MOSAIQ is with the current implementation.

During the test procedure, I will ask you to 'speak out loud', so that all the thoughts, questions and comments that are going through your mind while you follow the steps outlined below, can be recorded. This is very useful information to determine the efficacy and usability of MOSAIQ current implementation.

I will be here in case you need specific help, buy I am not able to instruct you or provide you with help in how to use the application.

Test Instructions

Goals:
    Enter a medication order
    Change a medication order
    Access a medication order

Patient: Test, Formulary

Steps: (3)
1. Enter a medication order from Favorite Prescriptions
   a. Click on the Pharmacy toolbar icon
   b. Click Add / From Favorites
   c. Order Amoxicillin (500 mg) three times per day
   d. Select for Patient
2. Change this just-created Amoxicillin order from Pharmacy Order List
   a. Click on the Pharmacy Ordering tab
   b. Find the just-created Amoxicillin order and change the frequency to BID
   c. Save changes
3. View the created medication order in Pharmacy Order List
   a. In Pharmacy Order List, point to the medication order

Elekta

Usability Test Drug Interaction Checking

Drug Interaction (a)(4) - Introduction

Thank you for participating in this study. Your input is very important. Our session today will last about 10 minutes. During that time you will use an instance of MOSAIQ. 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. The aim is that by following the steps below the user can achieve the task(s) outlined below successfully. The intention of this test is not to test you or your skills but to test how usable MOSAIQ is with the current implementation.

During the test procedure, I will ask you to 'speak out loud', so that all the thoughts, questions and comments that are going through your mind while you follow the steps outlined below, can be recorded. This is very useful information to determine the efficacy and usability of MOSAIQ current implementation.

I will be here in case you need specific help, buy I am not able to instruct you or provide you with help in how to use the application.

Test Instructions

Goal Clinical User:
- Generate drug-drug interaction messages
- Generate drug-allergy interaction messages
- Acknowledge interaction messages, (password is *pass*)

Patient: Test, Allergy_Vitals

Steps: (3)
1. Pharmacy, Add From Favorites
   a. Select the Amoxicillin order – Select Approved
   b. Acknowledge interaction checking message that displays
2. Add From Favorites
   a. Select Simvastin – Select Approved
   b. Acknowledge interaction checking message that displays
3. Add From Favorites
   a. Select Penicillin – Select Approved
   b. Acknowledge interaction checking message that displays

Non-Clinic User:
Show that drug interaction severity levels may be changed; get feedback on setting

Steps: (1)

1. **File | System Utilities | Department Set Up,** Clinical General tab-change the drug interaction checking severity to "Contraindicated"

Usability Test Maintain Medication List

Med List (a)(7)- Introduction

Thank you for participating in this study. Your input is very important. Our session today will last about 10 minutes. During that time you will use an instance of MOSAIQ. 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. The aim is that by following the steps below the user can achieve the task(s) outlined below successfully. The intention of this test is not to test you or your skills but to test how usable MOSAIQ is with the current implementation.

During the test procedure, I will ask you to 'speak out loud', so that all the thoughts, questions and comments that are going through your mind while you follow the steps outlined below, can be recorded. This is very useful information to determine the efficacy and usability of MOSAIQ current implementation.

I will be here in case you need specific help, buy I am not able to instruct you or provide you with help in how to use the application.

Test Instructions

Note: this is where you provide the users the task(s) to be performed in a pre-arranged adequate data set containing all the elements necessary to perform the task(s). It is suggested to select the top 3 critical tasks that best describe the area to be tested. Please note to provide the task but not the how to perform the task(s).

Goals:
Add a medication to the patient's medication list
Change a medication in the medication list
Access the patient's medication list

Patient: Test, Formulary

Steps: (4)
1. Chart | Medication List
   a. Add a drug with a strength, Advair 250 McG inhaler, 1 puff, twice per day
   b. Save the changes
2. Modify this Advair order to show the patient is taking it once per day
3. Show how to change the filters to display the active medication list
4. Display the historical (reconciliation) medication list

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Usability Test Allergies

Allergies (a)(8) - Introduction

Thank you for participating in this study. Your input is very important. This portion of our session today will last about 10 minutes. During that time you will use an instance of MOSAIQ. 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. The aim is that by following the steps below the user can achieve the task(s) outlined below successfully. The intention of this test is not to test you or your skills but to test how usable MOSAIQ is with the current implementation.

During the test procedure, I will ask you to 'speak out loud', so that all the thoughts, questions and comments that are going through your mind while you follow the steps outlined below, can be recorded. This is very useful information to determine the efficacy and usability of MOSAIQ current implementation.

I will be here in case you need specific help, buy I am not able to instruct you or provide you with help in how to use the application.

Test Instructions

Note: this is where you provide the users the task(s) to be performed in a pre-arranged adequate data set containing all the elements necessary to perform the task(s). It is suggested to select the top 3 critical tasks that best describe the area to be tested. Please note to provide the task but not the how to perform the task(s).

Goals:
Enter an allergy
Modify an allergy
Access the patient's allergy list
Display the active medication allergy list
Display the historical (reconciled) medication allergy list

Patient: Test, Formulary

Steps: (6)
1. From Allergies, add no known drug allergies (NKDA) for the patient
2. Enter a medication allergy for Nyquil that results in severe hives
    a. Save the entry
    b. Close the widget to return to chart
3. Access the allergy list
4. Change this Nyquil allergy to indicate a reaction of mild breathing difficulties
5. Point out the filter for Active status
6. Show where to find the historical (reconciled) medication allergy list

Usability Test Demographics

Demographics(a)(5) - Introduction

Thank you for participating in this study. Your input is very important. Our session today will last about 10 minutes. During that time you will use an instance of MOSAIQ. 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. The aim is that by following the steps below the user can achieve the task(s) outlined below successfully. The intention of this test is not to test you or your skills but to test how usable MOSAIQ is with the current implementation.

During the test procedure, I will ask you to 'speak out loud', so that all the thoughts, questions and comments that are going through your mind while you follow the steps outlined below, can be recorded. This is very useful information to determine the efficacy and usability of MOSAIQ current implementation.

I will be here in case you need specific help, buy I am not able to instruct you or provide you with help in how to use the application.

Test Instructions

Goals:
Add Gender Identification and Sexual Orientation responses
Change Gender Identification and Sexual Orientation responses
Access, add and modify date of birth, race, ethnicity, birth sex, and preferred language

Patient name = Formulary, Test

Steps: (3)

1. Access Demographics, Personal tab
    a. Add a date of birth - September 20 1950
    b. Add a race – Japanese
    c. Add gender identification – Declined to answer
    d. Add sexual orientation – Declined to answer
    e. Add birth sex - female
    f. Add ethnicity - Not Hispanic/ Latino
    g. Add preferred language - English
2. Save
3. Access Demographics, Personal tab – confirm the data is what you previously entered
    a. Change date of birth to November 10 1950
    b. Change race to Asian
    c. Add gender identification to Genderqueer
    d. Add sexual orientation to Don't Know
    e. Change birth sex to male
    f. Change ethnicity to Declined to Specify
    g. Change preferred language to French

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Usability Test Diagnosis/Problem List

Diagnosis/Problem List (a)(6) - Introduction

Thank you for participating in this study. Your input is very important. Our session today will last about 10 minutes. During that time you will use an instance of MOSAIQ. 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. The aim is that by following the steps below the user can achieve the task(s) outlined below successfully. The intention of this test is not to test you or your skills but to test how usable MOSAIQ is with the current implementation.

During the test procedure, I will ask you to 'speak out loud', so that all the thoughts, questions and comments that are going through your mind while you follow the steps outlined below, can be recorded. This is very useful information to determine the efficacy and usability of MOSAIQ current implementation.

I will be here in case you need specific help, buy I am not able to instruct you or provide you with help in how to use the application.

Test Instructions

Goals:
Add a problem on the Problem List
Change a problem on the Problem List
Display active Problem List
Display historical problem list, (reconciled problem list)

Patient: Test, Formulary

Steps: (4)
1. Access **Chart**, Diagnosis and Problem List tab
    a. Add Essential hypertension, unspecified
    b. Click OK
2. Open the created entry for hypertension
    a. Revise the response for Status or Consultation (date)
    b. Save changes
3. Disregarding the Diagnoses filter settings, display only Active status Problems
4. Display the historical problem list, (reconciled problem list)

Usability Test Implantable Devices

Implantable Devices (a)(14) - Introduction

Thank you for participating in this study. Your input is very important. Our session today will last about 10 minutes. During that time you will use an instance of MOSAIQ. 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. The aim is that by following the steps below the user can achieve the task(s) outlined below successfully. The intention of this test is not to test you or your skills but to test how usable MOSAIQ is with the current implementation.

During the test procedure, I will ask you to 'speak out loud', so that all the thoughts, questions and comments that are going through your mind while you follow the steps outlined below, can be recorded. This is very useful information to determine the efficacy and usability of MOSAIQ current implementation.

I will be here in case you need specific help, buy I am not able to instruct you or provide you with help in how to use the application.

Test Instructions

Goals:
Record an implantable device record obtained from FDA
Obtain UDI
Add a UDI
Change a UDI status
Access UDI, device description, identifiers, and attributes

Patient: Test, Formulary

Steps: (4)
1. From Demographics, access Admit Note
   a. Copy the number string listed and close the Note
2. Chart workspace, Implantable Device tab to access Implantable Devices pane
   a. Select **Add**
   b. Paste UDI into UDI field
   c. Select Get Device Info
   d. Add Implant Date
   e. Ensure that Status is Active
   f. Save
3. Open the just-created device entry
   a. Change the Status to Inactive or Voided
   b. Create and then select a reason of "device removed"
   c. Select Inactive Status
4. Save

Usability Test CDS Alerts

CDS Alerts (a)(9) - Introduction

Thank you for participating in this study. Your input is very important. Our session today will last about 30 minutes. During that time you will use an instance of MOSAIQ. 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. The aim is that by following the steps below the user can achieve the task(s) outlined below successfully. The intention of this test is not to test you or your skills but to test how usable MOSAIQ is with the current implementation.

During the test procedure, I will ask you to 'speak out loud', so that all the thoughts, questions and comments that are going through your mind while you follow the steps outlined below, can be recorded. This is very useful information to determine the efficacy and usability of MOSAIQ current implementation.

I will be here in case you need specific help, buy I am not able to instruct you or provide you with help in how to use the application.

Test Instructions

In this test we are going to test the usability of our CDS Alerts feature. The tester will cause an alert to be triggered so that there is no confusion regarding setting up the scenario that causes the alert, with responding to the alert. There will be simple steps for you to take for various alerts. The alerts we are going to show are based on patient problems, medication list, allergies, demographics, lab results, vital signs and a combination of those attributes. This test also includes using CDS alerts that are triggered during reconciliation of the data in the patient's problems, medications and allergies during incorporation of a CCDA.

CDS Alerts Usability

Goals Clinical User:
Determine whether the user understands what the alert is conveying
Identify what actions the user understands they can take against the alert including the ability to access the Infobutton

Steps:
1. Open patient CDS, Problem; access CWS / Care Plan; select the first care plan on the list
   Click OK

   What is the alert all about?
   What actions can the user take?
   Is there more information about the clinical decision support rule available to the user?
   Can you find the reference that explains why the rule has fired?
   Indicate that you want to deal with the alert later

2. Open patient CDS, MedList; access the Chart | Medication List
   Reconcile the Medication List

   What is the alert all about?

What actions can the user take?
Is there more information about the clinical decision support rule available to the user? Infobutton
Can you find the reference that explains why the rule has fired?

After writing a comment about the alert, indicate that you want to send the alert to another user

3. Open patient CDS, Demographics

   What is the alert all about?
   What actions can the user take?
   Can you find the reference that explains why the rule has fired?

   Indicate that you do not want to deal with this alert for this patient

4. Open patient CDS-Allergy; access Chart / Medication List

   Click Reconcile – the alert for colon cancer will appear
   What is the alert all about?
   Point to the reference

   Tester Explain: We are going to add an exclusion to show that the rule will not fire when the patient is allergic to a drug used in the treatment of colon cancer
   Select Document Assessment
   In the Exclusions-Chemo for Colon Ca section, add Drug allergy to the Medical Reasons (Colon Ca)
   – click Defer
   User: Return to Medication List / click Reconcile
   Why does the alert not appear?

5. Open patient CDS-DxColon-CEA
   Select Review Chart from the toolbar

   What is the alert all about?
   Point to the reference that explains why the alert has fired

   Tester: This alert displays when a patient has a colon cancer diagnosis and is missing a CEA value
   Select Document Assessment
   For CEA, add the value of 1
   Select Reviewed and Save
   Select Reconcile-(Note that that the alert does not display)

6. Open patient CDS-BMI-PSA, Chart
   Enter Vital signs- height of 65, weight of 190
   Click Reviewed

   Tester:
   What actions can the user take?
   Can you find the reference that explains why the rule has fired?

   Indicate that you do not want to deal with this alert for this patient

7. (Stay with patient CDS-BMI-PSA, Chart)
   Access Home workspace
   Highlight CDS Alerts in the Consolidated Worklist
   In Work Lists for CDS Alerts, highlight an alert with a Pending Resolved Status

   What actions can you take for this alert? Where are these actions displayed?

8. Tester explain: We are going to test CDS Alerts during the incorporation of a CCDA. I have already accessed the CCDA for the patient and I am displaying the window to incorporate medications. The CCDA Medications are on the left and the MOSAIQ Medications on the right.

Incorporate the medications
Click Reconcile

Tester:
What is the alert about? (the patient has stage III breast cancer and the alert is recommending an Aromatase Inhibitor be prescribed)
Is the CDS Alert that appears consistent with previous alerts you have seen?
Confirm your understanding of the Infobutton

9. Tester explain: The next patient has stage IIIC colon cancer and two alerts will be triggered during incorporation of a CCDA. We will start on the Mediations tab again with the CCDA Medications on the left and the MOSAIQ medications on the right.

    Incorporate the medications
    Click Reconcile

    Click to the Allergies Incorporate window
    Incorporate the Allergies
    Click Screen

    Tester:
    What is this Alert telling you?
    What actions can the user take?
    Can you find the reference for why the rule has fired?

10. Click to the Diagnosis and Problems Incorporate window

    Incorporate the problems
    Click Reconcile

    Tester:
    What actions can the user take?
    Does the message make it clear why the alert was triggered?
    Point to the reference
    Point to the Infobutton

Goals for Non-Clinic Users:

Determine what CDS alert rules can be configured
Find the configuration options
Tester explanation: The CDS Alerts are configured in MOSAIQ Customization.

Test Steps: (4)

1. Access **File | System Utilities | IQ Engine Configuration**
2. From the scripts displayed, identify the displayed CDS Alert scripts from the regular IQ Scripts
3. Identify the information that describes what the CDS Alert pertains to
4. How would you set up the alert for missing diagnosis details when putting the patient on a care plan so that it will fire for the desired users in your department?

Elekta

Usability Test E-Prescribing

ePrescribe (b)(3) - Introduction

Thank you for participating in this study. Your input is very important. Our session today will last about 15 minutes. During that time you will use an instance of MOSAIQ. 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. The aim is that by following the steps below the user can achieve the task(s) outlined below successfully. The intention of this test is not to test you or your skills but to test how usable MOSAIQ is with the current implementation.

During the test procedure, I will ask you to 'speak out loud', so that all the thoughts, questions and comments that are going through your mind while you follow the steps outlined below, can be recorded. This is very useful information to determine the efficacy and usability of MOSAIQ current implementation.

I will be here in case you need specific help, buy I am not able to instruct you or provide you with help in how to use the application.

Test Instructions

Goals:
Create new prescription
Change prescription (dosage or duration)
Cancel prescription
Refill prescription
Receive fill status notification
Request and receive medication history information

Patient name = Whiteside, Kara   MR#: eTxCert-6

Steps: (6)

1. Enter a medication order from Favorite Prescriptions
a. From Pharmacy, Add, From Favorites
b. Order Amoxicillin (500mg) three times per day
c. Approve the order

2. Change prescription (dose or duration) – (scenario: script returned from patient pharmacy)
a. Access ePrescription Work List pane
c. Filter for Transaction Type of Change Request
d. Open order for Biscayne, Sophia
e. Approve with Changes
f. Make a revision to any field
g. Save

Patient name = Whiteside, Kara   MR#: eTxCert-6

3. Cancel prescription
a. Access Pharmacy Order List
d. Select one of the Lipitor orders which has an eRx Status of Processing by SureScripts
e. Select Cancel ePrescription
f. See message regarding provider and select OK

Patient name = Whiteside, Kara   MR#: eTxCert-6

4. Refill prescription
a. Access ePrescription Work List pane
b. Filter for Transaction Type of Refill Request
e. Select and open one of the Lipitor orders which has an eRx Status of Refill Request
f. Approve the Refill Request

Patient name = Whiteside, Kara   MR#: eTxCert-6

5. Receive fill status notification
a. Access eRx Work List
b. Point out where to change Transaction Type

6. Request and receive medication history information
a. **eChart Orders | Medication List**
b. Select eRx Hx to see medication history

Usability Test Incorporate Clinical Information

Clinical Information - CCDA(b)(2) - Introduction

Thank you for participating in this study. Your input is very important. Our session today will last about 10 minutes. During that time you will use an instance of MOSAIQ. 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. The aim is that by following the steps below the user can achieve the task(s) outlined below successfully. The intention of this test is not to test you or your skills but to test how usable MOSAIQ is with the current implementation.

During the test procedure, I will ask you to 'speak out loud', so that all the thoughts, questions and comments that are going through your mind while you follow the steps outlined below, can be recorded. This is very useful information to determine the efficacy and usability of MOSAIQ current implementation.

I will be here in case you need specific help, buy I am not able to instruct you or provide you with help in how to use the application.

Test Instructions

Goals:
Review a patient's medication, allergies and problems lists on receipt of a CCDA
Incorporate received data into patient's existing chart
Reconcile each list
Generate (Preview) a CCDA

Patient: Barrett, Helen

Steps: (5)

1. **Tools | Incorporate Clinical Information**, select Barrett, Helen
   a. In Document Association, scroll through the Patient Summary, noting the information in Medications, Medication
   b. Allergies, and Problem List

2. Access the next screen (Medication List) see the first list to reconcile
   a. Show how to add matched incoming medications to the existing MOSAIQ medication list
   b. Reconcile the MOSAIQ Medication List

3. Access the second list to reconcile; (note there are no incoming medication allergies or existing medication allergies on this patient's chart)
   a. Reconcile the MOSAIQ Allergies List

4. Access the third list to reconcile
   a. Show how to add matched incoming problems to the Diagnoses and Problems List
   b. Identify how to modify an existing MOSAIQ diagnosis
   c. Reconcile the MOSAIQ Diagnoses and Problems List

5. **eChart | CCDA Manual Export,** (still working with Helen Barrett)
   a. For CCDA Destination, select Device/File
   b. Select Preview

c. When CCDA appears, scroll through the various sections
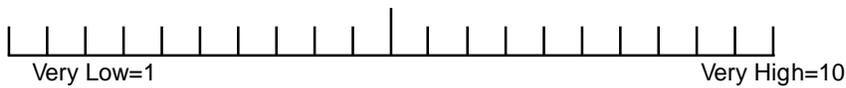d. Point to the **Export** command

Elekta

Appendix 3: ELEKTA USABILITY SCALE QUESTIONNAIRE
Questionnaire 1

Participant #: _____

On a scale of 1-10, indicate your experience of the task you just completed.

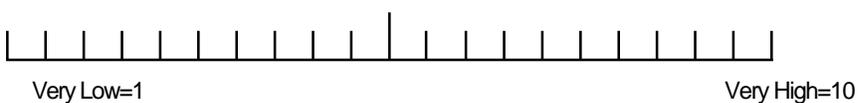**Mental Demand**   How mentally demanding was the task?

Very Low=1   Very High=10

Physical Demand   How physically demanding was the task?

Very Low=1   Very High=10

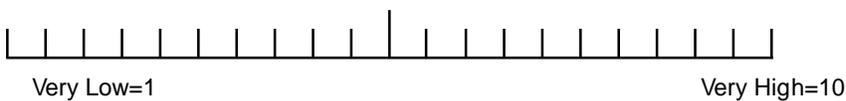**Temporal Demand**   How hurried or rushed was the pace of the task?

Very Low=1   Very High=10

Performance   How successful were you in accomplishing what you were asked to do?

Very Low=1   Very High=10

Effort   How hard did you have to work to accomplish your level of performance?

Very Low=1   Very High=10

Frustration   How insecure, discouraged, irritated, stressed, and annoyed were you?

Elekta

Appendix 4: SYSTEM USABILITY SCALE QUESTIONNAIRE

*In 1996, Brooke published a "*low-cost usability scale that can be used for global assessments of systems usability*" known as the System Usability Scale or SUS.*[16]   *Lewis and Sauro (2009) and others have*

elaborated on the SUS over the years. Computation of the SUS score can be found in Brooke's paper, in at http://www.usabilitynet.org/trump/documents/Suschapt.doc *or in Tullis and Albert (2008).*

	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 |