EDUCD - EDIMS USER CENTERED DESIGN
UCD DOCUMENT

8/15/2018

ENVISION PHYSICIAN SERVICES
3 CENTURY DRIVE
PARSIPPANY, NEW JERSEY 07054

CONTENTS

1. INTRODUCTION

User-Centered Design (UCD) is the process of designing a tool/user interface, from the perspective of how it will be understood and used by a human user. The result of employing UCD to a system design is a product that offers a more efficient, satisfying, and user-friendly experience for the user.

EDIMS delivers evidence-based best practices to emergency departments through its interoperable information systems by following User-Centered Design practices for its products. The EDIMS user Centered design document is being referred to as EDUCD.

The EDUCD model follows the ISO 9241-210 [1] standard which describes 6 key principles that will ensure a design is user centered:

1. The design is based upon an explicit understanding of tasks of users.
2. Users are involved throughout design and development.
3. The design is driven and refined by user-centered evaluation.
4. The process is iterative.
5. The design addresses the whole user experience.
6. The design team includes multidisciplinary skills and perspectives.

The EDUCD has followed these key principles in creating its EDIMS product.

2. PURPOSE

EDUCD is based on a detailed understanding of EDIMS clients and the users of its product. EDIMS product users are involved in the design and development phases of the Software Development Life Cycle (SDLC) in order to provide a better understanding of the user experience.

The purpose of EDUCD is that it requires our designers to analyze how a user is likely to use the EHR but also to test the validity of their assumptions with regards to user behavior - in real world tests, with actual users. In addition, it helps to determine answers to questions such as, 'Who *are* the users of the product", "What are *their* goals and needs", "What *are* the different user experience levels likely to use our product".

3. ELEMENTS

3.1 Visibility

Visibility of EDIMS functionality is one of the essentials during the EDUCD process. The User Manuals, EDIMS Help menu item and the product itself give a clear

[1] International Organization for Standardization, Published 2010-03-15 (Reviewed and confirmed in 2015), http://www.iso.org/iso/home.htm

understanding of what functions the product is, and is not, able to perform in a clinical setting.

3.2 Accessibility

In order to achieve ease of accessibility the EDIMS product contains multiple methods of achieving any given task via selection of clearly marked menu items, context menu selections, tab selections and / or short-cut key use. The 'Help' menu item allows the user various methods of obtaining desired information via the Table of Contents, Index and / or utilizing the Search functionality.

3.3 Legibility

EDUCD has been essential in determining the selection of font, point size, and the use of color-coding and contrast to allow the EHR to be as easy to use as possible.

3.4 Language

The use of EDUCD has allowed the development of an EHR that, dependent upon the user role - and the function being performed, is clear and concise using as little industry jargon or technical terms as possible.

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4. ANALYSIS/DESIGN TOOLS USED

4.1 User's Requirement

User's requirements are gathered and analyzed to reach the final set of requirements to be used in development of the product.

4.2 Scenario/Test Plan

Different virtual scenarios are created by the designers from a set of organized data to allow better understanding of the types of situations an end user will encounter utilizing the EDIMS EHR.

4.3 Use Case/Test Case

Use cases are written to identify useful levels of design work. EDUCD uses Use Cases where there is a need to represent a complicated task in simpler details.

4.4 Proto-typing

EDUCD also uses prototyping techniques where the use of a 'working model' may help ascertain the end user's needs in a more productive manner. It is also used to test a concept, or data, from real world scenarios whenever needed.

EDUCD - EDIMS USER CENTERED DESIGN

REPORT BASED ON ISO/IEC 25062:2006 COMMON INDUSTRY FORMAT FOR USABILITY TEST REPORTS

EDIMS Version 2.6.3

Date of Usability Test: October 18 – 20, 2016*

Date of Report: November 10, 2016*

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ENVISION PHYSICIAN HEALTHCARE
3 CENTURY DRIVE
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CONTENTS

1. Executive Summary

A usability test of EDIMS, v2.6.3, modular in-patient EHR was conducted on October 18, 2016 through October 20, 2016 in the EMA Office at 3 Century Drive, Parsippany, NJ by EDIMS. 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, thirty (30) healthcare providers matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

This study collected performance data on four (4) groups of tasks typically conducted in EDIMS:

- CPOE (Computerized Provider Order Entry) usability.
- Drug Interaction Checking usability.
- Medication Allergy List usability.
- Medication List usability.

During the seventy-five (75) minute one-on-one usability test, each participant was greeted by the administrator and asked to review and sign an informed consent (see 6.3); they were instructed that they could withdraw at any time. Participants had experience with a previous certified edition of EDIMS. The administrator introduced the test, and instructed participants to complete a series of tasks using EDIMS. During the testing, the administrator timed the test and, along with the data logger recorded user performance data on paper and electronically. The administrator did not give the participant assistance in how to complete the task.

The following types of data were collected for each participant:

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

All participant data was de-identified. Following the conclusion of the testing, participants were asked to complete a post-test questionnaire and were not compensated by EDIMS 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 EDIMS. The following table is an overall summary of the performance and rating data collected on EDIMS Full Suite v2.6.3.

Measure / Task	*N*	Task Success	Path Deviation	Task Time		Errors	Task Ratings 5=Easy
	#	Mean % (SD)	Deviations # (mean Observed / Optimal)	Mean (seconds) (SD)	Deviations (mean seconds) (Observed / Optimal)	Mean % (SD)	Mean # (SD)
CPOE usability	15	100% (0%)	0 (13/13)	22 (13)	0 (22/15)	15% (36%)	4.2 (0.40)
Drug interaction checking usability	15	100% (0%)	0 (23/23)	15 (6)	0 (15/23)	10% (30.51%)	4.2 (0.40)
Medication allergy list usability	15	100% (0%)	0 (5/5)	28 (10)	0 (28/45)	15.55% (42.4%)	4.1 (0.83)
Medication list usability	15	100% (0%)	0 (6/6)	32 (11)	0 (32/45)	20% (45.72%)	4.5 (0.54)

Table 1: Overall Metric Scoring

The results from the System Usability Scale administered after each session scored the subjective satisfaction with the system based on performance with these tasks to be: 80[2].

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

- Major findings
  - The EDIMS Full Suite EHR presents multiple methods of performing many tasks. The path and task time deviations noted in this study resulted in a 100% task success rate. In many cases, familiarity with the system resulted in obvious participant preference of method of task completion over another. No participants deviated to the point of task failure. Errors were calculated using those deviations but do not, technically, represent errors in task failure, or correctness.
- Areas for improvement
  - Many of the participants communicated their desire to see improvements made in the following areas:
    - Improved method of editing orders
    - Development of a more 'EDIM-like', 'intuitive', 'friendlier' e-Prescription module
    - Higher 'visibility' of pre-existing medication allergies
    - A simpler method of entering current medications

[2] See 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. Introduction

The EHRUT(s) tested for this study was EDIMS Full Suite, v2.6.3. Designed to present medical information to healthcare providers in Emergency Departments, EDIMS Full Suite consists of the Emergency Department Patient Documentation system utilized to record all Emergency Department patient encounter activity; i.e., collecting everything from the patients Triage data to Order Entry and Note capture to the completion of their Emergency Department visit. 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 EDIMS. To this end, measures of effectiveness, efficiency and user satisfaction, such as task completion time, ease of task completion ratings, etc. were captured during the usability testing.

3. Method

3.1 Participants

A total of thirty (30) participants were tested on EDIMS Full Suite. Participants in the test were Physicians, Mid-Level Practioners (PA's and NP's), and Nurses all familiar with or currently using a previously certified version of EDIMS in clinical settings. Participants were recruited by EMA and / or their clinical leadership and were not compensated for their time. In addition, participants had no direct connection to the development of the EHRUT.

For the test purposes, end-user characteristics were identified and a recruitment screener used to solicit participants; a copy of the EDIMS recruitment screener is provided in the Appendix [see 6.1]. Recruited participants had a mix of backgrounds and demographic characteristics conforming to the recruitment screener. The following is a table of participants by characteristics, including demographics, professional and computing experience (listed in months). Participant names were replaced with Participant IDs to ensure anonymity.

	Part. ID	Gender	Age	Education	Occupation / Role	Professional Experience	Computer Experience	Product Experience
1	537235	Female	50-59	Doctorate degree (e.g., MD, DNP, DMD, PhD)	MD	264	240	240
2	317434	Female	60-69	Doctorate degree (e.g., MD, DNP, DMD, PhD)	MD	348	240	240
3	361468	Male	30-39	Doctorate degree (e.g., MD, DNP, DMD, PhD)	MD	144	312	180
4	702082	Female	40-49	Associate degree	RN	180	120	60
5	782695	Female	20-29	Bachelor's Degree	RN	60	180	36
6	385638	Male	50-59	Bachelor's Degree	RN	360	240	72
7	606942	Male	60-69	Master's Degree	Physician's Assistant	240	240	48
8	993334	Female	60-69	Bachelor's Degree	RN	225	180	24
9	864246	Female	50-59	Doctorate degree (e.g., MD, DNP, DMD, PhD)	MD	234	234	234
10	353522	Male	30-39	Bachelor's Degree	RN	168	240	48

	Part. ID	Gender	Age	Education	Occupation / Role	Professional Experience	Computer Experience	Product Experience
11	844984	Male	50-59	Associate degree	RN	120	120	12
12	149422	Female	40-49	Associate degree	RN	158	300	60
13	147332	Male	30-39	Master's Degree	Physician's Assistant	175	335	48
14	802222	Female	30-39	Doctorate degree (e.g., MD, DNP, DMD, PhD)	MD	115	300	48
15	187345	Male	30-39	Doctorate degree (e.g., MD, DNP, DMD, PhD)	MD	147	300	84
16	736428	Male	60-69	Master's Degree	Physician's Assistant	364	240	30
17	457939	Female	60-69	Associate degree	RN	369	240	34
18	966083	Male	30-39	Master's Degree	Nurse Practitioner	133	240	48
19	943330	Male	40-49	Bachelor's Degree	RN	192	240	43
20	746175	Female	50-59	Doctorate degree (e.g., MD, DNP, DMD, PhD)	MD	279	279	26
21	247092	Female	50-59	Master's Degree	Nurse Practitioner	423	288	27
22	217915	Male	30-39	Bachelor's Degree	RN	159	180	33
23	293825	Female	20-29	Bachelor's Degree	RN	39	180	39
24	624765	Female	40-49	Bachelor's Degree	RN	237	180	53
25	575154	Female	60-69	Doctorate degree (e.g., MD, DNP, DMD, PhD)	MD	460	300	240
26	914128	Male	50-59	Bachelor's Degree	RN	109	120	37
27	819426	Female	50-59	Bachelor's Degree	RN	235	180	26
28	373099	Female	40-49	Master's Degree	Nurse Practitioner	234	264	180
29	272522	Male	60-69	Bachelor's Degree	RN	504	96	42
30	365371	Male	60-69	Doctorate degree (e.g., MD, DNP, DMD, PhD)	MD	336	300	29

Table 2: Participant Data

Thirty (30) participants were recruited and thirty (30) participated in the usability test. No participants failed to show for the study.

Participants were scheduled for seventy-five (75) minute sessions with ten (10) minutes in between each session for debriefing by the administrator and data logger, and to reset systems to proper test conditions. A spreadsheet was used to keep track of the participant schedule, and included each participant's demographic characteristics.

3.2 Study Design

Overall, the objective of this test was to uncover areas where the application performed well and areas where the application failed to meet the needs of the participants while also identifying areas where improvements must be made.

During the usability test, participants interacted with EDIMS Full Suite v2.6.3. Each participant used the system in the same location, and was provided with the same instructions. The system was evaluated for effectiveness, efficiency and satisfaction as defined by measures collected and analyzed for each participant:

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

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

3.3 Tasks

Tasks were constructed to be realistic and representative of the typical activities a user might complete using EDIMS Full Suite. Scenarios, and tasks, were segregated by typical users (i.e., Provider tasks were assigned to Provider participants and Nursing tasks were assigned to Nursing participants).

Tasks were selected based upon a combination of risk analysis and frequency of use, and criticality of function. Tasks were constructed in light of the study objectives and formatted in Use Case scenarios outlined in NISTIR 7804-01[3] . The scenarios were split into tasks that are directly measurable components related to ONC provided criteria, and performed as outlined below. Full scenarios are provided in the Appendix (see 6.5)

[3] NITIR 7804-01 Technical Evaluation, Testing and Validation of the Usability of Electronic Health Records: Empirically Based Use Cases for Validating Safety-Enhanced Usability and Guidelines for Standardization

3.3.1 Physician Tasks

Scenario 1: Patrick is a 47-year-old male who presents to the ED complaining of back pain after moving heavy furniture today.

Task 1: Issue an order for ibuprofen 600mg PO one time

- §170.315(a)(1) Computerized provider order entry – Medications

Task 2: Cancel ibuprofen 600mg PO one-time order, issue an order for ibuprofen 400mg PO one time and review medication orders.

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

Scenario 2: Kenneth is a 56-year-old male with a history of Asthma, Bronchitis, Angina, Hypertension, GERD and Erectile Dysfunction who presents to the ED with a PulsOx of 96% complaining of shortness of breath and cough for a week.

Task 3: Issue orders for albuterol 2.5mg via HFN, Chest X-Ray, PA & Lateral, 2 View and a CBC. Assess drug-drug, drug-allergy interactions and act accordingly.

- §170.315(a)(4) Drug-drug, drug-allergy interaction checks
- §170.315(a)(2) Computerized provider order entry—Laboratory
- §170.315(a)(3) Computerized provider order entry—Diagnostic imaging

Task 4: Cancel the Chest X-Ray, PA & Lateral, 2 View and CBC order, and issue orders for a Chest, Portable as well as a CBC w/Micro, CMP, and Cardiac Panel and review all issued orders.

- §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

Task 5: Issue orders for an initial dose of Augmentin 500/125mg PO one time. Assess any drug-drug, drug-allergy interactions and act accordingly.

- §170.315(a)(4) Drug-drug, drug-allergy interaction checks

Task 6: At discharge prescribe a 2-day supply of NitroStat 0.3 mg SL every 5 minutes up to 3 times at the first sign of angina and Protonix 40 mg. PO daily. Assess and drug-drug, drug-allergy interactions and act accordingly.

- §170.315(a)(4) Drug-drug, drug-allergy interaction checks

3.3.2 Nursing Tasks

Scenario 1: Kenneth is a 56-year-old male with a history of Asthma, Bronchitis, Angina, Hypertension, GERD and Erectile Dysfunction who presents to the ED with a PulsOx of 96% complaining of shortness of breath and cough for a week.

Task 1: Add medication allergy and severity to medication allergy list and verify new medication allergy.

- §170.315(a)(8) Medication allergy list

Task 2: Delete medication allergy, document reasons and verify deletion.

- §170.315(a)(8) Medication allergy list

Task 3: Update the patients existing allergy and verify modifications.

- §170.315(a)(8) Medication allergy list

Task 4: Update medication list and verify new medications

- §170.315(a)(7) Medication list

Scenario 2: Sonya is a 42-year-old female with a history of Type II Diabetes Mellitus who presents to the ED complaining of ankle pain after a fall.

Task 4: Update medication list and verify new medications

- §170.315(a)(7) Medication list

Task 5: Delete discontinued medication and verify deletion

- §170.315(a)(7) Medication list

Task 6: Update current medication list and verify modification

§170.315(a)(7) Medication list

3.4 Procedures

Upon arrival, participants were greeted; their identity was verified and matched with a name on the participant schedule. Participants were then assigned a randomly generated participant ID. Each participant reviewed and signed an informed consent form (See Appendix 6.3).

The administrator moderated the session including administering instructions and tasks. The administrator also monitored task times, obtained post-task rating data, and took notes on participant comments. 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:

- At their normal pace.
- Without assistance.
- Without commenting until the test was completed.

The participants were given a written copy of each Scenario and its attendant tasks. Task timing began once the administrator finished reading the question. The task time was stopped once the participant indicated they had successfully completed the task. Scoring is discussed below in Section 3.9.

Following the session, the administrator gave the participant the post-test questionnaire (e.g., the EDIMS System Usability Scale Questionnaire, see Appendix 6.6) and thanked each individual for their participation.

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

3.5 Test Location

The test facility included a waiting area and a quiet testing room with a table, computer for the participant, and recording computer for the administrator. Only the participant, administrator and data logger were in the test room. To ensure that the environment was comfortable for users, noise levels were kept to a minimum with the ambient temperature within a normal range.

3.6 Test Environment

EDIMS Full Suite would typically be used in an Emergency Department setting. In this instance, the testing was conducted in the EMA Headquarters. For testing, the computer used was a Dell OptiPlex 9020 running Windows 7. The participants used both a mouse and keyboard when interacting with EDIMS.

The display utilized during testing was a Samsung SyncMaster B2430H 24 inch 1920 x 1080 resolution monitor utilizing the Samsung – Natural Color Pro settings. The application was set up by EDIMS according to EDIMS documentation describing the system set-up and preparation. The application itself was running on a Windows platform using a QA database on a LAN connection. Technically, the system performance 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 or color.

3.7 Test Forms and Tools

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

- EDIMS Informed Consent (see 6.3)
- EDIMS Usability Testing Moderator's Guide (see 6.4)
- EDIMS System Usability Scale Questionnaire (see 6.6)

3.8 Participant Instructions

The EDIMS Moderator followed the Moderator Guide and read the statements and instructions aloud to each participant before administering the test (see 6.4).

During testing each scenario and group of tasks were read aloud by the moderator and provided, on paper, to the participant for reference.

3.9 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. As such, metrics for these measures captured during the usability testing.

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

4. Data Scoring

The following table (Table 3) details how tasks were scored, errors evaluated, and the time data analyzed.

Measures	Rationale and Scoring
Effectiveness: Task Success	A task is considered a success if the participant achieved the defined task without assistance and within the allotted time. The total number of successes were calculated for each task and divided by the total number of times the task was attempted. The results are presented as a percentage.
Effectiveness: Task Failures	A task is considered a failure if the participant abandoned the task, or did not complete the task in the allotted time. The total number of failures was calculated for each task and divided by the total number of times the task was attempted.
Efficiency: Task Deviations	Unnecessary steps are recorded each time a participant performs an action in the system that is not his intended action. Examples of unnecessary steps include typing mistakes and errant clicks that do not contribute to the completion of the task. The total number of unnecessary steps is calculated and divided by the number of participants to obtain the average number of unnecessary steps committed per participant. (Only unnecessary steps for tasks that were successfully completed are included in the average unnecessary steps per task analysis and standard deviation.)
Efficiency: Task Time	Each task was timed from a predetermined starting point until the participant indicated task completion. Only task times for tasks that were successfully completed are included in the average task time. Average time per task was calculated for each task
Satisfaction: Task Rating	The participant's subjective impression of the ease of use of the application is recorded for each task. After each task was completed, the moderator asked the participant to rate the task on a 5-point Likert scale: 1 (Very Difficult), 2 (Somewhat Difficult), 3 (Neither Difficult nor Easy), 4 (Somewhat Easy), 5 (Very Easy). These values are averaged across participants for each task with the calculated standard deviation reported in parentheses in the table in the Data Analysis and Reporting section for each criterion.

Table 3: Data Scoring

5. Results

5.1 §170.315(a)(1) CPOE - Medications

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.

The usability testing results for the EHRUT for this measure are summarized below, for detailed results see Table 6.7.1

Measure / Task	*N*	Task Success	Path Deviation	Task Time		Errors	Task Ratings 5=Easy
	#	Mean % (SD)	Deviations # (Observed / Optimal)	Mean (seconds) (SD)	Deviations (mean seconds) (Observed / Optimal)	Mean % (SD)	Mean # (SD)
1. Record and verify a medication order	15	100% (0%)	0 (11/11)	11 (3)	0 (11/15)	13.33% (35.18%)	4.2 (0.41)
2. Modify and review the medication orders	15	100% (0%)	0 (15/15)	11 (1)	0 (11/15)	13.33% (35.18%)	4.1 (0.35)

Table 4 – CPOE Medications Data Results

5.1.1 Discussion of the Findings

EFFECTIVENESS

In light of the findings all tasks were completed with 100% effectiveness. The system *does* provide multiple means of performing any given task, therefore minor task deviations from optimal *were* noted but these were completely acceptable alternatives to accomplishing the given task.

EFFICIENCY

System efficiency revealed only one (1) participant who did not meet the optimal task time, with a four (4) second overall task time deviation noted for these tasks leading to the conclusion that the expected task time of fifteen (15) seconds for each medication order entry was easily accomplished.

SATISFACTION

The individual task ratings resulted in a mean value of four (4), or 'Easy'. The SUS results data overall suggests the same result.

MAJOR FINDINGS
While area for improvement always exists the results of these tasks indicate that the ability of the system to place computerized provider order entries is a viable one. The participants *were* all familiar with the system so the reports of system ease of use were expected.

AREAS FOR IMPROVEMENT
This particular set of tasks resulted in no *obvious* areas for improvement in the quantitative findings, however the consensus of participant discussion revealed the desire for an 'easier method' of editing existing orders.

5.2 §170.315(a)(2) CPOE - Laboratory

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 for this measure are summarized below, for detailed results see Table 6.7.2

Measure / **Task**	***N***	**Task Success**	**Path Deviation**	**Task Time**		**Errors**	**Task Ratings** 5=Easy
	#	Mean % (SD)	Deviations # (Observed / Optimal)	Mean (seconds) (SD)	Deviations (mean seconds) (Observed / Optimal)	Mean % (SD)	Mean # (SD)
3. Record and verify a laboratory order	15	100% (0%)	0 (10/10)	38 (7)	0 (38/45)	20% (41.40%)	4.1 (0.35)
4. Modify and review the laboratory orders	15	100% (0%)	0 (15/15)	30 (9)	0 (30/45)	13.33% (35.18%)	4.3 (0.48)

Table 5 – CPOE Laboratory Data Results

5.2.1 Discussion of the Findings

EFFECTIVENESS

In light of the findings all tasks were completed with 100% effectiveness. The system *does* provide multiple means of performing any given task, therefore minor task deviations from optimal *were* noted but these were completely acceptable alternatives to accomplishing the given task.

EFFICIENCY

System efficiency revealed only three (3) participants who did not meet the optimal task time, with an eleven (11) second overall task time deviation noted for these tasks leading to the conclusion that the expected task time of fifteen (15) seconds for each laboratory order entry was easily accomplished.

SATISFACTION

The individual task ratings resulted in a mean value of four (4), or 'Easy'. The SUS results data overall suggests the same result.

MAJOR FINDINGS

While area for improvement always exists the results of these tasks indicate that the ability of the system to place computerized provider order entries is a viable one. The participants *were* all familiar with the system so the reports of system ease of use were expected.

AREAS FOR IMPROVEMENT

This particular set of tasks resulted in no *obvious* areas for improvement in the quantitative findings, however the consensus of participant discussion revealed the desire for an 'easier method' of editing existing orders.

5.3 §170.315(a)(3) CPOE – Diagnostic Imaging

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 for this measure are summarized below, for detailed results see Table 6.7.3

Measure / Task	*N*	Task Success	Path Deviation	Task Time		Errors	Task Ratings 5=Easy
	#	Mean % (SD)	Deviations # (Observed / Optimal)	Mean (seconds) (SD)	Deviations (mean seconds) (Observed / Optimal)	Mean % (SD)	Mean # (SD)
3. Record and verify a diagnostic imaging order	15	100% (0%)	0 (10/10)	38 (7)	0 (38/45)	20% (41.40%)	4.1 (0.35)
4. Modify and review the diagnostic imaging orders	15	100% (0%)	0 (15/15)	30 (9)	0 (30/45)	13.33% (35.18%)	4.3 (0.48)

Table 6 – CPOE Diagnostic Imaging Data Results

5.3.1 Discussion of the Findings

EFFECTIVENESS

In light of the findings all tasks were completed with 100% effectiveness. The system *does* provide multiple means of performing any given task, therefore minor task deviations from optimal *were* noted but these were completely acceptable alternatives to accomplishing the given task.

EFFICIENCY

System efficiency revealed only three (3) participants who did not meet the optimal task time, with an eleven (11) second overall task time deviation noted for these tasks leading to the conclusion that the expected task time of fifteen (15) seconds for each diagnostic imaging order entry was easily accomplished.

SATISFACTION

The individual task ratings resulted in a mean value of four (4), or 'Easy'. The SUS results data overall suggests the same result.

MAJOR FINDINGS

While area for improvement always exists the results of these tasks indicate that the ability of the system to place computerized provider order entries is a viable one. The participants *were* all familiar with the system so the reports of system ease of use were expected.

AREAS FOR IMPROVEMENT

This particular set of tasks resulted in no *obvious* areas for improvement in the quantitative findings, however the consensus of participant discussion revealed the desire for an 'easier method' of editing existing orders.

5.4 §170.315(a)(4) Drug-Drug, Drug-Allergy Interaction Checks

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 for this measure are summarized below, for detailed results see Table 6.7.4

Measure / Task	*N*	Task Success	Path Deviation	Task Time		Errors	Task Ratings 5=Easy
	#	Mean % (SD)	Deviations # (Observed / Optimal)	Mean (seconds) (SD)	Deviations (mean seconds) (Observed / Optimal)	Mean % (SD)	Mean # (SD)
5. Record and assess a medication order and its drug-drug, drug-allergy interaction	15	100% (0%)	0 (15/15)	10 (3)	0 (10/15)	6.66% (25.81%)	4.0 (0.25)
6. Record and assess a prescription order and its drug-drug, drug-allergy interaction	15	100% (0%)	0 (30/30)	20 (4)	0 (20/30)	13.33% (35.18%)	4.3 (0.48)

Table 7 – Drug-Drug, Drug-Allergy Data Results

5.4.1 Discussion of the Findings

EFFECTIVENESS

In light of the findings all tasks were completed with 100% effectiveness. The system *does* provide multiple means of performing any given task, therefore

minor task deviations from optimal *were* noted but these were completely acceptable alternatives to accomplishing the given task.

EFFICIENCY
System efficiency revealed only three (3) participants who did not meet the optimal task time, with a four (4) second overall task time deviation noted for these tasks leading to the conclusion that the expected task time of fifteen (15) seconds for each drug-drug, drug-allergy interaction task was easily accomplished.

SATISFACTION
The individual task ratings resulted in a mean value of four (4), or 'Easy'. The SUS results data overall suggests the same result.

MAJOR FINDINGS
While area for improvement always exists the results of these tasks indicate that the ability of the system to perform drug-drug, drug-allergy interaction checking is a viable one. The participants *were* all familiar with the system so the reports of system ease of use were expected.

AREAS FOR IMPROVEMENT
While the results of the quantitative findings are within reason, Provider feedback was overwhelmingly in support of an 'easier', alternative method of electronic prescription entry (and thus the drug-drug, drug-allergy interaction checking system) than the third-party e-Prescription module currently utilized in the EDIMS system.

5.5 §170.315(a)(8) Medication Allergy List

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 for this measure are summarized below, for detailed results see Table 6.7.5

Measure / Task	*N*	Task Success	Path Deviation	Task Time		Errors	Task Ratings 5=Easy
	#	Mean % (SD)	Deviations # (Observed / Optimal)	Mean (seconds) (SD)	Deviations (mean seconds) (Observed / Optimal)	Mean % (SD)	Mean # (SD)
1. Record and verify a medication allergy, reaction and severity	15	100% (0%)	0 (7/7)	30 (11)	0 (30/45)	13.33% (35.18%)	4.2 (0.77)
2. Remove and verify an existing allergy	15	100% (0%)	0 (3/3)	27 (11)	0 (27/45)	20% (56.06%)	3.7 (0.88)
3. Modify and verify an existing allergy	15	100% (0%)	0 (5/5)	27 (9)	0 (27/45)	13.33% (35.18%)	4.4 (0.73)

Table 8 – Medication Allergy List Data Results

5.5.1 Discussion of the Findings

EFFECTIVENESS

In light of the findings all tasks were completed with 100% effectiveness. The system *does* provide multiple means of performing any given task, therefore minor task deviations from optimal *were* noted but these were completely acceptable alternatives to accomplishing the given task.

EFFICIENCY

System efficiency revealed only three (3) participants who did not meet the optimal task time, with a six (6) second overall task time deviation noted for these tasks leading to the conclusion that the expected task time of forty-five (45) seconds for each medication allergy list interaction performance to be readily accomplished.

SATISFACTION

The individual task ratings resulted in a mean value of four (4), or 'Easy'. The SUS results data overall suggests the same result.

MAJOR FINDINGS

While area for improvement always exists the results of these tasks indicate that the ability of the system to access, enter and edit medication allergies is a viable one. The participants *were* all familiar with the system so the reports of system ease of use were expected.

AREAS FOR IMPROVEMENT

While the results of the quantitative findings are within reason, a few participants commented upon their inability to 'easily recognize' pre-existing allergies and a more visible means of calling their attention was suggested.

5.6 §170.315(a)(7) Medication List

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 for this measure are summarized below, for detailed results see Table 6.7.6

Measure / Task	*N*	Task Success	Path Deviation	Task Time		Errors	Task Ratings 5=Easy
	#	Mean % (SD)	Deviations # (Observed / Optimal)	Mean (seconds) (SD)	Deviations (mean seconds) (Observed / Optimal)	Mean % (SD)	Mean # (SD)
4. Record and verify a medication	15	100% (0%)	0 (10/10)	35 (15)	0 (35/45)	20% (41.40%)	4.6 (0.50)
5. Delete and verify a medication	15	100% (0%)	0 (4/4)	28 (8)	0 (28/45)	26.66% (59.36%)	4.4 (0.63)
6. Edit and verify a medication	15	100% (0%)	0 (4/4)	33 (10)	0 (33/45)	13.33% (35.18)	4.6 (0.50)

Table 9 – Medication List Data Results

5.6.1 Discussion of the Findings

EFFECTIVENESS

In light of the findings all tasks were completed with 100% effectiveness. The system *does* provide multiple means of performing any given task, therefore minor task deviations from optimal *were* noted but these were completely acceptable alternatives to accomplishing the given task.

EFFICIENCY

System efficiency revealed only two (2) participants who did not meet the optimal task time, with a ten (10) second overall task time deviation noted for these tasks leading to the conclusion that the expected task time of forty-five (45) seconds for each medication list interaction performance to be readily accomplished.

SATISFACTION

The individual task ratings resulted in a mean value of four (4), or 'Easy'. The SUS results data overall suggests the same result.

MAJOR FINDINGS

While area for improvement always exists the results of these tasks indicate that the ability of the system to access, enter and edit medications is a viable one. The participants *were* all familiar with the system so the reports of system ease of use were expected.

AREAS FOR IMPROVEMENT

The results of the quantitative findings are within reason, however a few participants commented upon the desire to streamline the entire current medication entry system reducing the number of dialogue boxes necessary to edit current medications.

6. Appendices

6.1 EDIMS Recruiting Screener

Demographic Information

1. Name:

2. Credentials:

3. Highest Level of Education:
   a. High school graduate / GED
   b. Some college
   c. College graduate
   d. Postgraduate
   e. Other _____

4. Organization:

5. Primary Work Location:

6. Contact method (please provide one of the following):
   a. Work phone:
   b. Cell phone:
   c. Email address:

7. What is your gender?
   a. Female
   b. Male
   c. Other / decline to answer

8. Which of the following best describes your current age?
   a. < 20
   b. 20 – 29
   c. 30 – 39
   d. 40 – 49
   e. 50 – 59
   f. 60 – 69
   g. 70 – 79
   h. ≥ 80

Professional Demographics

9. What is your current position and title? (Must be healthcare provider)
    a. RN: Specialty _____
    b. Physician: Specialty _____
    c. Resident: Specialty _____
    d. Nurse Practioner: Specialty _____
    e. Physician's Assistant: Specialty _____
    f. Other [disqualify]

10. How long have you held this position?

Additional Information

11. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company? (if Yes, disqualify)

12. Due to logistical restraints, we cannot provide assistive technologies during the testing session. Do you require any assistive technologies to use a computer? [if Yes, disqualify]

Computer Expertise

13. How frequently do you use EDIMS?

14. How many EHRs do you use or are you familiar with?

15. How does your work environment capture patient records?
    a. On paper
    b. Some paper, some electronic
    c. All electronic

Contact Information

16. Address:

17. City, State, Zip:

18. Daytime phone number:

19. Evening phone number:

20. Alternate [cell] phone number:

21. Email address:

6.2 Participant Demographics

Following is a high-level overview of the participants in this study.

Gender	
Men	14
Women	16
Total (participants)	30

Occupation/Role	
RN	15
Physician	9
Physician's Assistants	3
Nurse Practitioners	3
Total (participants)	30

Years of Experience	
Years of experience with EDIMS (average)	6.63

Facility Use of EHR	
All paper	0
Some paper, some electronic	18
All electronic	12
Total (participants)	30

6.3 Informed Consent Form

EDIMS Informed Consent

EDIMS would like to thank you for participating in this study. The purpose of this study is to evaluate an electronic health records system. If you decide to participate, you will be asked to perform several tasks using the prototype and give your feedback. The study will last about 75 minutes.

Agreement
I understand and agree that as a voluntary participant in the present study conducted by EDIMS I am free to withdraw consent or discontinue participation at any time. I understand and agree to participate in the study conducted by EDIMS.

I understand that the information is for research purposes only and that my name will not be used for any purpose other than research.

I understand and agree that the purpose of this study is to make software applications more useful and usable in the future.

I understand and agree that the data collected from this study may be shared with entities outside of EDIMS and EDIMS clients. I understand and agree that data confidentiality is assured, because only de- identified data – i.e., identification numbers not names – will be used in analysis and reporting of the results.

I agree to immediately raise any concerns or areas of discomfort with the study administrator. I understand that I can leave at any time.

Please check one of the following:

- YES, I have read the above statement and agree to be a participant.
- NO, I choose not to participate in this study.

Signature: _____ Date: _____

6.4 EDIMS Moderator's Guide

EDIMS Usability Testing Moderators Guide

Administrator _____
Data Logger_____
Date _____ Time _____
Participant # _____
Location _____

Prior to testing

- Confirm schedule with Participants
- Ensure EDIMS lab environment is running properly
- Ensure lab and data recording equipment is running properly

Prior to each participant:

- Reset application

Prior to each task:

- Reset application to starting point for next task

After all testing

- Back up all data files

Participant Orientation (please read to each participant)
Thank you for participating in this study. Our session today will last approximately seventy-five (75) minutes. During that time, you will take a look at the EDIMS electronic health record system.

I will ask you to complete a few tasks using this system and answer some questions.

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. You will be directed to the appropriate starting point for each task and will have a written copy of the scenario and its accompanying tasks to read. You will be asked to complete these tasks on your own trying to do them as quickly as you would normally perform them with the fewest possible errors or deviations. Do not do anything more than asked. Because we are testing specific functionality you may not complete a normal clinical workflow with any given patient. You may complete a task in any way is that is easiest for you, as multiple ways to complete a task may exist. Please verbalize when you have completed each task. You will complete a survey regarding your experience

after all the scenarios and tasks have been completed. Please save your detailed comments until the end of the session as a whole when we can discuss them freely. If you get lost or have difficulty I cannot answer and / or help you with anything to do with the system itself.

All of the information that you provide will be kept confidential and your name will not be associated with your comments at any time.

Do you have any questions or concerns?

The product you will be using today is the EDIMS Full Suite v2.6.3 MU 2015 edition. Some of the data may not make sense as it is placeholder data.

Take the participant to the starting point for the first task.

The following is information to be obtained for each task:

Success:

- ☐ Easily completed
- ☐ Completed with difficulty or help: Describe below
- ☐ Not completed

Comments:

Task Time: _____ Seconds

Optimal Path: e.g., *Screen A → Screen B → Drop Down 1 → "OK" Button → Screen C …*

- ☐ Correct
- ☐ Minor Deviations (Describe below)
- ☐ Major Deviations (Describe below)

Comments:

Observed Errors and Verbalizations:
Comments:

After each task is completed solicit the following:
Rating:

Overall, this task was: _____

"Very Easy" (1) to "Very Difficult" (5)

Administrator / Note taker Comments:

Final Questions:

What was your overall impression of this system?

What aspects of the system did you like most?

What aspects of the system did you like least?

Were there any features that you were surprised to see?

What features did you expect to encounter but did not see? That is, is there anything that is missing in this application?

Compare this system to other systems you have used.

Would you recommend this system to your colleagues?

Administer the EDIMS System Usability Scale Questionnaire

6.5 Scenarios

2.1.1 Provider Scenario 1

Patrick is a 47-year-old male who presents to the ED complaining of back pain after moving heavy furniture today.

Task 1: After performing an initial examination you issue an order for ibuprofen 600mg PO one time

Task 2: The nurse informs you that Patrick states he had already taken 200mg of ibuprofen immediately before coming to the ED. You decide to cancel the ibuprofen 600mg PO one-time order and issue and order for ibuprofen 400mg PO one time instead.

2.1.2 Provider Scenario 2

Kenneth is a 56-year-old male with a history of Asthma, Bronchitis, Angina, Hypertension, and GERD who presents to the ED with a PulsOx of 96% complaining of shortness of breath and cough for a week.

Task 3: Upon initial assessment you issue an order for a Chest X-Ray, PA & Lateral, 2 View and a CBC to evaluate his pulmonary status.

Task 4: After observing a slight decrease in his PulsOx and increase in his shortness of breath, you decide that the patient may be too unstable to leave the department for his X-Rays and would like further diagnostics to

rule out any other differential diagnoses. You cancel the Chest X-Ray, PA & Lateral, 2 View and CBC order, and issue an order for a Chest, Portable and a CBC w/Micro, CMP, and Troponin I instead.

Task 5: After receiving the diagnostic results you determine that Kenneth has simple bronchitis and order an initial dose of amoxicillin/clavulanate potassium 500 mg / 125 mg PO one time. Noticing a drug-allergy interaction you discontinue the Augmentin and order an initial dose of azithromycin 500 mg PO one time.

Task 6: You inform Kenneth of his diagnosis and let him know that he will be discharged shortly. He tells you that he is from out of town and has forgotten to bring his medications for angina and reflux and asks you for a short-term prescription for both until he can return home in two days. You prescribe an order for a 2-day supply of Isordil 20 mg PO twice daily and Protonix 40 mg PO daily. You notice that the nurse has updated his current medication list to include sildenafil, triggering a drug-drug interaction, and that his minor allergy to Prilosec has been updated to a severe allergy. After discussing these findings with Kenneth, you determine he understands the risks to taking sildenafil and isosorbide simultaneously, you continue the prescription for isosorbide. You also inform him of the increased risks of taking Protonix given his severe reaction to Prilosec and prescribe a 2-day supply of cimetidine 200 mg PO daily instead.

2.1.3 Nurse Scenario 1

Kenneth is a 56-year-old male with a history of Asthma, Bronchitis, Angina, Hypertension, and GERD who presents to the ED with a PulsOx of 96% complaining of shortness of breath and cough for a week.

Task 1: While performing your assessment he informs you that he forgot to tell the Triage Nurse that he is allergic to Penicillin, reviewing his medication allergy list you note it has not been listed and update his medication allergy list to include a severe reaction to Penicillin.

Task 2: Noticing that he has a medication allergy to Cardura listed, you review this information with him and find that it was entered by mistake. You remove the medication allergy and document the reasons for doing so.

Task 3: You confirm his mild allergy to Prilosec but he tells you that he had a severe reaction to the medication the last time he tried it. You update the existing Prilosec allergy to reflect a severe reaction and verify his medication allergies with him.

Task 4: At this point you decide that you want to ascertain the completeness of his medication list and review it with him. He tells you that he was diagnosed with Erectile Dysfunction 4 months ago and that his PCP had prescribed Viagra for him, and that he has only used twice so far and that the last time was over a month ago. You update his medication list to include the new medication noting the last time he took the medication.

2.1.4 Nurse Scenario 2

Sonya is a 42-year-old female with a history of Type II Diabetes Mellitus who presents to the ED complaining of ankle pain after a fall. She also informs you that her daily dosage of Nexium has been decreased from 40 mg PO daily to 20 mg PO daily.

Task 4: In reviewing her medication list with her, the patient informs you that she has recently begun taking 14 units of Toujeo subcutaneously daily but you do not see it on her current medication list. You update the medication list with the new medication and review her remaining medications with her.

Task 5: The patient suddenly remembers that since she has started taking the Toujeo her doctor told her she no longer needed to take the Glucophage so you update the patient's medication list to reflect the discontinuation of the metformin and the reasons why it has been discontinued.

Task 6: The patient tells you that after starting the Toujeo she has modified her diet enough so that her physician decreased her dose of Nexium from 40 mg to 20 mg a day. You update the medication list to reflect the current medication dosing and verify all her remaining medications with her.

6.6 System Usability Scale Questionnaire

EDIMS System Usability Scale Questionnaire

	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 this 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

6.7 Detailed Data Analysis

6.7.1 CPOE - Medication

Part. / Task 1	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Dev.	Errors	Error %	Task Rating
537235	100.00%	0.00%	11	11	0	10	15	-5	0	0.00%	4
317434	100.00%	0.00%	11	11	0	11	15	-4	0	0.00%	5
361468	100.00%	0.00%	11	11	0	9	15	-6	0	0.00%	5
606942	100.00%	0.00%	11	11	0	15	15	0	0	0.00%	4
864246	100.00%	0.00%	11	11	0	10	15	-5	0	0.00%	4
147332	100.00%	0.00%	12	11	1	12	15	-3	1	9.09%	4
802222	100.00%	0.00%	11	11	0	9	15	-6	0	0.00%	4
187345	100.00%	0.00%	11	11	0	9	15	-6	0	0.00%	5
736428	100.00%	0.00%	11	11	0	10	15	-5	0	0.00%	4
966083	100.00%	0.00%	11	11	0	11	15	-4	0	0.00%	4
746175	100.00%	0.00%	11	11	0	10	15	-5	0	0.00%	4
247092	100.00%	0.00%	11	11	0	12	15	-3	0	0.00%	4
575154	100.00%	0.00%	12	11	1	20	15	5	1	9.09%	4
373099	100.00%	0.00%	11	11	0	12	15	-3	0	0.00%	4
365371	100.00%	0.00%	11	11	0	11	15	-4	0	0.00%	4

Part. / Task 2	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
537235	100.00%	0.00%	15	15	0	10	15	-5	0	0.00%	4.00
317434	100.00%	0.00%	15	15	0	12	15	-3	0	0.00%	4.00
361468	100.00%	0.00%	15	15	0	9	15	-6	0	0.00%	5.00
606942	100.00%	0.00%	15	15	0	13	15	-2	0	0.00%	4.00
864246	100.00%	0.00%	15	15	0	10	15	-5	0	0.00%	4.00
147332	100.00%	0.00%	15	15	0	11	15	-4	0	0.00%	4.00
802222	100.00%	0.00%	16	15	1	10	15	-5	1	6.67%	4.00
187345	100.00%	0.00%	15	15	0	9	15	-6	0	0.00%	4.00
736428	100.00%	0.00%	15	15	0	10	15	-5	0	0.00%	4.00
966083	100.00%	0.00%	15	15	0	12	15	-3	0	0.00%	4.00
746175	100.00%	0.00%	16	15	1	11	15	-4	1	6.67%	5.00

Part. / Task 2	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
247092	100.00%	0.00%	15	15	0	12	15	-3	0	0.00%	4.00
575154	100.00%	0.00%	15	15	0	12	15	-3	0	0.00%	4.00
373099	100.00%	0.00%	15	15	0	12	15	-3	0	0.00%	4.00
365371	100.00%	0.00%	15	15	0	11	15	-4	0	0.00%	4.00

6.7.2 CPOE – Laboratory

Part. / Task 3	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
537235	100.00%	0.00%	10	10	0	48	45	3	0	0.00%	4.00
317434	100.00%	0.00%	10	10	0	45	45	0	0	0.00%	5.00
361468	100.00%	0.00%	10	10	0	35	45	-10	0	0.00%	4.00
606942	100.00%	0.00%	10	10	0	40	45	-5	0	0.00%	4.00
864246	100.00%	0.00%	11	10	1	30	45	-15	1	10.00%	4.00
147332	100.00%	0.00%	10	10	0	39	45	-6	0	0.00%	4.00
802222	100.00%	0.00%	10	10	0	35	45	-10	0	0.00%	4.00
187345	100.00%	0.00%	10	10	0	43	45	-2	0	0.00%	4.00
736428	100.00%	0.00%	10	10	0	32	45	-13	0	0.00%	5.00
966083	100.00%	0.00%	10	10	0	24	45	-21	0	0.00%	4.00
746175	100.00%	0.00%	10	10	0	30	45	-15	0	0.00%	4.00
247092	100.00%	0.00%	11	10	1	40	45	-5	1	10.00%	4.00
575154	100.00%	0.00%	10	10	0	35	45	-10	0	0.00%	4.00
373099	100.00%	0.00%	11	10	1	50	45	5	1	10.00%	4.00
365371	100.00%	0.00%	10	10	0	37	45	-8	0	0.00%	4.00

Part. / Task 4	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
537235	100.00%	0.00%	15	15	0	23	45	-22	0	0.00%	4.00
317434	100.00%	0.00%	15	15	0	19	45	-26	0	0.00%	4.00
361468	100.00%	0.00%	15	15	0	22	45	-23	0	0.00%	4.00

Part. / Task 4	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
606942	100.00%	0.00%	15	15	0	17	45	-28	0	0.00%	4.00
864246	100.00%	0.00%	15	15	0	38	45	-7	0	0.00%	5.00
147332	100.00%	0.00%	15	15	0	48	45	3	0	0.00%	5.00
802222	100.00%	0.00%	15	15	0	30	45	-15	0	0.00%	4.00
187345	100.00%	0.00%	15	15	0	24	45	-21	0	0.00%	4.00
736428	100.00%	0.00%	15	15	0	41	45	-4	0	0.00%	4.00
966083	100.00%	0.00%	15	15	0	27	45	-18	0	0.00%	4.00
746175	100.00%	0.00%	16	15	1	41	45	-4	1	6.67%	5.00
247092	100.00%	0.00%	16	15	1	34	45	-11	1	6.67%	4.00
575154	100.00%	0.00%	15	15	0	22	45	-23	0	0.00%	5.00
373099	100.00%	0.00%	15	15	0	28	45	-17	0	0.00%	4.00
365371	100.00%	0.00%	15	15	0	34	45	-11	0	0.00%	5.00

6.7.3 CPOE – Diagnostic Imaging

Part. / Task 3	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
537235	100.00%	0.00%	10	10	0	48	45	3	0	0.00%	4.00
317434	100.00%	0.00%	10	10	0	45	45	0	0	0.00%	5.00
361468	100.00%	0.00%	10	10	0	35	45	-10	0	0.00%	4.00
606942	100.00%	0.00%	10	10	0	40	45	-5	0	0.00%	4.00
864246	100.00%	0.00%	11	10	1	30	45	-15	1	10.00%	4.00
147332	100.00%	0.00%	10	10	0	39	45	-6	0	0.00%	4.00
802222	100.00%	0.00%	10	10	0	35	45	-10	0	0.00%	4.00
187345	100.00%	0.00%	10	10	0	43	45	-2	0	0.00%	4.00
736428	100.00%	0.00%	10	10	0	32	45	-13	0	0.00%	5.00
966083	100.00%	0.00%	10	10	0	24	45	-21	0	0.00%	4.00
746175	100.00%	0.00%	10	10	0	30	45	-15	0	0.00%	4.00
247092	100.00%	0.00%	11	10	1	40	45	-5	1	10.00%	4.00
575154	100.00%	0.00%	10	10	0	35	45	-10	0	0.00%	4.00

Part. Task 3	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
373099	100.00%	0.00%	11	10	1	50	45	5	1	10.00%	4.00
365371	100.00%	0.00%	10	10	0	37	45	-8	0	0.00%	4.00

Part. Task 4	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
537235	100.00%	0.00%	15	15	0	23	45	-22	0	0.00%	4.00
317434	100.00%	0.00%	15	15	0	19	45	-26	0	0.00%	4.00
361468	100.00%	0.00%	15	15	0	22	45	-23	0	0.00%	4.00
606942	100.00%	0.00%	15	15	0	17	45	-28	0	0.00%	4.00
864246	100.00%	0.00%	15	15	0	38	45	-7	0	0.00%	5.00
147332	100.00%	0.00%	15	15	0	48	45	3	0	0.00%	5.00
802222	100.00%	0.00%	15	15	0	30	45	-15	0	0.00%	4.00
187345	100.00%	0.00%	15	15	0	24	45	-21	0	0.00%	4.00
736428	100.00%	0.00%	15	15	0	41	45	-4	0	0.00%	4.00
966083	100.00%	0.00%	15	15	0	27	45	-18	0	0.00%	4.00
746175	100.00%	0.00%	16	15	1	41	45	-4	1	6.67%	5.00
247092	100.00%	0.00%	16	15	1	34	45	-11	1	6.67%	4.00
575154	100.00%	0.00%	15	15	0	22	45	-23	0	0.00%	5.00
373099	100.00%	0.00%	15	15	0	28	45	-17	0	0.00%	4.00
365371	100.00%	0.00%	15	15	0	34	45	-11	0	0.00%	5.00

6.7.4 Drug-Drug, Drug-Allergy Interaction Checking

Part. Task 5	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
537235	100.00%	0.00%	15	15	0	11	15	-4	0	0.00%	4.00
317434	100.00%	0.00%	15	15	0	11	15	-4	0	0.00%	4.00
361468	100.00%	0.00%	15	15	0	13	15	-2	0	0.00%	4.00
606942	100.00%	0.00%	16	15	1	12	15	-3	1	6.67%	4.00
864246	100.00%	0.00%	15	15	0	12	15	-3	0	0.00%	5.00

Part. / Task 5	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
147332	100.00%	0.00%	15	15	0	6	15	-9	0	0.00%	4.00
802222	100.00%	0.00%	15	15	0	7	15	-8	0	0.00%	4.00
187345	100.00%	0.00%	15	15	0	16	15	1	0	0.00%	4.00
736428	100.00%	0.00%	15	15	0	8	15	-7	0	0.00%	4.00
966083	100.00%	0.00%	15	15	0	11	15	-4	0	0.00%	4.00
746175	100.00%	0.00%	15	15	0	5	15	-10	0	0.00%	4.00
247092	100.00%	0.00%	15	15	0	10	15	-5	0	0.00%	4.00
575154	100.00%	0.00%	15	15	0	6	15	-9	0	0.00%	4.00
373099	100.00%	0.00%	15	15	0	11	15	-4	0	0.00%	4.00
365371	100.00%	0.00%	15	15	0	12	15	-3	0	0.00%	4.00

Part. / Task 6	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
537235	100.00%	0.00%	30	30	0	14	30	-16	0	0.00%	4.00
317434	100.00%	0.00%	30	30	0	27	30	-3	0	0.00%	4.00
361468	100.00%	0.00%	31	30	1	22	30	-8	1	3.33%	5.00
606942	100.00%	0.00%	30	30	0	19	30	-11	0	0.00%	5.00
864246	100.00%	0.00%	30	30	0	24	30	-6	0	0.00%	4.00
147332	100.00%	0.00%	30	30	0	19	30	-11	0	0.00%	4.00
802222	100.00%	0.00%	31	30	1	17	30	-13	1	3.33%	5.00
187345	100.00%	0.00%	30	30	0	18	30	-12	0	0.00%	5.00
736428	100.00%	0.00%	30	30	0	17	30	-13	0	0.00%	4.00
966083	100.00%	0.00%	30	30	0	21	30	-9	0	0.00%	4.00
746175	100.00%	0.00%	30	30	0	24	30	-6	0	0.00%	4.00
247092	100.00%	0.00%	30	30	0	17	30	-13	0	0.00%	4.00
575154	100.00%	0.00%	30	30	0	20	30	-10	0	0.00%	4.00
373099	100.00%	0.00%	30	30	0	21	30	-9	0	0.00%	5.00
365371	100.00%	0.00%	30	30	0	26	30	-4	0	0.00%	4.00

6.7.5 Medication Allergy List

Part. / Task 1	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
702082	100.00%	0.00%	8	7	1	36	45	-9	1	14.29%	5.00
782695	100.00%	0.00%	7	7	0	17	45	-28	0	0.00%	4.00
385638	100.00%	0.00%	8	7	1	36	45	-9	1	2.04%	4.00
993334	100.00%	0.00%	7	7	0	39	45	-6	0	0.00%	3.00
353522	100.00%	0.00%	7	7	0	46	45	1	0	0.00%	4.00
844984	100.00%	0.00%	7	7	0	22	45	-23	0	0.00%	4.00
149422	100.00%	0.00%	7	7	0	36	45	-9	0	0.00%	5.00
457939	100.00%	0.00%	7	7	0	37	45	-8	0	0.00%	5.00
943330	100.00%	0.00%	7	7	0	22	45	-23	0	0.00%	4.00
217915	100.00%	0.00%	7	7	0	15	45	-30	0	0.00%	3.00
293825	100.00%	0.00%	7	7	0	17	45	-28	0	0.00%	5.00
624765	100.00%	0.00%	7	7	0	19	45	-26	0	0.00%	5.00
914128	100.00%	0.00%	7	7	0	37	45	-8	0	0.00%	5.00
819426	100.00%	0.00%	7	7	0	43	45	-2	0	0.00%	4.00
272522	100.00%	0.00%	7	7	0	23	45	-22	0	0.00%	3.00

Part. / Task 2	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
702082	100.00%	0.00%	3	3	0	33	45	-12	0	0.00%	5.00
782695	100.00%	0.00%	5	3	2	26	45	-19	2	66.67%	4.00
385638	100.00%	0.00%	3	3	0	48	45	3	0	0.00%	2.00
993334	100.00%	0.00%	3	3	0	47	45	2	0	0.00%	3.00
353522	100.00%	0.00%	3	3	0	20	45	-25	0	0.00%	5.00
844984	100.00%	0.00%	4	3	1	18	45	-27	1	33.33%	4.00
149422	100.00%	0.00%	3	3	0	18	45	-27	0	0.00%	3.00
457939	100.00%	0.00%	3	3	0	17	45	-28	0	0.00%	4.00
943330	100.00%	0.00%	3	3	0	29	45	-16	0	0.00%	4.00
217915	100.00%	0.00%	3	3	0	17	45	-28	0	0.00%	3.00

Part. / Task 2	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
293825	100.00%	0.00%	3	3	0	23	45	-22	0	0.00%	4.00
624765	100.00%	0.00%	3	3	0	33	45	-12	0	0.00%	3.00
914128	100.00%	0.00%	3	3	0	18	45	-27	0	0.00%	5.00
819426	100.00%	0.00%	3	3	0	19	45	-26	0	0.00%	3.00
272522	100.00%	0.00%	3	3	0	39	45	-6	0	0.00%	4.00

Part. / Task 3	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Deviations	Errors	Error %	Task Rating
702082	100.00%	0.00%	5	5	0	42	45	-3	0	0.00%	5.00
782695	100.00%	0.00%	5	5	0	32	45	-13	0	0.00%	5.00
385638	100.00%	0.00%	5	5	0	21	45	-24	0	0.00%	5.00
993334	100.00%	0.00%	5	5	0	33	45	-12	0	0.00%	4.00
353522	100.00%	0.00%	5	5	0	37	45	-8	0	0.00%	5.00
844984	100.00%	0.00%	5	5	0	34	45	-11	0	0.00%	4.00
149422	100.00%	0.00%	5	5	0	35	45	-10	0	0.00%	5.00
457939	100.00%	0.00%	5	5	6	20	45	-25	1	20.00%	3.00
943330	100.00%	0.00%	5	5	6	37	45	-8	1	20.00%	3.00
217915	100.00%	0.00%	5	5	0	17	45	-28	0	0.00%	5.00
293825	100.00%	0.00%	5	5	0	21	45	-24	0	0.00%	5.00
624765	100.00%	0.00%	5	5	0	16	45	-29	0	0.00%	4.00
914128	100.00%	0.00%	5	5	0	19	45	-26	0	0.00%	5.00
819426	100.00%	0.00%	5	5	0	22	45	-23	0	0.00%	4.00
272522	100.00%	0.00%	5	5	0	18	45	-27	0	0.00%	4.00

6.7.6 Medication List

Part. / Task 4	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Dev.	Errors	Error %	Task Rating
702082	100.00%	0.00%	10	10	0	77	45	-13	0	0.00%	4
782695	100.00%	0.00%	10	10	0	22	45	-68	0	0.00%	4

Part. / Task 4	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Dev.	Errors	Error %	Task Rating
385638	100.00%	0.00%	10	10	0	40	45	-50	0	0.00%	5
993334	100.00%	0.00%	10	10	0	33	45	-57	0	0.00%	4
353522	100.00%	0.00%	10	10	0	33	45	-57	0	0.00%	5
844984	100.00%	0.00%	11	10	1	43	45	-47	1	10.00%	4
149422	100.00%	0.00%	10	10	0	36	45	-54	0	0.00%	5
457939	100.00%	0.00%	10	10	0	20	45	-70	0	0.00%	5
943330	100.00%	0.00%	10	10	0	27	45	-63	0	0.00%	5
217915	100.00%	0.00%	10	10	0	39	45	-51	0	0.00%	4
293825	100.00%	0.00%	11	10	1	20	45	-70	1	10.00%	5
624765	100.00%	0.00%	10	10	0	43	45	-47	0	0.00%	5
914128	100.00%	0.00%	11	10	1	21	45	-69	1	10.00%	5
819426	100.00%	0.00%	10	10	0	38	45	-52	0	0.00%	4
272522	100.00%	0.00%	10	10	0	34	45	-56	0	0.00%	5

Part. / Task 5	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Dev.	Errors	Error %	Task Rating
702082	100.00%	0.00%	4	4	0	21	45	-24	0	0.00%	5
782695	100.00%	0.00%	4	4	0	18	45	-27	0	0.00%	5
385638	100.00%	0.00%	4	4	0	25	45	-20	0	0.00%	5
993334	100.00%	0.00%	4	4	0	40	45	-5	0	0.00%	4
353522	100.00%	0.00%	5	4	1	15	45	-30	1	25.00%	4
844984	100.00%	0.00%	6	4	2	27	45	-18	2	50.00%	4
149422	100.00%	0.00%	5	4	1	49	45	4	1	25.00%	4
457939	100.00%	0.00%	4	4	0	30	45	-15	0	0.00%	4
943330	100.00%	0.00%	4	4	0	29	45	-16	0	0.00%	4
217915	100.00%	0.00%	4	4	0	28	45	-17	0	0.00%	3
293825	100.00%	0.00%	4	4	0	25	45	-20	0	0.00%	5
624765	100.00%	0.00%	4	4	0	30	45	-15	0	0.00%	5
914128	100.00%	0.00%	4	4	0	31	45	-14	0	0.00%	5

Part. / Task 5	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Dev.	Errors	Error %	Task Rating
819426	100.00%	0.00%	4	4	0	23	45	-22	0	0.00%	5
272522	100.00%	0.00%	4	4	0	27	45	-18	0	0.00%	4

6Part. / Task 6	Task Success	Task Failures	Obs. Task Steps	Opt. Task Steps	Task Deviations	Task Time	Opt. Task Time	Task Time Dev.	Errors	Error %	Task Rating
702082	100.00%	0.00%	4	4	0	22	45	-23	0	0.00%	4
782695	100.00%	0.00%	4	4	0	22	45	-23	0	0.00%	5
385638	100.00%	0.00%	4	4	0	25	45	-20	0	0.00%	4
993334	100.00%	0.00%	4	4	0	36	45	-9	0	0.00%	4
353522	100.00%	0.00%	5	4	1	28	45	-17	1	25.00%	4
844984	100.00%	0.00%	4	4	0	32	45	-13	0	0.00%	5
149422	100.00%	0.00%	5	4	1	43	45	-2	1	25.00%	5
457939	100.00%	0.00%	4	4	0	22	45	-23	0	0.00%	5
943330	100.00%	0.00%	4	4	0	51	45	6	0	0.00%	5
217915	100.00%	0.00%	4	4	0	28	45	-17	0	0.00%	4
293825	100.00%	0.00%	4	4	0	43	45	-2	0	0.00%	5
624765	100.00%	0.00%	4	4	0	33	45	-12	0	0.00%	5
914128	100.00%	0.00%	4	4	0	43	45	-2	0	0.00%	5
819426	100.00%	0.00%	4	4	0	19	45	-26	0	0.00%	5
272522	100.00%	0.00%	4	4	0	45	45	0	0	0.00%	4

6.8 System Usability Scale

	702082	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.	X					1	4
3	I thought the system was easy to use.					X	5	4
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.					X	5	4
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.					X	5	4
8	I found the system very cumbersome to use.	X					1	4
9	I felt very confident using the system.					X	5	4
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							100

	782695	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.				X		4	3
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.				X		4	3
4	I think that I would need the support of a technical person to be able to use this system.		X				2	3
5	I found the various functions in this system were well integrated.			X			3	2
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.				X		4	3
8	I found the system very cumbersome to use.		X				2	3
9	I felt very confident using the system.				X		4	3
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							78

	385638	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.				X		4	3
2	I found the system unnecessarily complex.	X					1	4
3	I thought the system was easy to use.				X		4	3
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.				X		4	3
8	I found the system very cumbersome to use.	X					1	4
9	I felt very confident using the system.				X		4	3
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							88

	993334	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.				X		4	3
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.					X	5	4
8	I found the system very cumbersome to use.	X					1	4
9	I felt very confident using the system.				X		4	3
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							90

	353522	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.				X		4	3
4	I think that I would need the support of a technical person to be able to use this system.		X				2	3
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.		X				2	3
7	I would imagine that most people would learn to use this system very quickly.				X		4	3
8	I found the system very cumbersome to use.		X				2	3
9	I felt very confident using the system.				X		4	3
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							80

	844984	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.	X					1	4
3	I thought the system was easy to use.					X	5	4
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.					X	5	4
8	I found the system very cumbersome to use.	X					1	4
9	I felt very confident using the system.					X	5	4
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							98

	149422	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.	X					1	4
3	I thought the system was easy to use.				X		4	3
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.				X		4	3
8	I found the system very cumbersome to use.	X					1	4
9	I felt very confident using the system.				X		4	3
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							90

	457939	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.				X		4	3
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.					X	5	4
6	I thought there was too much inconsistency in this system.		X				2	3
7	I would imagine that most people would learn to use this system very quickly.				X		4	3
8	I found the system very cumbersome to use.	X					1	4
9	I felt very confident using the system.					X	5	4
10	I needed to learn a lot of things before I could get going with this system.		X				2	3
	SUS Score							88

	943330	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.				X		4	3
2	I found the system unnecessarily complex.	X					1	4
3	I thought the system was easy to use.					X	5	4
4	I think that I would need the support of a technical person to be able to use this system.		X				2	3
5	I found the various functions in this system were well integrated.			X			3	2
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.			X			3	2
8	I found the system very cumbersome to use.	X					1	4
9	I felt very confident using the system.				X		4	3
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							83

	217915	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.	X					1	4
3	I thought the system was easy to use.				X		4	3
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.				X		4	3
8	I found the system very cumbersome to use.	X					1	4
9	I felt very confident using the system.				X		4	3
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							90

	293825	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.				X		4	1
3	I thought the system was easy to use.	X					1	0
4	I think that I would need the support of a technical person to be able to use this system.		X				2	3
5	I found the various functions in this system were well integrated.					X	5	4
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.			X			3	2
8	I found the system very cumbersome to use.	X					1	4
9	I felt very confident using the system.				X		4	3
10	I needed to learn a lot of things before I could get going with this system.		X				2	3
	SUS Score							70

	624765	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.				X		4	3
2	I found the system unnecessarily complex.			X			3	2
3	I thought the system was easy to use.				X		4	3
4	I think that I would need the support of a technical person to be able to use this system.		X				2	3
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.		X				2	3
7	I would imagine that most people would learn to use this system very quickly.				X		4	3
8	I found the system very cumbersome to use.		X				2	3
9	I felt very confident using the system.				X		4	3
10	I needed to learn a lot of things before I could get going with this system.		X				2	3
	SUS Score							73

	914128	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.			X			3	2
2	I found the system unnecessarily complex.	X					1	4
3	I thought the system was easy to use.					X	5	4
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.					X	5	4
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.					X	5	4
8	I found the system very cumbersome to use.	X					1	4
9	I felt very confident using the system.					X	5	4
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							95

	819426	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.				X		4	3
2	I found the system unnecessarily complex.			X			3	2
3	I thought the system was easy to use.			X			3	2
4	I think that I would need the support of a technical person to be able to use this system.		X				2	3
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.		X				2	3
7	I would imagine that most people would learn to use this system very quickly.				X		4	3
8	I found the system very cumbersome to use.		X				2	3
9	I felt very confident using the system.				X		4	3
10	I needed to learn a lot of things before I could get going with this system.		X				2	3
	SUS Score							70

	272522	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.		X				2	1
2	I found the system unnecessarily complex.					X	5	0
3	I thought the system was easy to use.		X				2	1
4	I think that I would need the support of a technical person to be able to use this system.				X		4	1
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.		X				2	3
7	I would imagine that most people would learn to use this system very quickly.			X			3	2
8	I found the system very cumbersome to use.				X		4	1
9	I felt very confident using the system.		X				2	1
10	I needed to learn a lot of things before I could get going with this system.				X		4	1
	SUS Score							35

	537235	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.				X		4	1
3	I thought the system was easy to use.				X		4	3
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.		X				2	3
7	I would imagine that most people would learn to use this system very quickly.				X		4	3
8	I found the system very cumbersome to use.	X					1	4
9	I felt very confident using the system.					X	5	4
10	I needed to learn a lot of things before I could get going with this system.			X			3	2
	SUS Score							78

	317434	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.				X		4	3
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.					X	5	4
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.					X	5	4
8	I found the system very cumbersome to use.	X					1	4
9	I felt very confident using the system.					X	5	4
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							95

	361468	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.		X				2	1
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.					X	5	4
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.		X				2	1
8	I found the system very cumbersome to use.				X		4	1
9	I felt very confident using the system.					X	5	4
10	I needed to learn a lot of things before I could get going with this system.		X				2	3
	SUS Score							73

	606942	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.			X			3	2
2	I found the system unnecessarily complex.	X					1	4
3	I thought the system was easy to use.					X	5	4
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.		X				2	3
7	I would imagine that most people would learn to use this system very quickly.				X		4	3
8	I found the system very cumbersome to use.	X					1	4
9	I felt very confident using the system.				X		4	3
10	I needed to learn a lot of things before I could get going with this system.			X			3	2
	SUS Score							80

	864246	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.					X	5	4
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.					X	5	4
8	I found the system very cumbersome to use.		X				2	3
9	I felt very confident using the system.					X	5	4
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							93

	147332	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.		X				2	1
2	I found the system unnecessarily complex.					X	5	0
3	I thought the system was easy to use.					X	5	4
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.			X			3	2
8	I found the system very cumbersome to use.			X			3	2
9	I felt very confident using the system.					X	5	4
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							70

	802222	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.		X				2	1
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.			X			3	2
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.		X				2	1
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.	X					1	0
8	I found the system very cumbersome to use.		X				2	3
9	I felt very confident using the system.			X			3	2
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							60

	187345	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.					X	5	4
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.					X	5	4
8	I found the system very cumbersome to use.		X				2	3
9	I felt very confident using the system.					X	5	4
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							93

	736428	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.		X				2	1
2	I found the system unnecessarily complex.			X			3	2
3	I thought the system was easy to use.		X				2	1
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.			X			3	2
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.				X		4	3
8	I found the system very cumbersome to use.		X				2	3
9	I felt very confident using the system.			X			3	2
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							65

	966083	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.			X			3	2
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.			X			3	2
8	I found the system very cumbersome to use.		X				2	3
9	I felt very confident using the system.			X			3	2
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							78

	746175	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.					X	5	4
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.					X	5	4
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.					X	5	4
8	I found the system very cumbersome to use.		X				2	3
9	I felt very confident using the system.					X	5	4
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							93

	247092	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.				X		4	3
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.			X			3	2
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.		X				2	1
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.			X			3	2
8	I found the system very cumbersome to use.		X				2	3
9	I felt very confident using the system.				X		4	3
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							73

	575154	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.			X			3	2
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.				X		4	3
4	I think that I would need the support of a technical person to be able to use this system.	X					1	4
5	I found the various functions in this system were well integrated.		X				2	1
6	I thought there was too much inconsistency in this system.	X					1	4
7	I would imagine that most people would learn to use this system very quickly.					X	5	4
8	I found the system very cumbersome to use.			X			3	2
9	I felt very confident using the system.					X	5	4
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							78

	373099	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.	X					1	0
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.				X		4	3
4	I think that I would need the support of a technical person to be able to use this system.			X			3	2
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.			X			3	2
7	I would imagine that most people would learn to use this system very quickly.					X	5	4
8	I found the system very cumbersome to use.			X			3	2
9	I felt very confident using the system.					X	5	4
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							68

	365371	Strongly Disagree 1	2	3	4	Strongly Agree 5	User Rating	SUS Score
1	I think that I would like to use this system frequently.		X				2	1
2	I found the system unnecessarily complex.		X				2	3
3	I thought the system was easy to use.					X	5	4
4	I think that I would need the support of a technical person to be able to use this system.		X				2	3
5	I found the various functions in this system were well integrated.				X		4	3
6	I thought there was too much inconsistency in this system.		X				2	3
7	I would imagine that most people would learn to use this system very quickly.					X	5	4
8	I found the system very cumbersome to use.			X			3	2
9	I felt very confident using the system.			X			3	2
10	I needed to learn a lot of things before I could get going with this system.	X					1	4
	SUS Score							73