

E·Z BIS Office Electronic Health Records Version 10.2

Usability Test Results and Analysis

The following is a report of many usability tests conducted by E·Z BIS, Inc. on certain features mostly related to medication in version 10.2 of the E·Z BIS Office Electronic Health Records product.

Terms Used in This Report:

EHRUT – EHR Under Test

CDS – Clinical Decision Support

Test Process Used:

National Institute of Standards and Technology (NISTIR) 7741 – NIST Guide to the Process Approach for Improving the Usability of Electronic Health Records.

The following report is based on the companion to this process, the NISTIR 7742 Custom Common Industry Format Template for Electronic Health Record Usability Testing.

Name and Version of EHRUT: E-Z BIS Office Electronic Health Records ver. 10.2

Date of Tests:

Participant A: April 29, 2014

Participant B: May 1, 2014

Participant C: May 2, 2014

Participant D: May 2, 2014

Participant E: May 14, 2014

Location of Tests:

The tests were performed in the Training Room of the E·Z BIS, Inc. office building located on 125 Rue Beauregard, Lafayette, LA 70508.

Test Environment

The EHRUT would typically be used in a healthcare office or facility. In this instance, the testing was conducted in the Training Room of the E·Z BIS, Inc. office building, which is a 12 ft. by 12 ft. room with a 6.5 ft. x 4 ft. table. There were two chairs, one for the test participant, and one for the moderator. For testing, the computer used a desktop PC running Windows 8. The participants used a mouse and keyboard when interacting with the EHRUT. The E·Z BIS Electronic Health Records used a 19 in. monitor, with 1280 x 1024 resolution and the automatic color settings of Windows 8. The application was set up by the vendor E·Z BIS, Inc. according to the vendor's documentation describing the system set-up and preparation. The application itself was running on a Microsoft Windows platform using a test database on the local machine. Technically, the system performance (i.e., response time) was representative to what actual users would experience in a field implementation. Additionally, participants were instructed not to change any of the default system settings (such as control of font size).

Description of the Intended Users

The intended users of these features include Chiropractors, M.D. and other Physicians, Nurse Practitioners, Physical Therapists, students pursuing degrees in such specialties, and non-providing staff members of medical offices (Chiropractor Assistants, Physician Assistants, Office Managers, and System Administrators). It is important to note that E·Z BIS Office is designed mostly for Chiropractors, the core customer base. Over 98% of customers do not prescribe medication.

Total Number of Participants

Five participants took part in the study. Each task was tested by all 5 participants, which, collectively, represented a total of five different roles from the set of intended users described above.

Description of Participants

Participants in the test included Chiropractors, a system administrator, a Chiropractor Assistant, an M.D., and a Physician Assistant. Some participants fulfilled more than 1 role. Participants were recruited by Joel Johnson. In addition, participants had no direct connection to the development of or organization producing the EHRUT. Participants were not from the testing or supplier organization. Participants were given the opportunity to have the same orientation and level of training as the actual end users would have received.

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

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

Part. ID	Gender	Age	Education	Occupation/ Role	Professional Experience	Computer Experience	Product Experience	Assistive Technology Needs
A	M	53	D.C.	Chiropractor, System Admin	21 yrs	19 years	6 years	none
B	F	33	B.S.	Chiro. Assistant	1 yr	17 years	1 years	none
C	M	62	D.C.	Chiropractor M.D.	25 yrs 3 yrs	25 years	4 years	ADHD
D	M	29	D.C.	Chiropractor	2 yrs	2 years	2 years	none
E	F	31	B.S., P.A.	Phys. Assistant	6 yrs	21 years	0 years	none

Five participants (matching the demographics in the section on Participants) were recruited and five participated in the usability test. No participants failed to show for the study. Participants A, B, C, D, and E were scheduled for four-hour sessions with at least two hours in between each session for debrief by the administrator(s) and data logger(s), and to reset systems to proper test conditions. A spreadsheet was used to keep track of the participant schedule, and included each participant's demographic characteristics as provided by the recruiter.

List of Specific Metrics Captured During Testing

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 E-Z BIS Electronic Health Records by measuring participant success rates and errors
2. Efficiency of E-Z BIS Electronic Health Records by measuring the average task time
3. Satisfaction with E-Z BIS Electronic Health Records by measuring ease of use ratings

Data Scoring

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

Measures	Rational and Scoring
Effectiveness Task Success	<p>A task was counted as a “Success” if the participant was able to achieve the correct outcome, without assistance, within the time allotted on a per task basis.</p> <p>The total number of successes were calculated for each task and then divided by the total number of times that task was attempted. The results are provided as a percentage.</p>
Effectiveness Task Failures	<p>If the participant abandoned the task, did not reach the correct answer or performed it incorrectly, or reached the end of the allotted time before successful completion, the task was counted as a “Failure.”</p> <p>No task times were taken for errors.</p> <p>The total number of errors was calculated for each task and then divided by the total number of times that task was attempted. Not all deviations were counted as errors. This is expressed as the mean number of failed tasks per participant.</p> <p>On a qualitative level, an enumeration of errors and error types were collected.</p>
Efficiency Task Time	<p>Each task was timed from when the administrator said “Begin” until the participant said, “Done.” If he or she failed to say, “Done,” the time was stopped when the participant stopped performing the task. Only task times for tasks that were successfully completed were included in the average task time analysis. Average time per task was calculated for each task. Variance measures (standard deviation and standard error) were also calculated.</p> <p>Task times were recorded for successes. Observed task times divided by the optimal time for each task is a measure of optimal efficiency.</p> <p>Optimal task performance time, as benchmarked by expert performance under realistic conditions, was recorded when constructing tasks. (Optimal times were discovered to be subjective though, being a few tests by individual participants resulted in times faster than the optimal time). Target task times used for task times in the Moderator’s Guide were operationally defined by taking multiple measures of optimal performance and multiplying by some factor (e.g., 1.25) that allows some time buffer because the participants are presumably not trained to expert performance. Thus, if expert, optimal performance on a task was 100 seconds then allotted task time performance would be 125 seconds. Target task times were simply used as a target goal to be compared against the mean task time.</p>
Satisfaction Task Rating	<p>Participant’s subjective impression of the ease of use of the application was measured by administering both a simple post-task question as well as a post-session questionnaire. After each task, the participant was asked to rate “Overall, this task was:” on a scale of 1 (Very Easy) to 5 (Very Difficult). These data were averaged across participants. (note that the rating scale here is reversed from the one provided by NIST because the rating scale in the Data Scoring section in the NIST document conflicted with the rating scale for taking notes about tasks in the appendix of that same document.)</p> <p>To measure participants’ confidence in and likeability of the application overall, the testing team administered the System Usability Scale (SUS) post-test questionnaire. Questions include, “I think I would like to use this system frequently,” “I thought the system was easy to use,” and “I would imagine that most people would learn to use this system very quickly.”</p>

CPOE (314.a.1) Tests

The following is a report of usability tests conducted on certain tasks related to CPOE in version 10.2 of the E-Z BIS Office Electronic Health Records product.

Description of the User Tasks that Were Tested

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:

Task and Risk Rating	Optimal Steps
<p>Record Medication Order (Risk Rating: 5 - Medication order records may be relied on for decision making but not as much as the Medication List and Medication Allergy List would be. Assuming those lists are kept up to date, recording accurate order records is only moderately important. Also, placing the order is more important than making a record of the order).</p>	<p>Go to File > E-prescribe Click NewRx Click Use None Click in Drug field Type in the drug "Loratadine" Key [Enter] Click Select next to any resulting medication Click in SIG field Type in "take once a day as needed" Click in Quantity field Type "30" Tab to Days Supply field Type "30" Tab to Refills field Type "2" Click the drop-down control for the Issue To field Select RX Retail Pharmacy Click Hold</p>
<p>Access Medication Order (Risk Rating: 5 - Medication order records may be relied on for decision making but not as much as the Medication List and Medication Allergy List would be. Assuming those lists are kept up to date, accessing order records is only moderately important. Also, placing the order is more important than making a record of the order).</p>	<p>Go to File > E-prescribe Click RxInbox tab Click on the Medication order</p>
<p>Change Medication Order (Risk Rating: 5 - Medication order records may be relied on for decision making but not as much as the Medication List and Medication Allergy List would be. Assuming those lists are kept up to date, modifying order records is only moderately important. Also, placing the order is more important than making a record of the order)</p>	<p>Go to File > E-prescribe Click RxInbox tab Double click pending order Edit SIG field Click Save or Authorize.</p>
<p>Record Laboratory Order (Risk Rating: 3 – Simply creating the record of a lab being ordered is only useful if it needs to be referred to later. Ordering labs and documenting their results are more important than just making a record of the order).</p>	<p>Go to File > E-prescribe Click Orders tab Click Create Order Click drop-down list for Order Type Click "Standard" Click Next Type "483" in Test Codes field</p>

	<p>Key [Enter] Click in ICD-9 code field Type "253.5" Key [Enter] Click Validate Order</p>
<p>Access Laboratory Order (Risk Rating: 3 – Accessing a record of a lab order is rarely needed in clinical decision making. The placing of the order and the recording of the results are more important)</p>	<p>Go to File > E-prescribe Click Orders tab Click on the link for the order Click Next</p>
<p>Change Laboratory Order (Risk Rating: 3 – An accurate record of a lab order is only useful if it needs to be referred to later. Ordering labs and documenting their results are more important than making a record of an order accurate.)</p>	<p>Go to File > E-prescribe Click Orders tab Click the Order # link Click Next Type "561" in the Test Codes field Key "[Enter]" Click in ICD-9 field Type "253.5" Key "[Enter]" Click Validate Order</p>
<p>Record Radiology/imaging Order (Risk Rating: 3 – Simply creating the record of a radiology/imaging order is only useful if it needs to be referred to later. Ordering radiology/imaging and documenting the results are more important than making a record of an order accurate.)</p>	<p>Go to File > E-prescribe Click Orders tab Click Create Order Click drop-down list for Order Type Click "Standard" Click drop-down list for Lab Click Meaningful Use Ordering Lab Click Next Check "Chest X-ray 2 views" Click in ICD-9 field Type "480.9" Key [Enter] Click Validate Order</p>
<p>Access Radiology/imaging Order (Risk Rating: 3 – Accessing a record of a radiology/imaging order is rarely needed in clinical decision making. The placing of the order and recording of the results are more important)</p>	<p>Go to File > E-prescribe Click Orders tab Click on the X-ray Order record Click on the link for the order Click Next</p>
<p>Change Radiology/imaging Order (Risk Rating: 3 – An accurate record of a radiology/imaging order is only useful if it needs to be referred to later. Placing the order and recording the results are more important than making a record of an order accurate.)</p>	<p>Go to File > E-prescribe Click Orders tab Click on the X-ray Order record Click on the link for the order Click Next Click Checkbox for R1006 code (Chest X-ray 2 views) Click Remove Test Click Validate Order</p>

Results of the Test and Data Analysis Including Risk Analysis

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. No participants failed to follow session and task instructions.

The usability testing results for the EHRUT are detailed below

Results

Effectiveness

Task	Number	Successes	Success Percentage	Failures	Failure Percentage	Failed Tasks per Participant
Record Medication Order	5	4	80%	1	20%	0.2
Access Medication Order	5	4	80%	1	20%	0.2
Change Medication Order	5	4	80%	1	20%	0.2
Record Laboratory Order	5	3	60%	2	40%	0.4
Access Laboratory Order	5	3	60%	2	40%	0.4
Change Laboratory Order	5	4	80%	1	20%	0.2
Record Radiology/imaging Order	5	3	60%	2	40%	0.4
Access Radiology/imaging Order	5	3	60%	2	40%	0.4
Change Radiology/imaging Order	5	5	100%	2	40%	0.4

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Standard. Error	Observed Task Time / Optimal Task Time
Record Medication Order	4	40	80	97.6	25.75	12.88	2.44
Access Medication Order	4	7	14	13.1	1.65	0.83	1.87
Change Medication Order	4	15	30	32.8	9.22	4.61	2.19
Record Laboratory Order	3	30	60	52	7.66	4.42	1.73
Access Laboratory Order	3	8	16	18.8	5.48	3.16	2.35
Change Laboratory Order	4	26	52	42.5	11.45	5.73	1.63
Record Radiology/imaging Order	3	26	52	56.7	5.33	3.08	2.18
Access Radiology/imaging Order	3	8	16	16	6.56	3.79	2
Change Radiology/imaging Order	5	17	34	25.6	8.26	3.69	1.51

Satisfaction

Task	Number	Average Satisfaction Rating on 1-5 Scale (1=Very Easy)
Record Medication Order	5	2
Access Medication Order	5	1.2
Change Medication Order	5	1.4
Record Laboratory Order	5	1.8
Access Laboratory Order	5	2
Change Laboratory Order	5	1.6
Record Radiology/imaging Order	5	1.8
Access Radiology/imaging Order	5	2
Change Radiology/imaging Order	5	1

Data and Risk Analysis

Tasks related to medication orders were acceptable in regard to risk due to the facts that

- 1) Less than 4% of the users will use this capability of the product
- 2) The risk rating is only moderate
- 3) The success rate was 80% for all of the tasks related to medication orders

Efficiency targets were missed for 2 of the tasks, but not disconcertingly. This module is outsourced and would require the third party to make changes. The target was met for one of the tasks.

Tasks related to laboratory orders were acceptable despite that two of them showed 40% failures. This is because

- 1) Fewer than 20% of users order labs
- 2) Users that order labs are not required to log all the records in the software
- 3) The risk rating is relatively low. The failures were not causes of safety concern. They prevented or slowed the recording of the order, but did not pose a safety risk.

The efficiency target for one task was missed, but not significantly. Efficiency targets were reached for the other two tasks.

Tasks related to radiology/imaging were acceptable despite that two of them showed 40% failures. This is because

- 1) Fewer than 20% of users order outside radiology/imaging orders. They perform most of the results in-house and document the results as a note.
- 2) Users that order radiology/imaging are not required to log all the records in the software
- 3) The risk rating is relatively low. The failures were not causes of safety concern. They prevented or slowed the recording of the order, but did not pose a safety risk.

The efficiency target for one task was missed, but not significantly. Efficiency targets were reached for the other two tasks.

The participants were, on average, quite satisfied with all of the tasks.

Drug-drug, Drug-allergy Interactions (314.a.2) Tests

The following is a report of usability tests conducted on certain tasks related to drug-drug and drug-allergy interventions in version 10.2 of the E-Z BIS Office Electronic Health Records product.

Description of the User Tasks that Were Tested

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:

Task and Risk Rating	Optimal Steps
Create drug-drug intervention (Risk Rating: 10 – Patients may suffer severe consequences if drug-drug interventions aren’t noticed)	Identify the warning right after a drug is selected that triggered it Click the View DUR Warnings button
Create drug-allergy intervention (Risk Rating: 10 – Patients may suffer severe consequences if drug-allergy interventions aren’t noticed)	Identify the warning right after a drug is selected that triggered it Click the View DUR Warnings button
Adjustment of severity level of drug-drug interventions (may be an admin type function) (Risk Rating: 5 – regardless of the setting, the user is always required to view the high-level warnings. Also, even then the setting does not require the user to view the low and moderate level warnings, there is still an indicator on the screen that there is a warning)	From blank EHR screen, click file > e-prescribe Click the Admin tab Click on Preferences List > DUR Edit a severity-level setting for Drug/Drug (not drug-allergy) Preferences (No need to click any button, tab, or other control after).

Results of the Test and Data Analysis Including Risk Analysis

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. No participants failed to follow session and task instructions.

The usability testing results for the EHRUT are detailed below

Results

Effectiveness

Task	Number	Successes	Success Percentage	Failures	Failure Percentage	Failed Tasks per Participant
Drug-drug intervention	5	5	100%	0	0%	0
Drug-allergy intervention	5	5	100%	0	0%	0
Adjust severity level	5	4	80%	2	20%	0.2

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Stand. Error	Observed Task Time / Optimal Task Time
Drug-drug intervention	5	2	4	2.9	0.55	0.25	1.45
Drug-allergy intervention	5	2	4	2.2	0.55	0.25	1.1
Adjust severity level	4	13	26	21.6	7.36	3.68	1.66

Satisfaction

Task	Number	Average Satisfaction Rating (1=Very Easy)
Drug-drug intervention	5	1.2
Drug-allergy intervention	5	1
Adjust severity level	5	1.2

Data and Risk Analysis

The effectiveness, efficiency, and satisfaction scores for “Drug-drug intervention” and “Drug-allergy intervention” were perfect.

The scores for “Adjust severity level” were acceptable, being that the risk rating is moderate for this task.

Medication List (314.a.6) Tests

The following is a report of usability tests conducted on certain tasks related to the medication list in version 10.2 of the E-Z BIS Office Electronic Health Records product.

Description of the User Tasks that Were Tested

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:

Task and Risk Rating	Optimal Steps
Record Medication List (Risk Rating: 10 – interventions are depended on this)	Click Add Click in Description field Type in description of “ibuprofen” Key [Enter] Double click any result in the list Click Ok
Change Medication List (Risk Rating: 10 – interventions are depended on this)	Double click the Medication Type in a frequency Select Ok
Access Medication List (Risk Rating: 8 – the ability to view medications is important for providers that make decisions based on medications)	Click to History tab Click on a Medication

Results of the Test and Data Analysis Including Risk Analysis

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. No participants failed to follow session and task instructions.

The usability testing results for the EHRUT are detailed below

Results

Effectiveness

Task	Number	Successes	Success Percentage	Failures	Failure Percentage	Failed Tasks per Participant
Record medication list	5	5	100%	0	0%	0
Change medication list	5	4	80%	2	20%	0.2
Access medication list	5	4	80%	0	20%	0.2

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Stand. Error	Observed Task Time / Optimal Task Time
Record medication list	5	9	18	20.1	5.1	2.28	2.23
Change medication list	4	6	12	15.875	4.97	2.49	2.65
Access medication list	4	3	6	5.25	2.63	1.32	1.75

Satisfaction

Task	Number	Average Satisfaction Rating (1=Very Easy)
Record medication list	5	1
Change medication list	5	1
Access medication list	5	1

Data and Risk Analysis

None of these tasks were deemed as unacceptable based on risk due to the fact that over 96% of the customers for the EHRUT are providers who do not treat using medication. Also, the one failure for “Change medication list” was simply caused by the user being very cautious and exceeding the time limit for the task. Likewise, the one failure for Access Medication List was simply caused by the user exceeding the time limit.

Efficiency Targets weren’t reached for two of the three tasks, but they were not missed significantly. The target was reached for one task.

The average satisfaction rating for all of these tasks was “1 (very easy).”

Medication Allergy List (314.a.7) Tests

The following is a report of usability tests conducted on certain tasks related to the medication allergy list in version 10.2 of the E-Z BIS Office Electronic Health Records product.

Description of the User Tasks that Were Tested

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:

Task and Risk Rating	Optimal Steps
Record Medication List (Risk Rating: 10 – interventions are depended on this)	Click Add Click Medication Allergy Click in the Allergy field Type in “ibuprofen” Key [Enter] Double click any result in the list Click Ok
Change Medication List (Risk Rating: 10 – interventions are depended on this)	Double click the Medication Click in the Reaction field Type in “hives.” Click Ok
Access Medication List (Risk Rating: 10 – interventions are depended on this)	Click to History tab Click on a Medication allergy

Results of the Test and Data Analysis Including Risk Analysis

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. No participants failed to follow session and task instructions.

The usability testing results for the EHRUT are detailed below

Results

Effectiveness

Task	Number	Successes	Success Percentage	Failures	Failure Percentage	Failed Tasks per Participant
Record medication list	5	4	80%	1	20%	0.2
Change medication list	5	5	100%	0	0%	0
Access medication list	5	5	100%	0	0%	0

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Stand. Error	Observed Task Time / Optimal Task Time
Record medication list	4	13	26	21.1	4.97	2.49	1.62
Change medication list	5	7	14	13	2.35	1.05	1.86
Access medication list	5	3.5	7	6	2.42	1.08	1.71

Satisfaction

Task	Number	Average Satisfaction Rating (1=Very Easy)
Record medication list	5	1
Change medication list	5	1
Access medication list	5	1

Data and Risk Analysis

Efficiency and Effectiveness scores were very acceptable, but being that risk rating for the task “Record Medication List” is very high, a solution should be considered for the one failure. This will be discussed in the Areas for Improvement section of this report.

Clinical Decision Support (314.a.8) Tests

The following is a report of usability tests conducted on certain tasks related to Clinical Decision Support in version 10.2 of the E-Z BIS Office Electronic Health Records product.

Description of the User Tasks that Were Tested

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:

Task and Risk Rating	Optimal Steps
Problem list interventions (Risk Rating: 10 – this could affect treatment decisions)	Trigger intervention by opening patient account Locate CDS notification icon Click the CDS icon Double click the CDS notification View Document
Medication list interventions (Risk Rating: 10 – this could affect treatment decisions)	Trigger intervention by opening patient account Locate CDS notification icon Click the CDS icon Double click the CDS notification View Document
Medication allergy list interventions (Risk Rating: 10 – this could affect treatment decisions)	Trigger intervention by opening patient account Locate CDS notification icon Click the CDS icon Double click the CDS notification View Document
Lab tests and results interventions (Risk Rating: 10 – this could affect treatment decisions)	Trigger intervention by opening patient account Locate CDS notification icon Click the CDS icon Double click the CDS notification View Document
Vital signs interventions (Risk Rating: 10 – this could affect treatment decisions)	Trigger intervention by opening patient account Locate CDS notification icon Click the CDS icon Double click the CDS notification View Document
Configuration of CDS interventions by user (may be an admin type function) (Risk Rating: 10 – interventions are depended on this).	Click Utilities Click Meaningful Use > Clinical Decision Support Rules Double click the first rule in the list Click the drop-down list for Clinical Role Check a 2 nd role Click Ok
Demographics interventions (Risk Rating: 7 – this could affect treatment decisions, but is less likely to)	Trigger intervention by opening patient account Locate CDS notification icon Click the CDS icon Double click the CDS notification View Document
Identify user diagnostic and therapeutic reference information (Risk Rating: 1).	Locate the Info button on a CDS warning Click the Info button View the reference information

Results of the Test and Data Analysis Including Risk Analysis

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. No participants failed to follow session and task instructions.

The usability testing results for the EHRUT are detailed below

Results

Effectiveness

Task	Number	Successes	Success Percentage	Failures	Failure Percentage	Failed Tasks per Participant
Problem list interventions	5	5	100%	0	0%	0
Medication list interventions	5	5	100%	0	0%	0
Medication allergy list interventions	5	5	100%	0	0%	0
Demographics interventions	5	5	100%	0	0%	0
Lab tests and results interventions	5	5	100%	0	0%	0
Vital signs interventions	5	5	100%	0	0%	0
Identify user diagnostic and therapeutic reference information	5	4	80%	1	20%	0.2
Configuration of CDS intervention by user	5	2	40%	3	60%	0.6

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Stand. Error	Observed Task Time / Optimal Task Time
Problem list interventions	5	8	16	10.1	3.44	1.54	1.26
Medication list interventions	5	7	14	8	0.79	0.35	1.14
Medication allergy list interventions	5	5	10	8.4	2.61	1.17	1.68
Demographics interventions	5	8	16	10.4	3.36	1.5	1.3
Lab tests and results interventions	5	5.5	11	6.9	0.89	0.4	1.25
Vital signs interventions	5	7	14	8.3	0.84	0.38	1.19
Identify user diagnostic and therapeutic reference information	4	2	4	2.5	0.58	0.29	1.25
Configuration of CDS intervention by user	2	10	20	22.3	3.89	2.75	2.23

Satisfaction

Task	Number	Average Satisfaction Rating (1=Very Easy)
Problem list interventions	5	1
Medication list interventions	5	1
Medication allergy list interventions	5	1
Demographics interventions	5	1
Lab tests and results interventions	5	1
Vital signs interventions	5	1
Identify user diagnostic and therapeutic reference information	5	1.2
Configuration of CDS intervention by user	5	1.6

Data and Risk Analysis

Efficiency and satisfaction scores for all of the tests were excellent or acceptable. Only one task had an average task time over the target time, but this was not significant.

The task, "Identify User Diagnostic and Therapeutic Information" had one failure, but the risk for this task was minimal.

The task "Configuration of CDS Intervention by User" had only a 40% success rate. It was determined that this was largely due to how the administrator was wording the instructions for this task. Users did not understand what the administrator meant when asking them to add "another role" that the intervention is active for. One participant expressed that if the administrator would have worded it by asking her to add other types of users to be active for the intervention, she would have passed. This approach was used with the last two participants, and both completed the task successfully. However, to be cautious, it is worth considering altering the form for configuring CDS interventions so that, whenever the intervention is not active for all roles, the user is made aware of this.

Electronic Prescribing (314.b.3) Tests

The following is a report of usability tests conducted on certain tasks related Electronic Prescribing in version 10.2 of the E-Z BIS Office Electronic Health Records product.

Description of the User Tasks that Were Tested

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:

Task	Optimal Steps
Create prescriptions (Risk Rating: 10)	Go to File > E-prescribe Click NewRx Click Use None Click in Drug field Type in the drug "Advair" Key [Enter] Click Select next to any result in the list Click in SIG field Type in "take once a day as needed" Click in Quantity field Type "30" Tab to Days Supply field Type "30" Tab to Refills field Type "2" Click the drop-down control for the Issue To field Select RX Retail Pharmacy Click Issue

Results of the Test and Data Analysis Including Risk Analysis

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. No participants failed to follow session and task instructions.

The usability testing results for the EHRUT are detailed below

Results

Effectiveness

Task	Number	Successes	Success Percentage	Failures	Failure Percentage	Failed Tasks per Participant
Create prescriptions	5	4	80%	1	20%	0.2

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Stand. Error	Observed Task Time / Optimal Task Time
Create prescriptions	4	40	80	47.1	15.22	7.61	1.18

Satisfaction

Task	Number	Average Satisfaction Rating (1=Very Easy)
Create prescriptions	5	1.2

Data and Risk Analysis

Efficiency and Satisfaction scores were excellent.

The one failure was caused by a training issue. The result was that the prescription went on paper instead of electronically and did not pose a serious risk to patient safety. The administrator failed to train the participant to notice what method was being used to issue the prescription.

Clinical Information Reconciliation (314.a.6) Tests

The following is a report of usability tests conducted on certain tasks related to Clinical Information Reconciliation in version 10.2 of the E-Z BIS Office Electronic Health Records product.

Description of the User Tasks that Were Tested

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:

Task and Risk Rating	Optimal Steps
Reconcile patient's active medication list with another source (Risk Rating: 10 – affects data that interventions use)	Click to Documents tab Double Click Meaningful Use folder Right click on the Clinical Summary Click Clinical Information Reconciliation Click on the 3 Medications on the left side of the list Click OK
Reconcile patient's active problem list with another source (Risk Rating: 10 – affects data that interventions use)	Click to Documents tab Double Click Meaningful Use folder Right click on the Clinical Summary Click Clinical Information Reconciliation Click on the 3 Medication Allergies on the left side of the list Click OK
Reconcile patient's active medication allergy list with another source (Risk Rating: 10 – affects data that interventions use)	Click to Documents tab Double Click Meaningful Use folder Right click on the Clinical Summary Click Clinical Information Reconciliation Click on the 4 Problem list items on the left side of the list Click OK

Results of the Test and Data Analysis Including Risk Analysis

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. No participants failed to follow session and task instructions.

The usability testing results for the EHRUT are detailed below

Results

Effectiveness

Task	Number	Successes	Success %	Failures	Failure Percentage	Failed Tasks per Participant
Reconcile patient's active medication list with another source	5	4	80%	1	20%	0.2
Reconcile patient's active problem list with another source	5	3	60%	2	40%	0.4
Reconcile patient's active medication allergy list with another source	5	5	100%	0	0%	0

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Stand. Error	Observed Task Time / Optimal Task Time
Reconcile patient's active medication list with another source	4	12	24	24.8	10.5	5.25	2.07
Reconcile patient's active problem list with another source	3	13	26	20	5	2.89	1.54
Reconcile patient's active medication allergy list with another source	5	12	24	15.8	3.25	1.45	1.32

Satisfaction

Task	Number	Average Satisfaction Rating (1=Very Easy)
Reconcile patient's active medication list with another source	5	1.6
Reconcile patient's active problem list with another source	5	1.4
Reconcile patient's active medication allergy list with another source	5	1

Data and Risk Analysis

Efficiency and satisfaction scores were excellent. Only one task was over the target time, and it was over by less than 1 second.

The 1 failure for “Reconcile patient’s active medication list with another source” posed no risk to patient safety. The failure prevented the user from ever beginning to reconcile the lists in a timely manner. The user double-clicked the CDA file and viewed it instead of right-clicking on it to access the menu that contained the reconcile command.

The two failures for “Reconcile patient’s active problem list with another source” could pose a risk to patient safety, should the provider rely on this information. The users did not merge all of the problem list items into the new list because they did not notice they needed to scroll down to select more items. However, it is expected that very few or no providers to rely on this information to treat patients. We anticipate providers will rely on the features related to patient complaint records, exam finding records, objective finding records, and diagnosis records instead of the problem list. Nonetheless, plans are being made to address this.

Conclusion

Post-session Questionnaire Results

Question	Average Rating
I think that I would like to use this system frequently (Strongly agree = 5)	4.8
I found the system unnecessarily complex (Strongly agree = 1)	1.2
I thought the system was easy to use (Strongly agree = 5)	5
I think that I would need the support of a technical person to be able to use this system	1.6
I found the various functions in this system were well integrated (Strongly agree = 5)	4.6
I thought there was too much inconsistency in this system (Strongly agree = 1)	1.2
I would imagine that most people would learn to use this system very quickly (Strongly agree = 5)	4.4
I found the system very cumbersome to use (Strongly agree = 1)	1
I felt very confident using the system (Strongly agree = 5)	4.8
I needed to learn a lot of things before I could get going with this system (Strongly agree = 1)	1.4

Major Test Findings

Overall, users were very satisfied with the product. The failure rate was a bit higher than expected, and the identified areas of improvement (see this section below) will be or have been reported to the design committee for review. Most of the efficiency concerns were with the outsourced product used for CPOE, over which E-Z BIS has limited control.

Interestingly, the 3 younger participants had excellent scores, while the 2 older participants had scores that were lower than expected.

Even participants who had the worst scores expressed that the system would be easy to use with a little practice.

Identified Areas for Improvement

CPOE task scores were acceptable, but the administrator and data logger identified some areas that could be improved. Recording laboratory orders and radiology/imaging orders could be improved in efficiency by redesigning the graphical user interface (GUI) to make the user more aware that they need to set the first field, Order Type, before moving on to other fields. These features are outsourced, so E-Z BIS has limited control over improving the GUI.

When recording medication and laboratory orders, the entering of the medication or lab code was not detected by the application sometimes because the user did not press the Enter key. The user was forced to select this field before completing the order (thus posing no risk to patient safety), but perhaps the application should accept the entry upon the lose focus event. These features are outsourced, so E-Z BIS has limited control over improving this.

Recording of Radiology/Imaging orders had a couple of failures because users failed to select the correct facility on the first form. The GUI should be altered to draw more attention to this field when it defaults to not being blank. This feature is outsourced, so E-Z BIS has limited control over improving the GUI.

For the medication allergy list, if the patient reports only medication allergies and no medications, there is a small chance, if the user is a novice and is not paying attention, that he or she will enter the allergies in the medication list instead of the allergy list. It would require ingenuity to come up with a desirable solution to help with this. Even though the chances of this happening are low and would be because of overt user error, a solution is worth

considering. At the same time, 98% of the clinics expected to use this product do not prescribe medications, greatly decreasing the scale of the risk.

As mentioned previously, the task "Configuration of CDS Intervention by User" had only a 40% success rate. It was determined that this was largely due to how the administrator was wording the instructions for this task. Users did not understand what the administrator meant when asking them to add "another role" for which the intervention is active. One participant expressed that if the administrator would have worded it by asking her to add other types of users to be active for the intervention, she would have passed. This approach was used with the last two participants, and both completed the task successfully. However, to be cautious, it is worth considering altering the form for configuring CDS interventions so that, whenever the intervention is not active for all roles, the user is made aware of this.

The one failure for Electronic Prescribing did not pose significant risk to patient health. The order was issued to paper instead of electronically. The training process could be improved to help with this.

When performing reconciliation, if some items are below the bottom edge of the form, causing the need for the user to scroll down to see them, it is not always clear there are more items below the bottom edge of the form. This should be made more clear somehow.

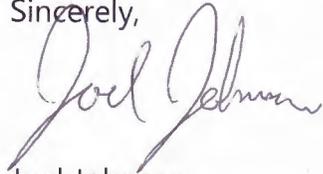
Participants did not express many thoughts on how to improve the program. Whenever they failed a task and the administrator expressed that the feature needs improvement, the participants agreed.

May 19, 2014

To whom it may concern,

In fulfillment of the 2014 Edition Test Procedure for §170.314(g)(3); Safety-enhanced design, E-Z BIS, Inc. submits the attached usability test report. I hereby attest that the processes and findings described in the *Usability Test Results and Analysis for E-Z BIS Office Electronic Health Records Version 10.2* are accurate and complete and I confirm the authenticity of the usability report.

Sincerely,



Joel Johnson,
Quality Assurance Specialist