

E·Z BIS Office Electronic Health Records Version 11.02

Usability Test Results and Analysis

The following is a report of usability tests conducted by E·Z BIS, Inc. on features in version 11.02 of the E·Z BIS Office Electronic Health Records product.

Terms Used in This Report:

- CDS – Clinical Decision Support
- CPOE – Computerized Provider Order Entry
- EHRUT – EHR Under Test
- SED – Safety Enhanced Design

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. 11.02

Date of Tests:

SED_01:	August 29, 2017	SED_07:	September 6, 2017
SED_02:	September 6, 2017	SED_08:	September 6, 2017
SED_03:	August 28, 2017	SED_10:	August 31, 2017
SED_04:	August 30, 2017	SED_11:	August 30, 2017
SED_06:	August 30, 2017	SED_13:	August 29, 2017

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 three chairs, one for the test participant, one for the data logger, 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).

Total Number of Participants

Ten participants took part in the study. Each task was tested by all 10 participants, which, collectively, represented a total of four different roles from the set of intended users described above.

Description of Participants

Participants in the test included Chiropractors, office managers, chiropractor assistants, and insurance administrator, and office staff members. Some participants fulfilled more than 1 role. Participants were recruited by Joel Johnson, Eric McCleery, and Aimee Byrd. 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
SED_01	F	44	B.S.	Chiropractor	15 years	2 years	2 years	None
SED_02	M	63	B.S.	Office Manager	35 years	10 years	26 years	None
SED_03	F	25	Some College	Chiropractic Assistant	4 years	4 years	6 months	None
SED_04	M	48	D.C.	Chiropractor	20 years	20 years	2 years	None
SED_06	F	57	Some College	Chiropractic Assistant	20 years	5 years	5 years	None
SED_07	M	56	D.C.	Chiropractor	20 years	20 years	20 years	None
SED_08	F	26	Some College	Office Manager	4.5 years	14 years	4.5 years	None
SED_10	F	48	Some College	Insurance Administrator	30 years	30 years	5 years	None
SED_11	M	74	D.C.	Chiropractor	50 years	5 years	5 years	Yes
SED_13	F	33	B.S.	Chiropractic Assistant	15 years	8 years	8 years	None

Sixteen participants (matching the demographics in the section on Participants) were recruited and ten participated in the usability test. Six participants failed to respond to scheduling requests for the study. All participants were scheduled for 90 minute sessions with at least 30 minutes in between each session 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 10 seconds then allotted task time performance would be 12.5 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 - Medications 315(a)(1) Tests

The following is a report of usability tests conducted on certain tasks related to CPOE medications in version 11.02 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
Record Patient Medication Order	<ol style="list-style-type: none"> 1.) Open EHR, click on 'File' and select 'E-prescribe' 2.) Select the appropriate doctor from the 'Doctor' dropdown 3.) Enter the 'User Id' and password and click 'OK' 4.) On the menubar, hover over 'Rx' and select 'New Rx' 5.) Enter 'Patient ID' or patient name and click 'Search' 6.) Click 'Select' next to the account that you would like to load 7.) Select a 'Prescriber', 'DEA Number' and (*if required*) 'Supervisor' 8.) Select or search for an associated ICD-10 (*if required*) 9.) Enter an 'Effective Date' for the prescription by either typing a future date in MM/DD/YYYY format, or by selecting the calendar icon and picking a future date. 10.) Click the magnifying glass icon next to 'Drug', enter the name of the prescription and press 'Search' 11.) From the results, click 'Select' next to the item to prescribe 12.) On the right, click 'Build SIG' to generate the usage instructions label for the patient 13.) Select appropriate values for each option, as necessary, and click 'Set' 14.) Enter a 'Quantity' for the prescription 15.) Enter a 'Days Supply', if necessary 16.) Enter the number of 'Refills' for the prescription 17.) Enter a 'Unit of Measure', if not already filled in 18.) Enter any 'Notes to the Pharmacist', if necessary 19.) Ensure that 'Issue To' value is correct 20.) Select a value from 'Issue Via' dropdown as a method of issuing the prescription 21.) Press 'Hold' to save the prescription order
Modify Patient Medication Order	<ol style="list-style-type: none"> 1.) Open EHR, click on 'File' and select 'E-prescribe' 2.) Select the appropriate doctor from the 'Doctor' dropdown 3.) Enter the 'User Id' and password and click 'OK' 4.) On the menubar, hover over 'Rx' and select 'Authorizations' 5.) Click the checkbox next to the prescription you would like modify and press 'Details' 6.) Update the necessary fields and click 'Save', then 'Close'

Results of the Test and Data 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	10	9	90%	1	10%	0.1
Modify Medication Order	10	9	90%	1	10%	0.1

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	10	53	159	99	44.2	13.99	1.87
Modify Medication Order	10	21	63	39	17.1	5.40	1.85

Satisfaction

Task	Number	Average Satisfaction Rating on 1-5 Scale (1=Very Easy)
Record Medication Order	10	1.7
Modify Medication Order	10	1.3

Data Analysis

Task results related to medication orders were acceptable, with only one failure per task. Both errors were from the same participant. The cause of the errors, and test failure, were:

- 1) Participant failed to notice a popup requiring action and continued to attempt to type into a text field
- 2) Participant repeatedly entered Dosage information in the Notes section, which caused validation issues
- 3) Participant was unsure of how to select the specific medication to modify from the main screen

All other participants met the efficiency targets set for the two tasks.

The participants were, on average, satisfied with both tasks. One participant rated the 'Record Medication Order' task as a '3' due to their confusion on how to complete the test. This same participant represents the lone failure on both tasks in this subsection, accounting for 40% of the observed errors in this function set.

CPOE - Laboratory 315(a)(2) Tests

The following is a report of usability tests conducted on certain tasks related to CPOE laboratory orders in version 11.02 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
Record Patient Lab Order	<ol style="list-style-type: none"> 1.) Open EHR, click on 'File' and select 'E-prescribe' 2.) Select the appropriate doctor from the 'Doctor' dropdown 3.) Enter the 'User Id' and password and click 'OK' 4.) On the menubar, hover over 'Orders' and select 'New Order' 5.) Enter 'Patient ID' or patient name and click 'Search' 6.) Click 'Select' next to the account that you would like to load 7.) Select an 'Order Type' and a 'Bill Type' 8.) Ensure patient information is correct, updating as necessary 9.) Select the 'Lab' that the order is being submitted to 10.) Select the 'Ordering Physician' requesting the lab order 11.) Ensure that 'Client/Facility' and 'Operator' values are correct, updating as necessary 12.) Click 'Next' 13.) Click the binoculars icon next to 'Test Codes' 14.) In the 'Description' field, type the value for the lab order and click 'Search' 15.) From the results grid, click the checkbox next to the appropriate result and click 'Use Selected' 16.) Select the appropriate ICD-10 code(s) associated with this lab and click 'Add to Order' 17.) Insert any 'Instructions' or 'Report Comments', as necessary 18.) Insert a phone or fax number to report results, as necessary 19.) Insert the 'Patient ID' to send a copy of the results to the patient 20.) Click 'Validate Order' 21.) On the menubar, hover over 'Patient' and select 'Patient Chart' 22.) Enter 'Patient ID' or patient name and click 'Search' 23.) Click 'Select' next to the account that you would like to use 24.) Select the 'Orders' tab 25.) Click the checkbox next to the lab order that you would like to submit 26.) Click 'Send Orders'
Modify Patient Lab Order	<ol style="list-style-type: none"> 1.) Open EHR, click on 'File' and select 'E-prescribe' 2.) Select the appropriate doctor from the 'Doctor' dropdown 3.) Enter the 'User Id' and password and click 'OK' 4.) On the menubar, hover over 'Patient' and select 'Patient Chart' 5.) Enter 'Patient ID' or patient name and click 'Search' 6.) Click 'Select' next to the account that you would like to load 7.) Select the 'Orders' tab 8.) Click on the 'Order #' for the order you need to modify 9.) Edit Patient, Doctor, Tests, or ICD-10 codes as necessary 10.) Click 'Validate Order'

Results of the Test and Data 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 Patient Lab Order	10	9	90%	1	10%	0.1
Modify Patient Lab Order	10	6	60%	4	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 Patient Lab Order	10	35	105	75	42.1	13.31	2.15
Modify Patient Lab Order	10	21	63	51	18.7	5.91	2.42

Satisfaction

Task	Number	Average Satisfaction Rating on 1-5 Scale (1=Very Easy)
Record Patient Lab Order	10	1.3
Modify Patient Lab Order	10	2.0

Data Analysis

Task results related to laboratory orders were within acceptable limits, despite the five combined failures. The cause of the errors were due to the fact that they were unfamiliar with this functionality due to not using it in their practices. As such, more time was needed to create and modify entries. In addition, participants paused several times to check their entries before moving on to the next, and a majority of the participants were searching for a way to select the laboratory order and were overlooking the hyperlink provided. The majority of participants met the efficiency targets set for the two tasks.

The participants were, on average, satisfied with both tasks once they were briefed on the proper task procedures. The four participants that took the longest to complete the tasks rated them an average of 3.25, with the remaining participants rating them an average of 1.25.

CPOE - Diagnostic Imaging 315(a)(3) Tests

The following is a report of usability tests conducted on certain tasks related to CPOE diagnostic imaging orders in version 11.02 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
Record Patient Diagnostic Imaging Order	<ol style="list-style-type: none"> 1.) Open EHR, click on 'File' and select 'E-prescribe' 2.) Select the appropriate doctor from the 'Doctor' dropdown 3.) Enter the 'User Id' and password and click 'OK' 4.) On the menubar, hover over 'Orders' and select 'New Order' 5.) Enter 'Patient ID' or patient name and click 'Search' 6.) Click 'Select' next to the account that you would like to load 7.) Select an 'Order Type' and a 'Bill Type' 8.) Ensure patient information is correct, updating as necessary 9.) Select the 'Lab' that the order is being submitted to 10.) Select the 'Ordering Physician' requesting the lab order 11.) Ensure that 'Client/Facility' and 'Operator' values are correct, updating as necessary 12.) Click 'Next' 13.) Click the binoculars icon next to 'Test Codes' 14.) In the 'Description' field, type the value for the lab order and click 'Search' 15.) From the results grid, click the checkbox next to the appropriate result and click 'Use Selected' 16.) Select the appropriate ICD-10 code(s) associated with this lab and click 'Add to Order' 17.) Insert any 'Instructions' or 'Report Comments', as necessary 18.) Insert a phone or fax number to report results, as necessary 19.) Insert the 'Patient ID' to send a copy of the results to the patient 20.) Click 'Validate Order' 21.) On the menubar, hover over 'Patient' and select 'Patient Chart' 22.) Enter 'Patient ID' or patient name and click 'Search' 23.) Click 'Select' next to the account that you would like to use 24.) Select the 'Orders' tab 25.) Click the checkbox next to the lab order that you would like to submit 26.) Click 'Send Orders'
Modify Patient Diagnostic Imaging Order	<ol style="list-style-type: none"> 1.) Open EHR, click on 'File' and select 'E-prescribe' 2.) Select the appropriate doctor from the 'Doctor' dropdown 3.) Enter the 'User Id' and password and click 'OK' 4.) On the menubar, hover over 'Patient' and select 'Patient Chart' 5.) Enter 'Patient ID' or patient name and click 'Search' 6.) Click 'Select' next to the account that you would like to load 7.) Select the 'Orders' tab 8.) Click on the 'Order #' for the order you need to modify 9.) Edit Patient, Doctor, Tests, or ICD-10 codes as necessary 10.) Click 'Validate Order'

Results of the Test and Data 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 Diagnostic Imaging Order	10	10	100%	0	0%	0.0
Modify Diagnostic Imaging Order	10	9	90%	1	10%	0.1

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Standard Error	Observed Task Time / Optimal Task Time
Record Diagnostic Imaging Order	10	33	99	58	18.7	5.93	1.76
Modify Diagnostic Imaging Order	10	18	54	39	25.2	7.96	2.16

Satisfaction

Task	Number	Average Satisfaction Rating on 1-5 Scale (1=Very Easy)
Record Diagnostic Imaging Order	10	1.1
Modify Diagnostic Imaging Order	10	1.1

Data Analysis

Task results related to diagnostic imaging orders were excellent, with only one failure total. The one failure was due to the participant being unfamiliar with the form layout. They selected a value and then continued to attempt to search for it, despite it already being selected.

All other participants met the efficiency targets set for the two tasks.

The overall rating for these tasks were both 1.1, which represents a 66% improvement over 315(a)(2), which uses the same functionality. This test was performed directly after the previous, so the participants had two training sessions and a previous attempt recorded before this attempt was made. Being more familiar with the tasks made it 'easier'.

Drug Interaction Checks for CPOE 315(a)(4) Tests

The following is a report of usability tests conducted on certain tasks related to CPOE drug interaction checks in version 11.02 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
View Prescription Interaction Warnings	<ol style="list-style-type: none"> 1.) Open EHR, click on 'File' and select 'E-prescribe' 2.) Select the appropriate doctor from the 'Doctor' dropdown 3.) Enter the 'User Id' and password and click 'OK' 4.) On the menubar, hover over 'Rx' and select 'New Rx' 5.) Enter 'Patient ID' or patient name and click 'Search' 6.) Click 'Select' next to the account that you would like to load 7.) Select a 'Prescriber', 'DEA Number' and (*if required*) 'Supervisor' 8.) Select or search for an associated ICD-10 (*if required*) 9.) Enter an 'Effective Date' for the prescription by either typing a future date in MM/DD/YYYY format, or by selecting the calendar icon and picking a future date. 10.) Click the magnifying glass icon next to 'Drug', enter the name of the prescription and press 'Search' 11.) From the results, click 'Select' next to the item to prescribe 12.) Click the 'View DUR Warnings' button 13.) Press either 'Accept and Return' or 'Close' button

Results of the Test and Data 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
View Prescription Interaction Warnings	10	7	70%	3	30%	0.3

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Standard Error	Observed Task Time / Optimal Task Time
View Prescription Interaction Warnings	10	18	54	46	33.1	10.46	2.56

Satisfaction

Task	Number	Average Satisfaction Rating on 1-5 Scale (1=Very Easy)
View Prescription Interaction Warnings	10	1.1

Data Analysis

The task results related to drug interaction warnings were acceptable, despite the three failures. The cause of failure was simply the participants not stopping when they noticed the warning cue, causing them to surpass the target task times. All three participants continued entering the prescription and only mentioned seeing the warning once they were done entering values. All other participants met the efficiency targets set for the task.

The participants were very satisfied with the task, despite the failures.

Demographics 315(a)(5) Tests

The following is a report of usability tests conducted on certain tasks related to demographics in version 11.02 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
Insert Patient Demographics	<ol style="list-style-type: none"> 1.) Open Filing, enter an account number, and press 'OK' 2.) Click on the 'General' tab 3.) Press the 'Quality Payment Program' button 4.) Press the 'Race' search button and select an option 5.) Press the 'Ethnicity' search button and select an option 6.) Press the 'Language' search button and select an option 7.) Press the 'Sexual Orientation' dropdown and select an option 8.) Press the 'Gender Identity' dropdown and select an option 9.) Type in a value for 'Previous Name' 10.) Select the 'Name Type' and 'Qualifier' for previous name entry 11.) Type in a value for 'Patient's Middle Name' 12.) Press the 'Patient Care Reminder' dropdown and select an option 13.) Press 'OK' to save
Update Patient Demographics	<ol style="list-style-type: none"> 1.) Open Filing, enter an account number, and press 'OK' 2.) Click on the 'General' tab 3.) Press the 'Quality Payment Program' button 4.) Press the 'Race' search button and select an option 5.) Press the 'Ethnicity' search button and select an option 6.) Press the 'Language' search button and select an option 7.) Press the 'Sexual Orientation' dropdown and select an option 8.) Press the 'Gender Identity' dropdown and select an option 9.) Type in a new value for 'Previous Name' 10.) Select the 'Name Type' and 'Qualifier' for previous name entry 11.) Type in a new value for 'Patient's Middle Name' 12.) Press the 'Patient Care Reminder' dropdown and select an option 13.) Press 'OK' to save

Results of the Test and Data 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
Insert Patient Demographics	10	10	100%	0	0%	0.0
Update Patient Demographics	10	10	100%	0	0%	0.0

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Standard Error	Observed Task Time / Optimal Task Time
Insert Patient Demographics	10	45	135	55	17.4	5.50	1.22
Update Patient Demographics	10	9	27	14	5.8	1.84	1.54

Satisfaction

Task	Number	Average Satisfaction Rating on 1-5 Scale (1=Very Easy)
Insert Patient Demographics	10	1.2
Update Patient Demographics	10	1.1

Data Analysis

Task results related to demographics were excellent, with no failures. Several participants overlooked data which was meant to be entered, thereby lowering the average task time and increasing the number of observed errors. Despite these issues, participants were satisfied with both tasks and did not raise any concerns about the process.

Problem List 315(a)(6) Tests

The following is a report of usability tests conducted on certain tasks related to problem list in version 11.02 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
Insert Problem List Item	<ol style="list-style-type: none">1.) Open EHR and select a patient account2.) Select the Diagnosis tab3.) Press the "Problem List" button4.) On the "Problem List" window, press Insert5.) Enter relevant details about the patient's problem6.) Press "OK" to save the entry
Update Problem List Item	<ol style="list-style-type: none">1.) Open EHR and select a patient account2.) Select the Diagnosis tab3.) Press the "Problem List" button4.) Select the entry to modify and press "Edit"5.) Update relevant details about the patient's problem6.) Press "OK" to save the changes

Results of the Test and Data 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
Insert Problem List Item	10	10	100%	0	0%	0.0
Update Problem List Item	10	10	100%	0	0%	0.0

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Standard Error	Observed Task Time / Optimal Task Time
Insert Problem List Item	10	20	60	31	15.8	4.99	1.55
Update Problem List Item	10	10	30	13	6.3	1.99	1.27

Satisfaction

Task	Number	Average Satisfaction Rating on 1-5 Scale (1=Very Easy)
Insert Problem List Item	10	1.1
Update Problem List Item	10	1.0

Data Analysis

Task results related to problem list were excellent, with no failures. Several participants entered the minimal amount of data required, which lowered the average task. All participants were satisfied with both tasks and did not raise any concerns about the process.

Medication List 315(a)(7) Tests

The following is a report of usability tests conducted on certain tasks related to the medication list in version 11.02 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
Record Patient Medication Order	<ol style="list-style-type: none"> 1.) Open EHR, enter an account number, and press 'OK' 2.) Click on the 'History' tab 3.) In the 'Medications' section, press the 'Add' button 4.) In the 'Medication Information' window, enter a medication name 5.) Press the magnifying glass button to search for that medication 6.) Choose a specific medication dosage/form and press 'Select' 7.) Enter the number of doses per medication use 8.) Enter a route for medication usage, or press the magnifying glass button to search for most used items 9.) Enter a frequency for medication usage, or press the magnifying glass button to search for most used items 10.) Enter a date or use the calendar to specify when the medication began 11.) If applicable, enter a date or use the calendar to specify when the medication ended 12.) Select a value from the 'Prescription Type' dropdown to specify the method the prescription was authorized
Modify Patient Medication Order	<ol style="list-style-type: none"> 1.) Open EHR, enter an account number, and press 'OK' 2.) Click on the 'History' tab 3.) In the 'Medications' section, press the 'Add' button 4.) In the 'Medication Information' window, enter a medication name 5.) Press the magnifying glass button to search for that medication 6.) Choose a specific medication dosage/form and press 'Select' 7.) Enter the number of doses per medication use 8.) Enter a route for medication usage, or press the magnifying glass button to search for most used items 9.) Enter a frequency for medication usage, or press the magnifying glass button to search for most used items 10.) Enter a date or use the calendar to specify when the medication began 11.) If applicable, enter a date or use the calendar to specify when the medication ended 12.) Select a value from the 'Prescription Type' dropdown to specify the method the prescription was authorized

Results of the Test and Data 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 Patient Medication Order	10	9	90%	1	10%	0.1
Modify Patient Medication Order	10	10	100%	0	0%	0.0

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Standard Error	Observed Task Time / Optimal Task Time
Record Patient Medication Order	10	44	122	74	43.9	13.89	1.67
Modify Patient Medication Order	10	11	33	18	6.7	2.12	1.64

Satisfaction

Task	Number	Average Satisfaction Rating on 1-5 Scale (1=Very Easy)
Record Patient Medication Order	10	1.5
Modify Patient Medication Order	10	1.3

Data Analysis

Task results related to medication orders were acceptable, with only one failure between the two tasks. The one failure was due to the participant surpassing the target time after getting visibly stuck on a screen. Once they gathered themselves, they were able to perform the task successfully.

Almost all participants were satisfied with both tasks. One participant rated the first task, 'Record Patient Medication Order' as a 5, despite completing it within the target time and having minimal issues. Another participant rated the second task, 'Modify Patient Medication Order', as a 3, despite completing it within the allotted timeframe and having no difficulty with the task.

Medication Allergy List 315(a)(8) Tests

The following is a report of usability tests conducted on certain tasks related to the medication allergy list in version 11.02 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
Record Patient Medication Allergy List	<ol style="list-style-type: none"> 1.) Open EHR, enter an account number, and press 'OK' 2.) Click on the 'History' tab 3.) In the 'Allergies' section, press the 'Add' button 4.) Select either 'No Known Allergies', 'Medication Allergy', or 'Other Allergen' 5.) Click the magnifying glass button to search for a medication or other allergen 6.) For a medication allergy, enter a search term and press 'Search'; for an 'Other Allergen', select a value from the 'Most Used' section, choose from the pre-built listing, or enter the allergen in the text field, then press 'Select Item' 7.) Enter a 'Reaction' description 8.) Enter a 'Start Date' for this allergy, if known 9.) Enter an 'End Date' for this allergy, if applicable 10.) Click 'OK'
Modify Patient Medication Allergy List	<ol style="list-style-type: none"> 1.) Open EHR, enter an account number, and press 'OK' 2.) Click on the 'History' tab 3.) In the 'Allergies' section, double-click the allergy to modify 4.) In the 'Medication Information' window, update any fields as necessary 5.) Click 'OK'

Results of the Test and Data 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 Patient Medication Allergy List	10	9	90%	1	10%	0.1
Modify Patient Medication Allergy List	10	9	90%	1	10%	0.1

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Standard Error	Observed Task Time / Optimal Task Time
Record Patient Medication Allergy List	10	17	51	33	13.6	4.32	1.96
Modify Patient Medication Allergy List	10	8	24	17	10.1	3.20	2.13

Satisfaction

Task	Number	Average Satisfaction Rating on 1-5 Scale (1=Very Easy)
Record Patient Medication Allergy List	10	1.5
Modify Patient Medication Allergy List	10	1.3

Data Analysis

Task results related to medication allergy lists were excellent, with only two failures total, both due to running over the target time. There were only four observed errors between the two tasks.

The participants were highly satisfied with both tasks, with two exceptions. On the first task, 'Record Patient Medication Allergy List', the participant was clicking the incorrect button and became frustrated, causing them to rate it as a 5. On the second task, 'Modify Patient Medication Allergy List', the participant encountered no errors but gave the task a rating of 3.

Clinical Decision Support 315(a)(9) Tests

The following is a report of usability tests conducted on certain tasks related to Clinical Decision Support in version 11.02 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 CDS Intervention	1.) Open EHR, click 'Utilities', hover over 'Meaningful Use' and select 'Clinical Decision Support Interventions' 2.) Click 'Add Support Intervention' 3.) Insert a value into the 'Intervention Name' field 4.) In the 'Clinical Roles' field, select which roles are able to select this intervention 5.) Create a filter to specify which patients will prompt with this intervention 6.) Click 'OK'
Access CDS Intervention	1.) With an account role allowed by the created Intervention, open EHR, enter an account number for a patient affected by a CDS Intervention, and press 'OK' 2.) Click on the red '!' icon on the top right to view associated CDS Interventions for this patient.

Results of the Test and Data 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 CDS Intervention	10	8	80%	2	20%	0.2
Access CDS Intervention	10	10	100%	0	0%	0.0

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Standard Error	Observed Task Time / Optimal Task Time
Create CDS Intervention	10	24	72	57	20.8	6.58	2.36
Access CDS Intervention	10	5	15	7	1.3	0.40	1.34

Satisfaction

Task	Number	Average Satisfaction Rating on 1-5 Scale (1=Very Easy)
Create CDS Intervention	10	1.4
Access CDS Intervention	10	1.0

Data Analysis

Task results related to CDS interventions were acceptable, despite the two failures. The cause of the first error was the participant being unsure of how to create a new intervention. They spent one-third of their time navigating the screen before taking action. The second was based on confusion on the participants' part as to what data was required to be entered, despite being trained on the task and being provided with a handout.

The participants were, on average, highly satisfied with the tasks presented.

Implantable Device List 315(a)(14) Tests

The following is a report of usability tests conducted on certain tasks related to the implantable device list in version 11.02 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
Record Patient Implantable Device	<ol style="list-style-type: none">1.) Open EHR, enter an account number, and press 'OK'2.) Click on the 'History' tab3.) In the 'Implantable Devices' section, press the 'Add' button4.) Insert the 'UDI' code5.) Insert the 'Began Use' date6.) Insert the 'Procedure Code' or click the magnifying glass icon to select one7.) Click 'OK'
Modify Patient Implantable Device	<ol style="list-style-type: none">1.) Open EHR, enter an account number, and press 'OK'2.) Click on the 'History' tab3.) In the 'Implantable Devices' section, double-click the device to modify4.) Update any fields as necessary5.) Click 'OK'

Results of the Test and Data 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 Patient Implantable Device	10	10	100%	0	0%	0.0
Modify Patient Implantable Device	10	10	100%	0	0%	0.0

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Standard Error	Observed Task Time / Optimal Task Time
Record Patient Implantable Device	10	29	87	29	17.1	5.40	1.00
Modify Patient Implantable Device	10	8	24	12	4.5	1.42	1.48

Satisfaction

Task	Number	Average Satisfaction Rating on 1-5 Scale (1=Very Easy)
Record Patient Implantable Device	10	1.4
Modify Patient Implantable Device	10	1.0

Data Analysis

Task results related to implantable devices were excellent, with no failures.

The participants were satisfied with both tasks. One participant rated the first task, ‘Record Patient Implantable Device’, as a 5 due to the amount of work required to complete it. They had an issue with typing in the 42 character UDI code. Later tests were performed with the participants able to copy/paste the code, despite the fact that this isn’t a viable real-world scenario. All other participants rated this task as a 1, ‘very easy’.

Clinical Information Reconciliation and Incorporation

315(b)(2) Tests

The following is a report of the usability test conducted on the task related to clinical information reconciliation and incorporation in version 11.02 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
Import Clinical Information	1.) Open EHR, enter an account number, and press 'OK' 2.) Click on the 'Documents' tab 3.) Double click on the 'Meaningful Use' folder 4.) Right-click the 'Clinical Summary' document and select 'Clinical Information Reconciliation' 5.) Select any items that you would like to merge 6.) Select 'Close'

Results of the Test and Data 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
Import Clinical Information	10	9	90%	1	10%	0.1

Efficiency

Task	Number	Optimal Task Time (sec)	Target Task Time	Avg. Task Time	Standard Deviation	Standard Error	Observed Task Time / Optimal Task Time
Import Clinical Information	10	12	36	27	20.0	6.33	2.24

Satisfaction

Task	Number	Average Satisfaction Rating on 1-5 Scale (1=Very Easy)
Import Clinical Information	10	1.5

Data Analysis

Task results related to the importing of clinical information were acceptable, with only one failure on the task. The participant was right-clicking on a folder instead of the intended file and was not seeing the option described during the training session. This resulted in a task timing more than doubled that of the other participants.

The participants were, on average, satisfied with this tasks. One participant rated it as a 5, despite the fact that they met the target timeframe for the task. Instead of right-clicking the file to import it into the system, they double-clicked it, which opened the file instead. They realized their mistake and took the appropriate actions to complete the task.

Conclusion

Post-session Questionnaire Results

Question ("Strongly Disagree" = 1, "Strongly Agree" = 5)	Avg Rating
I think that I would like to use this system frequently	4.3
I found the system unnecessarily complex	1.9
I thought the system was easy to use	4.8
I think that I would need the support of a technical person to be able to use this system	1.5
I found the various functions in this system were well integrated	4.6
I thought there was too much inconsistency in this system	1.3
I would imagine that most people would learn to use this system very quickly	3.9
I found the system very cumbersome to use	1.8
I felt very confident using the system	4.6
I needed to learn a lot of things before I could get going with this system	1.4

Major Test Findings

Overall, users were very satisfied with the product. The overall task failure rate was only ten percent, which is more than acceptable for an 18-part assessment of the program. One participant accounted for exactly half of the task failures, but they freely admitted that they don't use the software often. Their particular feedback was valuable because they are in a position of testing these features without having previous working knowledge of them. This participant was also the oldest of the participant pool, and took the most time in completing the tasks.

Identified Areas for Improvement

CPOE tasks seemed daunting to the participants at first glance due to it being vastly different than the main E-Z BIS Office software. The process for modifying a prescription was different than the process for modifying a lab order, which also caused confusion. The first task required selecting the checkbox for the specific prescription order and selecting 'Details', while the lab order tasks required the user to click on a hyperlink for the order. This non-uniformity caused task failures for four participants on the first attempt, 'Modify Patient Lab Order'. On the second attempt, 'Modify Patient Diagnostic Imaging Order', there was only one failure. If the participants were to use the features on a regular basis, the differences would seem common-place and there would be no hesitation in performing the tasks as they arose.

The second area of concern was 'View Prescription Interaction Warnings', with a 70% pass rate. It was made very clear in the training sessions that the participant was to stop as soon as they noticed the warning triggered by their actions, however three participants continued on despite the warning being displayed. Despite the fact that this was a user-error on their behalf, maybe the warning should be presented in a more noticeable manner, drawing user attention to the warning instead of it being a passive item on the page.

It should be noted that both of these areas are provided by a third-party and are not within the realm of control of E-Z BIS, Inc.