

## EHR Usability Test Report of DataLink Trinity EMR Version 3.0

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*The following is a report of usability tests conducted by DataLink Software, LLC on features related to Meaningful Use 2015, using version 3.0 of the Trinity EMR product. This report is based on NISTIR 7742 Customized Common Industry Format Template for Electronic Health Record Usability Testing*

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## EXECUTIVE SUMMARY

A usability test of Trinity ambulatory EMR, version 3.0, was conducted on the dates of December 13<sup>th</sup> and 14<sup>th</sup> by DataLink Software, LLC with users connecting from Tampa Florida, Jacksonville Florida, Miami Florida, and San Antonio Texas via a scheduled GotoMeeting sessions. The purpose of this test was to measure and provide evidence of usability of the EHRUT. In addition, this testing was done with consideration for the Meaningful use requirements of 170.315(g)(3). During the usability test, 8 healthcare providers, 1 Physician Executive, and 1 Business Executive matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

The study collected performance data on 12 groups of tasks that are typically conducted on an EHR:

- § 170.315 (a)(1) Computerized provider order entry (CPOE) – medications
- § 170.315 (a)(2) Computerized provider order entry (CPOE) – laboratory
- § 170.315 (a)(3) Computerized provider order entry (CPOE) – diagnostic imaging
- § 170.315 (a)(4) Drug-drug, drug-allergy interaction checks for CPOE
- § 170.315 (a)(5) Demographics
- § 170.315 (a)(6) Problem list
- § 170.315 (a)(7) Medication list
- § 170.315 (a)(8) Medication allergy list
- § 170.315 (a)(9) Clinical decision support (CDS)
- § 170.315 (a)(14) Implantable device list
- § 170.315 (b)(2) Clinical information reconciliation and incorporation
- § 170.315 (b)(3) Electronic prescribing

During the 90-minute one-on-one usability test, each participant was greeted by the administrator and given instructions on participation. They were informed that they could stop testing or withdraw at any time. All participants did have prior experience with the EHR. The administrator introduced the test, and instructed participants to complete a series of tasks (given one at a time) using the EHRUT. During the testing, the administrator timed the test and recorded user performance data on paper and electronically. Various recommended metrics, based off of the examples set forth in the *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records*, were used to evaluate the usability of the EHRUT. Following is a summary of the performance and rating data collected on the EHRUT

Measure Task	N	Task Successes	Task Time (seconds)		Failures	Task Ratings 1=Easy
	#	Mean (SD)	Mean (SD)	Observed/Optimal Time (Steps)	Mean (SD)	Mean (SD)
CPOE of medication	10	100%	138 (22.7)	0.7 (1.0)	0%	1
CPOE of labs	10	100%	80 (25.6)	0.7 (1.0)	0%	1
CPOE of diagnostic imaging	10	100%	70 (24.)	0.6 (1.0)	0%	1
Drug-Drug Drug-Allergy interactions	10	100%	358 (30.0)	1.1 (1.0)	0%	2.1
Demographics	10	100%	80 (15.0)	0.5 (1.0)	0%	1.1
Problem List	10	100%	55.5 (10.8)	0.8 (1.0)	0%	1.25
Medication List	10	100%	133 (16.1)	1.1 (1.0)	0%	2.4
Medication Allergies	10	100%	62 (13.4)	0.4 (1.0)	0%	1.6
Clinical Decision Support	10	100%	720 (260.2)	1.2 (1.0)	0%	2.8
Implantable Device List	10	100%	98 (37.2)	0.5 (1.0)	0%	1.4
Clinical Information Reconciliation and Incorporation	10	100%	401 (195.5)	0.7 (1.0)	0%	2.6
Electronic Prescribing	10	100%	136 (26.8)	0.6 (1.0)	0%	2.6

In addition to performance data, the following forms of qualitative observations were made- Major Findings, and Areas for Improvement. Both observation types are described further in individual sections of this report.

## INTRODUCTION

The EHRUT tested for this study was Datalink's Trinity 3.0. The EHRUT is typically used in a primary care office setting or facility. The intended users of the features that were tested in this study are clinical users in a primary care setting. The testing was conducted on the participant's computer, at their primary care healthcare center. The EHRUT is a web based system, so the tests were completed on the participant's computer over the internet using an environment mirroring what would be available in production. Measures of effectiveness, efficiency, and user satisfaction (such as time to complete tasks) were captured during the usability testing.

### Terms used in this report:

EHRUT- Electronic Health Record Under Test

CPOE- Computerized Provider Order Entry

## METHOD

### PARTICIPANTS

**Total Number of Participants-** Ten participants took part in this study. Participants in the test were physicians, Nurse Practitioners, clinical support staff, a physician executive, and an office administrator.

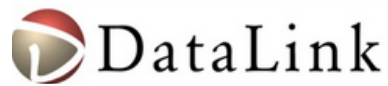
**Description of Intended Users-** The intended users of the features that were tested in this study are clinical users in a primary care setting. This includes Physicians, Physician Assistants, Nurse Practitioners, Nurses, Medical Assistants, Office Managers, Medical Directors, and Clinical Support Staff.

**Description of Participants-** Participants in this test included varying roles across the typical primary care setting, including Nurse Practitioners, a Physician/Administrator, an Office Administrator Medical Assistant. Participants were recruited from an existing customer's medical centers across two states. The participants had no direct connection to the development or organization producing the EHRUT. Participants were not from the testing or supplier organization. The participants were familiar with the previous version of the Trinity EMR product, so they were not given any additional training prior to testing.

For the test purposes, the end-user characteristics were only identified as existing users. The recruited participants have a mix of backgrounds and demographic characteristics. Below is a table of the participants by characteristics. The table includes, gender, current position, professional experience, highest level of education, computer experience, and product experience. All selected participants match the previously stated description of the intended users

Participant	Age (Years)	Gender	Current Position	Professional Experience-Current Position (Months)	Highest Level of Education	Computer Experience (Months)	Product Experience (Months)	Assistive Technology Needs
1	44	M	Physician	144	MD	180	12	No
2	39	F	ARNP	72	Masters	180	24	No
3	38	F	ARNP	36	Masters	132	6	No
4	45	M	ARNP	120	Masters	216	12	No
5	27	F	MA	24	Technical Training	132	6	No
6	23	F	MA	12	Technical Training	120	12	No
7	35	F	LPN	36	Technical Training	168	12	No
8	35	F	LPN	36	Technical Training	156	36	No
9	51	F	Medical Director	168	MD	240	72	No
10	53	F	Administrator	204	Bachelors	204	36	No

All ten participants recruited participated in the usability test. All ten participants were scheduled for a 90-minute session. Participants were debriefed between each task and asked to fill out a quick, anonymous questionnaire.



An electronic spreadsheet was used to keep track of the participant schedule, demographic information as reported by the user, and responses to questions asked after tasks were completed.

## **STUDY DESIGN**

Overall, the objective of this test was to uncover areas where the application performed well – that is, effectively, efficiently, and with satisfaction – and areas where the application failed to meet the needs of the participants. The data from this test may serve as a baseline for future tests with an updated version of the same EHR and/or comparison with other EHRs provided the same tasks are used. In short, this testing serves as both a means to record or benchmark current usability, but also to identify areas where improvements must be made. During the usability test, participants interacted with 1 EHR (Trinity 3.0) as well as its integrated e-prescribing solution, DrFirst Rcopia. Each participant used the system in the same testing environment, 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 of Failures
- Participant's verbalizations (comments)
- Participant's satisfaction ratings of the system

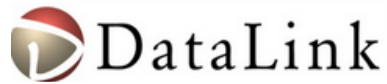
Additional information about the various measures can be found in the section below on Usability Metrics.

**Design Process-** Design of the EHRUT is based off of National Institute of Standards and Technology (NISTIR) 7742 – NIST Guide to the Process Approach for Improving the Usability of Electronic Health Records. Our internal system for customer initiated or company identified customer-focused application changes are well documented through Visual Studios, Team Foundation Server, and with Microsoft Test Manager.

## **TASKS**

A number of tasks were constructed that would be realistic and representative of the kinds of activities a user might do with this EHR, including:

- Record, update and review patient demographics
- Record vital signs and ensure follow-up based on the clinical decision support alert
- Record, update, and review allergy list and acknowledge the clinical decision support alert
- Record, update, and review orders for a medication (not electronically prescribed), laboratory test, and radiology test, and acknowledge the clinical decision support alert
- Record, update, and review problem and check for clinical decision support alert
- Record, update, and review Laboratory Test Results and acknowledge the clinical decision support alert
- Record, update, and review Radiology Test Results and acknowledge the clinical decision support alert
- Record, update, and review Implantable Device.
- Electronically prescribe a medication and acknowledge the clinical decision support alert
- Record, update, and review medication list, and view historical medication list
- Generate and incorporate CCDA document
- Adjust the severity level on drug-drug interventions and clinical decision support alerts per user role



## **PROCEDURES**

Upon arrival, participants were greeted; their identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant Identifier, (1 thru 10).

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. Participants were instructed to perform the tasks (see specific instructions below):

For each task, the participants were given a written copy of the task. 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.

Following the session, the administrator gave the participant the post-test questionnaire (e.g. Appendix 3) and thanked each individual for their participation. Participants' demographic information, task success rate, time on task, failures, verbal responses, and post-test questionnaire were recorded into a spreadsheet.

## **TEST LOCATION**

The EHRUT is a web based system, so the tests were completed on the participant's computer over the internet using an environment mirroring what would be available in production. The session was viewed/recorded using GoToMeeting from the moderator's computer. The location of the moderator is 14055 Riveredge Dr. STE 600, Temple Terrace, FL 33637.

Date of Tests:

Participant 1: 12/13/2018

Participant 2: 12/13/2018

Participant 3: 12/13/2018

Participant 4: 12/13/2018

Participant 5: 12/13/2018

Participant 6: 12/14/2018

Participant 7: 12/14/2018

Participant 8: 12/14/2018

Participant 9: 12/14/2018

Participant 10: 12/14/2018

## **TEST ENVIRONMENT**

The EHRUT is typically used in a primary care office setting or facility. The testing was conducted on the participant's computer, at the healthcare center. The users were instructed to use the Google Chrome web browser. All participants were using Windows 10, and were instructed not to change any of the system's default settings.

## **TEST FORMS AND TOOLS**

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

1. Participant Screening Form
2. Moderator's Introduction Guide
3. Tables of User Task Descriptions and Results
4. Satisfaction Survey Forms
5. Post-Test Questionnaire Form

The participant's interaction with the EHRUT was captured and recorded digitally with screen capture software running on the testing moderator's machine.

## **PARTICIPANT INSTRUCTIONS**

### **Welcome and Purpose**

The following introduction and testing instructions were delivered to each participant by the administrator before each testing session.

#### **Test Facilitator's Role**

*I am here to record your reactions and comments of the Web site you will view.*

*During this session, I would like you to use the task descriptions as best as you can to complete the tasks. I will not be able to offer any suggestions or hints, but from time to time, I may ask you to clarify what you have said or ask you for information on what you were looking for or what you expect to have happen.*

#### **Test Participant's Role**

- *Today I am going to be asking you to look for some information on the site and tell me how easy or difficult it was to find the information. These activities are all about how easy we have made it for people to use the site.*
- *There is no right or wrong answer. If you have any questions, comments or areas of confusion while you are working, please let me know.*
- *If you ever feel that you are lost or cannot complete a task with the information that you have been given, please let me know. I will ask you what you might do in a real-world setting and then either put you on the right track or move you on to the next scenario.*
- *As you use the site, please do so as you would at your office.*
- *We will be recording this session for reference if needed. We are capturing your voice and what you see on the screen. Your name will not be associated or reported with data or findings from this evaluation.*
- *I may ask you other questions as we go and we will have wrap up questions at the end.*

*Do you have any questions before we begin?*



## USABILITY METRICS

According to the NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records, EHRs should support a process that provides a high level of usability for all users. The goal is for users to interact with the system effectively, efficiently, and with an acceptable level of satisfaction. To this end, metrics for effectiveness, efficiency and user satisfaction were captured during the usability testing.

The goals of this test were to assess

1. Effectiveness of DataLink Trinity EMR version 3.0 by measuring participants success rates and Failures
2. Efficiency of DataLink Trinity EMR version 3.0 by measuring average task time
3. Satisfaction with DataLink Trinity EMR version 3.0 by measuring ease of use ratings.

**Data Scoring**-The following table details how tasks were scored, and time data was analyzed.

<b>Measures</b>	<b>Rational and Scoring</b>
<b>Effectiveness</b> Task Success	A task was considered a success if the participant was able to achieve the correct outcome without assistance, within the time allotted for the task. The total number of successes were calculated for each task then divided by the total number of times the task was attempted. The results are provided as a percentage
<b>Effectiveness</b> Task Failure	If the participant abandoned a task, or did not reach the correct outcome, or performed it incorrectly, or could not complete the task in the allotted time, the task was counted as a failure. Task times for failures were not included. The total number of failures was counted for each task and then divided by the total number of times the task was attempted.
<b>Efficiency</b> Task Time	Each task was timed from when the moderator told the participant to begin, until the participant said "done" or completed the task. Only task times for tasks that were successfully completed were included in the average task time analysis. Average time for per task was calculated. Variance measures were also calculated. Task times were recorded for successes. Observed task times were divided by the optimal time for each task, creating a measure of optimal efficiency. The optimal time for tasks was obtained from current users in a previous version of the system and then multiplied by a factor of 1.5, since the participants had no training for this version of the system. Target task times were compared against the mean task time.
<b>Satisfaction</b> Task Rating	The participant's impression of the ease of use or satisfaction was obtained by providing them a short questionnaire after each task. They ranked each task on a scale of 1-5 (1= Very Easy, 5= Not Very Easy). The responses were averaged across the participants. After all tasks were completed, the moderator asked the participant to complete a post-test questionnaire to gauge the participant's impression of usability across the entire system.

## RESULTS

### DATA ANALYSIS AND REPORTING

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above.

The usability testing results for the EHRUT are detailed below. The results should be seen in light of the objectives and goals outlined in the Study Design section of this report. The data should yield actionable results that, if corrected, yield material, positive impact on user performance.

#### **CPOE - Medications (315.a.1) Tests**

The following is a report of usability tests conducted on specific tasks related to CPOE - Medications in version 3.0 of the DataLink Trinity EMR product.

#### *Description of User Tasks that Were Tested*

<b>Task</b>	<b>Risk Rating 10=Highest</b>	<b>Steps</b>
<b>Record Medication Order</b>	5	Navigate to a patient's chart, Click any of the Dr.First icons, In the add medication box type in all or part of the medication name, Click on the dosage of the medication you wish to add, Build the sig, Select the date started (if known), Select the date last filled (if known), Select the date stopped (if known), Click "Continue"
<b>Change Medication Order</b>	5	Navigate to a patient's chart, Click any of the DrFirst icons, Click "Modify" next to the medication you wish to change, Make modifications to the sig, duration, quantities, refills, etc., Click continue..
<b>Display Changed Medication Order</b>	5	Navigate to Main Menu, Hover over Prescriptions, Click Pending

**Results of the Test**
*Effectiveness*

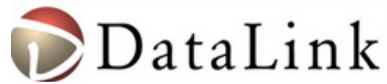
<b>Task</b>	<b>Number of Participants</b>	<b>Successes</b>	<b>Success Percentage</b>	<b>Failures</b>	<b>Failure Percentage</b>	<b>Failed Tasks per Participant</b>
<b>Record Medication Order</b>	10	10	100%	0	0%	0
<b>Change Medication Order</b>	10	10	100%	0	0%	0
<b>Display Changed Medication Order</b>	10	10	100%	0	0%	0

*Efficiency*

<b>Task</b>	<b>Number of Participants</b>	<b>Optimal Task Time (Seconds)</b>	<b>Avg Task Time</b>	<b>Standard Deviation</b>	<b>Standard Error</b>	<b>Observed/Optimal Time and (Steps)</b>
<b>Record Medication Order</b>	10	180	154	19.1	0	0.9 (1.0)
<b>Change Medication Order</b>	10	120	147	30.9	0	1.2 (1.0)
<b>Display Changed Medication Order</b>	10	60	113	25	0	1.9 (1.0)

*Satisfaction*

<b>Task</b>	<b>Number of Participants</b>	<b>Average Satisfaction Rating 1-5 (1= Very Easy)</b>
<b>Record Medication Order</b>	10	2.4
<b>Change Medication Order</b>	10	1.8
<b>Display Changed Medication Order</b>	10	1.4



**CPOE - Laboratory (315.a.2) Tests**

The following is a report of usability tests conducted on specific tasks related to CPOE - laboratory in version 3.0 of the DataLink Trinity EMR product.

*Description of User Tasks that Were Tested*

Task	Risk Rating 10=Highest	Steps
<b>Record Laboratory Order</b>	5	Navigate to a patient's chart, Click on Orders, Click Add, Enter required information in Order, Put Lab requests in Ordering Instructions, Click Add to create order
<b>Change Laboratory Order</b>	5	Navigate to a patient's chart, Click on Orders, Click desired order for change, Change desired information
<b>Display Changed Laboratory Order</b>	5	Once created the Lab order displays on patient's chart and in provider note.

**Results of the Test**

*Effectiveness*

Task	Number of Participants	Successes	Success Percentage	Failures	Failure Percentage	Failed Tasks per Participant
<b>Record Laboratory Order</b>	10	10	100%	0	0%	0
<b>Change Laboratory Order</b>	10	10	100%	0	0%	0
<b>Display Changed Laboratory Order</b>	10	10	100%	0	0%	0

*Efficiency*

Task	Number of Participants	Optimal Task Time (Seconds)	Average Task Time	Standard Deviation	Standard Error	Observed/Optimal Time (Steps)
<b>Record Laboratory Order</b>	10	180	124	42.1	0	0.7 (1.0)
<b>Change Laboratory Order</b>	10	120	65	15.5	0	0.5 (1.0)

<b>Display Changed Laboratory Order</b>	10	60	50	11	0	.8 (1.0)
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*Satisfaction*

<b>Task</b>	<b>Number of Participants</b>	<b>Average Satisfaction Rating 1-5 (1= Very Easy)</b>
<b>Record Laboratory Order</b>	10	1
<b>Change Laboratory Order</b>	10	1
<b>Display Changed Laboratory Order</b>	10	1

**CPOE – Diagnostic Imaging (315.a.3) Tests**

The following is a report of usability tests conducted on specific tasks related to CPOE – diagnostic imaging in version 3.0 of the DataLink Trinity EMR product.

*Description of User Tasks that Were Tested*

<b>Task</b>	<b>Risk Rating 10=Highest</b>	<b>Steps</b>
<b>Record Radiology/imaging Order</b>	5	Navigate to a patient's chart, Click on Orders, Click Add, Enter required information in Order, Put imaging requests in Ordering Instructions, Click Add to create order
<b>Change Radiology/imaging Order</b>	5	Navigate to a patient's chart, Click on Orders, Click desired order for change, Change desired information
<b>Display Changed Radiology/imaging Order</b>	5	Once created the imaging order displays on patient's chart and in provider note.

**Results of the Test**
*Effectiveness*

Task	Number of Participants	Successes	Success Percentage	Failures	Failure Percentage	Failed Tasks per Participant
Record Radiology/imaging Order	10	10	100%	0	0%	0
Change Radiology/imaging Order	10	10	100%	0	0%	0
Display Changed Radiology/imaging Order	10	10	100%	0	0%	0

*Efficiency*

Task	Number of Participants	Optimal Task Time (Seconds)	Average Task Time	Standard Deviation	Standard Error	Observed/Optimal Time (Steps)
Record Radiology/imaging Order	10	180	120	54	0	0.7 (1.0)
Change Radiology/imaging Order	10	120	50	12	0	0.4 (1.0)
Display Changed Radiology/imaging Order	10	60	40	9	0	0.7 (1.0)

*Satisfaction*

Task	Number of Participants	Average Satisfaction Rating 1-5 (1= Very Easy)
Record Radiology/imaging Order	10	1
Change Radiology/imaging Order	10	1
Display Changed Radiology/imaging Order	10	1

**Drug-drug, Drug-allergy Interactions (315.a.4) Tests**

The following is a report of usability tests conducted on specific tasks related to drug-drug and drug-allergy interventions in version 3.0 of the DataLink Trinity EMR product.

*Description of User Tasks that Were Tested*

<b>Task</b>	<b>Risk Rating</b>	<b>Steps</b>
<b>Drug-Drug Interaction</b>	9	Navigate to a patient's chart, Click any of the DrFirst icons, In the add medication box type in all or part of the medication name, Click on the dosage of the medication you wish to add, Build the sig, Select the date started (if known), Select the date last filled (if known), Select the date stopped (if known), Click "Continue." repeat these steps for an interacting drug. once the medication is selected, a drug-drug interaction will display with all risk factors.
<b>Drug-Allergy Interaction</b>	9	Navigate to a patient's chart, Click any of the DrFirst icons, Click Manage Allergies, Select common allergy or type in allergy search box, Select desired allergy and record additional information. Open medications, enter a new medication that would react with the patient's current allergies. once selected the drug-allergy interaction will display.
<b>Adjustment of severity level of drug-drug interventions</b>	9	In DrFirst Click "Additional options", Click "Preferences---location", Next to "When checking for drug-drug interactions, show:", change the dropdown box from "all interactions" to "Contraindicated only"

**Results of the Test**
*Effectiveness*

<b>Task</b>	<b>Number of Participants</b>	<b>Successes</b>	<b>Success Percentage</b>	<b>Failures</b>	<b>Failure Percentage</b>	<b>Failed Tasks per Participant</b>
<b>Drug-Drug Interaction</b>	10	10	100%	0	0%	0
<b>Drug-Allergy Interaction</b>	10	10	100%	0	0%	0
<b>Adjustment of severity level of drug-drug interventions</b>	10	10	100%	0	0%	0

Task	Number of Participants	Optimal Task Time (Seconds)	Average Task Time	Standard Deviation	Standard Error	Observed/Optimal Time (Steps)
<b>Drug-Drug Interaction</b>	10	300	332	53	0	1.1 (1.0)
<b>Drug-Allergy Interaction</b>	10	300	384	25	0	1.3 (1.0)
<b>Adjustment of severity level of drug-drug interventions</b>	10	60	64	14	0	1.0 (1.0)

*Satisfaction*

Task	Number of Participants	Average Satisfaction Rating 1-5 (1= Very Easy)
<b>Drug-Drug Interaction</b>	10	2.4
<b>Drug-Allergy Interaction</b>	10	2.2
<b>Adjustment of severity level of drug-drug interventions</b>	10	1.8

**Demographics (315.a.5) Tests**

The following is a report of usability tests conducted on specific tasks related to demographics in version 3.0 of the DataLink Trinity EMR product.

*Description of User Tasks that Were Tested*

Task	Risk Rating	Steps
<b>Record Demographics</b>	3	Navigate to a patient's chart, Click Demographics, In General Information you can change date of birth, birth sex, and language preference. In Demographics you can input race, ethnicity, sexual orientation, and gender identity
<b>Change Demographics</b>	3	Navigate to a patient's chart, Click Demographics, In General Information you can change date of birth, birth sex, and language preference. In Demographics you can input race, ethnicity, sexual orientation, and gender identity
<b>Display Demographics</b>	3	Navigate to a patient's chart, Click Demographics, In General Information you can change the Date Deceased



**Results of the Test**
*Effectiveness*

<b>Task</b>	<b>Number of Participants</b>	<b>Successes</b>	<b>Success Percentage</b>	<b>Failures</b>	<b>Failure Percentage</b>	<b>Failed Tasks per Participant</b>
<b>Record Demographics</b>	10	10	100%	0	0%	0
<b>Change Demographics</b>	10	10	100%	0	0%	0
<b>Display Demographics</b>	10	10	100%	0	0%	0

*Efficiency*

<b>Task</b>	<b>Number of Participants</b>	<b>Optimal Task Time (Seconds)</b>	<b>Average Task Time</b>	<b>Standard Deviation</b>	<b>Standard Error</b>	<b>Observed/Optimal Time (Steps)</b>
<b>Record Demographics</b>	10	180	88	17.9	0	0.5 (1.0)
<b>Change Demographics</b>	10	120	78	14.2	0	0.7 (1.0)
<b>Display Demographics</b>	10	30	71	13.1	0	2.3 (1.0)

*Satisfaction*

<b>Task</b>	<b>Number of Participants</b>	<b>Average Satisfaction Rating 1-5 (1= Very Easy)</b>
<b>Record Demographics</b>	10	1
<b>Change Demographics</b>	10	1.1
<b>Display Demographics</b>	10	1.1

## Problem List (315.a.6) Tests

The following is a report of usability tests conducted on specific tasks related to the problem list in version 3.0 of the DataLink Trinity EMR product.

### *Description of User Tasks that Were Tested*

<b>Task</b>	<b>Risk Rating</b>	<b>Steps</b>
<b>Record a Problem to the Problem List</b>	6	Navigate to a patient's chart, Click on Problem's List, Click Code and search for the diagnosis by code or name, Select a Status from the drop-down, Indicate if the condition is chronic, Click Add
<b>Change a Problem on the Problem List</b>	6	Navigate to a patient's chart, Click on Problem's List, Click Resolved or Click Inactive
<b>Display the Active Problem List</b>	6	Navigate to a patient's chart, click on Problem List
<b>Display the Historical Problem List</b>	6	Navigate to a patient chart, click on Problem List, set status filter to include Active, Inactive and Resolved

## Results of the Test

### *Effectiveness*

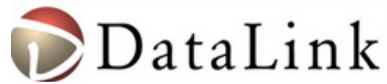
<b>Task</b>	<b>Number of Participants</b>	<b>Successes</b>	<b>Success Percentage</b>	<b>Failures</b>	<b>Failure Percentage</b>	<b>Failed Tasks per Participant</b>
<b>Record a Problem to the Problem List</b>	10	10	100%	0	0%	0
<b>Change a Problem on the Problem List</b>	10	10	100%	0	0%	0
<b>Display the Active Problem List</b>	10	10	100%	0	0%	0
<b>Display the Historical Problem List</b>	10	10	100%	0	0%	0

*Efficiency*

<b>Task</b>	<b>Number of Participants</b>	<b>Optimal Task Time (Seconds)</b>	<b>Average Task Time</b>	<b>Standard Deviation</b>	<b>Standard Error</b>	<b>Observed/Optimal Time (Steps)</b>
<b>Record a Problem to the Problem List</b>	10	120	54	11.8	0	0.5 (1.0)
<b>Change a Problem on the Problem List</b>	10	60	54	11.1	0	0.9 (1.0)
<b>Display the Active Problem List</b>	10	60	52	7.5	0	0.9 (1.0)
<b>Display the Historical Problem List</b>	10	60	62	12.8	0	0.7 (1.0)

*Satisfaction*

<b>Task</b>	<b>Number of Participants</b>	<b>Average Satisfaction Rating 1-5 (1= Very Easy)</b>
<b>Record a Problem to the Problem List</b>	10	1
<b>Change a Problem on the Problem List</b>	10	1
<b>Display the Active Problem List</b>	10	1
<b>Display the Historical Problem List</b>	10	1.4



## Medication List (315.a.7) Tests

The following is a report of usability tests conducted on specific tasks related to the medication list in version 3.0 of the DataLink Trinity EMR product.

### *Description of User Tasks that Were Tested*

<b>Task</b>	<b>Risk Rating</b>	<b>Steps</b>
<b>Record Medication List</b>	6	Navigate to a patient's chart, Click any of the DrFirst icons, In the add medication box type in all or part of the medication name, Click on the dosage of the medication you wish to add, Build the sig, Select the date started (if known), Select the date last filled (if known), Select the date stopped (if known), Click "Continue"
<b>Change Medication List</b>	6	Navigate to a patient's chart, Click any of the DrFirst icons, Click "Modify" next to the medication you wish to change, Make modifications to the sig, duration, quantities, refills, etc., Click continue.
<b>Access Active Medication List</b>	6	Navigate to Main Menu, Hover over Prescriptions, Click Pending
<b>Access the Historical Medication List</b>	6	Navigate to a patient's chart, Click on any of the DrFirst icons, Click Medication History, Click the For Last drop-down, Select 2 years, Click Obtain New Data

## Results of the Test

### *Effectiveness*

<b>Task</b>	<b>Number of Participants</b>	<b>Successes</b>	<b>Success Percentage</b>	<b>Failures</b>	<b>Failure Percentage</b>	<b>Failed Tasks per Participant</b>
<b>Record Medication List</b>	10	10	100%	0	0%	0
<b>Change Medication List</b>	10	10	100%	0	0%	0
<b>Access Medication List</b>	10	10	100%	0	0%	0
<b>Access the Historical Medication List</b>	10	10	100%	0	0%	0

<b>Task</b>	<b>Number of Participants</b>	<b>Optimal Task Time (Seconds)</b>	<b>Average Task Time</b>	<b>Standard Deviation</b>	<b>Standard Error</b>	<b>Observed/Optimal Time (Steps)</b>
<b>Record Medication List</b>	10	240	133	16.1	0	1.1 (1.0)
<b>Change Medication List</b>	10	60	72	24.1	0	1.2 (1.0)
<b>Access Medication List</b>	10	60	51	10	0	0.9 (1.0)
<b>Access the Historical Medication List</b>	10	120	92	25.1	0	1.5 (1.0)

*Satisfaction*

<b>Task</b>	<b>Number of Participants</b>	<b>Average Satisfaction Rating 1-5 (1= Very Easy)</b>
<b>Record Medication List</b>	10	2.4
<b>Change Medication List</b>	10	1.8
<b>Access Medication List</b>	10	1.4
<b>Access the Historical Medication List</b>	10	1.8

**Medication Allergy List (315.a.8) Tests**

The following is a report of usability tests conducted on specific tasks related to the medication allergy list in version 3.0 of the DataLink Trinity EMR product.

<b>Task</b>	<b>Risk Rating</b>	<b>Steps</b>
<b>Record Medication Allergy List</b>	5	Navigate to a patient's chart, Click any of the DrFirst icons, Select common allergy or type in allergy search box, Select desired allergy and record additional information
<b>Change Medication Allergy List</b>	5	Navigate to a patient's chart, Click any of the DrFirst icons, Select Modify on desired allergy and change the appropriate information
<b>Access Medication Allergy List</b>	5	Navigate to a patient's chart, Click any of the DrFirst icons, Look under Active/Current Allergies
<b>Access the Historical Medication Allergy List</b>	5	Navigate to a patient's chart, Click any of the DrFirst icons, Look under Inactive Allergies

**Results of the Test**
*Effectiveness*

<b>Task</b>	<b>Number of Participants</b>	<b>Successes</b>	<b>Success Percentage</b>	<b>Failures</b>	<b>Failure Percentage</b>	<b>Failed Tasks per Participant</b>
<b>Record Medication Allergy List</b>	10	10	100%	0	0%	0
<b>Change Medication Allergy List</b>	10	10	100%	0	0%	0
<b>Access Medication Allergy List</b>	10	10	100%	0	0%	0
<b>Access the Historical Medication Allergy List</b>	10	10	100%	0	0%	0

*Efficiency*

<b>Task</b>	<b>Number of Participants</b>	<b>Optimal Task Time (Seconds)</b>	<b>Average Task Time</b>	<b>Standard Deviation</b>	<b>Standard Error</b>	<b>Observed/Optimal Time (Steps)</b>
<b>Record Medication Allergy List</b>	10	150	62	13.4	0	0.4 (1.0)

<b>Change Medication Allergy List</b>	10	120	35	9.4	0	0.3 (1.0)
<b>Access Medication Allergy List</b>	10	60	30	7.1	0	0.5 (1.0)
<b>Access the Historical Medication Allergy List</b>	10	60	30	6	0	0.5 (1.0)

*Satisfaction*

<b>Task</b>	<b>Number of Participants</b>	<b>Average Satisfaction Rating 1-5 (1= Very Easy)</b>
<b>Record Medication Allergy List</b>	10	1.6
<b>Change Medication Allergy List</b>	10	1.6
<b>Access Medication Allergy List</b>	10	1.2
<b>Access the Historical Medication Allergy List</b>	10	1.2

**Clinical Decision Support (315.a.9) Tests**

The following is a report of usability tests conducted on specific tasks related to the clinical decision support in version 3.0 of the DataLink Trinity EMR product.

<b>Task</b>	<b>Risk Rating</b>	<b>Steps</b>
<b>Add a CDS intervention and/or reference resource for each of the required elements: Problem List, Medication List, Medication Allergy List, One Demographic, Lab Test, Vital Signs, 2 or more of above</b>	7	Navigate to the patient's chart, open note management, select a note template with required sections, sign the note.
<b>Trigger the CDS interventions/resources added using the applicable data elements from each of the required elements</b>	7	Navigate to the patient's chart, open note management, select a note template with required sections, sign the note, navigate to the facesheet, the clinical decision support section will be up to date.
<b>View the intervention/resource information using the Infobutton standard for data elements in the problem list, medication list, and demographics</b>	4	
<b>Trigger the CDS interventions/resources based on data elements in the problem list, medication list, and medication allergy list by incorporating patient information from a transition of care/referral summary</b>	7	Navigate to the patient's chart, open note management, select a note template with required sections, sign the note, navigate to the facesheet, the clinical decision support section will be up to date.
<b>Access the following attributes for one of the triggered CDS interventions/resources: bibliographic citation, developer, funding source, release/revision date</b>	4	



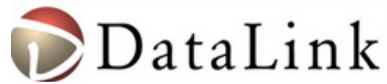
**Results of the Test**
*Effectiveness*

<b>Task</b>	<b>Number of Participants</b>	<b>Successes</b>	<b>Success Percentage</b>	<b>Failures</b>	<b>Failure Percentage</b>	<b>Failed Tasks per Participant</b>
<b>Add a CDS intervention and/or reference resource for each of the required elements: Problem List, Medication List, Medication Allergy List, One Demographic, Lab Test, Vital Signs, 2 or more of above</b>	10	10	100%	0	0%	0
<b>Trigger the CDS interventions/resources added using the applicable data elements from each of the required elements</b>	10	10	100%	0	0%	0
<b>View the intervention/resource information using the Infobutton standard for data elements in the problem list, medication list, and demographics</b>	10	10	100%	0	0%	0
<b>Trigger the CDS interventions/resources based on data elements in the problem list, medication list, and medication allergy list by incorporating patient information from a transition of care/referral summary</b>	10	10	100%	0	0%	0
<b>Access the following attributes for one of the triggered CDS interventions/resources: bibliographic citation, developer, funding source, release/revision date</b>	10	10	100%	0	0%	0

<b>Task</b>	<b>Number of Participants</b>	<b>Optimal Task Time (Seconds)</b>	<b>Average Task Time</b>	<b>Standard Deviation</b>	<b>Standard Error</b>	<b>Observed/Optimal Time (Steps)</b>
<b>Add a CDS intervention and/or reference resource for each of the required elements: Problem List, Medication List, Medication Allergy List, One Demographic, Lab Test, Vital Signs, 2 or more of above</b>	10	600	720	260.2	0	1.2 (1.0)
<b>Trigger the CDS interventions/resources added using the applicable data elements from each of the required elements</b>	10	600	620	250.6	0	1.0 (1.0)
<b>View the intervention/resource information using the Infobutton standard for data elements in the problem list, medication list, and demographics</b>	10	60	185	20.8	0	1.5 (1.0)
<b>Trigger the CDS interventions/resources based on data elements in the problem list, medication list, and medication allergy list by incorporating patient information from a transition of care/referral summary</b>	10	600	684	180.2	0	1.1 (1.0)
<b>Access the following attributes for one of the triggered CDS interventions/resources: bibliographic citation, developer, funding source, release/revision date</b>	10	120	40	15.3	0	0.6 (1.0)

*Satisfaction*

<b>Task</b>	<b>Number of Participants</b>	<b>Average Satisfaction Rating 1-5 (1= Very Easy)</b>
<b>Add a CDS intervention and/or reference resource for each of the required elements: Problem List, Medication List, Medication Allergy List, One Demographic, Lab Test, Vital Signs, 2 or more of above</b>	10	2.8
<b>Trigger the CDS interventions/resources added using the applicable data elements from each of the required elements</b>	10	3.0
<b>View the intervention/resource information using the Infobutton standard for data elements in the problem list, medication list, and demographics</b>	10	1
<b>Trigger the CDS interventions/resources based on data elements in the problem list, medication list, and medication allergy list by incorporating patient information from a transition of care/referral summary</b>	10	2.4
<b>Access the following attributes for one of the triggered CDS interventions/resources: bibliographic citation, developer, funding source, release/revision date</b>	10	1



## Implantable Device List (315.a.14) Tests

The following is a report of usability tests conducted on specific tasks related to the implantable device list in version 3.0 of the DataLink Trinity EMR product.

### Description of User Tasks that Were Tested

Task	Risk Rating	Steps
<b>Record UDI</b>	5	Navigate to the patient's chart, open note management, select a note with the implantable device section in the template. Go to implantable device, enter the UDI number, select add
<b>Change UDI Status</b>	5	Navigate to the patient's chart, open note management, select a note with the implantable device section in the template. Go to implantable device, select entered UDI, once selected change the status.
<b>Access UDI Detail</b>	5	Navigate to the patient's chart, open note management, select a note with the implantable device section in the template. Go to implantable device, enter the UDI number, select add, all additional information generates automatically when UDI is entered.

### Results of the Test

#### Effectiveness

Task	Number of Participants	Successes	Success Percentage	Failures	Failure Percentage	Failed Tasks per Participant
<b>Record UDI</b>	10	10	100%	0	0%	0
<b>Change UDI Status</b>	10	10	100%	0	0%	0
<b>Access UDI Detail</b>	10	10	100%	0	0%	0

#### Efficiency

Task	Number of Participants	Optimal Task Time (Seconds)	Average Task Time	Standard Deviation	Standard Error	Observed/Optimal Time (Steps)
<b>Record UDI</b>	10	180	98	37.2	0	0.5 (1.0)
<b>Change UDI Status</b>	10	120	52	12.0	0	0.4 (1.0)

<b>Access UDI Detail</b>	10	60	44	9.0	0	0.7 (1.0)
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*Satisfaction*

<b>Task</b>	<b>Number of Participants</b>	<b>Average Satisfaction Rating 1-5 (1= Very Easy)</b>
<b>Record UDI</b>	10	1.4
<b>Change UDI Status</b>	10	1.4
<b>Access UDI Detail</b>	10	1

**Clinical information reconciliation and incorporation (315.b.2) Tests**

The following is a report of usability tests conducted on specific tasks related to clinical information reconciliation in version 3.0 of the DataLink Trinity EMR product.

*Description of User Tasks that Were Tested*

<b>Task</b>	<b>Risk Rating</b>	<b>Steps</b>
<b>Incorporate a CCDA and conduct reconciliation of the medications, medication allergies, and problems in the CCDA with the information currently in the patient's record</b>	7	Navigate to the patient's chart, open note management, select a note template with required sections. Reconcile medications in the medications reviewed box. Select reviewed diagnoses in documents. Complete note.
<b>Generate a new CCDA with reconciled data</b>	7	Navigate to the patient's chart, open note management, select a note template with required sections.

**Results of the Test**
*Effectiveness*

<b>Task</b>	<b>Number of Participants</b>	<b>Successes</b>	<b>Success Percentage</b>	<b>Failures</b>	<b>Failure Percentage</b>	<b>Failed Tasks per Participant</b>
<b>Incorporate a CCDA and conduct reconciliation of the medications, medication allergies, and problems in the CCDA with the information currently in the patient's record</b>	10	10	100%	0	0%	0
<b>Generate a new CCDA with reconciled data</b>	10	10	100%	0	0%	0

*Efficiency*

<b>Task</b>	<b>Number of Participants</b>	<b>Optimal Task Time (Seconds)</b>	<b>Average Task Time</b>	<b>Standard Deviation</b>	<b>Standard Error</b>	<b>Observed/Optimal Time (Steps)</b>
<b>Incorporate a CCDA and conduct reconciliation of the medications, medication allergies, and problems in the CCDA</b>	10	600	401	195.5	0	0.7 (1.0)

with the information currently in the patient's record						
Generate a new CCDA with reconciled data	10	120	133	42.7	0	1.1 (1.0)

*Satisfaction*

Task	Number of Participants	Average Satisfaction Rating 1-5 (1= Very Easy)
Incorporate a CCDA and conduct reconciliation of the medications, medication allergies, and problems in the CCDA with the information currently in the patient's record	10	2.6
Generate a new CCDA with reconciled data	10	1.4

**Electronic prescribing (315.b.3) Tests**

The following is a report of usability tests conducted on specific tasks related to the electronic prescribing in version 3.0 of the DataLink Trinity EMR product.

<b>Task</b>	<b>Risk Rating</b>	<b>Steps</b>
<b>Create a Prescription</b>	6	Navigate to a patient's chart, Click any of the DrFirst icons, Click "Prescribe" next to the patient's name, In the box next to "Prescribe a medication" type in all or part of the name of the medication you wish to prescribe or select a favorite from the favorites list, Click on the name of the medication you would like to prescribe, Build the sig then click "Continue", Verify the prescription is correct then click "OK", Type password in the signature passcode box then click "Print w/o sending", Exit out of the window, Click "download prescriptions".
<b>Change prescription (dosage or duration)</b>	6	Navigate to a patient's chart, Click any of the DrFirst icons, Click "Modify" next to the medication you wish to change, Make modifications to the duration, quantities, refills, Click continue.
<b>Cancel prescription</b>	6	Navigate to a patient's chart, Click any of the DrFirst icons, click "stop" enter the reason for stopping
<b>Refill prescription</b>	6	Navigate to a patient's chart, Click any of the DrFirst icons, click "renew" enter the provider password and select send.
<b>Receive Fill Status Notification</b>	6	Navigate to Main Menu, Hover over Prescriptions, Click RX inbox
<b>Request and Receive Medication History Information</b>	6	Navigate to a patient's chart, Click any of the DrFirst icons, Click Medication History, Click the For Last drop-down, select 2 years, Click Obtain New Data

**Results of the Test**
*Effectiveness*

<b>Task</b>	<b>Number of Participants</b>	<b>Successes</b>	<b>Success Percentage</b>	<b>Failures</b>	<b>Failure Percentage</b>	<b>Failed Tasks per Participant</b>
<b>Create a Prescription</b>	10	10	100%	0	0%	0
<b>Change prescription</b>	10	10	100%	0	0%	0



(dosage or duration)						
Cancel prescription	10	10	100%	0	0%	0
Refill prescription	10	10	100%	0	0%	0
Receive Fill Status Notification	10	10	100%	0	0%	0
Request and Receive Medication History Information	10	10	100%	0	0%	0

*Efficiency*

Task	Number of Participants	Optimal Task Time (Seconds)	Average Task Time	Standard Deviation	Standard Error	Observed/Optimal Time (Steps)
Create a Prescription	10	240	136	26.8	0	0.6 (1.0)
Change prescription (dosage or duration)	10	120	96	13.4	0	0.8 (1.0)
Cancel prescription	10	60	56	5.3	0	0.9 (1.0)
Refill prescription	10	120	48	4.3	0	0.4 (1.0)
Receive Fill Status Notification	10	90	30	2.5	0	0.3 (1.0)
Request and Receive Medication History Information	10	120	1042	3.5	0	0.4 (1.0)

<b>Task</b>	<b>Number of Participants</b>	<b>Average Satisfaction Rating 1-5 (1= Very Easy)</b>
<b>Create a Prescription</b>	10	2.6
<b>Change prescription (dosage or duration)</b>	10	1.6
<b>Cancel prescription</b>	10	1.4
<b>Refill prescription</b>	10	1.2
<b>Receive Fill Status Notification</b>	10	1
<b>Request and Receive Medication History Information</b>	10	1.2

## **DISCUSSION OF THE FINDINGS**

**Effectiveness-** Based on the findings in the EHRUT, the users of Trinity were successful in completing all assigned tasks, although there was a significant amount of feedback was received on ways to increase usability of the system.

**Efficiency-** Based on the usability testing of the EHRUT, participant comments demonstrate the need for increased efficiency of the workflows and functionality of Trinity. Although the participants were able to complete the tasks assigned, there were recurring points where they were observed as uncertain of how to navigate through the workflow. Participants were able to complete all tasks, however many steps were reported by participants as being tedious, especially in the tasks involving medications and allergies which spanned the integration between two software, Trinity EMR and DrFirst Rcopia.

**Satisfaction-** Based on the task ratings by the participants, the majority of the tasks were reported as being simple and easy to use. It was clear which tasks had the highest likelihood of causing frustration, administrative tasks and clinical decision support.

## **MAJOR FINDINGS**

**Drug-Drug Allergy Interaction:** Performed in DrFirst, this functionality was easy to see when an interaction was indicated, as the indication is displayed in red text.

**Electronic Prescribing:** For most of the participants, the functionality was easy to use. However certain click requirements were repeatedly noted as being tedious.

**Medication Allergy:** For most of the participants, the functionality was easy to use. However certain click requirements were repeatedly noted as being tedious.

**Clinical Decision Support Interventions:** The majority of the participants found the CDS triggers and notifications to be a basic but an area with a lot of potential for enhancement.

## Post Session Results of System Usability Scale Questionnaire

Question	Average Rating
I think that I would like to use this system frequently (Strongly Agree=5)	4.6
I found the system unnecessarily complex (Strongly Agree=5)	1
I thought the system was easy to use (Strongly Agree=5)	4.6
I think that I would need the support of a technical person to be able to use this system (Strongly Agree=5)	2
I found the various functions in this system were well integrated (Strongly Agree=5)	5
I thought there was too much inconsistency in this system (Strongly Agree=5)	1
I would imagine that most people would learn to use this system very quickly (Strongly Agree=5)	2
I found the system very cumbersome to use (Strongly Agree=5)	1
I felt very confident using the system (Strongly Agree=5)	5
I needed to learn a lot of things before I could get going with this system (Strongly Agree=5)	1

**Identified Areas for Improvement**

Reducing the number of tedious steps to increase efficiencies in the workflow steps required to add, modify and view medications and allergies.

**Participant Results**

- Measures of effectiveness, efficiency, and satisfaction collected for each participant including:
  - Number of tasks successfully completed within the allotted time without assistance;
  - Time to complete tasks;
  - Number and types of errors;
  - Path deviations;
  - Participant’s verbalizations; and
  - Participant’s satisfaction ratings of the system



## **APPENDICES**

**Appendix 1: Participant Demographics**

**Appendix 2: Participant Screening Form**

**Appendix 3: System Usability Scale Questionnaire**

**Appendix 1: Participant Demographics**

<b>Participant</b>	<b>Age</b>	<b>Gender</b>	<b>Current Position</b>	<b>Professional Experience (Current Position)</b>	<b>Highest Level of Education</b>	<b>Computer Experience</b>	<b>Product Experience</b>

# DataLink Trinity Usability Test- Participant Screening

\* Required

Are you male or female? \*

- Male  
 Female

What is your current position and title? \*

How long have you held this position? \*

What is your highest level of education? \*

This is a required question

Do you use a computer? \*

- yes  
 no

About how many hours per week do you spend on the computer? \*

What computer platform do you normally use? \*

- Mac  
 Windows XP  
 Windows 7  
 Windows 8  
 Other:

What internet browsers do you normally use? \*

## Appendix 3: System Usability Scale Questionnaire

### System Usability Scale

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