ONC HIT Certification Program
Test Results Summary for 2014 Edition EHR Certification

Part 1: Product and Developer Information

1.1 Certified Product Information

Product Name:	WebChart EHR-CQMs
Product Version:	6.4
Domain:	Ambulatory
Test Type:	Complete EHR

1.2 Developer/Vendor Information

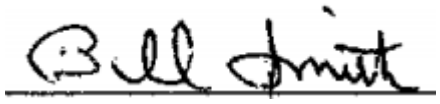
Developer/Vendor Name:	Medical Informatics Engineering
Address:	6302 Constitution Drive Fort Wayne IN 46804
Website:	www.mieweb.com
Email:	horner@mieweb.com
Phone:	(260)459-6270
Developer/Vendor Contact:	Doug Horner

Part 2: ONC-Authorized Certification Body Information

2.1 ONC-Authorized Certification Body Information

ONC-ACB Name:	Drummond Group
Address:	13359 North Hwy 183, Ste B-406-238, Austin, TX 78750
Website:	www.drummondgroup.com
Email:	ehr@drummondgroup.com
Phone:	817-294-7339
ONC-ACB Contact:	Bill Smith

This test results summary is approved for public release by the following ONC-Authorized Certification Body Representative:

Bill Smith	Certification Committee Chair
ONC-ACB Authorized Representative	**Function/Title**
 12/16/2014	
Signature and Date	

2.2 Gap Certification

The following identifies criterion or criteria certified via gap certification

§170.314			
☐ (a)(1)	☐ (a)(17)	☐ (d)(5)	☐ (d)(9)
☐ (a)(6)	☐ (b)(5)*	☐ (d)(6)	☐ (f)(1)
☐ (a)(7)	☐ (d)(1)	☐ (d)(8)	

*Gap certification allowed for Inpatient setting only

☒ No gap certification

2.3 Inherited Certification

The following identifies criterion or criteria certified via inherited certification

§170.314			
[x] (a)(1)	[x] (a)(14)	[ ] (c)(3)	[x] (f)(1)
[x] (a)(2)	[x] (a)(15)	[x] (d)(1)	[x] (f)(2)
[x] (a)(3)	[ ] (a)(16) *Inpt. only*	[x] (d)(2)	[x] (f)(3)
[x] (a)(4)	[ ] (a)(17) *Inpt. only*	[x] (d)(3)	[ ] (f)(4) *Inpt. only*
[x] (a)(5)	[x] (b)(1)	[x] (d)(4)	[ ] (f)(5) *Optional & Amb. only*
[x] (a)(6)	[x] (b)(2)	[x] (d)(5)	
[x] (a)(7)	[x] (b)(3)	[x] (d)(6)	[ ] (f)(6) *Optional & Amb. only*
[x] (a)(8)	[x] (b)(4)	[x] (d)(7)	
[x] (a)(9)	[x] (b)(5)	[x] (d)(8)	[ ] (g)(1)
[x] (a)(10)	[ ] (b)(6) *Inpt. only*	[ ] (d)(9) *Optional*	[x] (g)(2)
[x] (a)(11)	[x] (b)(7)	[x] (e)(1)	[x] (g)(3)
[x] (a)(12)	[ ] (c)(1)	[x] (e)(2) *Amb. only*	[x] (g)(4)
[x] (a)(13)	[ ] (c)(2)	[x] (e)(3) *Amb. only*	

[ ] No inherited certification

Part 3: NVLAP-Accredited Testing Laboratory Information

Report Number: SG-12112014-2197

Test Date(s): 12/11/2014

3.1 NVLAP-Accredited Testing Laboratory Information

ATL Name:	Drummond Group EHR Test Lab
Accreditation Number:	NVLAP Lab Code 200979-0
Address:	13359 North Hwy 183, Ste B-406-238, Austin, TX 78750
Website:	www.drummondgroup.com
Email:	ehr@drummondgroup.com
Phone:	512-335-5606
ATL Contact:	Beth Morrow

For more information on scope of accreditation, please reference NVLAP Lab Code 200979-0.

Part 3 of this test results summary is approved for public release by the following Accredited Testing Laboratory Representative:

Sonia Galvan	Test Proctor
ATL Authorized Representative	**Function/Title**
Sonia Galvan 12/16/2014	Houston, TX
Signature and Date	**Location Where Test Conducted**

3.2 Test Information

3.2.1 Additional Software Relied Upon for Certification

Additional Software	Applicable Criteria	Functionality provided by Additional Software
Nomoreclipboard.com	170.314.e.1, 3	Patient Portal
FroozHIE	170.314.b.4	Clinical Reconciliation
Healthwise	170.314.a.8, 15	Patient Education

☐ No additional software required

3.2.2 Test Tools

Test Tool	Version
[x] Cypress	2.4.1
[x] ePrescribing Validation Tool	1.0.4
[ ] HL7 CDA Cancer Registry Reporting Validation Tool	1.0.3
[ ] HL7 v2 Electronic Laboratory Reporting (ELR) Validation Tool	1.8
[x] HL7 v2 Immunization Information System (IIS) Reporting Validation Tool	1.8
[x] HL7 v2 Laboratory Results Interface (LRI) Validation Tool	1.7
[x] HL7 v2 Syndromic Surveillance Reporting Validation Tool	1.7
[x] Transport Testing Tool	179
[x] Direct Certificate Discovery Tool	3.0.2

[ ] No test tools required

3.2.3 Test Data

[ ] Alteration (customization) to the test data was necessary and is described in Appendix [*insert appendix letter*]

[☒] No alteration (customization) to the test data was necessary

3.2.4 Standards

3.2.4.1 Multiple Standards Permitted

The following identifies the standard(s) that has been successfully tested where more than one standard is permitted

Criterion #	Standard Successfully Tested	
(a)(8)(ii)(A)(2)	[ ] §170.204(b)(1) HL7 Version 3 Implementation Guide: URL-Based Implementations of the Context-Aware Information Retrieval (Infobutton) Domain	[ ] §170.204(b)(2) HL7 Version 3 Implementation Guide: Context-Aware Knowledge Retrieval (Infobutton) Service-Oriented Architecture Implementation Guide
(a)(13)	[x] §170.207(a)(3) IHTSDO SNOMED CT® International Release July 2012 and US Extension to SNOMED CT® March 2012 Release	[ ] §170.207(j) HL7 Version 3 Standard: Clinical Genomics; Pedigree

Criterion #	Standard Successfully Tested	
(a)(15)(i)	[x] §170.204(b)(1) HL7 Version 3 Implementation Guide: URL-Based Implementations of the Context-Aware Information Retrieval (Infobutton) Domain	[ ] §170.204(b)(2) HL7 Version 3 Implementation Guide: Context-Aware Knowledge Retrieval (Infobutton) Service-Oriented Architecture Implementation Guide
(a)(16)(ii)	[ ] §170.210(g) Network Time Protocol Version 3 (RFC 1305)	[ ] §170. 210(g) Network Time Protocol Version 4 (RFC 5905)
(b)(2)(i)(A)	[ ] §170.207(i) The code set specified at 45 CFR 162.1002(c)(2) (ICD-10-CM) for the indicated conditions	[x] §170.207(a)(3) IHTSDO SNOMED CT® International Release July 2012 and US Extension to SNOMED CT® March 2012 Release
(b)(7)(i)	[ ] §170.207(i) The code set specified at 45 CFR 162.1002(c)(2) (ICD-10-CM) for the indicated conditions	[x] §170.207(a)(3) IHTSDO SNOMED CT® International Release July 2012 and US Extension to SNOMED CT® March 2012 Release
(e)(1)(i)	Annex A of the FIPS Publication 140-2 [*list encryption and hashing algorithms*] 3DES SHA-512	
(e)(1)(ii)(A)(2)	[ ] §170.210(g) Network Time Protocol Version 3 (RFC 1305)	[x] §170. 210(g) Network Time Protocol Version 4 (RFC 5905)
(e)(3)(ii)	Annex A of the FIPS Publication 140-2 [*list encryption and hashing algorithms*] 3DES SHA-512	
Common MU Data Set (15)	[x] §170.207(a)(3) IHTSDO SNOMED CT® International Release July 2012 and US Extension to SNOMED CT® March 2012 Release	[ ] §170.207(b)(2) The code set specified at 45 CFR 162.1002(a)(5) (HCPCS and CPT-4)

[ ] None of the criteria and corresponding standards listed above are applicable

3.2.4.2 Newer Versions of Standards

The following identifies the newer version of a minimum standard(s) that has been successfully tested

Newer Version	Applicable Criteria

☒ No newer version of a minimum standard was tested

3.2.5 Optional Functionality

Criterion #	Optional Functionality Successfully Tested
☒ (a)(4)(iii)	Plot and display growth charts
☐ (b)(1)(i)(B)	Receive summary care record using the standards specified at §170.202(a) and (b) (Direct and XDM Validation)
☐ (b)(1)(i)(C)	Receive summary care record using the standards specified at §170.202(b) and (c) (SOAP Protocols)
☐ (b)(2)(ii)(B)	Transmit health information to a Third Party using the standards specified at §170.202(a) and (b) (Direct and XDM Validation)
☐ (b)(2)(ii)(C)	Transmit health information to a Third Party using the standards specified at §170.202(b) and (c) (SOAP Protocols)
☒ (f)(3)	Ambulatory setting only – Create syndrome-based public health surveillance information for transmission using the standard specified at §170.205(d)(3) (urgent care visit scenario)
☐ Common MU Data Set (15)	Express Procedures according to the standard specified at §170.207(b)(3) (45 CFR162.1002(a)(4): Code on Dental Procedures and Nomenclature)
☐ Common MU Data Set (15)	Express Procedures according to the standard specified at §170.207(b)(4) (45 CFR162.1002(c)(3): ICD-10-PCS)

☐ No optional functionality tested

3.2.6 2014 Edition Certification Criteria* Successfully Tested

Criteria #	Version		Criteria #	Version	
	TP**	TD***		TP	TD
☐ (a)(1)	1.2	1.5	☒ (c)(3)	1.6	1.6
☐ (a)(2)	1.2		☐ (d)(1)	1.2	
☐ (a)(3)	1.2	1.4	☐ (d)(2)	1.5	
☐ (a)(4)	1.4	1.3	☐ (d)(3)	1.3	
☐ (a)(5)	1.4	1.3	☐ (d)(4)	1.3	
☐ (a)(6)	1.3	1.4	☐ (d)(5)	1.2	
☐ (a)(7)	1.3	1.3	☐ (d)(6)	1.2	
☐ (a)(8)	1.2		☐ (d)(7)	1.2	
☐ (a)(9)	1.3	1.3	☐ (d)(8)	1.2	
☐ (a)(10)	1.2	1.4	☐ (d)(9) *Optional*	1.2	
☐ (a)(11)	1.3		☐ (e)(1)	1.8	1.5
☐ (a)(12)	1.3		☐ (e)(2) *Amb. only*	1.2	1.6
☐ (a)(13)	1.2		☐ (e)(3) *Amb. only*	1.3	
☐ (a)(14)	1.2		☐ (f)(1)	1.2	1.2
☐ (a)(15)	1.5		☐ (f)(2)	1.3	1.7.1
☐ (a)(16) *Inpt. only*	1.3	1.2	☐ (f)(3)	1.3	1.7
☐ (a)(17) *Inpt. only*	1.2		☐ (f)(4) *Inpt. only*	1.3	1.7
☐ (b)(1)	1.7	1.4	☐ (f)(5) *Optional & Amb. only*	1.2	1.2
☐ (b)(2)	1.4	1.6			
☐ (b)(3)	1.4	1.2	☐ (f)(6) *Optional & Amb. only*	1.3	1.0.3
☐ (b)(4)	1.3	1.4			
☐ (b)(5)	1.4	1.7	☐ (g)(1)	1.7	1.9
☐ (b)(6) *Inpt. only*	1.3	1.7	☐ (g)(2)	1.7	1.9
☐ (b)(7)	1.4	1.6	☐ (g)(3)	1.3	
☒ (c)(1)	1.6	1.6	☐ (g)(4)	1.2	
☒ (c)(2)	1.6	1.6			

☐ No criteria tested

*For a list of the 2014 Edition Certification Criteria, please reference http://www.healthit.gov/certification (navigation: 2014 Edition Test Method)

**Indicates the version number for the Test Procedure (TP)

***Indicates the version number for the Test Data (TD)

3.2.7 2014 Clinical Quality Measures*

Type of Clinical Quality Measures Successfully Tested:

- [x] Ambulatory
- [ ] Inpatient
- [ ] No CQMs tested

*For a list of the 2014 Clinical Quality Measures, please reference http://www.cms.gov (navigation: 2014 Clinical Quality Measures)

Ambulatory CQMs							
CMS ID	Version	CMS ID	Version	CMS ID	Version	CMS ID	Version
[x] 2	v3	[x] 90	v3	[x] 136	v3	[x] 155	v2
[x] 22	v2	[x] 117	v2	[ ] 137		[x] 156	v2
[x] 50	v2	[x] 122	v2	[x] 138	v2	[ ] 157	
[ ] 52		[x] 123	v2	[x] 139	v2	[ ] 158	
[ ] 56		[x] 124	v2	[x] 140	v2	[ ] 159	
[x] 61	v3	[x] 125	v2	[x] 141	v3	[ ] 160	
[ ] 62		[x] 126	v2	[ ] 142		[ ] 161	
[ ] 64		[x] 127	v2	[ ] 143		[x] 163	v2
[x] 65	v3	[ ] 128		[x] 144	v2	[x] 164	v2
[ ] 66		[ ] 129		[x] 145	v2	[x] 165	v2
[x] 68	v3	[x] 130	v2	[x] 146	v2	[x] 166	v3
[x] 69	v2	[x] 131	v2	[x] 147	v2	[ ] 167	
[ ] 74		[ ] 132		[ ] 148		[ ] 169	
[x] 75	v2	[ ] 133		[ ] 149		[ ] 177	
[ ] 77		[ ] 134		[x] 153	v2	[ ] 179	
[ ] 82		[x] 135	v2	[x] 154	v2	[x] 182	v3

Inpatient CQMs							
CMS ID	Version	CMS ID	Version	CMS ID	Version	CMS ID	Version
[ ] 9		[ ] 71		[ ] 107		[ ] 172	
[ ] 26		[ ] 72		[ ] 108		[ ] 178	
[ ] 30		[ ] 73		[ ] 109		[ ] 185	
[ ] 31		[ ] 91		[ ] 110		[ ] 188	
[ ] 32		[ ] 100		[ ] 111		[ ] 190	
[ ] 53		[ ] 102		[ ] 113			
[ ] 55		[ ] 104		[ ] 114			
[ ] 60		[ ] 105		[ ] 171			

3.2.8 Automated Numerator Recording and Measure Calculation

3.2.8.1 Automated Numerator Recording

Automated Numerator Recording Successfully Tested			
☐ (a)(1)	☐ (a)(9)	☐ (a)(16)	☐ (b)(6)
☐ (a)(3)	☐ (a)(11)	☐ (a)(17)	☐ (e)(1)
☐ (a)(4)	☐ (a)(12)	☐ (b)(2)	☐ (e)(2)
☐ (a)(5)	☐ (a)(13)	☐ (b)(3)	☐ (e)(3)
☐ (a)(6)	☐ (a)(14)	☐ (b)(4)	
☐ (a)(7)	☐ (a)(15)	☐ (b)(5)	

☒ Automated Numerator Recording was not tested

3.2.8.2 Automated Measure Calculation

Automated Measure Calculation Successfully Tested			
☒ (a)(1)	☒ (a)(9)	☐ (a)(16)	☐ (b)(6)
☒ (a)(3)	☒ (a)(11)	☐ (a)(17)	☒ (e)(1)
☒ (a)(4)	☒ (a)(12)	☒ (b)(2)	☒ (e)(2)
☒ (a)(5)	☒ (a)(13)	☒ (b)(3)	☒ (e)(3)
☒ (a)(6)	☒ (a)(14)	☒ (b)(4)	
☒ (a)(7)	☒ (a)(15)	☒ (b)(5)	

☐ Automated Measure Calculation was not tested

3.2.9 Attestation

Attestation Forms (as applicable)	Appendix
☒ Safety-Enhanced Design*	A
☒ Quality Management System**	B
☒ Privacy and Security	C

*Required if any of the following were tested: (a)(1), (a)(2), (a)(6), (a)(7), (a)(8), (a)(16), (b)(3), (b)(4)

**Required for every EHR product

3.3 Appendices

Attached below.

Test Results Summary Change History

Test Report ID	Description of Change	Date

2014 Edition Test Report Summary

EHR Usability Test Report of WebChart EHR Version 6.4

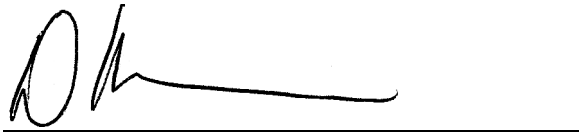
Report based on ISO/IEC 25062:2006 Common Industry Format for Usability Test Reports

WebChart EHR version 6.4

Date of Usability Tests: 10/16/2013- 10/24/2013
Date of Report: 10/27/2013
Report Prepared By: Medical Informatics Engineering

Angie Nichols, Project Manager
260-457-6270
anichols@mieweb.com
6302 Constitution Drive, Fort Wayne, IN 46804

Attested by:



10/28/2013 Doug Horner, CTO

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EXECUTIVE SUMMARY

A usability test of WebChart EHR version 6.4 (Ambulatory) was conducted on 10/16/2013-10/24/2013 in Fort Wayne, Indiana by Medical Informatics Engineering ("MIE"). The purpose of this test was to test and validate the usability of the current user interface and provide evidence of usability in the EHR Under Test (EHRUT). Five healthcare providers who matched the target demographic criteria served as participants in the usability test. The participants used the EHRUT in simulated, but representative, tasks during the test. This study contains performance data collected from the test as it relates to the following 29 tasks typically conducted on an EHR:

- Identify User Diagnostic & Therapeutic Reference Information
- Record Medication Order
- Record Allergy List
- Configure CDS for User Roles & Reference Resources
- Adjust severity level for drug-drug interventions
- Record Imaging Order
- Record Lab Order
- Access Lab Order
- Access Imaging Order
- Access Allergy List
- Access Medication List
- Change Allergy List
- Record Medication List
- Change Medication List
- Change Medication Order
- Access Medication Order
- Creating Electronic Prescriptions
- Change Lab Order
- Change Imaging Order
- Create drug-drug & drug-allergy interventions prior to CPOE completion
- Reconcile Meds, Problems & Allergy List with another source
- Select/Activate CDS Interventions
- Select/Activate CDS User Roles
- Trigger CDS Demographics Intervention
- Trigger CDS Problem List Intervention
- Trigger CDS Med List Intervention
- Trigger CDS Allergy List Intervention
- Trigger CDS Vital Sign Intervention
- Trigger CDS Lab Test/Result Intervention

During each 75 minute usability test, each participant was greeted by the administrator and asked to review and sign an informed consent/release form and was instructed that they could withdraw at any time. Participants had prior experience with the EHR. MIE provided training on new functionalities or functionalities that the participant had never used before (such as Clinical Decision Support programming and reconciling electronic data). 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, along with the data logger(s), recorded user performance data on paper and electronically. The administrator did not give the participants assistance regarding how to complete any task.

Participant screens, head shots, and audio were recorded for subsequent analysis.

The following types of data were collected for each participant:

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

All participant data was de-identified – no correspondence could be made between the identity of the participant to the data collected. Following the conclusion of the testing, participants were asked to give post-test feedback and to complete a questionnaire. Various recommended metrics, in accordance with the examples set forth in the *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records*, were used to evaluate the usability of the EHRUT. The following is a summary of the performance and rating data collected regarding the EHRUT.

Task	**N**	**Task Success**	**Path Deviation**	**Task Time**		**Errors**	**Task Ratings** 1=Very Easy to 5=Very Difficult
Description	#	Mean (Standard Deviation)	Deviations (observed/ optimal)	Mean *in seconds* (Standard Deviation)	Deviations (observed/ optimal)	Mean (SD)	Mean (SD)
Identify User Diagnostic & Therapeutic Reference Information	5	100% (0)	3 (6:4)	85s (43)	1 (152s:120s)	0	1.6 (0.8)
Record Medication Order	5	100% (0)	1 (4:3)	81s (15)	0	0	1.4 (0.5)
Record Allergy List	5	100% (0)	1 (4:3)	39s (25)	0	0	1.2 (0.4)
Configure CDS for User Roles & Reference Resources	5	100% (0)	0	28s (5)	0	0	1.5 (0.5)
Adjust severity level for drug-drug interventions	5	100% (0)	0	70s (35)	0	0	1.3 (0.4)
Record Imaging Order	5	100% (0)	0	65s (24)	0	0	1.3 (0.4)
Record Lab Order	5	100% (0)	0	64s (14)	0	0	1.2 (0.4)
Access Lab Order	5	100% (0)	0	23s (11)	0	0	1.2 (0.4)
Access Imaging Order	5	100% (0)	0	15s (15)	0	0	1.2 (0.4)
Access Allergy List	5	100% (0)	0	6s (4)	0	0	1
Access Medication List	5	100% (0)	0	8s (2)	0	0	1
Change Allergy List	5	100% (0)	0	17s (14)	0	0	1

Record Medication List	5	100% (0)	0	83s (19)	0	0	1
Change Medication List	5	100% (0)	0	12s (5)	0	0	1
Change Medication Order	5	100% (0)	0	23s (17)	0	0	1
Access Medication Order	5	100% (0)	0	21s (9)	0	0	1
Creating Electronic Prescriptions	5	100% (0)	0	78s (26)	0	0	1
Change Lab Order	5	100% (0)	0	23s (4)	0	0	1
Change Imaging Order	5	100% (0)	0	25s (5)	0	0	1
Create drug-drug & drug-allergy interventions prior to CPOE completion	5	100% (0)	0	18s (16)	0	0	1
Reconcile Meds, Problems & Allergy List with another source	5	100% (0)	0	63s (25)	0	0	1
Select/Activate CDS Interventions	5	100% (0)	0	85s (50)	0	0	1
Select/Activate CDS User Roles	5	100% (0)	0	55s (29)	0	0	1
Trigger CDS Demographics Intervention	5	100% (0)	0	44s (15)	0	0	1
Trigger CDS Problem List Intervention	5	100% (0)	0	24s (35)	0	0	1
Trigger CDS Med List Intervention	5	100% (0)	0	19s (4)	0	0	1
Trigger CDS Allergy List Intervention	5	100% (0)	0	23s (8)	0	0	1
Trigger CDS Vital Sign Intervention	5	100% (0)	0	14s (4)	0	0	1
Trigger CDS Lab Test/Result Intervention	5	100% (0)	0	21s (5)	0	0	1

The results from the System Usability Scale reveal that the subjective satisfaction with the system based on performance of the above was 82.5

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

- Major findings

Overall the participants were able to navigate easily throughout the system and reported the system functionality was great. Participants enjoyed using the system and its offerings. Nearly all of the participants reported that it was easy to complete the assigned tasks. Participants relied on the easiness of the Patient Summary dashboard tab to quickly find information about a patient for areas such as warnings, guideline alerts, medications, and allergies. Many participants did not understand the difference between an unordered order and creating an order to give the patient to take someplace, thus causing some confusion and making the task take longer than o

Participants liked the Healthwise reference tool and found it very helpful to find information on items that were not recognized, such a certain disease or diagnosis. In addition, participants found the FroozHIE reconcile function to provide a very quick outcome of importance. The FroozHIE reconcile function allowed them to import data from another source directly into a patient's chart. The participants were pleased to have a setting to change the drug warnings

severity levels that appear from First Data Bank. The participants noted that there are too many warning alerts that display or pop-up on the screen, and, as a result, users are ignoring the alerts.

- Areas for improvement

Some of the participants provided valuable feedback regarding areas for improvement and enhancements. A color feature was mentioned that would allow users to choose a background color for a portlet on the patient summary dashboard tab. For example, a user suggested that the allergies portlet display in a color red to alert the user that those are the patient's allergies. Feedback was also given regarding working in an encounter. A participant suggested that one of the EHR's current jump buttons on the encounter be renamed to "Plan/Orders" to make it easier to find where to do orders. Participants stated expressed some difficulty directing individuals to the E-Orders page when they initially were learning to make orders. The "view recent" hyperlink isn't intuitive. Participants also experienced difficulty in interpreting the difference between an order vs. an unordered order. One participant reported that the E-Orders page was not easy to navigate in and the entire order process was challenging compared to other items in the system. The participants would also appreciate a UI or system setting that allows them to remove unwanted/unneeded fields in the 'add order' screen. They would also like the ability to add more required fields for orders based on their workflows.

Participants also found it difficult to find the appropriate setting if such a setting needed to be changed. Participants strongly suggested the need for a "search" ability or function on the security module to address this difficulty. Currently users can use Control F; however, that is a Windows function and as a result many users may not be aware of this function. Participants also suggested that perhaps the security options could be grouped together in specific functionality categories versus throughout the area ad that keywords such as edit, manage, and change be used more consistently when naming the security settings. Also, while the active CDS for user roles allows users to restrict certain guideline alerts from displaying, participants suggested that it should not be a two-step process to configure those restrictions.

Participants also provided feedback regarding the use of Surescripts for e-prescribing, medications, and importing data. Participants stated that they did not like the current search functionality when creating an electronic RX and that the functionality needs to be clearer. For example, Surescripts may call a pharmacy "Wal-Mart" and the user may be searching under "Walmart" (no-hyphen). Oftentimes, pharmacies may be located within a store and are named something different from then name of the store in which the pharmacy is located. This sometimes causes difficulty in finding the pharmacy to which the prescription is to be

transmitted. In the Meds/Allergies module participants would appreciate an edit button near the top of the screen. The current screen size does not show an edit button and participants stated that it is not intuitive to scroll down to find it.

As part of the user diagnostic tool, participants used the Healthwise knowledgebase to search for a disease that was unknown to the provider. The participants stated that they would like a search link next to data, similar to the link that the patient education module has. In addition, the participants stated it was nice to have the knowledgebase, rather than opening another screen to that would take them to google.com. Participants suggested another 'submit' button on the top of lengthy chart tab screens or a message display that would tell the user to click submit to save their work when leaving a page. Currently, a user is informed that their work will be lost. Perhaps a help bubble with instructions at the top of each tab (for example: to tell the user to add the condition to the patient's chart) and then click submit to save all work would be effective in resolving this issue.

INTRODUCTION

The EHRUT tested for this study was WebChart EHR version 6.4 (Ambulatory). Designed to present medical information to healthcare providers in ambulatory facilities of many different specialty settings, the EHRUT consists of working wherever you are, with whatever systems and equipment you already have. Screens are custom-configured for each user, providing the exact content and layout they need for peak productivity. The result is office-wide efficiency, without changing the way your doctors practice medicine. WebChart adapts to your practice workflow, helping clinicians stay cognitive, not clerical. Screens can be configured for each user to ensure peak productivity. The usability testing attempted to represent realistic exercises and conditions. The purpose of this study was to test and validate the usability of the current user interface, and provide evidence of usability in the EHR Under Test (EHRUT). To this end, measures of effectiveness, efficiency and user satisfaction, such as time on task and task ratings, were captured during the usability testing.

METHOD

3.1 PARTICIPANTS

A total of 5 participants were tested on the EHRUT(s). Participants in the test were Physicians, Mid-Levels and System Administrators. Participants were not from the testing or supplier organization. Participants were given the opportunity to have the same orientation and level of

training as the actual end users would have received. Recruited participants had a mix of backgrounds and demographic characteristics conforming to the requirements. The following table identifies the 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 linked with individual identities.

	Participant ID	Gender	Education	Occupation/Role	Computer Experience	EHR Product Experience	Assistive Technology Needs
1	12344	M	Post Graduate (MD/PhD)	Physician	Advanced User	5-9 years	No
2	24652	M	Post Graduate (MD/PhD)	Physician	Above Average User	5-9 years	No
3	63929	F	Master's Degree	Mid-Level	Novice/Average User	1-4 years	No
4	34987	M	Post Graduate (MD/PhD)	Physician	Above Average User	1-4 years	No
5	53841	F	Master's Degree	Administrative SuperUser	Above Average User	10+ years	No
6	49247	F	Bachelor's Degree	Administrative SuperUser	Above Average User	1-4 years	No

6 participants (matching the demographics in the section on Participants) were recruited and 5 participated in the usability test. One participant did not show up for the study. Participants were individually scheduled for one individual 75 minute session. A spreadsheet was used to keep track of the participant's schedules, and that spreadsheet included each participant's demographic characteristics.

3.2 STUDY DESIGN

The overall objective of this test was to uncover areas in which the application performed well – that is, effectively, efficiently, and with satisfaction – and areas where the application did not meet all of 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, and also to identify areas where improvements should be made. During the usability test, participants interacted with one EHR. Each participant used the system

in their remote location, and each participant received the same test instructions. The system was evaluated by each participant for effectiveness, efficiency and satisfaction regarding the following by measures:

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

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

3.3 TASKS

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

- Identify User Diagnostic & Therapeutic Reference Information
- Record Medication Order
- Record Allergy List
- Configure CDS for User Roles & Reference Resources
- Adjust severity level for drug-drug interventions
- Record Imaging Order
- Record Lab Order
- Access Lab Order
- Access Imaging Order
- Access Allergy List
- Access Medication List
- Change Allergy List
- Record Medication List
- Change Medication List
- Change Medication Order
- Access Medication Order
- Creating Electronic Prescriptions
- Change Lab Order
- Change Imaging Order
- Create drug-drug & drug-allergy interventions prior to CPOE completion
- Reconcile Meds, Problems & Allergy List with another source
- Select/Activate CDS Interventions
- Select/Activate CDS User Roles
- Trigger CDS Demographics Intervention
- Trigger CDS Problem List Intervention
- Trigger CDS Med List Intervention
- Trigger CDS Allergy List Intervention
- Trigger CDS Vital Sign Intervention
- Trigger CDS Lab Test/Result Intervention

These tasks were selected based on ONC 2014 Certification requirements. Tasks were constructed in light of the certification objectives.

3.4 PROCEDURE

Upon arrival, each participant was greeted, and his or her identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant ID. Each participant reviewed and signed an informed consent and release form as well as a non-disclosure agreement. Each participant's electronic signature was captured. To ensure that the test ran smoothly, two staff members participated in this test, the usability administrator and the data logger. The usability testing staff conducting the test was experienced usability practitioners with 10+ years of EHR experience, Bachelor degrees, and each held the title of project manager. 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. The data logger took notes on task success, path deviations, number and type of errors, and comments.

Participants were instructed to perform the tasks:

- As quickly as possible making as few errors and deviations as possible based on what is seen on the screen.
- Without assistance; administrators were allowed to give immaterial guidance and clarification on tasks, but not instructions on use.
- Without using a think aloud technique.

For each task, the participants were verbally told the task. Task timing began once the administrator finished reading the scenario task and saying the word "Begin". The task time was stopped once the participant indicated they had successfully completed the task. Scoring is discussed below in Section 3.9. Following the session, the administrator gave the participant additional time to provide additional feedback & complete a questionnaire either verbally or written and thanked each individual for their participation. Participants' demographic information, task success rate, time on task, errors, deviations, verbal responses, and post-test questionnaire were recorded into a spreadsheet.

3.5 TEST LOCATION

Because the participants were from out of town, the sessions were held remotely. The participants used their own computer, keyboard, mouse, telephone, and the WebEx recording services. Only the participant, administrator, and data logger were in the WebEx. To ensure that the environment was comfortable for users, background noise levels were kept to a minimum on both sides.

3.6 TEST ENVIRONMENT

The EHRUT would be typically be used in a healthcare office or facility. In this instance, the testing was conducted remotely via WebEx from the participant's clinical office. For testing, the computer used a laptop running Internet Explorer. The participants used a mouse, keyboard, webcam & monitor when interacting with the EHRUT. The application was configured by the vendor according to the vendor's documentation describing the system set-up and preparation. The application itself was running on a Windows platform using a standard built WebChart database system using a LAN connection. 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 font size).

3.7 TEST FORMS AND TOOLS

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

1. Informed Consent
2. Non-Disclosure Consent
3. Moderator's Guide
4. Post-test Questionnaire

The Moderator's Guide was devised so as to be able to capture required data. The participants' interaction with the EHRUT was captured and recorded digitally with screen capture software running on the test machine. The WebEx session with webcam camera recorded each participant's facial expressions synced with the screen capture, and verbal comments were recorded with the audio connection. The test sessions were performed via WebEx where the data logger observed the test session.

3.8 PARTICIPANT INSTRUCTIONS

The administrator read the following instructions aloud to the each participant:

> *Thank you for participating in this study. Your input is very important. Our session today will last about 1 hour 15 minutes. During that time you will use WebChart Version 6.4 on an October 2013 software release. I will ask you to complete several tasks using this system and answer some questions. You should complete the tasks as quickly as possible making as few errors as possible based on what you see on the screen. Please try to complete the tasks on your own following the instructions very closely. Please note that we are not testing you we are testing the system, therefore if you have difficulty all this means is that something needs to be improved in the system. I will be here in case you need specific help, but I am not able to instruct you or provide help in how to use the application. Overall, we are interested in how easy (or how difficult) this system is to use, what in it would be useful to you, and how we could improve it. All of the information that you provide will be kept confidential and your name will not be associated with your comments at any time. Should you feel it necessary you are able to withdraw at any time during the testing.*

Following the procedural instructions, participants were shown the EHR and were given time to explore the system and make comments. Once that was complete, the administrator gave the following instructions:

> *For each tsk, I will read the scenario description to you and I will say the word "Begin." At that point, please perform the task and say "Done" once you believe you have successfully completed the task. I will ask you for your impressions about the task once you are done by asking you a few questions.*

Participants were then given 29 tasks to complete. Tasks are listed in Table B.

3.9 USABILITY METRICS

According to the *NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records*, EHRs should support a process that provides a high level of usability for all users. The goal is for users to interact with the system effectively, efficiently, and with an acceptable level of satisfaction. 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 WebChart EHR by measuring participant success rates and errors.
2. Efficiency of WebChart EHR by measuring the average task time and path deviations.
3. Satisfaction with WebChart EHR by measuring ease of use ratings.

DATA SCORING

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

Measures	Rationale and Scoring
Effectiveness: Task Success (Mean)	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. 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 which is the mean. Standard Deviations (SD) were the noted next to the average task success rate.
Effectiveness: Task Failures	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." No task times were taken for errors. The total number of errors was calculated for each task and then divided by the total number of times that task was attempted.
Efficiency: Path Deviations	The participant's path (i.e., steps) through the application was recorded. Deviations occur if the participant, for example, went to a wrong screen, clicked on an incorrect menu item, followed an incorrect link, or interacted incorrectly with an on-screen control. This path was then compared to the optimal path (Observed/Optimal). The number of steps in the observed path is divided by the number of optimal steps to provide a ratio of path deviation (Observed/Optimal)
Efficiency: Task Time (Mean)	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 (the mean). Variance measure Standard Deviation (SD) was also calculated.
Efficiency: Task Time Deviations	The participant's task time was recorded. Task Time deviations occur if the participant takes longer to complete the task than the optimal time allowed for the task. This task time was then compared to the optimal task allowed time (Observed/Optimal). The time (in seconds) of the observed task time is divided by the time (in seconds) of the optimal task time to provide a ratio of path deviation (Observed/Optimal)
Satisfaction: Task Rating (Mean)	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). This data are averaged across the participants (the mean). To measure participants' confidence in and likeability of the EHRUT overall, the testing team administered the System Usability Scale (SUS) post-test questionnaire. Questions included, "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."

Table A. Details of how observed data were scored.

RESULTS

4.1 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 (Table B). The results should be seen in light of the objectives and goals outlined in Section 3.2 Study Design. The data should yield actionable results that, if corrected, yield material, positive impact on user performance.

Task	**N**	**Task Success**	**Path Deviation**	**Task Time**		**Errors**	**Task Ratings** 1=Very Easy to 5=Very Difficult
Description	**#**	Mean (Standard Deviation)	Deviations (observed/ optimal)	Mean *in seconds* (Standard Deviation)	Deviations (observed/ optimal)	Mean (SD)	Mean
Identify User Diagnostic & Therapeutic Reference Information	5	100% (0)	3 (6:4)	85s (43)	1 (152s:120s)	0	1.6
Record Medication Order	5	100% (0)	1 (4:3)	81s (15)	0	0	1.4
Record Allergy List	5	100% (0)	1 (4:3)	39s (25)	0	0	1.2
Configure CDS for User Roles & Reference Resources	5	100% (0)	0	28s (5)	0	0	1.5
Adjust severity level for drug-drug interventions	5	100% (0)	0	70s (35)	0	0	1.3
Record Imaging Order	5	100% (0)	0	65s (24)	0	0	1.3
Record Lab Order	5	100% (0)	0	64s (14)	0	0	1.2
Access Lab Order	5	100% (0)	0	23s (11)	0	0	1.2
Access Imaging Order	5	100% (0)	0	15s (15)	0	0	1.2
Access Allergy List	5	100% (0)	0	6s (4)	0	0	1
Access Medication List	5	100% (0)	0	8s (2)	0	0	1
Change Allergy List	5	100% (0)	0	17s (14)	0	0	1
Record Medication List	5	100% (0)	0	83s (19)	0	0	1
Change Medication List	5	100% (0)	0	12s (5)	0	0	1
Change Medication Order	5	100% (0)	0	23s (17)	0	0	1
Access Medication Order	5	100% (0)	0	21s (9)	0	0	1
Creating Electronic Prescriptions	5	100% (0)	0	78s (26)	0	0	1
Change Lab Order	5	100% (0)	0	23s (4)	0	0	1
Change Imaging Order	5	100% (0)	0	25s (5)	0	0	1
Create drug-drug & drug-allergy interventions prior to CPOE completion	5	100% (0)	0	18s (16)	0	0	1
Reconcile Meds, Problems & Allergy List with another source	5	100% (0)	0	63s (25)	0	0	1
Select/Activate CDS Interventions	5	100% (0)	0	85s (50)	0	0	1
Select/Activate CDS User Roles	5	100% (0)	0	55s (29)	0	0	1

Trigger CDS Demographics Intervention	5	100% (0)	0	44s (15)	0	0	1
Trigger CDS Problem List Intervention	5	100% (0)	0	24s (35)	0	0	1
Trigger CDS Med List Intervention	5	100% (0)	0	19s (4)	0	0	1
Trigger CDS Allergy List Intervention	5	100% (0)	0	23s (8)	0	0	1
Trigger CDS Vital Sign Intervention	5	100% (0)	0	14s (4)	0	0	1
Trigger CDS Lab Test/Result Intervention	5	100% (0)	0	21s (5)	0	0	1

Table B. Data Analysis

The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these tasks to be: 82.5. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

4.2 RISK ANALYSIS

The usability testing results for the EHRUT are prioritized by using two subjective risk scores: Probability (P) x Impact (I) = Risk Priority Number (RPN)

The probability is how likely it is that the error will actually occur again. The impact is the impact on the project if a possible risk actually occurs. A subjective 1-to-5 scale is used to rank each factor, where higher scores imply greater impact and greater probability.

The Risk Priority Number determines the action required.

Risk Priority Number	**Action**
15–25 (High Risk)	Define and Implement Mitigation Action
8–14 (Medium Risk)	Monitor Risk Periodically
1-7 (Low Risk)	No Action

Probability of Occurrence (1 to 5 scale)
1 – Very low probability – not worth considering
2 – Low probability – very unlikely to occur
3 – Medium probability – realistic chance of occurrence
4 – High probability – likely to occur
5 – Very high probability – almost certain to occur

Impact (1 to 5 scale)
1 – Very minor risk – no significant impact
2 – Minor risk – can be managed without mitigation
3 – Medium risk – may require mitigation
4 – High risk – significant impact on cost / schedule
5 – Very high risk – can be a “project killer”

Risk Type Category

The risks must be categorized by type for mitigation.

Type 1 – Cause of risk is well-understood, and a mitigation strategy is obvious.
Mitigation Strategy: Assign action items, track progress, and periodically reassess risk.

Type 2 – Cause of risk is well-understood, and a mitigation strategy is NOT obvious.
Mitigation Strategy: Use "risk scenarios" to identify possible mitigation actions and then treat as Type 1.

Type 3 – Risk is the result of a "knowledge gap," a lack of required knowledge that is essential to the project's success.
Mitigation Strategy: Use "rapid cycles of learning" to close knowledge gap.

Risk Description	Probability (1-5)	Impact (1-5)	Risk Priority Number	Risk Type Category
Identify User Diagnostic & Therapeutic Reference Information	3	3	20	Type 3
Record Medication Order	2	3	5	Type 1
Record Allergy List	2	3	5	Type 1
Configure CDS for User Roles & Reference Resources	2	3	5	Type 1
Adjust severity level for drug-drug interventions	2	3	5	Type 1
Record Imaging Order	2	3	5	Type 1
Record Lab Order	2	3	5	Type 1
Access Lab Order	2	3	5	Type 1
Access Imaging Order	2	3	5	Type 1

4.3 DISCUSSION OF THE FINDINGS

EFFECTIVENESS

Based on the success and path deviation data, participants were able to complete all tasks successfully. The effectiveness of the system and the ease in navigation and usability allowed many tasks to be completed under a minute with an average rating of 1 being very easy to complete using optimal paths. Each screen has exact content and layout they need for peak productivity. Screens have functionality that allows users to quickly navigate and find the needed information very quickly. This enhances the efficiency of a practice without changing the way providers practice medicine.

EFFICIENCY

Based on the observations of task time and deviation data as noted above, participants were able to quickly complete each task with no error and the majority of the tasks using the optimal path. The ability to be able to quickly navigate and complete a task allows the end user to focus more time engaging with the patient and successfully getting the data in the system quickly for peak productivity. The quality of care provided to patients is increased by the system being efficient to allow the provider to continue their duties while documenting critical information in the system.

SATISFACTION

Based on the SUS (Subjective Usability Scale) score of 82.5, observation and feedback provided by all participants stated they were highly satisfied with the system and the easiness and efficiency that it provided. They stated the system allowed easy access to key information and easy navigation throughout. Even though some tasks took some participants longer to complete than the others, important feedback was provided to help improve certain areas of the EHR. The participants stated that some of the extended times it took to perform some tasks were caused by lack of knowledge of the system (e.g. where to go, and how to navigate around, etc.), and had nothing to do with the system's functionality or effectiveness.

MAJOR FINDINGS

Overall the participants were able to navigate easily throughout the system and reported the system functionality was great. Participants enjoyed using the system and its offerings. Nearly all of the participants reported that it was easy to complete the assigned tasks. Participants relied on the easiness of the Patient Summary dashboard tab to quickly find information about a patient for areas such as warnings, guideline alerts, medications, and allergies. Many participants did not understand the difference between an unordered order and creating an order to give the patient to take someplace, thus causing some confusion and making the task take longer than other tasks.

Participants liked the Healthwise reference tool and found it very helpful to find information on items that were not recognized, such a certain disease or diagnosis. In addition, participants found the FroozHIE reconcile function to provide a very quick outcome of importance. The FroozHIE reconcile function allowed them to import data from another

source directly into a patient's chart. The participants were pleased to have a setting to change the drug warnings severity levels that appear from First Data Bank. The participants noted that there are too many warning alerts that display or pop-up on the screen, and, as a result, users are ignoring the alerts.

AREAS FOR IMPROVEMENT

Some of the participants provided valuable feedback regarding areas for improvement and enhancements. A color feature was mentioned that would allow users to choose a background color for a portlet on the patient summary dashboard tab. For example, a user suggested that the allergies portlet display in a color red to alert the user that those are the patient's allergies.

Feedback was also given regarding working in an encounter. A participant suggested that one of the EHR's current jump buttons on the encounter be renamed to "Plan/Orders" to make it easier to find where to do orders. Participants stated expressed some difficulty directing individuals to the E-Orders page when they initially were learning to make orders. The "view recent" hyperlink isn't intuitive. Participants also experienced difficulty in interpreting the difference between an order vs. an unordered order. One participant reported that the E-Orders page was not easy to navigate in and the entire order process was challenging compared to other items in the system. The participants would also appreciate a UI or system setting that allows them to remove unwanted/unneeded fields in the 'add order' screen. They would also like the ability to add more required fields for orders based on their workflows.

Participants also found it difficult to find the appropriate setting if such a setting needed to be changed. Participants strongly suggested the need for a "search" ability or function on the security module to address this difficulty. Currently users can use Control F; however, that is a Windows function and as a result many users may not be aware of this function. Participants also suggested that perhaps the security options could be grouped together in specific functionality categories versus throughout the area ad that keywords such as edit, manage, and change be used more consistently when naming the security settings. Also, while the active CDS for user roles allows users to restrict certain guideline alerts from displaying, participants suggested that it should not be a two-step process to configure those restrictions.

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search functionality when creating an electronic RX and that the functionality needs to be clearer. For example, Surescripts may call a pharmacy “Wal-Mart” and the user may be searching under “Walmart” (no-hyphen). Oftentimes, pharmacies may be located within a store and are named something different from then name of the store in which the pharmacy is located. This sometimes causes difficulty in finding the pharmacy to which the prescription is to be transmitted. In the Meds/Allergies module participants would appreciate an edit button near the top of the screen. The current screen size does not show an edit button and participants stated that it is not intuitive to scroll down to find it.
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Quality Management System Documentation

Medical Informatics Engineering / WebChart

MEDICAL INFORMATICS ENGINEERING

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WWW.MIEWEB.COM

This document describes the organizational structure, procedures, processes and resources used by WebChart to implement quality management.

We use a collection of automated tools to ensure that WebChart is performing as expected and to prevent us from introducing unexpected changes with new features.

The developers at MIE/WebChart follow a QA Process. Code developed follows a Software Development Life Cycle (SDLC) for approval.
Before code is promoted into production branches it is reviewed and tested for:

- Code correctness
- Potential security vulnerabilities - OWASP Top Ten Vulnerabilities Project
- Adherence to standard coding guidelines

Selenium is an open source project whose goal is to provide control over a browser to simulate the actions that a user may perform (click, mouse over, right-click, double-click, etc) We use selenium as the basis for our primary testing framework which allows us to simulate the actions of a user in WebChart.

Example
Selenium tests operate on the concept of a "workflow" in that the tests are written to simulate the exact operations a user would follow to accomplish a given task.
For example, in order to register a new patient, the workflow would be:

- Click the Patient Registration chart tab
- Enter the patient's last name
- Click the Search button
- Enter demographic information
- Click the Save button

At any of these steps in the workflow, the selenium test can verify that the process is working as expected by ensuring the presence of certain elements on the page, verifying that messages contain the expected text or checking any of the countless other properties that may signify a success or failure in this particular process.

Because Selenium tests are written as a linear "workflow" this means that any interruption in that flow will signal a failure. In the above example for instance, suppose someone changes the 'Search' button so that it says 'Find' instead, the entire process would fail because the test cannot find a 'Search' button anymore.

Coverity® Static Analysis Verification Engine (Coverity SAVE™) is a static code analysis tool for C, C++, C# and Java source code. Coverity commercialized a research tool for finding bugs through static analysis,[1] the Stanford Checker, which used abstract interpretation to identify defects in source code.

Coverity is useful to the developer to find errors in logic, memory errors that can happen without being checked and other issues that are often overlooked.

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A series of unit tests of specific transactions (URLs or messages) passed WebChart and compared to a statically version of the page that is checked into revision control. Changes are compared and reconciled by the developer making the changes. This method of testing is being phased out for Selenium but many tests are currently best handled by WCTEST and so it will be some time before it will completely go away.
WCTest is an older testing framework that is still in use today. It operates by looking at specific pages of WebChart and showing any differences on those pages from a stored baseline. At the time of this writing, WCTest is analyzing approximately 4,000 different pages of WebChart.

WCTest is a very general testing framework in that it does not differentiate between types of changes. For example, a change in any of the following; color, number of columns of a listview, display name of a patient or even hidden html code that isn't visible will be detected as a "change". It would be up to the developer to investigate the change and find out if this change is acceptable or not.

WCTest is useful for testing pages that should never change in the slightest or for pages that aren't accessible to testing by Selenium, but it does have its limitations. WCTest for example has no concept of a "workflow" as Selenium does. WCTest cannot be told to click a button, all it can do is go to the page and verify that the button is present and it can go to the page that should appear after the button was clicked, but it cannot by itself actually verify that the button is clickable nor click it to see what happens.

The process that is to be used for requesting and managing changes to work products, product implementation, and product maintenance is documented in WebChart's Change Control Process.

Final Draft

11/12/2013

Attested by:

Doug Horner CTO

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DTR 170.314.D.2-2 Permit Audit Log Disabling (Disable Encryption Status)

WebChart EHR Version 6.4 web servers use HTTPS 128bit SSL for security. There is no toggle or option to use an unencrypted connection. If a user attempts to access the application on a non-secure port (HTTP port 80) then the user is redirected to use the encrypted HTTPS connection.

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DTR 170.314.D.2-4: Protect Audit Log

WebChart EHR Version 6.4 records auditable events in two ways:

1. Event Level: For each auditable event such as accessing a chart or viewing documents, the following information is recorded in the audit event log:
    - User - logged-in user performing the action
    - Patient - patient ID accessed by the user
    - Event Type - type of event recorded, such as accessing to a patient or viewing a document
    - Event Action - action performed during an event type--view, create, edit, delete, etc.
    - Time - timestamp of when each action took place
    - Access Granted - whether or not access was granted for each event recorded

2. Click Level: Each mouse click is recorded for the logged-in user. Low-level granular HTTP CGI data is captured and logged.

Auditable events can be toggled on or off only by those with Security Administrator rights. These events are also logged.

The application web servers use HTTPS 128bit SSL for security. There is no toggle or option to use an unencrypted connection. If a user attempts to access the application on a non-secure port (HTTP port 80) then the user is redirected to use the encrypted HTTPS connection.

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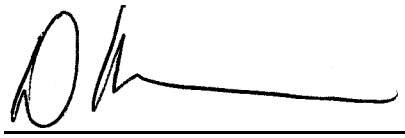
DTR 170.314.d.2-5 Detection of Audit Log Alteration

WebChart EHR Version 6.4 (Medical Informatics Engineering) uses several levels to provide security and to prevent audit log tampering.

1. The application has been written to only allow inserts and updates to audit log tables.
2. Database table and column grants have been limited to query and write only.
3. For detection, access to the database server and queries done to audit tables are logged to central audit log server.
4. Database table checksums are calculated, point-in-time, and compared.

Attested by:
10/20/2013



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