



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: Bayview EMR
Product Version: 2.0
Domain: Ambulatory
Test Type: Modular EHR

1.2 Developer/Vendor Information

Developer/Vendor Name: Bayview Physicians Group
Address: 3241 Western Branch Blvd Chesapeake VA 23321
Website: www.BayviewPhysicians.com
Email: elmore@msaphy.com
Phone: 757-686-3500
Developer/Vendor Contact: Jeffrey Elmore



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: (512) 599-1817
ONC-ACB Contact: Jodi Gonzalez

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

Jodi Gonzalez
ONC-ACB Authorized Representative

Certification Body Manager
Function/Title

12/7/2015

Signature and Date

2.2 Gap Certification

The following identifies criterion or criteria certified via gap certification

§170.314			
<input type="checkbox"/> (a)(1)	<input type="checkbox"/> (a)(19)	<input type="checkbox"/> (d)(6)	<input type="checkbox"/> (h)(1)
<input type="checkbox"/> (a)(6)	<input type="checkbox"/> (a)(20)	<input type="checkbox"/> (d)(8)	<input type="checkbox"/> (h)(2)
<input type="checkbox"/> (a)(7)	<input type="checkbox"/> (b)(5)*	<input type="checkbox"/> (d)(9)	<input type="checkbox"/> (h)(3)
<input type="checkbox"/> (a)(17)	<input type="checkbox"/> (d)(1)	<input type="checkbox"/> (f)(1)	
<input type="checkbox"/> (a)(18)	<input type="checkbox"/> (d)(5)	<input type="checkbox"/> (f)(7)**	

*Gap certification allowed for Inpatient setting only

**Gap certification allowed for Ambulatory setting only

No gap certification



2.3 Inherited Certification

The following identifies criterion or criteria certified via inherited certification

§170.314			
<input type="checkbox"/> (a)(1)	<input type="checkbox"/> (a)(16) <i>Inpt. only</i>	<input type="checkbox"/> (c)(2)	<input type="checkbox"/> (f)(2)
<input type="checkbox"/> (a)(2)	<input type="checkbox"/> (a)(17) <i>Inpt. only</i>	<input type="checkbox"/> (c)(3)	<input type="checkbox"/> (f)(3)
<input type="checkbox"/> (a)(3)	<input type="checkbox"/> (a)(18)	<input type="checkbox"/> (d)(1)	<input type="checkbox"/> (f)(4) <i>Inpt. only</i>
<input type="checkbox"/> (a)(4)	<input type="checkbox"/> (a)(19)	<input type="checkbox"/> (d)(2)	<input type="checkbox"/> (f)(5) <i>Amb. only</i>
<input type="checkbox"/> (a)(5)	<input type="checkbox"/> (a)(20)	<input type="checkbox"/> (d)(3)	
<input type="checkbox"/> (a)(6)	<input type="checkbox"/> (b)(1)	<input type="checkbox"/> (d)(4)	<input type="checkbox"/> (f)(6) <i>Amb. only</i>
<input type="checkbox"/> (a)(7)	<input type="checkbox"/> (b)(2)	<input type="checkbox"/> (d)(5)	
<input type="checkbox"/> (a)(8)	<input type="checkbox"/> (b)(3)	<input type="checkbox"/> (d)(6)	<input type="checkbox"/> (f)(7)
<input type="checkbox"/> (a)(9)	<input type="checkbox"/> (b)(4)	<input type="checkbox"/> (d)(7)	<input type="checkbox"/> (g)(1)
<input type="checkbox"/> (a)(10)	<input type="checkbox"/> (b)(5)	<input type="checkbox"/> (d)(8)	<input type="checkbox"/> (g)(2)
<input type="checkbox"/> (a)(11)	<input type="checkbox"/> (b)(6) <i>Inpt. only</i>	<input type="checkbox"/> (d)(9) <i>Optional</i>	<input type="checkbox"/> (g)(3)
<input type="checkbox"/> (a)(12)	<input type="checkbox"/> (b)(7)	<input type="checkbox"/> (e)(1)	<input type="checkbox"/> (g)(4)
<input type="checkbox"/> (a)(13)	<input type="checkbox"/> (b)(8)	<input type="checkbox"/> (e)(2) <i>Amb. only</i>	<input type="checkbox"/> (h)(1)
<input type="checkbox"/> (a)(14)	<input type="checkbox"/> (b)(9)	<input type="checkbox"/> (e)(3) <i>Amb. only</i>	<input type="checkbox"/> (h)(2)
<input type="checkbox"/> (a)(15)	<input type="checkbox"/> (c)(1)	<input type="checkbox"/> (f)(1)	<input type="checkbox"/> (h)(3)

No inherited certification



Part 3: NVLAP-Accredited Testing Laboratory Information

Report Number: [TEB-09252015_452](#)

Test Date(s): [9/25/2015](#)

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: 817-709-1627
ATL Contact: Kyle Meadors

For more information on scope of accreditation, please reference [NVLAP site](#).

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

[Timothy Bennett](#)

ATL Authorized Representative

12/7/2015

Signature and Date

Test Proctor

Function/Title

[Nashville, TN](#)

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

No additional software required



3.2.2 Test Tools

Test Tool	Version
<input type="checkbox"/> Cypress	2.6
<input type="checkbox"/> ePrescribing Validation Tool	1.0.5
<input type="checkbox"/> HL7 CDA Cancer Registry Reporting Validation Tool	1.0.3
<input type="checkbox"/> HL7 v2 Electronic Laboratory Reporting (ELR) Validation Tool	1.8.2
<input type="checkbox"/> HL7 v2 Immunization Information System (IIS) Reporting Validation Tool	1.8.2
<input type="checkbox"/> HL7 v2 Laboratory Results Interface (LRI) Validation Tool	1.7.2
<input type="checkbox"/> HL7 v2 Syndromic Surveillance Reporting Validation Tool	1.7.2
<input type="checkbox"/> Transport Testing Tool	181
<input type="checkbox"/> Direct Certificate Discovery Tool	3.0.4
<input type="checkbox"/> Edge Testing Tool	0.0.5

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)	<input type="checkbox"/> §170.204(b)(1) HL7 Version 3 Implementation Guide: URL-Based Implementations of the Context-Aware Information Retrieval (Infobutton) Domain	<input type="checkbox"/> §170.204(b)(2) HL7 Version 3 Implementation Guide: Context-Aware Knowledge Retrieval (Infobutton) Service-Oriented Architecture Implementation Guide
(a)(13)	<input checked="" type="checkbox"/> §170.207(a)(3) IHTSDO SNOMED CT® International Release July 2012 and US Extension to SNOMED CT® March 2012 Release	<input type="checkbox"/> §170.207(j) HL7 Version 3 Standard: Clinical Genomics; Pedigree



Criterion #	Standard Successfully Tested	
(a)(15)(i)	<input checked="" type="checkbox"/> §170.204(b)(1) HL7 Version 3 Implementation Guide: URL-Based Implementations of the Context-Aware Information Retrieval (Infobutton) Domain	<input type="checkbox"/> §170.204(b)(2) HL7 Version 3 Implementation Guide: Context-Aware Knowledge Retrieval (Infobutton) Service-Oriented Architecture Implementation Guide
(a)(16)(ii)	<input type="checkbox"/> §170.210(g) Network Time Protocol Version 3 (RFC 1305)	<input type="checkbox"/> §170.210(g) Network Time Protocol Version 4 (RFC 5905)
(b)(2)(i)(A)	<input type="checkbox"/> §170.207(i) The code set specified at 45 CFR 162.1002(c)(2) (ICD-10-CM) for the indicated conditions	<input type="checkbox"/> §170.207(a)(3) IHTSDO SNOMED CT® International Release July 2012 and US Extension to SNOMED CT® March 2012 Release
(b)(7)(i)	<input type="checkbox"/> §170.207(i) The code set specified at 45 CFR 162.1002(c)(2) (ICD-10-CM) for the indicated conditions	<input type="checkbox"/> §170.207(a)(3) IHTSDO SNOMED CT® International Release July 2012 and US Extension to SNOMED CT® March 2012 Release
(b)(8)(i)	<input type="checkbox"/> §170.207(i) The code set specified at 45 CFR 162.1002(c)(2) (ICD-10-CM) for the indicated conditions	<input type="checkbox"/> §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 <i>[list encryption and hashing algorithms]</i> <input type="text"/> <input type="text"/>	
(e)(1)(ii)(A)(2)	<input type="checkbox"/> §170.210(g) Network Time Protocol Version 3 (RFC 1305)	<input type="checkbox"/> §170.210(g) Network Time Protocol Version 4 (RFC 5905)
(e)(3)(ii)	Annex A of the FIPS Publication 140-2 <i>[list encryption and hashing algorithms]</i> <input type="text"/> <input type="text"/>	
Common MU Data Set (15)	<input type="checkbox"/> §170.207(a)(3) IHTSDO SNOMED CT® International Release July 2012 and US Extension to SNOMED CT® March 2012 Release	<input type="checkbox"/> §170.207(b)(2) The code set specified at 45 CFR 162.1002(a)(5) (HCPCS and CPT-4)

Criterion #	Standard Successfully Tested
-------------	------------------------------

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
<input checked="" type="checkbox"/> (a)(4)(iii)	Plot and display growth charts
<input type="checkbox"/> (b)(1)(i)(B)	Receive summary care record using the standards specified at §170.202(a) and (b) (Direct and XDM Validation)
<input type="checkbox"/> (b)(1)(i)(C)	Receive summary care record using the standards specified at §170.202(b) and (c) (SOAP Protocols)
<input type="checkbox"/> (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)
<input type="checkbox"/> (b)(2)(ii)(C)	Transmit health information to a Third Party using the standards specified at §170.202(b) and (c) (SOAP Protocols)
<input type="checkbox"/> (e)(1)	View, download and transmit data to a third party utilizing the Edge Protocol IG version 1.1
<input type="checkbox"/> (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)
<input type="checkbox"/> (f)(7)	Ambulatory setting only – transmission to public health agencies – syndromic surveillance - Create Data Elements
<input type="checkbox"/> 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)
<input type="checkbox"/> 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
<input type="checkbox"/> (a)(1)	1.3	1.5	<input type="checkbox"/> (c)(3)	1.11	1.11
<input type="checkbox"/> (a)(2)	1.2		<input type="checkbox"/> (d)(1)	1.2	
<input type="checkbox"/> (a)(3)	1.2	1.4	<input type="checkbox"/> (d)(2)	1.6	
<input checked="" type="checkbox"/> (a)(4)	1.4	1.3	<input type="checkbox"/> (d)(3)	1.3	
<input checked="" type="checkbox"/> (a)(5)	1.4	1.3	<input type="checkbox"/> (d)(4)	1.3	
<input type="checkbox"/> (a)(6)	1.3	1.4	<input type="checkbox"/> (d)(5)	1.2	
<input type="checkbox"/> (a)(7)	1.3	1.3	<input type="checkbox"/> (d)(6)	1.2	
<input checked="" type="checkbox"/> (a)(8)	1.3		<input type="checkbox"/> (d)(7)	1.2	
<input type="checkbox"/> (a)(9)	1.3	1.3	<input type="checkbox"/> (d)(8)	1.2	
<input type="checkbox"/> (a)(10)	1.2	1.4	<input type="checkbox"/> (d)(9) <i>Optional</i>	1.2	
<input checked="" type="checkbox"/> (a)(11)	1.3		<input type="checkbox"/> (e)(1)	1.11	1.5
<input checked="" type="checkbox"/> (a)(12)	1.3		<input type="checkbox"/> (e)(2) <i>Amb. only</i>	1.2	1.6
<input checked="" type="checkbox"/> (a)(13)	1.2		<input type="checkbox"/> (e)(3) <i>Amb. only</i>	1.3	
<input type="checkbox"/> (a)(14)	1.2		<input type="checkbox"/> (f)(1)	1.2	1.2
<input checked="" type="checkbox"/> (a)(15)	1.5		<input type="checkbox"/> (f)(2)	1.3	1.3
<input type="checkbox"/> (a)(16) <i>Inpt. only</i>	1.3	1.2	<input type="checkbox"/> (f)(3)	1.3	1.3
<input type="checkbox"/> (a)(17) <i>Inpt. only</i>	1.2		<input type="checkbox"/> (f)(4) <i>Inpt. only</i>	1.3	1.3
<input type="checkbox"/> (a)(18)	1.1	1.5	<input type="checkbox"/> (f)(5) <i>Amb. only</i>	1.2	1.2
<input checked="" type="checkbox"/> (a)(19)	1.1	1.5	<input type="checkbox"/> (f)(6) <i>Amb. only</i>	1.4	1.4
<input type="checkbox"/> (b)(1)	1.7	1.4	<input type="checkbox"/> (f)(7) <i>Amb. only</i>	1.1	
<input type="checkbox"/> (b)(2)	1.4	1.6	<input type="checkbox"/> (g)(1)	2.0	2.0
<input type="checkbox"/> (b)(3)	1.4	1.4	<input checked="" type="checkbox"/> (g)(2)	2.0	2.0
<input type="checkbox"/> (b)(4)	1.3	1.4	<input checked="" type="checkbox"/> (g)(3)	1.4	
<input type="checkbox"/> (b)(5)	1.4	1.2	<input checked="" type="checkbox"/> (g)(4)	1.2	
<input type="checkbox"/> (b)(6) <i>Inpt. only</i>	1.3	1.3	<input type="checkbox"/> (h)(1)	1.1	
<input type="checkbox"/> (b)(7)	1.4	1.7	<input type="checkbox"/> (h)(2)	1.1	
<input type="checkbox"/> (b)(8)	1.2	1.2	<input type="checkbox"/> (h)(3)	1.1	
<input type="checkbox"/> (b)(9)	1.1	1.1			
<input type="checkbox"/> (c)(1)	1.11	1.11			
<input type="checkbox"/> (c)(2)	1.11	1.11			



Criteria #	Version		Criteria #	Version	
	TP**	TD***		TP	TD

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:

- Ambulatory
- Inpatient
- No CQMs tested

*For a list of the 2014 Clinical Quality Measures, please see the CMS [eCQM Library](#)
 (Navigation: June 2014 and April 2014 Updates)

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

Inpatient CQMs							
CMS ID	Version	CMS ID	Version	CMS ID	Version	CMS ID	Version
<input type="checkbox"/> 9		<input type="checkbox"/> 71		<input type="checkbox"/> 107		<input type="checkbox"/> 172	
<input type="checkbox"/> 26		<input type="checkbox"/> 72		<input type="checkbox"/> 108		<input type="checkbox"/> 178	
<input type="checkbox"/> 30		<input type="checkbox"/> 73		<input type="checkbox"/> 109		<input type="checkbox"/> 185	
<input type="checkbox"/> 31		<input type="checkbox"/> 91		<input type="checkbox"/> 110		<input type="checkbox"/> 188	
<input type="checkbox"/> 32		<input type="checkbox"/> 100		<input type="checkbox"/> 111		<input type="checkbox"/> 190	
<input type="checkbox"/> 53		<input type="checkbox"/> 102		<input type="checkbox"/> 113			
<input type="checkbox"/> 55		<input type="checkbox"/> 104		<input type="checkbox"/> 114			
<input type="checkbox"/> 60		<input type="checkbox"/> 105		<input type="checkbox"/> 171			



3.2.8 Automated Numerator Recording and Measure Calculation

3.2.8.1 Automated Numerator Recording

Automated Numerator Recording Successfully Tested			
<input type="checkbox"/> (a)(1)	<input type="checkbox"/> (a)(11)	<input type="checkbox"/> (a)(18)	<input type="checkbox"/> (b)(6)
<input type="checkbox"/> (a)(3)	<input type="checkbox"/> (a)(12)	<input type="checkbox"/> (a)(19)	<input type="checkbox"/> (b)(8)
<input type="checkbox"/> (a)(4)	<input type="checkbox"/> (a)(13)	<input type="checkbox"/> (a)(20)	<input type="checkbox"/> (b)(9)
<input type="checkbox"/> (a)(5)	<input type="checkbox"/> (a)(14)	<input type="checkbox"/> (b)(2)	<input type="checkbox"/> (e)(1)
<input type="checkbox"/> (a)(6)	<input type="checkbox"/> (a)(15)	<input type="checkbox"/> (b)(3)	<input type="checkbox"/> (e)(2)
<input type="checkbox"/> (a)(7)	<input type="checkbox"/> (a)(16)	<input type="checkbox"/> (b)(4)	<input type="checkbox"/> (e)(3)
<input type="checkbox"/> (a)(9)	<input type="checkbox"/> (a)(17)	<input type="checkbox"/> (b)(5)	

Automated Numerator Recording was not tested

3.2.8.2 Automated Measure Calculation

Automated Measure Calculation Successfully Tested			
<input type="checkbox"/> (a)(1)	<input checked="" type="checkbox"/> (a)(11)	<input type="checkbox"/> (a)(18)	<input type="checkbox"/> (b)(6)
<input type="checkbox"/> (a)(3)	<input checked="" type="checkbox"/> (a)(12)	<input checked="" type="checkbox"/> (a)(19)	<input type="checkbox"/> (b)(8)
<input checked="" type="checkbox"/> (a)(4)	<input checked="" type="checkbox"/> (a)(13)	<input checked="" type="checkbox"/> (a)(20)	<input type="checkbox"/> (b)(9)
<input checked="" type="checkbox"/> (a)(5)	<input type="checkbox"/> (a)(14)	<input type="checkbox"/> (b)(2)	<input type="checkbox"/> (e)(1)
<input type="checkbox"/> (a)(6)	<input checked="" type="checkbox"/> (a)(15)	<input type="checkbox"/> (b)(3)	<input type="checkbox"/> (e)(2)
<input type="checkbox"/> (a)(7)	<input type="checkbox"/> (a)(16)	<input type="checkbox"/> (b)(4)	<input type="checkbox"/> (e)(3)
<input type="checkbox"/> (a)(9)	<input type="checkbox"/> (a)(17)	<input type="checkbox"/> (b)(5)	

Automated Measure Calculation was not tested

3.2.9 Attestation

Attestation Forms (as applicable)	Appendix
<input checked="" type="checkbox"/> Safety-Enhanced Design*	A
<input checked="" type="checkbox"/> Quality Management System**	B
<input type="checkbox"/> Privacy and Security	C

*Required if any of the following were tested: (a)(1), (a)(2), (a)(6), (a)(7), (a)(8), (a)(16), (a)(18), (a)(19), (a)(20), (b)(3), (b)(4), (b)(9).

**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



Bayview Physicians Group

Bayview Physician Services, P.C.

www.BayviewPhysicians.com

Primary Care

Family Medicine

Internal Medicine

Pediatrics

Urgent Care

Specialties

Cardiology

Dermatology

Ear, Nose & Throat

Endocrinology

Geriatric Medicine

Hospital Care

Infectious Disease

Neurology

OB/GYN

Occupational Medicine

**Physical Medicine &
Rehabilitation**

Plastic Surgery

Podiatry

**Pulmonary & Critical
Care**

Rheumatology

Sleep Medicine

Administrative Office

3241 Western Branch Blvd
Chesapeake, VA 23321

Phone: (757) 686-3500

Fax: (757) 686-0541

October 1, 2015

Bayview Physicians Group
Bayview EMR 2.0

Jeff Elmore
Director of Information Systems
757-686-3500

For public release:

Bayview Physicians Group attests that the usability standard/process and usability report submitted for the certification of Bayview 2.0 is accurate and complete per the requirements of the ONC criterion 170.314(g)(3).

Respectfully Submitted,

Jeff Elmore
Director of Information Systems
Bayview Physicians Group



Bayview Physicians Group

Bayview Physician Services, P.C.

www.BayviewPhysicians.com

Primary Care

Family Medicine

Internal Medicine

Pediatrics

Urgent Care

Specialties

Cardiology

Dermatology

Ear, Nose & Throat

Endocrinology

Geriatric Medicine

Hospital Care

Infectious Disease

Neurology

OB/GYN

Occupational Medicine

**Physical Medicine &
Rehabilitation**

Plastic Surgery

Podiatry

**Pulmonary & Critical
Care**

Rheumatology

Sleep Medicine

Administrative Office

3241 Western Branch Blvd
Chesapeake, VA 23321

Phone: (757) 686-3500

Fax: (757) 686-0541

October 1, 2015

Bayview Physicians Group
Bayview EMR 2.0

Jeff Elmore
Director of Information Systems
757-686-3500

For public release:

Bayview Physicians Group used the following usability design process in developing and designing their HIT system, Bayview EMR 2.0: Usability.gov guidelines.

U.S. Dept. of Health and Human Services. The Research-Based Web Design & Usability Guidelines, Enlarged/Expanded edition. Washington: U.S. Government Printing Office, 2006.

Respectfully Submitted,

Jeff Elmore
Director of Information Systems
Bayview Physicians Group



EHR Usability Test Report of Bayview EMR 2.0

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

Bayview EMR 2.0

Date of Usability Test: 10/01/2015
Date of Report: 10/06/2015
Report Prepared By: Jeffrey Elmore, Director of Information Systems, Bayview Physicians Group
757-686-3500
elmorej@bayviewphysicians.com
3241 Western Branch Blvd, Chesapeake, VA 23321

Table of Contents

1. EXECUTIVE SUMMARY
2. INTRODUCTION
3. METHOD
 - 3.1 PARTICIPANTS
 - 3.2 STUDY DESIGN
 - 3.3 TASK
 - 3.4 PROCEDURE
 - 3.5 TEST LOCATION
 - 3.6 TEST ENVIRONMENT
 - 3.7 TEST FORMS AND TOOLS
 - 3.8 PARTICIPANT INSTRUCTIONS
 - 3.9 USABILITY METRICS
4. RESULTS
 - 4.1 DATA ANALYSIS AND REPORTING
 - 4.2 DISCUSSION OF THE FINDINGS
5. APPENDICES
 - 5.1 Appendix 1: SAMPLE RECRUITING SCREENER
 - 5.2 Appendix 2: PARTICIPANT DEMOGRAPHICS
 - 5.3 Appendix 3: NON-DISCLOSURE AGREEMENT AND INFORMED CONSENT
 - 5.4 Appendix 4: MODERATOR'S GUIDE
 - 5.5 Appendix 5: SYSTEM USABILITY SCORE QUESTIONNAIRE

EXECUTIVE SUMMARY

A usability test of Bayview EMR 2.0 was conducted on 10/01/2015 in the office of North Suffolk Family Medicine, 3235 Bridge Road, Suffolk, VA 23435 by Bayview Physicians Group. The purpose of this test was to test and validate the usability of the current user interface, and provide evidence of usability in the Bayview EMR, the EHR Under Test (EHRUT). During the usability test, six healthcare providers and clinical staff matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

This study collected performance data on three tasks typically conducted on an EHR:

- CPOE
- Clinical Decision Support

During the 15 minute one-on-one usability test, each participant was greeted by the administrator and asked to review and sign an informed consent/release form (included in Appendix 3); they were instructed that they could withdraw at any time. Participants had 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, along with the data logger, recorded user performance data on paper and electronically. The administrator did not give the participant assistance in how to complete the task.

The following types of data were collected for each participant:

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

All participant data was de-identified – no correspondence could be made from the identity of the participant to the data collected. Following the conclusion of the testing, participants were asked to complete a post-test 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. Following is a summary of the performance and rating data collected on the Bayview EMR.

Task	Measure	Effectiveness		Efficiency		Satisfaction	
		N	Task Success	Task Time	Path Deviation	Task Time	Task Ratings
		#	% of success	Deviations (Observed / Optimal)	Deviations (Observed / Optimal)	Time (Seconds)	Rating (1=Easy)
Electronically Access Laboratory Orders		6	100%	1.00	1.00	2.14	1.00
Electronically Change Laboratory Orders (Cancel)		6	100%	1.00	1.00	5.9	1.00
Electronically Record Laboratory Orders		6	100%	1.17	1.16	23.6	1.33
Electronically Access Radiology Orders		6	100%	1.00	1.00	2.0	1.00
Electronically Change Radiology Orders (Cancel)		6	100%	1.00	1.00	5.7	1.00
Electronically Record Radiology Orders		6	100%	1.17	1.16	23.4	1.33
Electronically Access Patient Active Medication List		6	100%	1.22	1.00	3.2	1.00
Electronically Change Patient Active Medication List (Delete)		6	84%	0.97	1.07	10.4	1.50
Electronically Record Patient Active Medication List		6	100%	1.14	1.05	17.1	1.33
View clinical decision support rule based on Problem List data		6	100%	1.00	1.00	2.2	1.00
View clinical decision support rule based on Medication List data		6	100%	1.00	1.00	2.2	1.00
View clinical decision support rule based on Rx allergy data		6	84%	1.26	1.07	19.0	1.67
View clinical decision support rule based on lab test data		6	100%	1.24	1.00	3.1	1.00
View clinical decision support rule based on patient demographics data.		6	100%	1.00	1.00	2.1	1.00
View clinical decision support rule based on vitals data		6	100%	1.04	1.00	2.6	1.00
View diagnostic and therapeutic reference information		6	100%	1.00	1.00	2.0	1.00
Clinical Decision Support Rule Configuration (Admin Only)		2	100%	0.94	1.00	7.5	1.50

The results from the System Usability Scale scored the subjective satisfaction with the system based on performance with these tasks to be: 97.0

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

- Major findings

Most participants found it easy to view and update lab and radiology orders but had minor problems with the user interface for generating new orders. From a usability perspective, the screen design would benefit from the addition of a search feature to help reduce the number of possible tests that can be ordered. Participants stated that the list of tests was lengthy, which made it harder for the participant to locate the test to be ordered.

The test participants were also happy to see that that clinical decision support rules more medically relevant and tied directly to clinical quality measures. This linkage will lead to more meaningful alerts appearing inside the EHR which in turn will make physicians more likely to review them. Participants also commented on the ease of access to the clinically relevant information attached to the clinical decision support alert.

- Areas for improvement

As stated above, the order entry UI does not currently have a search feature to help the user find the desired test to order. While this does not hinder the user from ordering the test, it can introduce an undesired delay in the ordering process while the user searches the alphabetical list of possible tests.

Some users noted that while clinical decision support alerts were clearly visible on the patient desktop, they are not viewable inside the corresponding modules. No user wanted the system to immediately generate a popup and interrupt their work every time a new alert was generated. However, the addition of a toolbar icon or some other omnipresent alert notification would at least guide the user to the existence of alerts.

INTRODUCTION

The EHRUT tested for this study was Bayview EMR 2.0. It is designed to present medical information to healthcare providers in an outpatient ambulatory environment. The Bayview EMR consists of various modules and interfaces design to capture, display, and modify patient clinical data. 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, user satisfaction, and deviation from optimal paths, were captured during the usability testing.

METHOD

Bayview EMR Design Process

The Bayview EMR design process follows the same principles of human-centered design and fits in to our overall quality management system (QMS). The system involves users in the overall design and software development process. The design team includes individuals with skills spanning across multiple disciplines and with different perspectives. The team works to address the entire user experience through a deep understanding of the tasks and workflows required by end users. The process is iterative and requirements are continually updated to better address the context of use, increase usability, and reduce user error.

Bayview EMR is developed using the user-design processes and guidelines published by the U.S. Dept. of Health and Human Services. The Research-Based Web Design & Usability Guidelines, Enlarged/Expanded edition. Washington: U.S. Government Printing Office, 2006.

The main steps of the process are:

- Understanding/stating the context of use for the function or module
 - Business requirements are gathered from internal and client stakeholders. These stakeholders are kept up to date with product developments through regular meetings.
- Creating design solutions
 - A design team consisting of developers, quality leaders, and business analysts work to design several possible solutions and through further analysis with stakeholders the solution is refined.
- Creating user requirements
 - Business analysis creates full requirements documents based on feedback from the design team.
- Evaluating the solution
 - Solution prototypes are created and vetted against the original understanding of the context of use.
- Performing user centered evaluations
 - Formal summative user testing is performed and the analysis is sent back to the design team. The results are then used to drive future iterations of the product.

The following tasks and modules were developed based on the Bayview EMR design process:

§ 170.314(a)(8) (Clinical decision support)

§ 170.314(a)(1) (CPOE)

INTENDED USERS

The Bayview EMR 2.0 software is intended to be used by users in all job functions of the outpatient healthcare setting with levels of experience. Examples of intended users include, but are not limited to, patient advocates, medical receptionists, medical assistants, nurses, physician assistants, nurse practitioners, physicians, clinic managers, and group administrators.

PARTICIPANTS

The testing methods were in accordance with the Bayview EMR Design Process. A total of six participants were tested on the EHRUT(s). Participants in the study included medical assistants, and technicians from the family medicine specialty. Participants were given the opportunity to have the same orientation and level of training as the actual end users would have received.

For the test purposes, end-user characteristics were identified and translated into a recruitment screener used to solicit potential participants; an example of a screener is provided in Appendix 1.

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

ID	Gender	Age	Occupation/Role	EHR Experience (Years)	Rx Module Experience
1593	Female	25-39	Practice Manager	4	Beginner
2582	Female	18-24	Nurse	2	Moderate
3287	Female	40-59	Nurse	15	Expert
4957	Female	40-59	Physician	20	Expert
5637	Female	40-59	Physician	12	Expert
6702	Male	40-59	Group Administrator	10	Moderate

Seven participants (matching the demographics in the section on Participants) were recruited and six participated in the usability test. One participant was on personal leave at the time of the study for the study.

Participants were scheduled for 15 minute sessions with 5 minutes in between each session for debrief by the administrator and data logger, and to reset systems to proper test conditions. A spreadsheet was used to keep track of the participants, and included each participant's demographic characteristics.

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 one EHR. Each participant used the system in the same room, and was provided with the same instructions. The system was evaluated for effectiveness, efficiency and satisfaction as defined by measures collected and analyzed for each participant:

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

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

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:

1. CPOE:
 - a. Electronically Access Laboratory Orders
 - b. Electronically Record Radiology Orders
 - c. Electronically Change Radiology Orders (Cancel)
 - d. Electronically Access Patient Active Medication List
 - e. Electronically Change Patient Active Medication List (Delete)
 - f. Electronically Record Patient Active Medication List
2. Clinical Decision Support:
 - a. View clinical decision support rule based on Problem List data
 - b. View clinical decision support rule based on Medication List data
 - c. View clinical decision support rule based on Rx allergy data
 - d. View clinical decision support rule based on patient demographics data.
 - e. View clinical decision support rule based on lab test data.
 - f. View clinical decision support rule based on vitals data
 - g. View diagnostic and therapeutic reference information
 - h. Clinical Decision Support Rule Configuration (Admin Only)

Tasks were selected based on their frequency of use, criticality of function, and those that may be most troublesome for users.

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 ID. Each participant reviewed and signed an informed consent and release form (See Appendix 3). A representative from the test team witnessed the participant's signature.

To ensure that the test ran smoothly, the administrator participated in the test.

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 test administrator also served as the data logger and took notes on task success, path deviations, number and type of errors, and comments.

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

- As quickly as possible making as few errors
- 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 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 in Section 3.9.

Following the session, the administrator gave the participant the post-test questionnaire (the System Usability Scale, see Appendix 5) 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.

TEST LOCATION

The tests were performed in the exam room where the EHRUT would typically be deployed and used in production. Only the participant and the administrator were in the test room. To ensure that the environment was comfortable for users, noise levels were kept to a minimum with the ambient temperature within a normal range. All of the safety instruction and evacuation procedures were valid, in place, and visible to the participants.

TEST ENVIRONMENT

The EHRUT would be typically be used in a healthcare office or facility. In this instance, the testing was conducted in an examination room on a computer where interactions with the EHRUT would typically take place in real world office scenarios. For testing, the computer used a Windows PC running windows 7 with a standard mouse and keyboard.

The Bayview EMR 2.0 system was viewed on a 19-inch vertical monitor in portrait mode. The application was set up by the Bayview Physicians Group according to standard operating procedures for client/server installation. The application itself was running on a Windows 2008 Server using a Training SQL database on a WAN 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 control of font size).

TEST FORMS AND TOOLS

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

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

Examples of these documents can be found in Appendices 3-5 respectively. The Moderator's Guide was devised so as to be able to capture required data.

PARTICIPANT INSTRUCTIONS

The administrator reads the following instructions aloud to the each participant (also see the full moderator's guide in Appendix 4):

Thank you for participating in this study. Our session today will last about 15 minutes. During that time you will take a look at an early prototype of Bayview EMR 2.0.

I will ask you to complete a few tasks using this system and answer some questions. We are interested in how easy (or how difficult) this system is to use, what in it would be useful to you, and how we could improve it. You will be asked to complete these tasks on your own trying to do them as quickly as possible with the fewest possible errors or deviations. Please do not do anything more than asked. If you get lost or have difficulty I cannot answer help you with anything to do with the system.

Please save your detailed comments until the end of a task or the end of the session as a whole when we can discuss freely. Since this is a test system some of the data may not make sense as it is placeholder data. We are recording the screen of our session today for our internal use only.

Do you have any questions or concerns?

Following the procedural instructions, participants were shown the EHR. Once this task was complete, the administrator gave the following instructions:

For each task, I will read the description to you and say "Begin." At that point, please perform the task and say "Done" once you believe you have successfully completed the task. I would like to request that you not talk aloud or verbalize while you are doing the tasks. I will ask you your impressions about the task once you are done.

Participants were then given 17 tasks to complete. Tasks are listed in the moderator's guide in Appendix 4.

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 Bayview EMR 2.0 by measuring participant success rates and errors
2. Efficiency of Bayview EMR 2.0 by measuring the average task time and path deviations
3. Satisfaction with Bayview EMR 2.0 by measuring ease of use ratings

DATA SCORING

The following table (Table 1) details how tasks were scored, errors evaluated, and the time data analyzed

Measures	Rationale and Scoring
Effectiveness: Task Success	<p>A task was counted as a "Success" if the participant was able to achieve the correct outcome, without assistance, within the time allotted on a per task basis.</p> <p>The total number of successes were calculated for each task and then divided by the total number of times that task was attempted. The results are provided as a percentage.</p> <p>Task times were recorded for successes. Observed task times divided by the optimal time for each task is a measure of optimal efficiency and was recorded.</p>

	<p>Optimal task performance time, as benchmarked by expert performance under realistic conditions, is recorded when constructing tasks. Target task times used for task times in the Moderator’s Guide were defined by taking multiple measures of optimal performance and multiplying each time by a factor of 1.5. This factor allows some time buffer, as participants are presumably not trained to expert performance. Thus, if expert performance on a task was [x] seconds then optimal task time performance was [x * 1.5] seconds. The ratio of reported time to optimal time was aggregated across tasks and reported with mean.</p>
<p>Effectiveness: Task Failures</p>	<p>If the participant abandoned the task, did not reach the correct answer or performed it incorrectly, or reached the end of the allotted time before successful completion, the task was counted as a “Failures.” No task times were taken for errors.</p> <p>On a qualitative level, an enumeration of errors and error types was collected and is described in the narrative section below.</p>
<p>Efficiency: Task Deviations</p>	<p>The participant’s path through the application was recorded. Deviations occur if the participant, for example, went to a wrong screen, clicked on an incorrect menu item, opened an incorrect module, or interacted incorrectly with an on-screen control. This path was compared to the optimal path. The number of steps in the observed path is divided by the number of optimal steps to provide a ratio of path deviation.</p> <p>Optimal paths were recorded in the moderator guide. Task deviations are discussed further in the qualitative sections.</p>
<p>Efficiency: Task Time</p>	<p>Each task was timed from when the administrator said “Begin” until the participant said, “Done.” If he or she failed to say “Done,” the time was stopped when the participant stopped performing the task. Only task times for tasks that were successfully completed were included in the average task time analysis. Average time per task was calculated for each task.</p>
<p>Satisfaction: Task Rating:</p>	<p>Participant’s subjective impression of the ease of use of the application was measured by administering both a simple post-task question as well as a post-session questionnaire.</p> <p>After each task, the participant was asked to rate “Overall, this task was:” on a scale of 1 (Very Easy) to 5 (Very Difficult). These data are averaged across participants.</p> <p>Common convention is that average ratings for systems judged easy to use should be 3.3 or below.</p> <p>To measure participants’ confidence in and likeability of the Bayview EMR 2.0 overall, the testing team administered the System Usability Scale (SUS) post-test questionnaire. Questions included, “I thought the system was easy to use” and “I would imagine that most people would learn to use this system very quickly.” See full System Usability Score questionnaire in Appendix 5.</p>

Table 1. Details of how observed data were scored.

RESULTS

DATA ANALYSIS AND REPORTING

The results of the usability test were calculated according to the methods specified in the Usability Metrics section above. Participants who failed to follow session and task instructions had their data excluded from the analyses.

There were a few minor issues which may have affected data collection. The task descriptions and the terminology used could have contributed to some hesitation on the part of the user when completing tasks. Efforts were made to use descriptions and terminology which would be familiar to users; however, some users still may have experienced some confusion.

As part of testing, users were presented with entirely new data entry screens. Test participants had never used these screens to creating and update lab and radiology orders, so it is understandable that users would have some initial difficulty navigating unfamiliar screens.

The usability testing results for the EHRUT are detailed below (see Table 2).

Task	Measure	Effectiveness		Efficiency		Satisfaction	
		N	Task Success	Task Time	Path Deviation	Task Time	Task Ratings
		#	% of success	Deviations (Observed / Optimal)	Deviations (Observed / Optimal)	Time (Seconds)	Rating (1=Easy)
Electronically Access Laboratory Orders		6	100%	1.00	1.00	2.14	1.00
Electronically Change Laboratory Orders (Cancel)		6	100%	1.00	1.00	5.9	1.00
Electronically Record Laboratory Orders		6	100%	1.17	1.16	23.6	1.33
Electronically Access Radiology Orders		6	100%	1.00	1.00	2.0	1.00
Electronically Change Radiology Orders (Cancel)		6	100%	1.00	1.00	5.7	1.00
Electronically Record Radiology Orders		6	100%	1.17	1.16	23.4	1.33
Electronically Access Patient Active Medication List		6	100%	1.22	1.00	3.2	1.00
Electronically Change Patient Active Medication List (Delete)		6	84%	0.97	1.07	10.4	1.50
Electronically Record Patient Active Medication List		6	100%	1.14	1.05	17.1	1.33
View clinical decision support rule based on Problem List data		6	100%	1.00	1.00	2.2	1.00
View clinical decision support rule based on Medication List data		6	100%	1.00	1.00	2.2	1.00
View clinical decision support rule based on Rx allergy data		6	84%	1.26	1.07	19.0	1.67
View clinical decision support rule based on lab test data		6	100%	1.24	1.00	3.1	1.00
View clinical decision support rule based on patient demographics data.		6	100%	1.00	1.00	2.1	1.00

View clinical decision support rule based on vitals data	6	100%	1.04	1.00	2.6	1.00
View diagnostic and therapeutic reference information	6	100%	1.00	1.00	2.0	1.00
Clinical Decision Support Rule Configuration (Admin Only)	2	100%	0.94	1.00	7.5	1.50

Table 2. Usability Testing Results

The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these tasks to be: 97.0. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.¹

DISCUSSION OF THE FINDINGS

EFFECTIVENESS

Based on the findings, most users were quite effective at using the EHRUT. The average number of failures per task was 0.2, but the “errors” were primarily due to the user timing out before the task could be completed. Some users spent additional time making sure that they had typed information correctly, which contributed to timing out on the task, and ultimately, failure on the task. However, making certain that data is entered correctly contributes to an overall patient safety goal of this project.

Most test participants were quite effective and showed very few, if any path deviations. This finding could be partially attributed to the testing circumstances. Specifically, users had been recently trained on how to use the modules. Subsequent testing would be interesting to measure effectiveness once again after training decay has set in to see if users continue to follow an optimal path.

Risk Prone Errors

When discussing errors, it is important to note which tasks are more likely to result in errors and what types of errors are most likely to cause patient safety issues. Tasks which do not alter the patient’s record but simply display information to the user are less likely to lead to errors. Viewing order details and reviewing the patient’s prescription history does not involve the user entering or alerting data, so the chance of error is very low. The system will only allow an order to be generated when all medically necessary information has been entered, so there is no chance of an incomplete order being sent to the lab

Tasks which require the user to enter data are more prone to error. To that end every effort should be made to ensure that the user can clearly discern what has been selected on the screen and that they are given an opportunity to double check and “cancel” actions before they are committed.

Below is a prioritized list of tasks in the order of the associated risk and with a rating of the risk (1-3, where 1 is a low risk and 3 is a high risk)

Task	Risk Level
------	------------

¹ See Tullis, T. & Albert, W. (2008). Measuring the User Experience. Burlington, MA: Morgan Kaufman (p. 149).

Electronically Change Laboratory Orders (Cancel)	3
Electronically Change Radiology Orders (Cancel)	3
Electronically Change Patient Active Medication List (Delete)	3
Electronically Record Patient Active Medication List	3
Electronically Record Laboratory Orders	2
Electronically Record Radiology Orders	2
Clinical Decision Support Rule Configuration (Admin Only)	2
Electronically Access Patient Active Medication List	1
View clinical decision support rule based on Problem List data	1
View clinical decision support rule based on Medication List data	1
View clinical decision support rule based on Rx allergy data	1
View clinical decision support rule based on lab test data	1
View clinical decision support rule based on patient demographics data.	1
View clinical decision support rule based on vitals data	1
View diagnostic and therapeutic reference information	1
Electronically Access Laboratory Orders	1
Electronically Access Radiology Orders	1

EFFICIENCY

The average deviations ratios (observed path / optimal path) in the group tested were close to 1.0 for all tasks. Even users who were unable to complete a task in time were generally on the correct path and rarely deviated into a different area of the software. Thus, we conclude that users were relatively efficient when completing the tasks set before them.

SATISFACTION

The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these tasks to be: 87.2. Verbal feedback as well as task ratings conclude that there is a high level of comfort and overall satisfaction with the system. Specifically, users stated that the system is “simple and intuitive,” “user friendly,” and “organized logically.” These statements, along with other participant verbalizations, suggest a high level of usability within the system.

There are of course some areas of improvement, which are discussed below, but even so the average task ease of use rating was between 1.0 and 2.0 for each task. As set forth in the data scoring section, average ratings for systems judged easy to use should be 3.3 or below. Hence, a major finding of this testing was that the modules tested are very easy to use.

MAJOR FINDINGS

Most of the participants were very familiar with the Rx module so very few users had difficulty with those tasks. Most users agreed that the system as a whole was well integrated and that they found that they rarely had trouble using the module.

Most participants found it easy to view and update lab and radiology orders but had minor problems with the user interface for generating new orders. From a usability perspective, the screen design would

benefit from the addition of a search feature to help reduce the number of possible tests that can be ordered. Participants stated that the list of tests was lengthy, which made it harder for the participant to locate the test to be ordered.

The test participants were also happy to see that that clinical decision support rules more medically relevant and tied directly to clinical quality measures. This linkage will lead to more meaningful alerts appearing inside the EHR which in turn will make physicians more likely to review them. Participants also commented on the ease of access to the clinically relevant information attached to the clinical decision support alert.

AREAS FOR IMPROVEMENT

Generally, the feedback was very positive, but there are some areas where usability could be improved. One major takeaway from this process is that gathering user feedback earlier in the development process as well as working with less advanced/beginner users rather than super users could improve usability and overall safety.

As stated above, participants found it easy to view and update lab and radiology orders but had minor problems with the user interface for generating new orders. From a usability perspective, the screen design would benefit from the addition of a search feature to help reduce the number of possible tests that can be ordered. Participants stated that the list of tests was lengthy, which made it harder for the participant to locate the test to be ordered.

Some users noted that while clinical decision support alerts were clearly visible on the patient desktop, they were not viewable inside the modules themselves. No user wanted the system to immediately generate a popup and interrupt their work every time a new alert was generated. However the addition of a toolbar icon or some other omnipresent alert notification would at least guide the user to the alerts when they were ready to view them.

APPENDICES

The following appendices include supplemental data for this usability test report. Following is a list of the appendices provided:

- 1: Sample Recruiting Screener
- 2: Participant Demographics
- 3: Non-Disclosure Agreement (NDA) and Informed Consent Form
- 4: Moderator's Guide
- 5: System Usability Scale Questionnaire

Appendix 1: SAMPLE RECRUITING SCREENER

The purpose of a screener is to ensure that the participants selected represent the target user population as closely as possible. Rather than reaching out to individual participants, Bayview Physicians Group opted to target the Practice Administrator and rely upon them to select qualified participants based on the functionality being tested.

Recruiting Scripts:

Hello, my name is _____, and I am calling from Bayview Physicians Group. We are recruiting participants for a usability study on the Bayview EMR. Would you be willing to participate, along with staff members? This is strictly for research purposes. We will primarily be conducting tests on the usability of the new clinical decision support and computerized physician order entry. Could you identify users in the practice such as physicians, medical assistants, and technicians who use this module? Once you have identified those users, please send them a demographics questionnaire.

Would you be able to participate on October 1st? The test will take place at your office.

Thank you and we appreciate your time.

Appendix 2: PARTICIPANT DEMOGRAPHICS

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

Total Participants	6		
Gender		Occupation/Role	
Men	1	Physician	2
Women	5	Nurse	2
		Technician	0
Age		Manager	1
18-25	1	Other	1
25-39	1		
40-59	4	Years of Experience	
60+	0	0-2	1
		3-5	1
Race/Ethnicity		6-9	0
Caucasian	6	10+	4
Asian	0		
Black/African-American	0		
Latino/a or Hispanic	0		
Other	0		

Following is a full participant breakdown:

ID	Gender	Age	Occupation/Role	EHR Experience (Years)	Rx Module Experience	Needs Assistance?	Ethnicity
1593	Female	25-39	Practice Manager	4	Beginner	No	White
2582	Female	18-24	Nurse	2	Moderate	No	White
3287	Female	40-59	Nurse	15	Expert	No	White
4957	Female	40-59	Physician	20	Expert	No	White
5637	Female	40-59	Physician	12	Expert	No	White
6702	Male	40-59	Group Administrator	10	Moderate	No	White

Appendix 3: NON-DISCLOSURE AGREEMENT AND INFORMED CONSENT FORM

Non-Disclosure Agreement

THIS AGREEMENT is entered into as of *September 25, 2013*, between _____ (“the Participant”) and the testing organization *Bayview Physicians Group* located at *3241 Western Branch Blvd, Chesapeake, VA 23321*.

The Participant acknowledges his or her voluntary participation in today’s usability study may bring the Participant into possession of Confidential Information. The term "Confidential Information" means all technical and commercial information of a proprietary or confidential nature which is disclosed by *Bayview Physicians Group*, or otherwise acquired by the Participant, in the course of today’s study.

By way of illustration, but not limitation, Confidential Information includes trade secrets, processes, formulae, data, know-how, products, designs, drawings, computer aided design files and other computer files, computer software, ideas, improvements, inventions, training methods and materials, marketing techniques, plans, strategies, budgets, financial information, or forecasts.

Any information the Participant acquires relating to this product during this study is confidential and proprietary to *Bayview Physicians Group* and is being disclosed solely for the purposes of the Participant’s participation in today’s usability study. By signing this form the Participant acknowledges that s/he will not disclose this confidential information obtained today to anyone else or any other organizations.

Participant’s printed name: _____

Signature: _____

Date: _____

Informed Consent

Bayview Physicians Group would like to thank you for participating in this study. The purpose of this study is to evaluate an electronic health records system. If you decide to participate, you will be asked to perform several tasks using the prototype and give your feedback. The study will last about 30 minutes.

Agreement

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

I understand and consent to the use and release of the recording by *Bayview Physicians Group*. I understand that the information and recording is for research purposes only and that my name and image will not be used for any purpose other than research. I relinquish any rights to the recording and understand the recording may be copied and used by *Bayview Physicians Group* without further permission.

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

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

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

Please check one of the following:

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

Signature: _____

Date: _____

BAYVIEW EMR Usability Test

Moderator's Guide

Administrator _____

Data Logger _____

Date _____ **Time** _____

Participant # _____

Location _____

Prior to testing

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

Prior to each participant:

- Reset application
- Start session recordings with LogMeIn Rescue

Prior to each task:

- Reset application to starting point for next task

After each participant:

- End session recordings with LogMeIn Rescue

After all testing

- Back up all video and data files

Orientation

Thank you for participating in this study. Our session today will last about 20 minutes. During that time you will take a look at an early prototype of Bayview EMR 2.0.

I will ask you to complete a few tasks using this system and answer some questions. We are interested in how easy (or how difficult) this system is to use, what in it would be useful to you, and how we could improve it.

You will be asked to complete these tasks on your own trying to do them as quickly as possible with the fewest possible errors or deviations. Please do not do anything more than asked. If you get lost or have difficulty I cannot answer help you with anything to do with the system itself.

Please save your detailed comments until the end of a task or the end of the session as a whole when we can discuss freely. Since this is a test system some of the data may not make sense as it is placeholder data. We are recording the screen of our session today for our internal use only.

Do you have any questions or concerns?

Participant Name:

Task 1: Electronically Access Laboratory Orders

Please use the Orders module to access patient Andrea Smith's laboratory orders.

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User is on the Desktop Clinical Summary
- 2) User searches for a patient (ex. Brown, Paul)
- 3) User clicks on the Lab Orders power tab
- 4) User views the orders module for the selected laboratory order

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Task 2: Electronically Change Laboratory Orders (Cancel)

Please use the Orders app to cancel a Laboratory order of Total Cholesterol for patient Hector Jones.

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User is on the Desktop Clinical Summary
- 2) User searches for a patient (ex. Brown, Paul)
- 3) User clicks on the Lab Orders power tab
- 4) User selects the order to update
- 5) User selects Cancel, then select “Yes” to cancel the order

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: “Very Easy” (1) to “Very Difficult” (5)

Administrator / Notetaker Comments:

Task 3: Electronically Record Laboratory Orders

Please use the Orders app to create a Laboratory order for Total Cholesterol with facility Any Lab Site, a date, and a priority of stat for patient Thomas Gray.

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User is on the Desktop Clinical Summary
- 2) User searches for a patient (ex. Brown, Paul)
- 3) User clicks on the “Add Lab Order” hyperlink at the top of the orders app
- 4) User selects diagnosis
- 5) User searches for and selects Total Cholesterol
- 6) User enters facility
- 7) User enters due date
- 8) User enters priority
- 9) User selects Create Order

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: “Very Easy” (1) to “Very Difficult” (5)

Administrator / Notetaker Comments:

Task 4: Electronically Access Radiology Orders

Please use the Orders module to access patient Andrea Smith's radiology orders.

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 5) User is on the Desktop Clinical Summary
- 6) User searches for a patient (ex. Brown, Paul)
- 7) User clicks on the Radiology Orders power tab
- 8) User views the orders module for the selected radiology order

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Task 5: Electronically Change Radiology Orders (Cancel)

Please use the Orders app to cancel a Radiology order of MRI Abdomen for patient Hector Jones.

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 6) User is on the Desktop Clinical Summary
- 7) User searches for a patient (ex. Brown, Paul)
- 8) User clicks on the Radiology Orders
- 9) User selects the order to update
- 10) User selects Cancel, then select "Yes" to cancel the order

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Task 6: Electronically Record Imaging Orders

Please use the Orders app to create an Imaging order for a knee x-ray of both knees with facility Any Radiology Site, a date, and a priority of stat for patient Thomas Gray.

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 10) User is on the Desktop Clinical Summary
- 11) User searches for a patient (ex. Brown, Paul)
- 12) User clicks on the "Add Radiology Order" hyperlink at the top of the orders app
- 13) User selects diagnosis
- 14) User searches for and selects MRI Knee
- 15) User enters facility
- 16) User enters due date
- 17) User enters priority
- 18) User selects Create Order

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Task 7: Electronically Access Patient Active Medication List

(Optimal Time: 2.25 seconds; Maximum Time: 4.5 seconds)

Please use the Rx module to access patient [Paul Brown's] medication list so that all medications are displayed.

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User is on the Desktop Clinical Summary
- 2) User clicks on Rx
- 3) User can access the patient (ex. Brown, Paul) for active, discontinued and deleted prescriptions

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Task 8: Electronically Change Patient Active Medication List (Delete)

(Optimal Time: 11.25 seconds; Maximum Time: 22.5 seconds)

Please delete an active drug (not Coumadin or Aspirin) from patient [Paul Brown]'s chart.

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User is on the Desktop Clinical Summary
- 2) User clicks on Rx
- 3) User selects and active drug
- 4) User right clicks and selects Delete
- 5) User confirms delete

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Task 9: Electronically Record Patient Active Medication List

Please add “TobraDex, Suspension, 0.3-01 %” to the patient [Paul Brown]’s medication list as historical

(Optimal Time: 12.6 seconds; Maximum Time: 37.8 seconds)

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User is on the Desktop Clinical Summary
- 2) User clicks on Rx
- 3) User searches for TobraDex, Suspension, 0.3-01 %
- 4) Users right click and adds drug to history

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: “Very Easy” (1) to “Very Difficult” (5)

Administrator / Notetaker Comments:

Task 10: View clinical decision support rule based on Rx allergy data

Please use the Rx module to add view the interactions alert for penicillin for patient Christian Schwartz.

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User has Clinical Decision Support interventions activated
- 2) User is on the Desktop Interoperability Dashboard
- 3) User searches for a Patient (ex. Certain age, certain number of encounters)
- 4) User opens Rx
- 5) User selects an intolerant drug (**penicillin**)
- 6) User checks for an interaction alert

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Task 11: View clinical decision support rule based on patient demographics data.

Please search for patient Alice Fairchild and view any clinical decision support rules on the Interoperability dashboard

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User is on the Desktop Clinical Summary
- 2) User searches for a patient (ex. Brown, Paul)
- 3) User views age-based clinical decision support rules based on the current patient's demographics

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Task 12: View clinical decision support rule based on vitals data

Please find patient Alice Fairchild and use the vitals app to add a blood pressure of 145/80 to the patient's chart for date 10/01/15. View the clinical decision support rule on the Interoperability dashboard

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User has Clinical Decision Support interventions activated
- 2) User is on the Desktop Interoperability Dashboard
- 3) User searches for a Patient (ex. Certain age, certain number of encounters)
- 4) User opens Vitals application
- 5) User adds new Vitals to Patient (ex. Blood Pressure, weight, ABI)
- 6) User views Desktop Interoperability Dashboard
- 7) User sees Clinical Decision Support Alert appear on Interoperability Dashboard

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Task 13: View clinical decision support rule based on medication list data

Please find patient Alice Fairchild. View the medication-based clinical decision support rule on the Interoperability dashboard.

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User has Clinical Decision Support interventions activated
- 2) User is on the Desktop Interoperability Dashboard
- 3) User searches for a Patient (ex. Certain age, certain number of encounters)
- 4) User views Desktop Interoperability Dashboard
- 5) User sees medication-based Clinical Decision Support Alert appear on Interoperability Dashboard. The alert will indicate that the patient should be taking a statin.

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Task 14: View clinical decision support rule based on problem list data

Please find patient Alice Fairchild. View the problems-based clinical decision support rule on the Interoperability dashboard.

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User has Clinical Decision Support interventions activated
- 2) User is on the Desktop Interoperability Dashboard
- 3) User searches for a Patient (ex. Certain age, certain number of encounters)
- 4) User views Desktop Interoperability Dashboard
- 5) User sees problems-based Clinical Decision Support Alert appear on Interoperability Dashboard.
The alert will indicate that the patient should be taking aspirin based on age and a problem of diabetes.

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Task 15: View clinical decision support rule based on lab results data

Please find patient Alice Fairchild. View the lab results-based clinical decision support rule on the Interoperability dashboard.

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User has Clinical Decision Support interventions activated
- 2) User is on the Desktop Interoperability Dashboard
- 3) User searches for a Patient (ex. Certain age, certain number of encounters)
- 4) User views Desktop Interoperability Dashboard
- 5) User sees lab results-based Clinical Decision Support Alert appear on Interoperability Dashboard. The alert will indicate that the patient should receive an A1C blood test based on not having an A1C lab test on file and a problem of diabetes.

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Task 16: View diagnostic and therapeutic reference information

Please use the clinical decision support app to view the diagnostic and therapeutic reference information for an active clinical decision support rule for patient Alice Fairchild.

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User has Clinical Decision Support Interventions activated
- 2) User searches for a Patient
- 3) User views Interoperability Dashboard
- 4) User clicks on information button on the clinical decision support app to view diagnosis to view diagnostic and therapeutic reference information

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Task 17: Clinical Decision Support Rule Configuration (Admin Only)

Please use the clinical decision support admin powertab to assign clinical decision support rules to a doctor

Success:

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

Comments:

Task Time: _____ Seconds

Optimal Path

- 1) User searches for a Patient
- 2) User selects the CDS admin powetab
- 3) User selects the doctor
- 4) User selects the appropriate CDS rule
- 5) User selects save

- Correct
- Minor Deviations / Cycles :: Describe below
- Major Deviations :: Describe below

Comments:

Observed Errors and Verbalizations:

Comments:

Rating:

Overall, this task was: _____

Show participant written scale: "Very Easy" (1) to "Very Difficult" (5)

Administrator / Notetaker Comments:

Appendix 5: SYSTEM USABILITY SCALE QUESTIONNAIRE

This questionnaire was adapted from John Brooke's "SUS: a "quick and dirty" usability scale" at Digital Equipment Corporation in the UK.² Participants completed this questionnaire on paper after the test.

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 with this system

1	2	3	4	5

² Brooke, J. (1996). "SUS: a "quick and dirty" usability scale." In P. W. Jordan, B. Thomas, B. A. Weerdmeester, & A. L. McClelland. *Usability Evaluation in Industry*. London: Taylor and Francis.



Bayview Physicians Group

Bayview Physician Services, P.C.

www.BayviewPhysicians.com

Primary Care

Family Medicine

Internal Medicine

Pediatrics

Urgent Care

Specialties

Cardiology

Dermatology

Ear, Nose & Throat

Endocrinology

Geriatric Medicine

Hospital Care

Infectious Disease

Neurology

OB/GYN

Occupational Medicine

Physical Medicine &
Rehabilitation

Plastic Surgery

Podiatry

Pulmonary & Critical
Care

Rheumatology

Sleep Medicine

Administrative Office

3241 Western Branch Blvd
Chesapeake, VA 23321

Phone: (757) 686-3500

Fax: (757) 686-0541

October 1, 2015

Mr. Timothy Bennett
Drummond Group, Inc.
13359 North Hwy. 183
Suite B 406-238
Austin, TX 78750

RE: Quality Management System

Dear Mr. Bennett,

Bayview Physicians Group affirms that the information in the Quality Management System documentation below is accurate. The procedures and processes described in this document are adhered to for all relevant releases of Bayview's customized software.

Introduction

Bayview Physicians Group has been developing customized software to fit the needs and workflows of the Bayview practices. As such, an in-house Quality Management System has been developed to streamline and protect the software development process. Our tailor-made QMS is based on recognition of the industry-wide practices and processes which have yielded the highest levels of quality.

Leadership Commitment

The practice management team at Bayview Physicians Group recognizes the need to ensure a very high level of control and quality when it comes to developing healthcare-related software. This attitude exists within all aspects of the company that remains committed to the highest standards of excellence.

Development Procedures

Bayview Physicians Group defines specific processes which must be adhered to, in order to bring a feature from concept to delivery. All stages of the process are monitored by internal quality teams. These teams represent user experiences from the perspectives of usability and quality, ensuring that the software is free from any significant defect in either of these areas. In addition to our internal quality controls, we employ User Centric Design practices to solicit feedback from our users during the development and maintenance stages of the software lifecycle. The entire development process includes the following stages and checkpoints:

- o Preliminary Design
- o Design Completion

- o Prototype Construction
- o Prototype Completion
- o Full Construction
- o User Experience Testing
- o User Experience Adjustments
- o Construction Completion

Quality Controls

Our software passes through four stages of quality control between development and general release:

Unit QA - Each developer is responsible for the quality of his or her deliverables. Developers will test features which they deliver, as well as engage their peers for a quality review of the underlying code. Developers employ Test-Driven Development practices to produce unit tests that are verified on a nightly basis. Any failures are investigated and corrected usually within one working day.

Integrated QA - A separate team of QA testers is tasked with testing the integrated product. A mix of manual and automated testing is employed so that testing covers all test cases which are derived from the full range of defined use cases.

User Acceptance Testing - UAT takes place in a selected practice location around two weeks after preliminary production construction. Our QA teams and IT support departments act as stakeholders on behalf of the users to review the software which they will be installing and supporting.

User-Centric Design Review - The analysis, design and development of all product features closely follow the principles of human-centered design. Each design is based upon an understanding of user's problems and workflows in real world scenarios. Users are involved in all phases of development from the initial concept all the way through User Acceptance and Beta testing. Each design is improved and iterated based on user feedback. The design team includes members with varying level of experience and real world knowledge ranging from senior management through end users. User involvement is dynamic and our user base is often our best source of the relevant data we need to create designs that address the whole user experience holistically.

All of the various QA stages involve direct feedback into the development loop so that discovered issues are prioritized to be either incorporated directly into the current version, or scheduled for a future version or patch release.

Change Management

New features, and changes to existing features are driven by our end users, which are then decided upon by our design team. Changes to software are implemented through the same process described above, which is in place for new development. Specifications, as

well as the codebase itself are preserved in a version management repository so that the evolution of specifications and software over time is fully tracked and auditable.

Quality Improvement

Continuous quality improvement is a cornerstone of our corporate culture of excellence. Our support and implementation feedback loop extends beyond the UAT phase to address field issues which are discovered during the support / maintenance stage for all supported versions of our product. Issues which cannot be resolved by our support team are escalated back to our development team. A quality committee, with representatives from Support, BA, Programming and QA departments assesses and prioritizes each issue to determine the appropriate path to resolution in each instance.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "Jeff Elmore". The signature is fluid and cursive, with the first name "Jeff" being more prominent than the last name "Elmore".

Jeff Elmore
Director of Information Systems
Bayview Physicians Group