User Centered Design

Usability Test Report
by GeniusDoc INC.
GeniusDoc_UTR v 2.0

2300 West Sahara Ave, Suite 800, Las Vegas, NV 89102
Telephone: 310.752.7772
Fax: 310.776.7482
Email: support@geniusdoc.com

TITLE PAGE

EHR Usability Test Report of GeniusDoc Version 11.0
Name of Product and Version Tested: GeniusDoc V 11.0
Report based on

NISTIR 7741 - NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records, ISO 9241 -11 Guidance on usability
http://www.nist.gov/manuscript-publication-search.cfm?pub_id=907313

Author(s): Robert M. Schumacher; Svetlana Z. Lowry;

Title: (NISTIR 7741) NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records

Published: November 29, 2010

Abstract: Usability has been a topic of considerable interest in the health IT community. This document provides NIST guidance for those developing electronic health record (EHR) applications that need to know more about processes of user-centered design (UCD). An established UCD process ensures that designed EHRs are efficient, effective, and satisfying to the user. Following the guidance in this document will greatly increase the likelihood of achieving the goal of building usable user interfaces and a better user experience. One of the main purposes of this guide is to provide practical guidance on methods relating to UCD and usability testing. The intended audiences of this document are those with a role in determining the features and functions contained in the EHR and how those are represented in the user interface.

Citation: NIST Interagency/Internal Report (NISTIR) - 7741

And

NISTIR 7742 Customized Common Industry Format Template for Electronic Health Record Usability Testing, ISO/IEC 25062:2006 Common Industry Format for Usability Test Reports
http://www.nist.gov/manuscript-publication-search.cfm?pub_id=907312

Author(s): Robert M. Schumacher; Svetlana Z. Lowry;

Title: (NISTIR 7742) Customized Common Industry Format Template for Electronic Health Record Usability Testing

Published: November 16, 2010

Abstract: This document provides a template for the modified version of Software engineering Software product Quality Requirements and Evaluation(SQuaRE) Common Industry Format (CIF) for usability test reports (ISO/IEC 25062:2006(E)), the Common Industry Format (CIF) usability test report. This version of the CIF has been customized for use in usability testing of Electronic Health Records (EHRs). The intention of the CIF is to help vendors demonstrate evidence of usability in their final product in a format that allows both independent evaluation of a single product and comparison across multiple products.

Citation: NIST Interagency/Internal Report (NISTIR) - 7742

Date of Usability Test: 09/24/2018 - 09/28/2018
Date of Report: 10/01/2018
Report Prepared By: GeniusDoc Inc
Contact Person, Title and Affiliation: RC Raju, Team Lead Quality & Testing
Email Address: rc@geniusdoc.com
Mailing Address: 2300 West Sahara Ave, Suite 800, Las Vegas, NV 89102

THIS IS A WORKING DOCUMENT THAT HAS NOT RECEIVED GENIUSDOC SANCTION FOR PUBLICATION, IS SUBJECT TO REVISION, AND SHOULD NOT BE CIRCULATED OUTSIDE OF THE RECEIVING OFFICE.

GeniusDoc Inc.

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report documents the findings of a usability test of GeniusDoc 11.0 EHR by GeniusDoc Inc. A usability test of GeniusDoc 11.0 EHR was conducted on 09/24/2018 through 09/28/2018 by GeniusDoc employees via web conferencing sessions with client at RAM NEMANI INC Client Location in Santa Monica. The purpose of this testing was to validate the usability of the user interface and provide evidence of usability in the EHR Under Test (EHRUT During the usability test, ten healthcare providers matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

The study collected performance data on 33 tasks in the following twelve areas, typically conducted on an EHR:

> ➢ CPOE – medications

> ➢ CPOE – laboratory

> ➢ CPOE – diagnostic imaging

> ➢ Drug-drug, drug-allergy interaction checks

> ➢ Demographics

> ➢ Problem list

> ➢ Medication list

> ➢ Medication allergy list

> ➢ Clinical decision support

> ➢ Implantable device list

> ➢ Clinical information reconciliation and incorporation

> ➢ Electronic Prescribing

During the 60-minute usability test, each participant was greeted by the administrator. Most of the participants had prior experience with the EHR in some of the categories tested above. 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. 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 systems

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.

2. INTRODUCTION

The EHRUT tested for this study was GeniusDoc, version EHR 11.0 ambulatory software. Designed to present medical information to healthcare providers in private practices, the EHRUT consists of practice management, EHR and medical billing software. 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, path deviation, errors, were captured during the usability testing.

3. METHOD

3.1. PARTICIPANTS

A total of 10 participants were tested on the EHRUT. Participants in the test were clinical professionals with EHR experience. Participants were recruited by GeniusDoc. Participants were given the opportunity to have the same orientation and level of training as the actual end users would have received.

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

Participant ID	Gender	Age	Education	Occupation / role	Professional Experience (Months)	Computer Experience (Months)	Product Experience (Months)	Assistive Technology Needs
GDUT001	Male	30-39	Doctorate degree	MD	120	228	84	No
GDUT002	Male	60-69	Doctorate degree	MD	360	480	168	No
GDUT003	Male	30-39	MPAS	PA	108	180	72	No
GDUT004	Female	20-29	BCHS	PA	24	210	65	No
GDUT005	Female	20-29	Diploma in Nursing	RN	18	168	18	No

GDUT006	Female	30-39	Bachelor of Science in Nursing	RN	120	228	84	No
GDUT007	Female	20-29	BSc - Healthcare Management	Front Office	18	168	18	No
GDUT008	Male	40-49	Diploma in Nursing	NP	192	300	48	No
GDUT009	Male	50-59	Diploma in Nursing	NP	324	240	168	No
GDUT010	Female	20-29	Diploma in Nursing	NP	72	150	60	No

10 participants (matching the demographics in the section on Participants) were recruited and 10, i.e., total number of participants who showed participated in the usability test. None of the participants failed to show for the study.

Participants were scheduled for 60 minutes sessions with 30 minutes at the beginning of the session for debrief by the administrator(s) and data logger(s), and to reset systems to proper test conditions. A spreadsheet was used to keep track of the participant schedule, and included each participant's demographic characteristics as provided by the recruiting firm.

3.2.   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 GeniusDoc EHR. Each participant used the system in the same location, 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.

3.3. 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:

3.3.1. 170.315 (A) (1) - CPOE – MEDICATIONS

- A1.1 - Record Medication Order
- A1.2 - Change Mediation Order
- A1.3 - Access Medication Order

3.3.2. 170.315 (A) (2) - CPOE – LABORATORY

- A2.1 - Record Lab Order
- A2.2 - Change Lab Order
- A2.3 - Access Lab Order

3.3.3. 170.315 (A) (3) - CPOE – DIAGNOSTIC IMAGING

- A3.1 - Record Radiology Order
- A3.2 - Change Radiology Order
- A3.3 - Access Radiology Order

3.3.4. 170.315 (A) (4) - DRUG-DRUG, DRUG-ALLERGY INTERACTION CHECKS FOR CPOE

- A4.1 - Create drug-drug interaction
- A4.2 - Create drug-allergy interaction
- A4.3 - Adjust the severity level of drug-drug interaction

3.3.5. 170.315 (A) (5) – DEMOGRAPHICS

- A5.1 - Record demographics : Last name, First Name, DOB, Sex, Language, Ethnicity, Race, Charge Type, Assigned M.D. .
- A5.2 - Change demographics: Race, Ethnicity, and Charge Type.
- A5.3 - Access demographics data

3.3.6. 170.315 (A) (6) - PROBLEM LIST

- A6.1 - Record Problem List
- A6.2 - Change Problem List

- A6.3 - Access Problem List

3.3.7. 170.315 (A) (7) - MEDICATION LIST

- A7.1 - Record Medication List

- A7.2- Change Medication List

- A7.3 - Access Medication List

3.3.8. 170.315 (A) (8) - MEDICATION ALLERGY LIST
- A8.1 - Record Medication Allergy List

- A8.2 - Change Medication Allergy List

- A8.3 - Access Medication Allergy List

3.3.9. 170.315 (A) (9) - CLINICAL DECISION SUPPORT

- A9.1 - CDS Configure

- A9.2 - Evidence Based Decision Support Intervention

- A9.3 - Trigger CDS Interventions

3.3.10. 170.315 (A) (14) - IMPLANTABLE DEVICE LIST
- A14.1 - Record UDI

- A14.2 - Access UDI and Description

3.3.11. 170.315 (B) (2) - CLINICAL INFORMATION RECONCILIATION AND INCORPORATION
- B2.1 - Reconcile Medication List

- B2.2 - Reconcile Problem List

- B2.3 - Reconcile Medication Allergy List

3.3.12. 170.315 (B) (3) - ELECTRONIC PRESCRIBING
- B3.1 - Prescribe a medication and Transmit electronically

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

3.4. PROCEDURES
Upon connection to the online meeting tool participants were greeted; their identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant ID.

The administrator moderated the session including administering instructions and tasks. The administrator also monitored task times, obtained post-task rating data, and took notes on participant comments.

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

• As quickly as possible making as few errors and deviations as possible.

• Without assistance; administrators were allowed to give immaterial guidance and clarification on tasks, but not instructions on use.

• Without using a think aloud technique.

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 the Data Scoring section.

Following the session, the administrator gave the participant the final questions (see Appendix 4) and post-test System Usability Scale questionnaire (see Appendix 5), and thanked each individual for their participation.

3.5.   TEST LOCATION

All participants were tested over a remote conferencing session.

The participant was requested in advance to select a location with minimal distractions and a computer that could connect to the internet via a web conferencing session. The administrator and the participants were the only ones on the call.

3.6.   TEST ENVIRONMENT

The GeniusDoc would typically be used in a healthcare office or facility. In this instance, the testing was conducted remotely via WebEx. For testing, the moderator used a 15-inch laptop running windows 8, on a 2.3 GHz Intel Corei7 processor. The participants used their own computer, keyboard and mouse when interacting with the EHR.

The application itself was running on Windows 2008 using a test database on a wireless connection. Technically, the system performance (i.e., response time) was somewhat slower than what actual users would experience in a field implementation.

3.7.   TEST FORMS AND TOOLS

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

1. Moderator's Guide (Appendix 2)

2. Participant Task Instructions (Appendix 3)

3. Final Questions (Appendix 4)

4. Usability Scale Questionnaire (Appendix 5)

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

3.8. PARTICIPANT INSTRUCTIONS

The administrator reads the following instructions aloud to each participant (also see the full moderator's guide in Appendix 2):

Thank you for participating in this study. Our session today will last about 60 minutes. During that time you will use an instance of GeniusDoc EHR, specifically focusing on functionality required for Meaningful Use Certification. Most tasks will be familiar to you based on how you use the system on a daily basis. I will ask you to complete a few tasks using this system and answer some questions. Please try to complete the tasks on your own following the instructions very closely. 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, the administrator gave the participant control of the keyboard and mouse on their workstation, and then 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 33 tasks to complete. Tasks are listed in the moderator's guide, participant task instructions in Appendix 2, 3.

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 GeniusDoc EHR version 11 by measuring participant success rates and errors

2. Efficiency of GeniusDoc EHR version 11 by measuring the average task time and path deviations

3. Satisfaction with GeniusDoc EHR version 11 by measuring ease of use rating

DATA SCORING

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

Measure	Rationale and Scoring
Effectiveness:	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.

Task Success	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. Task times were recorded for successes. Observed task times divided by the optimal time for each task is a measure of optimal efficiency. 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 must be operationally defined by taking multiple measures of optimal performance and multiplying by some factor [e.g., 1.25] that allows some time buffer because the participants are presumably not trained to expert performance. Thus, if expert, optimal performance on a task was [x] seconds then allotted task time performance was [x * 1.25] seconds. This ratio should be aggregated across tasks and reported with mean and variance scores.
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. Not all deviations would be counted as errors. This should also be expressed as the mean number of failed tasks per participant. On a qualitative level, an enumeration of errors and error types should be collected.
Efficiency: **Task 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 compared to the optimal path. The task deviations were rated on the scale of 1 = no deviations, 2 = minor deviations, 3= major deviations.
Efficiency: **Task Time**	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.
Satisfaction: **Task Rating**	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, a Likert Scale was used for each participant to rate the task. They were asked "Overall, this task was:" on a scale of 1 (Very Difficult) to 5 (Very Easy). These data are averaged across participants. Common convention is that average ratings for systems judged easy to use should be 3.3 or above. To measure participants' confidence in and likeability of GeniusDoc EHR version 11 overall, the testing team administered the System Usability Scale (SUS) posttest questionnaire. Questions included, "I think I would like to use the 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." See full System Usability Score questionnaire in Appendix 5.

4. 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. Participants who failed to follow session and task instructions had their data excluded from the analyses.

The usability testing results for the GeniusDoc are detailed below. The results should be seen in light of the objectives and goals outlined in Study Design section.

4.1.1 170.315 (A) (1) - COMPUTERIZED PROVIDER ORDER ENTRY (CPOE) – MEDICATIONS

Tasks		Task Success Mean (%) (SD)	Path Deviation Deviations (Observed/Optimal)	Task Time (in Seconds) Mean (SD)	Deviations (Observed/Optimal	Errors Mean (%) (SD)	Task Rating Mean (SD)
A1.1	Record Medication Order	100 (0)	7/7	47 (3)	5 (47/42)	0	4 (1)
A1.2	Change Medication order	100 (0)	5/5	22 (3)	5 (22/17)	0	4 (1)
A1.3	Access Medication Order	100 (0)	3/3	12 (3)	2 (12/10)	0	5 (1)

4.1.2 170.315 (A) (2) - CPOE – LABORATORY

Tasks		Task Success Mean (%) (SD)	Path Deviation Deviations (Observed/Optimal)	Task Time (in Seconds) Mean (SD)	Deviations (Observed/Optimal	Errors Mean (%) (SD)	Task Rating Mean (SD)
A2.1	Record Laboratory Order	100 (0)	4/4	36 (3)	11 (36/25)	0	5 (1)
A2.2	Change Laboratory Order	100 (0)	4/4	22 (3)	4 (22/18)	0	5 (1)
A2.3	Access Laboratory Order	100 (0)	3/3	13 (2)	4 (13/9)	0	5 (1)

4.1.3 170.315 (A) (3) - CPOE – DIAGNOSTIC IMAGING

Tasks		Task Success Mean (%) (SD)	Path Deviation Deviations (Observed/Optimal)	Task Time (in Seconds) Mean (SD)	Deviations (Observed/Optimal	Errors Mean (%) (SD)	Task Rating Mean (SD)
A3.1	Record Radiology Order	100 (0)	4/4	41 (2)	6 (41/35)	0	5 (1)

		Task Success	Path Deviation		Task Time (in Seconds)		Errors	Task Rating
A3.2	**Change Radiology Order**	100 (0)	4/4	23 (3)	4 (24/20)		0	5 (1)
A3.3	**Access Radiology Order**	100 (0)	3/3	13 (2)	5 (14/9)		0	5 (1)

4.1.4   170.315 (A) (4) - DRUG-DRUG, DRUG-ALLERGY INTERACTION CHECKS FOR CPOE

		Task Success	Path Deviation		Task Time (in Seconds)		Errors	Task Rating
	Tasks	**Mean (%) (SD)**	**Deviations (Observed/Optimal)**	**Mean (SD)**	**Deviations (Observed/Optimal**		**Mean (%) (SD)**	**Mean (SD)**
A4.1	**Create drug-allergy interaction**	100 (0)	8/8	40 (2)	8 (40/32)		0	5 (1)
A4.2	**Create drug-drug interaction**	100 (0)	8/8	43 (2)	3 (43/40)		0	5 (1)
A4.3	**Adjust severity level of drug-drug interaction**	100 (0)	6/6	21 (2)	6 (21/15)		0	5 (1)

4.1.5   170.315 (A) (5) – DEMOGRAPHICS

		Task Success	Path Deviation		Task Time (in Seconds)		Errors	Task Rating
	Tasks	**Mean (%) (SD)**	**Deviations (Observed/Optimal)**	**Mean (SD)**	**Deviations (Observed/Optimal**		**Mean (%) (SD)**	**Mean (SD)**
A5.1	**Record Demographics**	100 (0)	11/11	39 (2)	7 (39/32)		0	4 (1)
A5.2	**Change Demographics**	100 (0)	7/7	32 (2)	7 (32/25)		0	5 (1)
A5.3	**Access Demographics**	100 (0)	3/3	12 (2)	2 (12/10)		0	5 (1)

4.1.6   170.315 (A) (6) - PROBLEM LIST

		Task Success	Path Deviation	Task Time (in Seconds)	Errors	Task Rating

	Tasks	Mean (%) (SD)	Deviations (Observed/Optimal)	Mean (SD)	Deviations (Observed/Optimal	Mean (%) (SD)	Mean (SD)
A6.1	Record Problem List	100 (0)	7/7	48 (3)	3 (48/45)	0	5 (1)
A6.2	Change Problem List	100 (0)	4/4	32 (3)	4 (32/28)	0	5 (1)
A6.3	Access Problem List	100 (0)	3/3	13 (2)	4 (13/9)	0	5 (1)

4.1.7   170.315 (A) (7) - MEDICATION LIST

		Task Success	Path Deviation	Task Time (in Seconds)		Errors	Task Rating
	Tasks	Mean (%) (SD)	Deviations (Observed/Optimal)	Mean (SD)	Deviations (Observed/Optimal	Mean (%) (SD)	Mean (SD)
A7.1	Record Medication List	100 (0)	7/7	46 (3)	4 (46/42)	0	5 (1)
A7.2	Change Medication List	100 (0)	5/5	22 (3)	5 (22/17)	0	4 (1)
A7.3	Access Medication List	100 (0)	3/3	12 (3)	2 (12/10)	0	5 (1)

4.1.8   170.315 (A) (8) - MEDICATION ALLERGY LIST

		Task Success	Path Deviation	Task Time (in Seconds)		Errors	Task Rating
	Tasks	Mean (%) (SD)	Deviations (Observed/Optimal)	Mean (SD)	Deviations (Observed/Optimal	Mean (%) (SD)	Mean (SD)
A8.1	Record Medication Allergy List	100 (0)	7/7	51 (3)	11 (51/40)	0	5 (1)
A8.2	Change Medication Allergy List	100 (0)	5/5	23 (3)	5 (23/18)	0	5 (1)
A8.3	Access Medication Allergy List	100 (0)	3/3	13 (3)	4 (13/9)	0	5 (1)

4.1.9   170.315 (A) (9) - CLINICAL DECISION SUPPORT

	Tasks	Task Success Mean (%) (SD)	Path Deviation Deviations (Observed/Optimal)	Task Time (in Seconds) Mean (SD)	Deviations (Observed/Optimal	Errors Mean (%) (SD)	Task Rating Mean (SD)
A9.1	CDS Configure	100 (0)	3/3	48 (4)	6 (48/42)	0	4 (1)
A9.2	Evidence Based Decision Support Intervention	100 (0)	4/4	34 (3)	4 (34/30)	0	5 (1)
A9.3	Trigger CDS Interventions	100 (0)	6/6	37 (3)	2 (37/35)	0	4 (1)

4.1.10 170.315 (A) (14) - IMPLANTABLE DEVICE LIST

	Tasks	Task Success Mean (%) (SD)	Path Deviation Deviations (Observed/Optimal)	Task Time (in Seconds) Mean (SD)	Deviations (Observed/Optimal	Errors Mean (%) (SD)	Task Rating Mean (SD)
A14.1	Record UDI	100 (0)	7/7	48 (2)	3 (48/45)	0	5 (1)
A14.2	Access UDI and Description	100 (0)	5/5	28 (2)	3 (28/25)	0	5 (1)

4.1.11 170.315 (B) (2) - CLINICAL INFORMATION RECONCILIATION AND INCORPORATION

	Tasks	Task Success Mean (%) (SD)	Path Deviation Deviations (Observed/Optimal)	Task Time (in Seconds) Mean (SD)	Deviations (Observed/Optimal	Errors Mean (%) (SD)	Task Rating Mean (SD)
B2.1	Reconcile Medication List	100 (0)	6/6	34 (3)	4 (34/30)	0	5 (1)
B2.2	Reconcile Problem List	100 (0)	6/6	33 (2)	3 (33/30)	0	5 (1)
B2.3	Reconcile Medication Allergy List	100 (0)	6/6	34 (3)	4 (34/30)	0	5 (1)

4.1.12 170.315 (B) (3) - ELECTRONIC PRESCRIBING

	Task Success	Path Deviation	Task Time (in Seconds)	Errors	Task Rating

	Tasks	Mean (%) (SD)	Deviations (Observed/Optimal)	Mean (SD)	Deviations (Observed/Optimal	Mean (%) (SD)	Mean (SD)
B3.1	Prescribe a medication and Transmit electronically	100 (0)	6/6	44 (3)	4 (44/40)	0	4 (1)

The results from the SUS (System Usability Scale) scored the subjective satisfaction with the system based on performance with these tasks to be: 95.0. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

4.2. DISCUSSION OF THE FINDINGS

4.2.1. EFFECTIVENESS

The analysis indicated that most of the participants were successful in completing the tasks as presented.

4.2.2. EFFICIENCY

The analysis indicated the physicians were able to perform all functions successfully. This portrayed accurate working in realistic production environments. There were no deviations noted when the study is done on particular tasks, however when workflow of the application based on User Roles is conducted there were few deviations but were able to perform the tasks after training.

4.2.3. SATISFACTION

Participant satisfaction was rated extremely high. All tasks scored a 5 to 4 mean rating with the majority of tasks at 5 (Very easy).

To measure participants confidence in and likeability of GeniusDoc EHR version 11 overall, the testing team administered the System Usability Scale (SUS) post-test questionnaire (See Appendix 5). The results from the SUS scored the subjective satisfaction with the system based on performance with these tasks to be: 95.0. Broadly interpreted, scores under 60 represent systems with poor usability; scores over 80 would be considered above average.

4.2.4. MAJOR FINDINGS

Overall the participants were able to maneuver through the EHRUT and easily perform the 12 tasks. Every task tested and measured using summative testing methods, were completed by the participants within the allocated target task time. Most tasks were performed efficiently and effectively with a high level of satisfaction reported by the participants. There were no major complaints or serious actionable comments made by participants in the study. The participants found the system well organized and intuitive.

4.2.5. AREAS FOR IMPROVEMENT

- We will prepare Training Videos and Cheat Sheets for the Users to identify Alternative Navigations and Quick Steps to work on the Application.

- We will place an alert mechanism where in the users of the practice and GeniusDoc Support team are alerted in case the automated services are not running/ stopped on the server. We will also check the periodic activity health check up on the clients.

5. APPENDICES

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

1. Patient Demographics
2. Example Moderator's Guide
3. Participant Task Instructions
4. Final Questions
5. Usability Scale Questionnaire

5.1. APPENDIX 1

Participant Demographics

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

Gender

Men	5
Women	5
Total (participants)	10

Occupation / Role

MD	2
PA	2
NP	3
RN	2
Front Office	1
Total (participants)	10

Years of Experience

Facility Use of EHR All Paper	0
Some paper, some electronic	10
All electronic	0
Total (participants)	10

5.2. APPENDIX 2

Moderator's Guide

Prior to testing
Confirm schedule with participants

Ensure test environment is up and running

Prior to each participant
Reset application
Prepare timing devices and task documentation sheets

Prior to starting testing
Verify the participant's identity to ensure it is the participant on the schedule
Check the participant has printed the usability tests

Prior to each task
Direct user to starting point of task
Check the participant has the correct usability test in front of them
Rest timer

Orientation (15 minutes)
Thank you for participating in this study. Our session today will last about 60 minutes. During that time you will use an instance of GeniusDoc EHR version 11, specifically focusing on functionality required for Meaningful Use Certification. Most tasks will be familiar with how you use the system on a daily basis. I will ask you to complete a few tasks using this system and answer some questions. Please try to complete the tasks on your own following the instructions very closely. 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, the administrator gave the participant control of the keyboard and mouse on their workstation, and then 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.

Task Documentation
Before each task take control of the session and direct the application to the starting point for the new task. Let the participant know which task you will be starting and make sure their task instructions are at the correct place. The moderator will read the scenario out loud and then start the timer. When the participant is finished they will say "done". The moderator will then fill in the Usability Task sheet for that particular task.

The moderator will fill in the following information:

Success: easily completed, completed with difficulty or help, not completed

Participant comments about the task

Task Time in seconds

How the task was completed: optimal path used, minor deviations, major deviations

Ask the participant a rating for the task: very easy, easy, average, difficult, very difficult

Administrator comments

5.3. APPENDIX 3

Participant Task Instructions

5.3.1   170.315 (A) (1) - COMPUTERIZED PROVIDER ORDER ENTRY (CPOE) – MEDICATIONS

Navigation: Open Patient File >> Visit Entry >> Meds / Allergies.

A1.1	Record Medication Orders -- Add medication order **Aspirin 500 mg** **Oral** **Q 4H** **7 days**
A1.2	Change Medication Orders – Update medication order for Aspirin 650 mg **Q 6H** **10 Days**
A1.3	Access Medication Orders – view the Amoxicillin medication order in the completed note

5.3.2   170.315 (A) (2) - CPOE – LABORATORY

Navigation: Open Patient File >> Visit Entry >> My Orders >> Labs.

A2.1	Record Lab Orders – Add lab order **HDL Cholesterol** **Routine**
A2.2	Change Lab Orders – Update lab order **Routine** -> **Prior to Next Visit**
A2.3	Access Lab Orders – view HDL Cholesterol order in the completed note

5.3.3   170.315 (A) (3) - CPOE – DIAGNOSTIC IMAGING

Navigation: Open Patient File >> Visit Entry >> My Orders >> Imaging / Procedures.

A3.1	Record Radiology Orders – Add radiology order **CT – Bone Density With Contrast** **Stat**
A3.2	Change Radiology Orders – update radiology order **CT – Bone Density With / Without Contrast**
A3.3	Access Radiology Orders – view CT – Bone Density With / Without Contrast radiology order in the completed note

5.3.4   170.315 (A) (4) - DRUG-DRUG, DRUG-ALLERGY INTERACTION CHECKS FOR CPOE

Navigation: Open Patient File >> Visit Entry >> Meds / Allergies.

A4.1	Drug-drug Interactions – add medication order for **Plavix** – a Moderate drugdrug interaction shows (currently has **Aspirin** as a medication)
A4.2	Drug-allergy Interactions – add medication order for **Amoxicillin** Capsule – a drug-allergy interaction shows (currently has **Penicillin V Potassium**)
A4.3	Adjust drug-drug interactions – change severity filter in medication order to only show moderate

5.3.5   170.315 (A) (5) - DEMOGRAPHICS

Navigation: Toolbar >> New Patient.

A5.1	Record Demographics – Add Demographics **Race: Patient declines to specify** **Ethnicity: Hispanic Or Latino** **Preferred Language: English** **Sex: F** **Date of Birth: 04/20/1970** **Charge Type : Medicare**
A5.2	Change Demographics – Change Demographics **Race: White** **Ethnicity: Not Hispanic Or Latino** **Charge Type : Medicaid**
A5.3	Access Demographics -- view demographics for patient

5.3.6   170.315 (A) (6) - PROBLEM LIST

Navigation: Open Patient File >> Visit Entry >> Assessment.

A6.1	Record Problem List – Add Problem **Anemia – Chronic Disease** **Clinical Status : Progressive** **Status : Started - 06/10/1992**
A6.2	Change Problem List – Update **Anemia – Chronic Disease** **Clinical Status : Stable** **Status: Resolved – 03/08/2012**
A6.3	Access Problem List – view offender's current problems

5.3.7   170.315 (A) (7) - MEDICATION LIST

Navigation: Open Patient File >> Visit Entry >> Meds / Allergies.

A7.1	Record Medication List – Add Medication **Abilify 15mg** **Oral** **QD (Daily)** **30 Days supply**
A7.2	Change Medication List – Update **Abilify 15mg** **Oral** **BID (Twice a Day)** **30 Days Supply**
A7.3	Access Medication List – view offender's current medications

5.3.8   170.315 (A) (8) - MEDICATION ALLERGY LIST

Navigation: Open Patient File >> Visit Entry >> Meds / Allergies >> Allergies.

A8.1	Record Medication Allergy – Add & Save
	    1. **Penicillin V Potassium**
	         Severity : Severe
	         Reaction : Dizziness
	    2. **Accupril**
	         Severity : Moderate
	         Reaction : Itching

A8.2	Change Medication Allergy –
	    1. **Accupril**
	         Severity : Mild
	         Reaction : Nausea and Vomiting

A8.3	Access Medication Allergies – view offender's current allergies

5.3.9   170.315 (A) (9) - CLINICAL DECISION SUPPORT

Navigation: Open Patient File >> Visit Tab >> CDS Button.

CDS Business Rules Setup Forms Navigation:

Toolbar >> EMR Menu >> HM Module >> Problem Medication

A9.1	Trigger CDS Interventions– log in as a User. Diagnose **Breast Cancer**. Add medication order **Tamoxifen**. Contraindication pops up.
A9.2	Identify User Diagnostic/Therapeutic Reference Information – view reference info under the information button for this offender's **Tamoxifen**
A9.3	Configure CDS interventions by User – turn off **Problem Medication** list References.

5.3.10   170.315 (A) (14) - IMPLANTABLE DEVICE LIST

Navigation: Open Patient File >> Visit Entry >> PH / FH / SH >> Artificial / Implantable Devices

A14.1	Record Implantable Device List – Add UDI (01)00643169007222(17)160128(21)BLC200461H Test Date Active
A14.2	Access UDI and description -- View UDI just added and description

5.3.11   170.315 (B) (2) - CLINICAL INFORMATION RECONCILIATION AND INCORPORATION

Navigation: Open Patient File >> Visit Entry >> Assessment >> Reconciliation.

B2.1	Medication Reconciliation – add all medications from outside source to reconciled list. > Added all medications from outside source to the EHR medication list.
B2.2	Problem Reconciliation – add all problems from outside source to reconciled list. > Added all Problems from outside source to the EHR Problem list.
B2.3	Medication Allergy Reconciliation – add all allergies from outside source to reconciled list. > Added all Medication allergies from outside source to the EHR Medication allergy list.

5.3.12   170.315 (B) (3) - ELECTRONIC PRESCRIBING

Navigation: Open Patient File >> Visit Entry >> Medications >> Send Rx >> Sign & Send

B3.1	Prescribe **Aspirin** drug and transmit electronically.

5.4.   APPENDIX 4

Final Questions

What was your overall impression of this system?

What aspects of the system did you like most?

What aspects of the system did you like least?

Were there any features that you were surprised to see?

What features did you expect to encounter but did not see? That is, is there anything that is missing in this application?

Compare this system to other systems you have used.

 Would you recommend this system to your colleagues?

5.5.   APPENDIX 5

Usability Scale Questionnaire

| | 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

3.   I thought the system was easy to use

4.   I think that I would need the support of a technical person to be able to use this system

5.   I found the various functions in this system were well integrated

6.   I thought there was too much inconsistency in this system

7.   I would imagine that most people would learn to use this system very quickly

8.   I found the system very cumbersome to use

9.   I felt very confident using the system

10. I needed to learn a lot of things before I could get going with this system

EHR Usability Test Report of GeniusDoc Version 12.0
Name of Product and Version Tested: GeniusDoc V 12.0
Report based on

NISTIR 7741 - NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records, ISO 9241 -11 Guidance on usability
http://www.nist.gov/manuscript-publication-search.cfm?pub_id=907313

Author(s): Robert M. Schumacher; Svetlana Z. Lowry;

Title: (NISTIR 7741) NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records

Published: November 29, 2010

Abstract: Usability has been a topic of considerable interest in the health IT community. This document provides NIST guidance for those developing electronic health record (EHR) applications that need to know more about processes of user-centered design (UCD). An established UCD process ensures that designed EHRs are efficient, effective, and satisfying to the user. Following the guidance in this document will greatly increase the likelihood of achieving the goal of building usable user interfaces and a better user experience. One of the main purposes of this guide is to provide practical guidance on methods relating to UCD and usability testing. The intended audiences of this document are those with a role in determining the features and functions contained in the EHR and how those are represented in the user interface.

Citation: NIST Interagency/Internal Report (NISTIR) - 7741

And

NISTIR 7742 Customized Common Industry Format Template for Electronic Health Record Usability Testing, ISO/IEC 25062:2006 Common Industry Format for Usability Test Reports
http://www.nist.gov/manuscript-publication-search.cfm?pub_id=907312

Author(s): Robert M. Schumacher; Svetlana Z. Lowry;

Title: (NISTIR 7742) Customized Common Industry Format Template for Electronic Health Record Usability Testing

Published: November 16, 2010

Abstract: This document provides a template for the modified version of Software engineering Software product Quality Requirements and Evaluation(SQuaRE) Common Industry Format (CIF) for usability test reports (ISO/IEC 25062:2006(E)), the Common Industry Format (CIF) usability test report. This version of the CIF has been customized for use in usability testing of Electronic Health Records (EHRs). The intention of the CIF is to help vendors demonstrate evidence of usability in their final product in a format that allows both independent evaluation of a single product and comparison across multiple products.

Citation: NIST Interagency/Internal Report (NISTIR) - 7742

Date of Usability Test: 10/14/2024 – 10/18/2024

Date of Report: 11/01/2024

Report Prepared by: GeniusDoc Inc.

Contact Person: RC Raju, Team Lead Quality & Testing

Email Address: rc@geniusdoc.com

Mailing Address
GeniusDoc Inc.
11407 Wistful Vista Way
Porter Ranch
CA 91326

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report documents the findings of a usability test of GeniusDoc 12.0 EHR by GeniusDoc Inc. A usability test of GeniusDoc 12.0 EHR was conducted on 10/14/2024 through 10/18/2024 by GeniusDoc employees via web conferencing sessions with our client. The purpose of this testing was to validate the usability of the user interface and provide evidence of usability in the EHR Under Test (EHRUT). During the usability test, ten healthcare providers/users matching the target demographic criteria served as participants and used the EHRUT in simulated, but representative tasks.

The study collected performance data on following 5 tasks as part of the 170.315(b)(11) Decision Support Intervention criteria:

- b11.1 - Create CDS Rule

- b11.2 – Modify CDS Rule

- b11.3 - Trigger CDS Alert

- b11.4 - Record Feedback

- b11.5 - Export Feedback

During the 30-minutes usability test, each participant was greeted by the administrator. Most of the participants had prior experience with the EHR in some of the categories tested above. 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. 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 systems

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.

2. INTRODUCTION

The EHRUT tested for this study was GeniusDoc, version EHR 12.0 ambulatory software. Designed to present medical information to healthcare providers in private practices, the EHRUT consists of practice

management, EHR and medical billing software. 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 user centered design methodologies to support certification according to functionality outlined in criterion §170.315(g)(3) Safety Enhanced Design for criterion §170.315(b)(11) Decision Support Intervention.

The usability testing attempted to represent realistic exercises and conditions. Also, to 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, path deviation, errors, post task rating scores were captured during the usability testing.

3. METHOD

3.1. PARTICIPANTS

A total of 10 participants were tested on the EHRUT. Participants in the test were clinical professionals with EHR experience. Participants were recruited by GeniusDoc. Participants were given the opportunity to have the same orientation and level of training as the actual end users would have received.

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

Participant ID	Gender	Age	Education	Occupation / role	Professional Experience (Months)	Computer Experience (Months)	Product Experience (Months)	Assistive Technology Needs
GDUT011	Male	50-59	Doctorate Degree	MD	240	144	12	No
GDUT012	Male	50-59	Doctorate Degree	MD	240	150	30	No
GDUT013	Male	60-69	Doctorate Degree	MD	360	250	240	No
GDUT014	Male	60-69	Doctorate Degree	MD	360	240	220	No
GDUT015	Female	30-39	Bachelor's Degree	MA	120	150	48	No
GDUT016	Female	30-39	Bachelor's Degree	MA	100	120	36	No
GDUT017	Female	30-39	Associate Degree	MA	140	150	48	No
GDUT018	Female	40-49	Bachelor's Degree	MA	160	180	60	No
GDUT019	Female	30-39	Bachelor's Degree	RN	80	100	24	N0
GDUT020	Female	40-49	Master's Degree	Office Manager	160	150	120	No

10 participants (matching the demographics in the section on Participants) were recruited and 10, i.e., total number of participants who showed participated in the usability test. None of the participants failed to show for the study.

Participants were scheduled for 30-minutes session with 10 minutes at the beginning of the session for debrief by the administrator(s) and data logger(s), and to reset systems to proper test conditions. A spreadsheet was used to keep track of the participant schedule, and included each participant's demographic characteristics as provided by the recruiting firm.

3.2. 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 GeniusDoc EHR. Each participant used the system in the same location, 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.

3.3. TASKS

A few tasks were constructed that would be realistic and representative of the kinds of activities a user might do with this EHR in the context of b11

- Create CDS Rule
- Modify CDS Rule
- Trigger CDS Alert
- Record Feedback
- Export Feedback

Tasks were selected based on their frequency of use, criticality of function, and those that may be most troublesome for users. Tasks should always be constructed in light of the study objectives.

3.4. PROCEDURES

Upon connection to the online meeting tool participants were greeted; their identity was verified and matched with a name on the participant schedule. Participants were then assigned a participant ID.

The administrator moderated the session including administering instructions and tasks. The administrator also monitored task times, obtained post-task rating data, and took notes on participant comments.

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

• As quickly as possible making as few errors and deviations as possible.

• Without assistance; administrators were allowed to give immaterial guidance and clarification on tasks, but not instructions on use.

• Without using a think aloud technique.

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 the Data Scoring section.

Following the session, the administrator gave the participant the final questions (see Appendix 4) and post-test System Usability Scale questionnaire (see Appendix 5), and thanked each individual for their participation.

3.5.   TEST LOCATION

All participants were tested over a remote conferencing session.

The participant was requested in advance to select a location with minimal distractions and a computer that could connect to the internet via a web conferencing session. The administrator and the participants were the only ones on the call.

3.6.   TEST ENVIRONMENT

The GeniusDoc would typically be used in a healthcare office or facility. In this instance, the testing was conducted remotely via WebEx. For testing, the moderator used a 15-inch laptop running windows 11, on a 2.8 GHz Intel Core i7 processor. The participants used their own computer, keyboard and mouse when interacting with the EHR.

The application itself was running on Windows Server 2022 using a test database on a wireless connection. Technically, the system performance (i.e., response time) was somewhat slower than what actual users would experience in a field implementation.

3.7.   TEST FORMS AND TOOLS

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

1. Moderator's Guide (Appendix 4)

2. Participant Task Instructions (Appendix 4)

3. Final Questions (Appendix 4)

4. Usability Scale Questionnaire (Appendix 5)

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

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

3.8. PARTICIPANT INSTRUCTIONS

The administrator reads the following instructions aloud to 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 30 minutes. During that time, you will use an instance of GeniusDoc EHR, specifically focusing on functionality related to 170.315(b)(11) Decision Support Intervention. I will ask you to complete a few tasks using this system and answer some questions. Please try to complete the tasks on your own following the instructions very closely. 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, the administrator gave the participant control of the keyboard and mouse on their workstation, and then 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 5 tasks to complete. Tasks are listed in the moderator's guide, participant task instructions in Appendix 4.

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 GeniusDoc EHR version 12 by measuring participant success rates and errors

2. Efficiency of GeniusDoc EHR version 12 by measuring the average task time and path deviations

3. Satisfaction with GeniusDoc EHR version 12 by measuring ease of use ratings

DATA SCORING

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

Measure	Rationale and Scoring
Effectiveness: **Task Success**	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. Task times were recorded for successes. Observed task times divided by the optimal time for each task is a measure of optimal efficiency. 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 must be operationally defined by taking multiple measures of optimal performance and multiplying by some factor [e.g., 1.25] that allows some time buffer because the participants are presumably not trained to expert performance. Thus, if expert, optimal performance on a task was [x] seconds then allotted task time performance was [x * 1.25] seconds. This ratio should be aggregated across tasks and reported with mean and variance scores.
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. Not all deviations would be counted as errors. This should also be expressed as the mean number of failed tasks per participant. On a qualitative level, an enumeration of errors and error types should be collected.
Efficiency: **Task 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 compared to the optimal path. The task deviations were rated on the scale of 1 = no deviations, 2 = minor deviations, 3= major deviations.
Efficiency: **Task Time**	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.
Satisfaction: **Task Rating**	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, a Likert Scale was used for each participant to rate the task. They were asked "Overall, this task was:" on a scale of 1 (Very Difficult) to 5 (Very Easy). These data are averaged across participants. Common convention is that average ratings for systems judged easy to use should be 3.3 or above. To measure participants' confidence in and likeability of GeniusDoc EHR version 12 overall, the testing team administered the System Usability Scale (SUS) posttest questionnaire. Questions included, "I think I would like to use the 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." See full System Usability Score questionnaire in Appendix 5.

4. 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. Participants who failed to follow session and task instructions had their data excluded from the analyses.

The usability testing results for the GeniusDoc are detailed below. The results should be seen in light of the objectives and goals outlined in Study Design section.

170.315 (B) (11) Decision Support Intervention

	Tasks	Task Success Mean (%) (SD)	Path Deviation Deviations (Observed/Optimal)	Task Time (in Seconds) Mean (SD)	Deviations (Observed/Optimal	Errors Mean (%) (SD)	Task Rating Mean (SD)
b11.1	Create CDS Rule	100 (0)	7/7	47 (1)	4 (47/43)	0	5 (1)
b11.2	Modify CDS Rule	100 (0)	7/7	44 (3)	2 (44/42)		5 (1)
b11.3	Trigger CDS Alert	100 (0)	5/5	30 (2)	2 (30/28)	0	5 (1)
b11.4	Record Feedback	100 (0)	5/5	45 (1)	5 (45/40)		5 (1)
b11.5	Export Feedback	100 (0)	7/7	47 (1)	5 (47/42)	0	5 (1)

4.2. DISCUSSION OF THE FINDINGS

4.2.1. EFFECTIVENESS

The analysis indicated that most of the participants were successful in completing the tasks as presented.

4.2.2. EFFICIENCY

The analysis indicated the physicians were able to perform all functions successfully. This portrayed accurate working in realistic production environments. There were no deviations noted when the study is done on particular tasks, however when workflow of the application based on User Roles is conducted there were few deviations but were able to perform the tasks after training.

4.2.3. SATISFACTION

Participant satisfaction was rated extremely high. All tasks scored a 5 rating.

To measure participant's confidence in and likeability of GeniusDoc EHR version 12 overall, the testing team administered the System Usability Scale (SUS) post-test questionnaire (See Appendix 5).

4.2.4. MAJOR FINDINGS

Overall the participants were able to maneuver through the EHRUT and easily perform the tasks. Every task tested and measured using summative testing methods, were completed by the participants within the allocated target task time. Capturing user feedback on DSI was a new

concept for them, and they welcomed the opportunity to supply this. Tasks were performed efficiently and effectively with a high level of satisfaction reported by the participants. There were no major complaints or serious actionable comments made by participants in the study. The participants found the system well organized and intuitive. Accessing of the user feedback as an administrative user was determined to be very simple and straightforward.

4.2.5. AREAS FOR IMPROVEMENT

- We will prepare Cheat Sheets for guidance to the Users.

5. 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. Informed Consent Form
4. Moderator's Guide & Tasks
5. Usability Scale Questionnaire

5.1. APPENDIX 1: SAMPLE RECRUITING SCREENER

We are recruiting individuals to participate in a usability study for an electronic health record. We would like to ask you a few questions to see if you qualify and if would like to participate. This should only take a few minutes of your time. This is strictly for research purposes. If you are interested and qualify for the study you will be compensated for your time and participation.

Can I ask you a few questions?

1. Are you male or female?
2. Have you participated in a focus group or usability test in the past 6 months?
3. Do you, or does anyone in your home work in marketing research, usability research, and/or web design?
4. Do you, or does anyone in your home, have a commercial or research interest in an electronic health record software or consulting company?
5. Which of the following best describes your age?
   23 - 39; 40 - 59 60 - 74; 75 and older.
6. Which of the following best describes your race or ethnic group?
   Caucasian, Asian, Black/African-American, Latino/a or Hispanic, etc.
7. Do you require any assistive technologies to use a computer?
8. What is your current position and title?
9. How long have you held this position?
10. Describe your work location (or affiliation) and environment?
11. Which of the following describes your highest level of education?
    High school graduate/GED, some college, college graduate (RN, BSN), postgraduate (MD/PhD), other
12. what professional activities do you do on the computer?
13. How many hours per week do you spend on the computer?
14. What computer platform do you usually use?
15. What Internet browser(s) do you usually use?
16. In the last month, how often have you used an electronic health record?
17. How many years have you used an electronic health record?
18. How many EHRs do you use or are you familiar with?
19. How does your work environment patient records?

5.2. APPENDIX 2: PARTICIPANT DEMOGRAPHICS

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

Gender

Men	4
Women	6

Total (participants)	10

Occupation / Role

MD	4
MA	4
RN	1
Office Manager	1
Total (participants)	10

Years of Experience

Facility Use of EHR All Paper	0
Some paper, some electronic	10
All electronic	0
Total (participants)	10

5.3.   APPENDIX 3: INFORMED CONSENT FORM

The Usability People 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. At the conclusion of the test, you will be compensated for your time.

Agreement

I understand and agree that as a voluntary participant in the present study conducted by Test Company I am free to withdraw consent or discontinue participation at any time. I understand and agree to participate in the study conducted and videotaped by The Usability People.

I understand and consent to the use and release of the videotape by The Usability People. I understand that the information and videotape 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 videotape and understand the videotape may be copied and used by The Usability People y 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 The Usability People. 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: _____

5.4.   APPENDIX 4: MODERATOR'S GUIDE

Prior to testing
Confirm schedule with participants
Ensure test environment is up and running

Prior to each participant
Reset application
Prepare timing devices and task documentation sheets

Prior to starting testing
Verify the participant's identity to ensure it is the participant on the schedule
Check the participant has printed the usability tests

Prior to each task
Direct user to starting point of task
Check the participant has the correct usability test in front of them
Rest timer

Orientation (15 minutes)
Thank you for participating in this study. Our session today will last about 30 minutes. During this session, you will use an instance of GeniusDoc EHR version 12, specifically focusing on functionality related to b11. Most tasks will be familiar with how you use the system on a daily basis. I will ask you to complete a few tasks using this system and answer some questions. Please try to complete the tasks on your own following the instructions very closely. 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, the administrator gave the participant control of the keyboard and mouse on their workstation, and then 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.

Task Documentation
Before each task take control of the session and direct the application to the starting point for the new task. Let the participant know which task you will be starting and make sure their task instructions are at the correct place. The moderator will read the scenario out loud and then start the timer. When the participant is finished they will say "done". The moderator will then fill in the Usability Task sheet for that particular task.

The moderator will fill in the following information:

Success: easily completed, completed with difficulty or help, not completed

Participant comments about the task

Task Time in seconds

How the task was completed: optimal path used, minor deviations, major deviations

Ask the participant a rating for the task: very easy, easy, average, difficult, very difficult

Administrator comments

PARTICIPANT TASK INSTRUCTIONS

170.315 (B) (11) Decision Support Intervention

b11.1	• **Create CDS Rule** • Login as a Admin User. Navigation: Toolbar >> EMR Menu >> Clinical Decision Support • Create a CDS Rule. • User should be able to update the source attributes.
b11.2	• **Modify CDS Rule** • Login as a Admin User. Navigation: Toolbar >> EMR Menu >> Clinical Decision Support • Edit and Modify a CDS Rule. • User should be able to update the source attributes.
b11.3	• **Trigger CDS Alert** • Open the patient file that matches the CDS rule. Navigation: Open Patient File >> Visit Tab >> CDS Button • Click on CDS blinking alert to view the Alerts.
b11.4	• **Record Feedback** • User should be able to record feedback using FB button in the CDS alert screen.
b11.5	• **Export Feedback** • Navigation: Reports Menu >> Report Builder >> CDS Feedback Report • Generate and Export the report.

FINAL QUESTIONS

What was your overall impression of this system?

What aspects of the system did you like most?

What aspects of the system did you like least?

Were there any features that you were surprised to see?

What features did you expect to encounter but did not see? That is, is there anything that is missing in this application?

Compare this system to other systems you have used.

Would you recommend this system to your colleagues?

5.5. APPENDIX 5: USABILITY SCALE QUESTIONNAIRE

| | 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

3. I thought the system was easy to use

4. I think that I would need the support of a technical person to be able to use this system

5. I found the various functions in this system were well integrated

6. I thought there was too much inconsistency in this system

7. I would imagine that most people would learn to use this system very quickly

8. I found the system very cumbersome to use

9. I felt very confident using the system

10. I needed to learn a lot of things before I could get going with this system