NIST National Institute of Standards and Technology

UNITED STATES DEPARTMENT OF COMMERCE

NIST

National Institute of Standards and Technology

Mobile Application Development Plan

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Document Version History

Version	Date	Description of Changes
1.0	03/30/2012	Share initial draft with client
1.1	04/11/2012	Updated feedback and additional requirements from client
1.2	04/17/2012	Updated based on resolved outstanding questions
1.3	04/24/2012	Made corrections based on developer and client feedback

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Contents

1. Introduction

This document details the system requirements for the mobile application (app) for the National Institute of Standards and Technology (NIST).

NIST currently collects testing data for the memorization and keying of character strings simulating the entry of a password using a desktop application and keyboard. The purpose of the app is to extend this capability to the iPhone device.

This app will guide the user to memorize and enter 10 different character strings (varying in length) 10 times each. The last portion of the test will require the user to enter as many character strings as possible from memory.

The app will capture data including but not limited to key strokes, timing of key strokes and which portion of the test they were keyed. At the completion of the test, the data output files can be exported from the device.

The mobile app will be developed for usage on iOS 5.0 and above (iPhone only) in the portrait orientation only.

The app delivery date will be:

- April 23, 2012 – Deliver 1st build of app to client (Includes all original functionality discussed. Does not include the new requirements listed in Section 5 of requirements document).

- April 30, 2012 – Deliver 2nd build of app to client (All functionality including new requirements listed in this document –v1.3). Any additional requirements would be future phase and extend delivery into May.

2. Target Audience(s)

The primary target audience of NIST mobile app is the participants that will enter the character strings to simulate the keying of passwords.

As a secondary user, the NIST administrator will also use the app to export the data files created during the participant's use of the app.

3. Summary of Mobile Application

The NIST mobile app will guide the user to memorize and enter 10 different character strings (varying in length) 10 times each. The last portion of the test will require the user to enter as many character strings as possible from memory. Back and Exit App buttons will not be provided to encourage the user to continue through the flow and complete the test. Wire frames of the pages of the app are outlined below.

Note: This is a working document that will continue to be updated as we refine the specifications, technical considerations and open issues. Preliminary wireframes are included as a reference.

These wireframes do not reflect the final look and feel of the app.

3a. Welcome page

This will be the first page that displays upon launching the app and will allow the entry the participant number to document who completed the test.
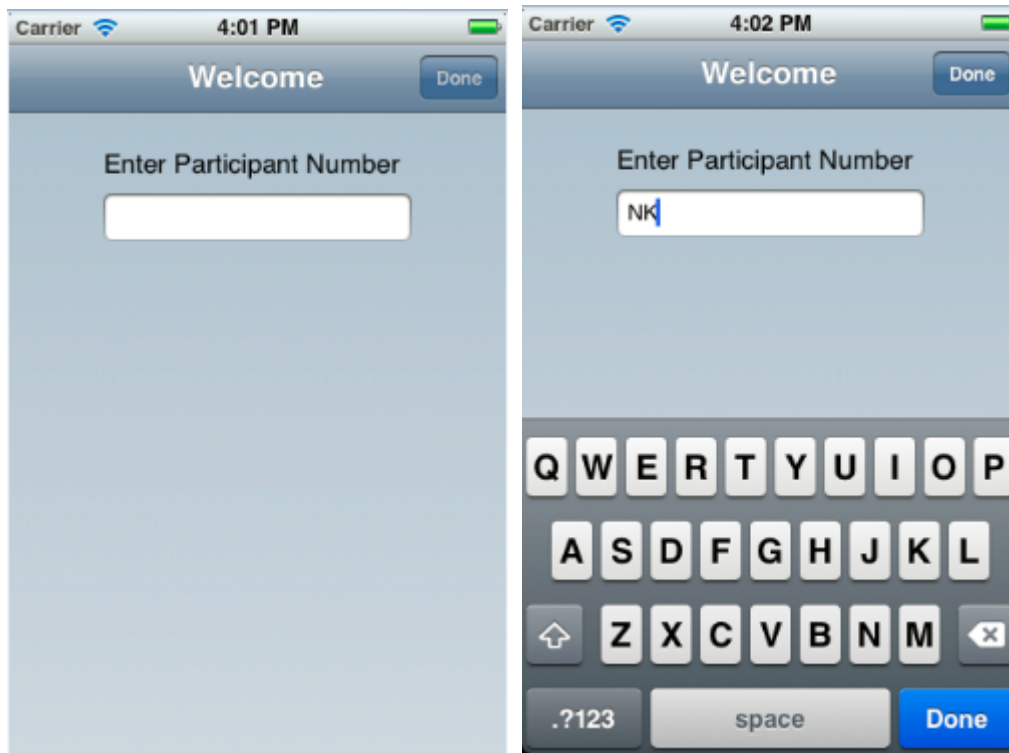
Requirement #3a.1: Participant Number field
Description:
• Upon page display, field is enabled.
• When field is enabled, standard keyboard is displayed
• Field will allow 1 - 12 characters.
• Field allows entry of any characters.
Client Comments:

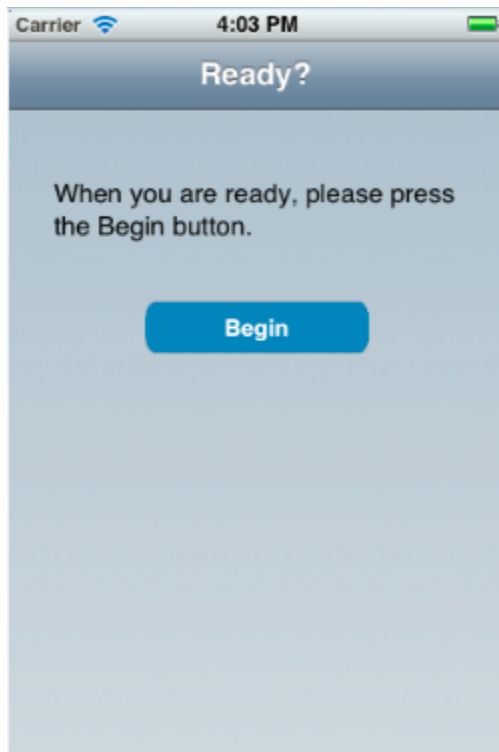| Requirement #3a.2: Done button |
| --- |
| **Description:** |
| • Button is enabled once value is entered in Participant Number field |
| • Upon selection, user is navigated to Ready? page. |
| **Client Comments:** |

3b. Ready? page

This page allows the participant to indicate they are ready to start the test.

Requirement #3b.1: Begin button
Description:
• Upon display of the page, button is enabled.
• Upon selection, user is navigated to the Memorize page
Client Comments:

3c. Memorize page

This page displays the character string and provides a space to help memorize the character string. This page will be displayed for each of the 10 character strings.
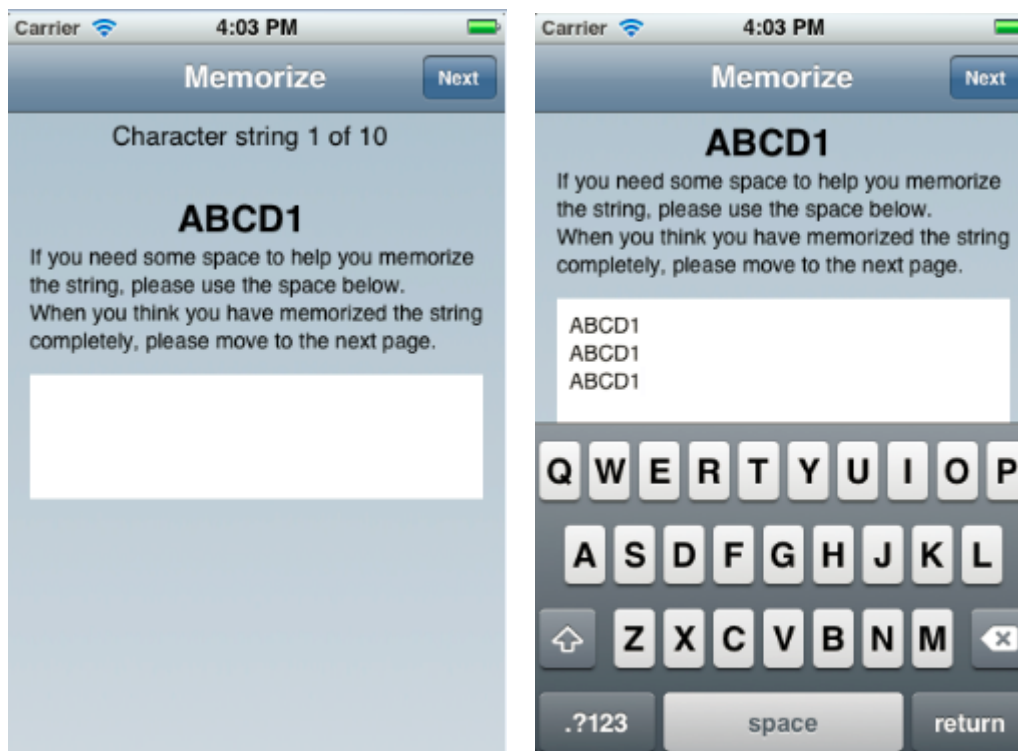
Requirement #3c.1: Character String Number Text
Description:
• The text will include which character string out of ten is displayed.   • Valid values: 1 of 10, 2 of 10, 3 of 10, 4 of 10, 5 of 10, 6 of 10, 7 of 10, 8 of 10, 9 of 10, 10 of 10.
Client Comments:

Requirement #3c.2: Character String
Description:
• Character string displayed will be provided by input file. See Section 4a.
Client Comments:

Requirement #3c.3: Entry field

Description:

- Field is not enabled upon display of the page so that keyboard is not displayed initially and entire page can be viewed.

- Field is enabled once user touches the field.

- Field will automatically scroll up when keyboard is enabled to be displayed.

- Field allows any characters and number of digits.

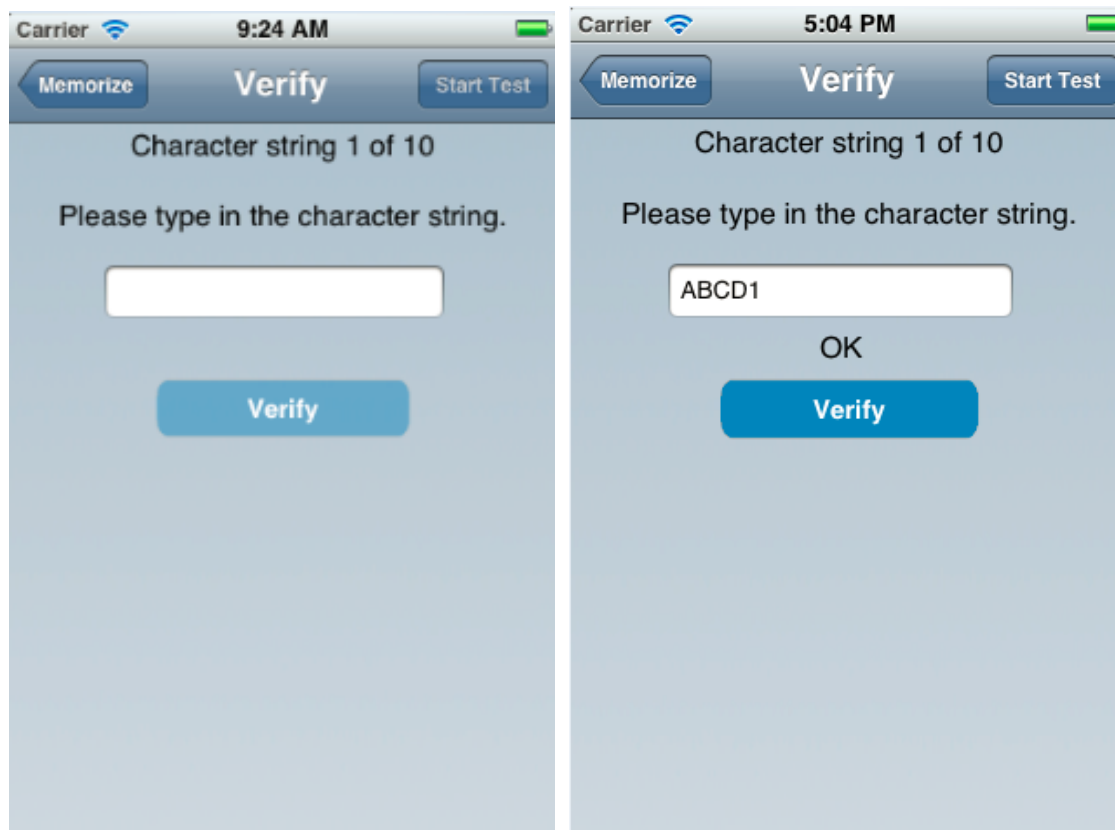- Upon display of page, field is always blank.

Client Comments:

Requirement #3c.4: Next button

Description:
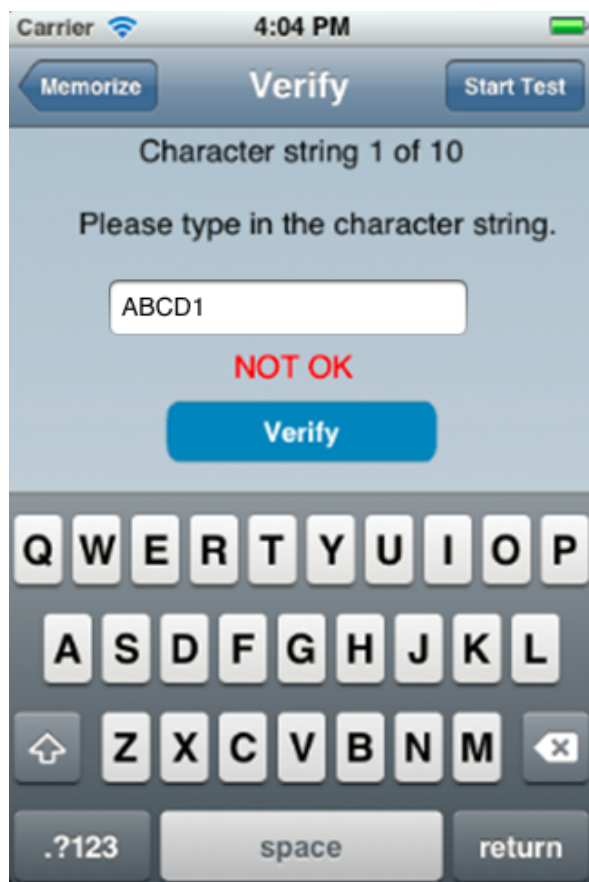
- Upon selection, user is navigated to next page of character string 1 of 10 flow, the Verify page.

Client Comments:

3d. Verify page

This page verifies if the participant has memorized the character string. A message will display advising the participant whether or not the character string was entered correctly. This page will be displayed for each of the 10 character strings.

Requirement #3d.1: Memorize button
Description:
•   Upon selection, user is navigated back to Memorize page.
Client Comments:

Requirement #3d.2: Entry field
Description:
•   Upon display of page, field is enabled and standard keyboard is displayed.
•   Field requires a minimum of 6 characters.
•   Field allows a maximum of 14 characters
•   Field allows all characters (alpha, numeric, special)
Client Comments:

Requirement #3d.3: Verify button
Description:

•   Upon selection if incorrect password entered, display message: "Not OK".
 	
     •   Upon selection if correct password entered, display message: "OK".
 	
     •   If Field is cleared out or additional characters are entered, remove message.

Client Comments:

Requirement #3d.4: Start Test button
Description:
•   Upon selection, the user is navigated to the next page of character string 1 of 10 flow, the Entry page.   •   Button is displayed as enabled when character string has been entered and verified as correct.
Client Comments:

3e. Entry page

This page will require the participant to enter the memorized character string 10 times. This page will be displayed for each of the 10 character strings.

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Requirement #3e.1: Page Header
Description:
• Page header will display which character string out of ten is displayed • Valid values: Character String 1 of 10, 2 of 10, 3 of 10, 4 of 10, 5 of 10, 6 of 10, 7 of 10, 8 of 10, 9 of 10, 10 of 10.
Client Comments:

Requirement #3e.2: Character String Entry fields
Description:
• Upon display of the page, the keyboard will not display. Upon selection of an entry field, keyboard will be displayed. • 10 entry fields will display on the page. • Characters will not display as they are typed. Instead an * will display as a placeholder.
Client Comments:

Requirement #3e.3: Done button
Description:
• The participant is required to key the character string 10 times. Button will not be enabled until a value has been entered in all ten fields. • Upon selection of button on page, entry will be submitted for collection. • Prior to entering a value, each field will display a shadow number which indicates entry of 1 through 10. This shadow number disappears once a value is entered in the field.
Client Comments:

Requirement #3e.4: Next button (keyboard)
Description:
• Upon selection, curser tabs to the next entry field. • If curser is in last entry field, upon selection will tab the first entry field.
Client Comments:

3f. Recall page

This page will display once the participant has complete the flow for all 10 character strings. This page will allow the user to enter as many character strings they can recall by memory. Ten is the maximum number of entries.

Requirement #3f.1: Entry fields
Description:

- When field is enabled, standard keyboard is displayed.

- Characters entered will display.

Client Comments:

Requirement #3f.1: Next button (keyboard)

Description:

- Upon selection, curser tabs to the next entry field.

- If curser is in last entry field, upon selection will tab the first entry field.

| Client Comments: |
|---|
| |

Requirement #3f.1: Done button

Description:

- Upon display of page, button is displayed as enabled. Entry is not required to navigate to the next page.

- Upon selection, all entries will be submitted for collection and user is navigated to the Thank You page.

Client Comments:

3g. Thank You page

This page will let the participant know they have completed the test.
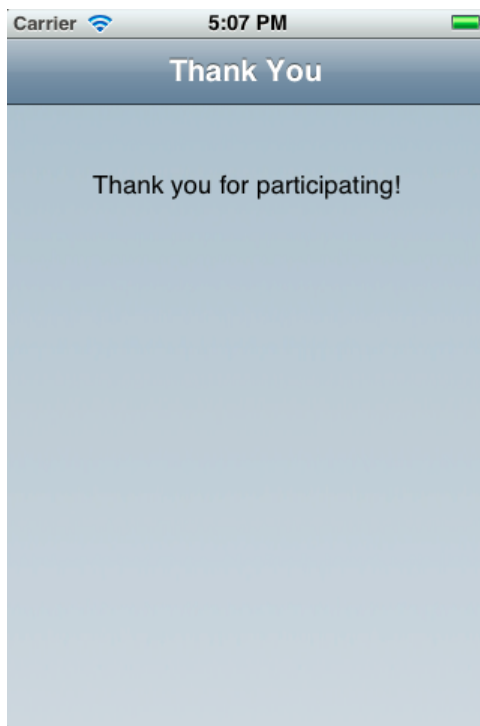
4. Technical Requirements

The NIST mobile app will capture data through the test. Two data out files (Raw Data and Rolled Up) will be created in CSV format with this data.

Detailed requirements for these data files are listed below. There are also some outstanding questions in Section 5.

The app will support iTunes file sharing which will allow copying these data files between your computer and the app on the iOS device. Booz Allen will provide guidance regarding loading the delivered mobile app on to the device and exporting the files.

4a. Character String Input File

Requirement #4a.1: File Format
Description:
•   A text file containing 10 character strings (with one character string per line) will be provided for

embedding into the app.

Client Comments:

Requirement #4a.2: Character String Format and Display

Description:

- Each character string may be up to 14 characters in length and consist of alpha, numeric, and special characters, including commas.

- The 10 character strings will display in the same order for each participant.

Client Comments:

Requirement #4a.3: Ability to Update File Off Line

Description:

- The input file containing 10 character strings can be updated outside of app (on desktop) and re-embedded in the app. This will allow for changing the character strings as needed.

Client Comments:

4b. Raw Data Output File

Requirement #4b.1: File Creation and Export

Description:

- One raw data output file will be created per participant.

- The app will support iTunes file sharing which will allow copying these data files between your computer and the app on the iOS device. Booz Allen will provide guidance regarding loading the delivered mobile app on to the device and exporting the files.

Client Comments:

Requirement #4b.2: Data Collection

Description:

- Raw Data collection will occur in all 4 phases of the test: Memorize, Verify, Entry and Recall.

- All timings recorded in Raw Data file will begin at point in time Begin button on the Ready? Page is selected.

Client Comments:

Requirement #4b.3: Contents of Raw Data File (By Column)

Description:

- Column A: Time in Milliseconds

- Column B: Phase and Participant Number

- Column C: Character String Number (Valid values: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10)

- Column D: Phase when keystroke occurred (Memorize, Verify, Entry 1-10 and Recall 1-10)

- Column E: Character Codes

- Column F: Entered string (what was typed in) column

- Column G: Target character string (what should be typed in)

- Column H: Target Typed Correctly? (If Target Character String matches what was typed, value will be "True". If values don't match, the value will be "False".) Values will be provided for all phases but only applicable to the Verify and Entry phases.

- Column I: X, Y touch coordinates which will indicate where the screen touch occurred. (This does not include coordinates for keyboard. Additional research will be required for this functionality)*

*New requirement. See Section 5.

4c. Rolled Up Data Output File

Requirement #4c.1: File Creation

Description:

- One rolled up data file will be created per participant.

- The Rolled Up Data file will contain data for multiple and/or all 4 phases of the test:

Memorize, Verify, Entry and Recall.

Client Comments:

Requirement #4c.2: Contents of Timings Data File Tab

Description:

General
- Character String Number
- Participant ID
- Target character string (what should be typed in)*
- Entered string (what was typed in) column*
- Column I: Target Typed Correctly? (If Target Character String matches what was typed, value will be "True". If entered value doesn't match, the value will be "False".) Values will be returned for all phases but should not be used for Memorize. Values only make sense for Verify and Entry pages. Match value for Recall phase will be provided in Rolled Up Data file.*

Memorize Phase
- Individual Memorize time (per each view of the Memorize page). This will capture the Memorize time per character string from display of the page until the last character was entered. If the user views the Memorize page more than once per character string, the data file will contain multiple Memorize times (one for each page view). *
- Total Memorize time per character string. This will capture the total time spend on Memorize page per character string regardless of the number of times the page was viewed. *

Verify Phase:
- Individual Verify time (per each view of the Verify page). This will capture the Verify time per character string.*
- If the user views the Verify page more than once per character string, the data file will contain multiple Verify times (one for each page view). *
- If the user views the Verify page more than once per character string, a Total Verify time per character string will be provided. This will capture the total time spend on the Verify page per character string regardless of the number of times the page was viewed. *

Entry Phase:
- Individual Entry time for each of the ten entries in the Entry page per character string. Data file may contain more than 10 Individual Entry times. If previously completed entry field is reselected and rekeyed, a time for each entry will be contained in the data file. Must indicate which entry field was being keyed for each time (i.e. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10). This captures

in what order Participant keyed entries.

- Total Entry time per character string will be provided. Timing begins when Entry page is displays and ends when Done button is selected. Because the participant will be required to complete all 10 entries before moving on to the next page, this will ensure the entire time spent keying all entries is captured. *

Recall Phase:

- Total Recall time (from display of Recall page to last keystroke on that page) *

- Recall Typed Correctly? (If individual recall values entered matched any of the character strings, value will be "True". If entered value doesn't match, the value will be "False".) *

Multiple Phases:

- Total Time from Memorize page is displayed to last keystroke on Entry page per character string.
- Total session time for all 4 phases of the test (Memorize, Verify, Entry and Recall). Timing of session will begin when first Memorize page displays and will end with last character entered on the Recall page. If no characters are entered in Recall page, timing will end when user navigates from the Recall page.
- Characters actually in entry fields at the time of the page turn. This captures what the final version of what the participant entered before moving on to the next page (without any characters that were typed over or deleted). *

*New requirement. See Section 5.

5. New Requirements

Below is the recently requested new functionality that may be included in the second version of the app. The final delivery date will need to be discussed to accommodate all of this functionality.

#	Requirement	Description
1.	**#4b.3 Column J**	Capturing X, Y Screen Touch Coordinates
2.	**#4b.3**	Characters actually in entry fields at the time of the page turn
3.	**#4c.2 Memorize Phase**	Capture the Memorize time per character string
4.	**#4c.2: Memorize Phase**	If the user views the Memorize page more than once per character string, the data file will contain multiple Memorize times (one for each page view).

5.	**#4c.2: Memorize Phase**	If multiple views of page, Total Memorize time per character string
7.	**#4c.2: Memorize Phase**	Characters actually in entry fields at the time of the page turn
8.	**#4c.2: Verify Phase**	Individual Verify time (per each view of page)
9.	**#4c.2: Verify Phase**	If the user views the Verify page more than once per character string, the data file will contain multiple Verify times (one for each page view).
11	**#4c.2: Timings Data File Tab - Entry Phase**	Individual Entry time for each of the ten entries in the Entry page per character string.
13	**#4c.2: Recall Phase**	Total Recall time (from display of Recall page to last keystroke on that page)
14	**#4c.2: Recall Phase**	Recall Typed Correctly? (If individual recall values entered matched any of the character strings, value will be "True". If entered value doesn't match, the value will be "False".)

6. Outstanding Questions

The following outstanding questions will need to be resolved to complete the requirements phase for this project.

#	Question	Answer/Resolution	Date Resolved
1	Need decision: How will new character strings be entered into the app? Copy new CSV data file from desktop to device? Manually enter into app using a Settings page.	New character strings will be entered into the app by copying a new CSV data file from desktop to device.	4/16/12
2	Need to determine level of translation for character codes. Brian will research. Until then, numeric codes generated automatically by the keyboard will be in the output file.	Values currently provided by API for desktop version. Mobile version values will match what is displayed on the keyboard.	4/16/12
3	Need to determine if the formula for calculations will be outside of the app in Excel or within app. May need to be in app due to the number of data file rows in file will different per participant.	Calculations will occur within the app.	4/16/12
4	Does the order of character strings need to be included in Rolled Up Data file? It is currently	No need to include order of character strings since they will	4/16/12

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	included in desktop version but may not be needed since character strings will display in same order every time.	always display in the same order.	
5	The Excel files were very helpful. Can you also sent the CSV files as they are generated from desk top application? It will be helpful to see the data prior to any translations or Excel calculations.	CSV provided by Brian.	4/12/12
6	Should we ignore spaces entered before or after characters entered when considering a mismatch or "False" match value? See Requirement #4a.3: Contents of Raw Data File (By Column) Spaces embedded within the characters will be considered when matching.	Any spaces regardless of placement will be included in matching criteria and considered "False" if does not match target character string.	4/16/12
8	Does the Error tab of the Rolled Up Data file include errors for Recall phase?	N/A. Errors will not be provided in fields created by the app. These will be calculated outside of the app (in Excel).	4/16/12
9	My notes indicate timings will end with "last character enter (key stroke)". Since we are also capturing touch, should timings end at each touch instead? Does this include touching the button to move on to the next page?	Ending of timings have been updated in Requirement #4c.2.	4/16/12
10	What should occur if the app is exited manually prior to completing the test? Should we include a pop up asking if they want to exit the app (if in error, user can select No)? Should the app automatically end the test?	App will continue to run in the background. Administrator can manually close app using device button to stop app from running and end timings.	4/16/12
11	Need NIST iOS developer account info to deliver application code. We will use Test Flight to deliver Beta builds as a temporary solution.	Source code and steps were sent to Brian.	4/23/12

7. Nice To Have Requirements

These requirements will not be included in Phase 1 of the app delivery but have been noted as possible future functionality.

#	Requirement	Reason For Future Phase
1	Option to randomly display character strings without new input file or manually changing order of character strings.	Would need to update output files to accommodate for new order of character strings.

2	Capture X, Y coordinates for keyboard.	Requires research to determine level of effort.
3	Ability to capture any key pressed on keyboard that does not change the value in entry field. The key to change view of keyboard (to numeric or special characters) and the shift key are examples.	Because the iOS keyboard does not return values for these keys, this will need to be future functionality. Delivery date of app would need to be delayed to develop a way to capture this info.

8. Appendix A

Example of Raw Data File for existing desk top version of the test provided by NIST.

A	B	C	D	E	F	G	H	I
milliseconds	phase & participant number	string number	Practice Verify Memorize number F1-F10 final recall	key press down up	character code	what has been typed	target string	target = typed
320	Practice							
33612	2	1	P	D	D5		5c2'Qe	False
33744	2	1	P	U	D5	5	5c2'Qe	False
33914	2	1	P	D	C	5	5c2'Qe	False
34042	2	1	P	U	C	5c	5c2'Qe	False
35306	2	1	P	D	D2	5c	5c2'Qe	False
35466	2	1	P	U	D2	5c2	5c2'Qe	False
35626	2	1	P	D	Back	5c2	5c2'Qe	False
35730	2	1	P	U	Back	5c	5c2'Qe	False
35818	2	1	P	D	D2	5c	5c2'Qe	False
35970	2	1	P	U	D2	5c2	5c2'Qe	False
36130	2	1	P	D	Oemti	5c2	5c2'Qe	False

						lde		
36306	2	1	P	U	Oemti lde	5c2'	5c2'Qe	False
36714	2	1	P	D	ShiftK ey	5c2'	5c2'Qe	False
36786	2	1	P	D	Q	5c2'	5c2'Qe	False
36890	2	1	P	U	ShiftK ey	5c2' Q	5c2'Qe	False
36891	2	1	P	U	Q	5c2' Q	5c2'Qe	False
36986	2	1	P	D	W	5c2' Q	5c2'Qe	False
37130	2	1	P	U	W	5c2' Qw	5c2'Qe	False
37642	2	1	P	D	Back	5c2' Qw	5c2'Qe	False
37794	2	1	P	U	Back	5c2' Q	5c2'Qe	False
37962	2	1	P	D	E	5c2' Q	5c2'Qe	False
38098	2	1	P	U	E	5c2' Qe	5c2'Qe	True
46650	2	1	P	D	Back	5c2' Qe	5c2'Qe	True

9. Appendix B

Example of Rolled Up data file for existing desk top version of the test provided by NIST.

	order	1	9	3	10	5	6	4	7	2	8
	string	5c2'Qe	3.bH1o	m3)61fHw	ua7t?C2#	p4d46*3TXY	q80<U/C2mv	d51)u4;X3wrf	6n04%Ei'Hm3V	m#o)fp^2aRf207	4i_55fQ$2Mnh30
	string length	6	6	8	8	10	10	12	12	14	14
	participant↓										
	1	1.26	0.79	1.11	1.39	1.49	1.76	2.16	2.63	3.66	2.63
	2	1.27	0.96	1.41	1.42	2.12	1.62	3.02	2.52	3.32	2.91
	3	2.39	1.69	3.63	3.09	5.44	4.34	6.93	10.31	9.56	6.85
	5	3.2	3.17	3.66	4.08	8.34	5.81	6.08	13.16	11.8	9.13
	6	3.1	2.18	2.77	5.35	6.88	5.44	5.4	10.13	8.27	10.94
	7	3.62	1.77	3.78	5.56	5.12	4.31	4.43	6.57	8.62	7.15
	8	2.21	0.98	2.28	2.03	2.44	3.29	3.36	5.04	5.2	5.29
	9	1.89	2.01	2.18	3.54	4.07	3.77	5.72	4.88	8.83	6.48
	10	4.19	2.5	2.5	3.17	5.34	5.42	4.57	7.88	8.84	14.2
	11	3.23	1.89	2.41	2.54	3.58	3.87	4.22	4.62	6.97	5.08
	13	3.53	1.94	2.88	2.71	5.23	4.07	6.28	9.51	15.11	10.47
	15	2.65	1.88	2.89	3.7	3.78	4.97	6.17	7.09	14.03	11.34
	16	1.3	1.34	1.64	2.45	2.8	2.52	3.18	5.34	6.6	5.64
	18	3.27	1.5	2.92	2.94	4.41	4.1	7.56	6.42	6.41	6.2
	19	3.71	3.34	4.47	5.83	4.97	6.49	6.26	8.59	8.88	10.62
	21	2.31	1.59	1.95	2.75	3.47	3.32	3.7	5.65	7.84	6.35
	23	2.63	1.62	2.31	2.25	3.96	3.15	4.43	5.38	9.48	4.46
	24	3.34	4.18	3.41	5.22	4.97	6.63	5.91	11.43	14.47	5.99
	25	5.67	2.72	4.16	4.01	7.52	7.69	7.23	9.65	11.22	8.66
	26	2.6	1.65	3.21	4.21	3.37	4.64	5.12	5.5	9.64	6.13
	28	4.23	2.02	2.66	2.89	4.77	7.23	5.56	6.26	7.88	8.38
	29	2.59	1.1	2.14	1.92	3.72	4.45	3.76	5	9.13	5.11
	30	2.49	1.78	2.36	3.78	4.07	3.69	4.38	8.44	7.32	6.11
	31	2.65	2.81	4	2.89	6.33	5.82	7.49	8.95	9.07	8.21
Incomplete											
	4	2.51		5.38		4.7	7.8	8.1		36.35	
	12	3.95		5.95		7.21	7.57	8.88	20.3	16.93	
	14	3.13		3.3		7.67	5.88	7.87	12.37	13.53	13.4
	17	2.64		2.17		4.36		5.11		9.38	
	20	3.83		3.13		10.49	10.51	11.65	10.62	19.34	
	22	2.65		3.27		6.89	6.47	11.93	11.54	22.68	13.09
	27	7.86		4.6		14.42	10.48	8.22		27.21	