SOP: CS 703 Version No.: 4.0 Issue Date: 01Mar2024 Effective Date: 15Apr2024	IT ENVIRONMENTS	Supersedes Document Version : 3.0 Effective Date : 08Apr2023

NeuroNEXT Network

Standard Operating Procedure (SOP)

IT Environments

Version 4.0 SOP

NN CS 703

Originators: NeuroNEXT CCC and DCC Personnel

Reviewed and Approved by

Signature and Date: Christopher S. Coffey *Electronically signed by: Christopher S. Coffey Reason: I approve this document Date: Feb 23. 2024 13:34 CST* 23-Feb-2024
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NEURONEXT NETWORK STANDARD OPERATING PROCEDURE FOR IT ENVIRONMENTS

SOP: CS 703 Version No.: 4.0 Issue Date: 01Mar2024 Effective Date: 15Apr2024	IT ENVIRONMENTS	Supersedes Document Version : 3.0 Effective Date : 08Apr2023

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Joan Ohayon

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11-Mar-2024

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1. POLICY

The purpose of this SOP is to provide guidelines to the NeuroNEXT Data Coordinating Center (DCC) Information Technology (IT) Team regarding the creation of database and website environments for the development and testing of IT applications for the NeuroNEXT Network. Some of the processes referred to in this SOP are described in greater detail in other NeuroNEXT SOPs. Please refer to Section 5: References to Other Applicable SOPs for a listing of relevant SOPs.

2. SCOPE

This SOP has been developed to be in alignment with federal regulations and Good Clinical Practices (GCP) as set forth in the 2016 Integrated Addendum to ICH E6(R1): Guideline for Good Clinical Practice E6(R2). The policies and procedures described in this SOP apply to the NeuroNEXT Clinical Coordinating Center (CCC) and DCC within the context of their oversight and advisory roles for the NeuroNEXT Network, and to all NeuroNEXT investigators, staff, subcontractors, or other entities associated with the NeuroNEXT Network who manage, oversee, and conduct research regulated by FDA and/or applicable review committees.

This SOP is in alignment with Information Technology policies set forth by Information Technology Services at The University of Iowa and the Office of Information Technology in the UI College of Public Health (UI CPH IT).

3. ROLES and RESPONSIBILITIES

These policies and procedures apply to NeuroNEXT DCC staff and other individuals who develop, test, and move code for NeuroNEXT applications.

The NeuroNEXT DCC IT and DM Teams and any other individuals who develop and perform testing of data systems or applications for the NeuroNEXT Network are responsible for adhering to the procedures outlined in this SOP.

4. APPLICABLE REGUALTION AND GUIDELINES

21 CFR Part 11 Electronic Records; Electronic Signatures

FDA Guidance for Industry: Part 11, Electronic Records; Electronic Signatures – Scope and Application (August 2003)

FDA Guidance for Industry: Computerized Systems Used in Clinical Investigations

(May 2007) FDA Guidance for Industry: Computerized Systems Used in Clinical Trials(April 1999)

FDA	Guidance for Industry: General Principles of Software Validation **(**January 2002**)**
FDA	Guidance for Industry: Electronic Source Data in Clinical Investigations (September 2013)

5. REFERENCES TO OTHER APPLICABLE SOPS

NN CS 702	Application Development and Validation
NN DM 1004	Specifications Development, Testing Plans, and Validation Documentation

6. ATTACHEMENTS AND REFERENCES

NN CS 703 – A Document History

National Institute of Standards and Technology (NIST) Guides:

NIST Guide to Secure Web Services, Special Publication 800-95

(August 2007) NIST Guide to SSL VPNs, Special Publication 800-

113 (July 2008)

7. TERMS AND ABBREVIATIONS

The following terms and abbreviations are used in this document:

CCC	Clinical Coordinating Center at Massachusetts General Hospital
Clone	A copy of the Production application environment that is used for testing and training purposes.
CTSDMC	Clinical Trials Statistical & Data Management Center at The University
DCC	Data Coordinating Center at The University of Iowa
Demo	A copy of the Production application environment that is used for training purposes. The Demo environment does not contain clinical study data.
Dev (Development)	IT environment used for development applications
FogBugz®	Project management software licensed to DCC
Milestone	A grouping (batch) of development project cases that comprise an application
Production	Application environment in which study data are collected.
Schema	Refers to an organizational system that describes the structure of a relational database, and defines the components or objects in the database (e.g. tables, fields, relationships, procedures, and other elements).

Script	A sequence of instructions to be used by an external program (e.g. SQL Server) to perform defined tasks (such as listing, modifying, copying, or deleting records) according to specified parameters.
Stage	IT environment used for final validation testing
Test	IT environment used for initial application testing

8. SPECIFIC PROCEDURES

DCC Application Environments and Database Structure

The DCC will maintain core website applications and a core database structure that is common to all studies in the NeuroNEXT Network. The application code and database tables define relationships between studies, centers, users, and the access rights that users are granted within a study. The DCC IT development process utilizes four application environments: Development (Dev), Test, Stage, and Production (Prod). These environments are designed to assist with controlled development, coding changes, validation testing, and deployment of applications. Each environment is associated with its own database and website for managing the application, and operates independently from the other environments.

The DCC also creates Clone and Demo environments for testing and training purposes. The Clone environment is a copy of the Production application and database, and is refreshed as needed to reflect the most current version of the Production environment. The Clone environment is used internally as a safe environment for troubleshooting without affecting the Production environment.

The Demo environment is used for training purposes, and is created as needed from the Production application and database. All clinical data are removed from the Demo environment before it is used for training.

A customized version of the FogBugz® project management tool is used by the DCC to manage work units, or ‘cases’, associated with application development and testing. Cases are batched into groups (Milestones) that are moved together through the IT environments as the next version of an application. Stepwise processes and checklists for preparing the database and website for each environment, and for deploying the web application, are followed as a Milestone progresses through the work flow. The DCC IT Team uses a version control program to move code between the environments.

The Dev environment, used only by the developer, is created for the initial development, testing, and preliminary testing of an application. Once the developer verifies that coding or modifications are complete and ready for further testing, the code is committed to the version control program and the FogBugz® case is updated. After all cases in a Milestone have been approved for deployment from the Dev environment, the IT Lead or designee moves the entire Milestone into a newly created Test environment. In the Test environment, cases are validated by the Data Management (DM) Team. Upon completion of independent testing and any necessary code modifications, all cases in the Milestone are moved to the Stage environment. The Stage environment allows for a final validation by independent testers in a setting as close to the current Production environment as possible. After final validation and creation of testing documentation, all cases in the Milestone are moved to the Production environment.

Occasionally, unanticipated ‘hot fixes’ may be added into the development cycle after a Milestone has been

established. 'Hot fixes' are evaluated on a case-by-case basis, and are integrated into the cycle accordingly.

Creating Application Environments

When a new study is initiated, the application code and the reference tables are generated, and make up the initial Production environment. As each subsequent Milestone version is developed, the latest version of the Production environment will be the basis for creation of the other environments that are used for validation testing and code modification. The process of creating the application environments is conducted by the IT Lead or designated IT personnel.
The Dev, Test, and Stage environments are designed to specifically assess the system's capability in an environment similar to the current Production environment. Application development and preliminary testing is conducted in the Dev environment. The developer creates the application in a user-controlled system, and runs the initial application on a local web server to make changes without affecting the work of other developers. After the developer has completed testing, the application is committed to the version control program in preparation for independent testing.

The initial stage of independent testing is performed in the Test environment. A stepwise process is followed to ensure that the Test environment is freshly prepared prior to testing. Because the Test database is reset from a copy of the current Production database, a number of safeguards are followed to protect the information contained in the Production database. These safeguards include: deactivating Production user accounts, activating Test accounts, changing randomization assignments, and appending 'Test' to the user's last name to indicate the Test environment. Database scripts are first applied to the newly created Test environment, and changes are made via scripts to ensure that the development process was created accurately. In final preparation of the Test environment, schema changes are made to the structure of the database, including the tables, fields, and the relationships between fields and tables. The application is then deployed to the Test environment for testing.

The second phase of testing is performed in the Stage environment. The process for creation of the Stage environment is similar to that used to create the Test environment. The Stage database is reset as a copy of the Production database, with the same safeguards in place to protect Production information including: deactivating Production user accounts, activating test Stage accounts, changing randomization assignments, and appending 'Stage' to the user's last name to indicate the Stage environment. Schema changes are applied to the Stage database before reference tables related to the Data Dictionary and all stored procedures are moved from the verified Test database into the Stage database. The tested application is then moved to the Stage environment for testing.

After successful testing, the application is moved to the Production environment and is released for use by clinical centers, study coordinators, and others for whom the application is intended. The Production database is backed-up prior to the application move. Schema changes are then applied to the Production environment. The tables related to the Data Dictionary and all stored procedures are then moved from the verified Stage database. A copy of the Production environment is placed in Clone and Demo environments. The Clone environment is used internally as a safe environment for troubleshoots without affecting the Production environment. The Demo environment is provided to Protocol and Site Coordinators for use in training, if needed. Additional safeguards are established in each of these environments to prevent access to Production environment information, including: deactivating Production user accounts, activating test Clone/Demo accounts, changing randomization assignments, and appending 'Clone' or 'Demo' to the user's last name to indicate the Clone/Demo environment.

A. Development Environment

#	*Who*	*Task*	*Attachment/ Reference*	*Related SOP*
1.	DCC IT Developer	Perform localized application development according to specifications.		NN DM 1004
2.	DCC IT Developer	Create scripts necessary for database changes to schema and stored procedures.		
3.	DCC IT Developer	Perform testing on application in accordance with the specifications.		
4.	DCC IT Developer	Commit tested application to the version control program and assign to the IT Lead.		

B. Test Environment

#	*Who*	*Task*	*Attachment/ Reference*	*Related SOP*
1.	DCC IT Lead or designee	Create the Test database from a copy of the Production database. Run safeguard scripts to protect data, user accounts, and randomization sequences.		
2.	DCC IT Lead or designee	Run developer scripts and schema changes to the Test database.		
3.	DCC IT Lead or designee	Deploy application to the Test website.		
4.	DCC IT Lead or designee	Notify DCC DM through FogBugz® to begin testing in Test environment.		NN DM 1004
5.	DCC IT Developer	If errors are discovered during testing, modify code accordingly and assign the case back to the tester.		NN DM 1004

6.	DCC DM	When all cases have been successfully tested, assign to the IT Lead or designee.		

C. Stage Environment

#	*Who*	*Task*	*Attachment/ Reference*	*Related SOP*
1.	DCC IT Lead or designee	Create the Stage database from a copy of the Production database. Run safeguard scripts to protect data, user accounts, and randomization sequences.		
2.	DCC IT Lead or designee	Run schema changes and move reference tables for the Data Dictionary and all stored procedures from the Test database.		
3.	DCC IT Lead or designee	Deploy the application to the Stage website.		
4.	DCC IT Lead or designee	Notify DCC DM through FogBugz® to begin testing in the Stage environment.		NN DM 1004
5.	DCC IT Developer	If errors are discovered during testing, modify code accordingly and assign the case back to the independent tester.		NN DM 1004
6.	DCC DM	When all cases have been successfully tested, assign to the IT Lead or designee.		

D. Productions Environment

#	*Who*	*Task*	*Attachment/ Reference*	*Related SOP*
1.	DCC IT Lead or designee	Create a backup copy of the Production database.		
2.	DCC IT Lead or designee	Run schema changes and move reference tables for the Data Dictionary and all stored procedures from the Stage database.		

3.	DCC IT Lead or designee	Deploy the application to the Production environment.		
4.	DCC IT Lead or designee	Notify the DCC DM of the successful deployment through FogBugz®.		

E. Clone and Demo Environments

#	***Who***	***Task***	***Attachment/ Reference***	***Related SOP***
1.	DCC IT Lead or designee	For the Clone environment, create a database from a copy of the newly created Production database.		
2.	DCC IT Lead or designee	As needed, create a Demo environment from the current Production database, and delete all clinical data from the Demo database.		
#	Who	Task	Attachment/ Reference	Related SOP
3.	DCC IT Lead or designee	Run safeguard scripts in the Clone and Demo database environments to protect data, user accounts, and randomization sequences.		
4.	DCC IT Lead or designee	Deploy the application to the Clone and Demo environments using the Production application.		
5.	DCC IT Lead or designee	If part of a Milestone move to Production, notify DCC DM that Clone has been deployed.		

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Attachment NN CS 703 - A. Document History

NeuroNEXT Network Standard Operating Procedure (SOP) IT Environments SOP NN CS 703					
Version	**Description of Modification**	**Reason or Justification for Modification**	**Issue Date**	**Effective Date**	**Reviewer(s)**
1.0	New	N/A	30Mar2012	29Apr2012	N/A
2.0	Updated information regarding The University of Iowa Information Technology Services and the Office of Information Technology in The University of Iowa College of Public Health (UI CPH IT). Added information regarding Clone and Demo environments, and included listings of safeguards that are used when creating new application environments from Production. Additional updates throughout.	Updated for version 2.0	21Sep2016	21Oct2016	N/A
3.0	Updated “1996 ICH E6 Consolidated Guidance” to “2016 Integrated Addendum to ICH E6(R1): Guideline for Good Clinical Practice E6(R2)”. Updated signature block to accommodate for electronic signatures.	Updated for version 3.0	22Feb2023	08Apr2023	Catherine Gladden

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	Additional minor updates throughout.				
4.0	Minor edits for clarity	Periodic review	01Mar2024	15Apr2024	Preeti Paul

NN CS 703 IT Environments v4.0 clean

Final Audit Report 2024-03-11

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Marianne Chase (mchase@mgh.harvard.edu) authenticated with Adobe Acrobat Sign.
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Tania Leeder (tleeder@mgb.org) added alternate signer ecklundd@uiowa.edu. The original signer dixie-ecklund@uiowa.edu can still sign.

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