

From: [Carolyn Coggins](#)
To: jfranklin@eac.gov
Cc: mmasterson@eac.gov; [McKay, Sue](#); [Steve Pearson](#); bhancock@eac.gov; [Jennifer Garcia](#)
Subject: Unity 5.0.0.0 - Reuse of the Unity 3.0 NY Certification Code Review
Date: 04/14/2010 03:43 PM
Attachments: Unity 5.0.0.0 -NY Source Code Reuse Letter.pdf

<<Unity 5.0.0.0 -NY Source Code Reuse Letter.pdf>>

Dear Josh,

ES&S has requested EAC consideration for reuse of the unchanged Unity 3.0 New York Certification code review performed to the VVSG by SysTest, an EAC VSTL. iBeta is providing the EAC with a letter outlining our:

- Validation of the results of the NY code review from SysTest;
- Process to review the sampling of the code;
- Evaluation of the results; and
- Recommendation for reuse.

Two attachments are incorporated into the letter:

- 1) Matrix of Sample Review of the NYSBOE Certified Unity 3.0 for Reuse in Unity 5.0.0.0
- 2) Summary of Potential Logic Discrepancies with ES&S' response

It should be noted that the decision on reuse is only applicable to code that was unchanged. iBeta has or will complete a 100% review of any changes to the NY certification baseline.

Please contact me if you have any questions. We look forward to receiving the EAC's decision on reuse. We request that you copy in Sue McKay on this decision.

Carolyn Coggins

QA Director - Voting

iBeta Quality Assurance

303-627-1110 x122 fax 303-627-1233

<http://www.ibeta.com>

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April 13, 2010

Mr. Brian Hancock
U.S. Election Assistance Commission
Voting System Testing and Certification Program
1201 New York Avenue, NW, Suite 300
Washington, DC 20005

Sent via E-mail

Mr. Hancock,

The purpose of this letter is to document our findings in a 3% sampling review of the Unity 5.0.0.0 source code that was previously reviewed by SysTest Labs to the *US EAC Voluntary Voting System Guidelines (VVSG 2005)* for the New York State Board of Elections (NYSBOE) in state certification of the ES&S Unity 3.0 voting system. This letter also provides the iBeta recommendation to the EAC regarding the reuse of the source code review in the NY certification test effort.

Validation of the Results of the SysTest Review for NYSBOE

As the public reports released by NYSBOE documented the New York certification and not specific details with regard to the source code review performed by a VSTL to the VVSG 2005, iBeta requested a letter from SysTest identifying the: scope of the review, overall findings, and identification of differences between a NYSBOE source code review and an EAC VSTL source code review. SysTest provided the letter, a matrix of all requirements tested for NYSBOE, and a list of source code discrepancies accepted by NYSBOE. SysTest identified in their letter the applications and versions tested, review to the VVSG 2005 source code review requirements and that "NYSBOE did not stipulate that all requirements be met as long as the findings were minor and there were compensating controls that would prevent findings from impacting the ability of the systems to correctly and safely perform all voting functions". The 41 source code discrepancies accepted by NYSBOE were added to the assessment performed on the discrepancies identified in the sample review. (This process is identified in *Assessment of the Sample*.)

Documentation of the Review Process

Preparation of the Review Criteria To conduct the review, iBeta used our *PCA Source Code Review Procedure*. The trusted source code was delivered from SysTest and configuration managed in the iBeta Source Code Repository. All coding languages submitted for review had been previously reviewed on other EAC certification test efforts; so that iBeta had all necessary language specific interpretations of the VVSG source code review requirements. A review of the ES&S coding standards was conducted. These practices were found consistent with industry best practices for the applicable languages. Incorporation of ES&S coding standards into the review had no substantive impact on the review criteria. The previously used interpretation of the VVSG requirements to the language specific review criteria updated with ES&S coding standards were utilized. The iBeta language specific review criteria are not attached to this letter but have been previously provided to the EAC. The VVSG requirements applicable to the source code review task are:

Volume 1	Section 5.2.2 through 5.2.7, 7.2 and 7.4.27.2
Volume 2	Sections 2.5.4d and 5.4.2

Selection of the Sample iBeta conducted an analysis by first using a library of static analysis tools to parse each application source code base and provide a list of the files and functions as well as the Lines of Code (LOC) count. iBeta uses executable LOCs only and does not include comment, blank, or continued lines in our metrics. As iBeta's library of static analysis tools does not address Cobol source code, the number of files and files sizes were used to determine the volume of code to select a 3% sample.

Recording of the Sample Review Results Review spreadsheets were prepared by language and populated for each application. Selection of the files/functions was made based on the file header information documenting the file purpose. iBeta focused the review by selecting source code files and functions that process vote data, audit logs, and reporting.

Assessment of the Sample Each review was conducted by a reviewer that had a minimum experience of code review on two VSTL certification test efforts. The sampling was reviewed for all VVSG 2005 source code review requirements. Non-conformities to the standards were noted as discrepancies. Following the review of the code sample, an assessment was conducted by an experienced reviewer who had reviewed source code requirements on a minimum of four VSTL test efforts. The assessor analyzed each instance of non-compliance with the VVSG requirements and assessed if the issue impacted source code logic. Discrepancies that dealt with comments, headers, formatting, and style were accepted as non-logic issues and color coded as green. Potential logic issues were flagged for an EAC decision and color coded as yellow. Confirmed logic issues were to be flagged as red, but no confirmed logic issues were identified.

Summary of 3% Source Code Review Results

Categorization of Issues A total of 236 discrepancies were identified. Of these 215 or 91% were identified as non-logic issues. The remaining 21 were categorized as potential logic issues. No confirmed logic issues were identified. Attachment 1 contains metrics by language, software and firmware.

Research and Response The 21 potential logic discrepancies were sent to ES&S to provide a response justifying non compliance with the requirement or disagreement with iBeta's interpretation requirements. Precedence for the iBeta interpretation has been established with testing for other clients and these established interpretations must be applied consistently to all manufacturers under test with iBeta. We do acknowledge that in some instances another interpretation may be possible and that alternative interpretation may be acceptable to the EAC reviewers. Attachment 2 contains the 21 EAC Decision Discrepancies with ES&S response.

Recommendation Regarding the Reuse of the SysTest Source Code Review

Evaluating the Results In order to provide a recommendation, iBeta evaluated the results of the sample source code review. The results would be recommended as acceptable if no significant discrepancies were found. This would include the less critical requirements dealing with comments, headers, formatting, and style which were not addressed, not recorded or interpretations are inconsistent with documenting industry accepted practices. However, as there were discrepancies written that potentially impact the source code, additional analysis was conducted.

Review the severity of the discrepancies discovered: Code was reviewed with the ES&S response to assess if the issues could be closed without changes to the executable code and if the issue was addressed in the current version of the code. Four of the issues could be addressed with appropriate documentation that would not require changes to the executable code. The remaining issues were against parameter validation in EDM and ElectionwarePaperBallot. The ES&S response was found to be valid for the current code; hence there is no confirmed logic issue. The potential logic issue is not addressed for parameter validation in future changes or additions to the code. Assuming the code would

not be changed without resubmission to a VSTL, precautions can be taken to document the need for careful review of parameter validation in future versions of these two application packages.

Recommendation: Based on the limited impact (or perhaps no impact) on the source code as a result of these discrepancies, iBeta recommends reuse of the results of the SysTest source code of the Unity 3.0 source code review.

Sincerely,

A handwritten signature in blue ink that reads "Carolyn E. Coggins". The signature is written in a cursive style with a long horizontal flourish at the end.

Carolyn Coggins
QA Director Voting

Attachment 1: Matrix of Sample Review of the NYSBOE Certified Unity 3.0 for Reuse in Unity 5.0.0.0

Attachment 2: Summary of Discrepancies

cc: Steve Pearson, ES&S
Sue Munguia, ES&S



U. S. ELECTION ASSISTANCE COMMISSION
VOTING SYSTEM TESTING AND CERTIFICATION PROGRAM
1201 New York Avenue, NW, Suite 300
Washington, DC. 20005

04/23/2010

Sent via email

Carolyn Coggins, QA Director - Voting
iBeta Quality Assurance
3131 S Vaughn Way, Suite 650
Aurora, CO 80014

Dear Ms. Coggins,

This letter is in response to iBeta Quality Assurance's recommendations to the Election Assistance Commission (EAC) regarding the reuse of the unchanged Unity 3.0 New York Certification source code review performed to the VVSG by SysTest Laboratories. iBeta performed the review per section 2.10.6. of the EAC's *Testing and Certification Program Manual*. This review was conducted in an effort to preserve any prior testing that could be relied upon as meeting the EAC's rigorous program requirements.

Source Code Review

At the direction of the EAC, iBeta conducted a 3% source code audit of the Unity 5.0.0.0 (Unity 3.0 New York) source code. In addition to the audit and review conducted by iBeta, the EAC Technical Reviewers have conducted a review of the recommendation made by iBeta. Based on the number of discrepancies found during the audit and the existence of unresolved discrepancies in the New York State Board of Elections (NYSBOE) testing results, the EAC has determined a 30% source code audit is in order to determine if more comprehensive testing is necessary.

The EAC also requests iBeta to provide a copy of the Unity 5.0.0.0 source code audit procedures to help the EAC better understand the process iBeta used in conjunction with the NYSBOE testing. If you should have any questions regarding this approval or the impact it has on the Unity 5.0.0.0 (Unity 3.0 New York) testing engagement please do not hesitate to contact me. Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read "Brian Hancock".

Brian Hancock
Director, Testing and Certification
US Election Assistance Commission



U. S. ELECTION ASSISTANCE COMMISSION
VOTING SYSTEM TESTING AND CERTIFICATION PROGRAM
1201 New York Avenue, NW, Suite 300
Washington, DC. 20005

05/14/2010

Carolyn Coggins, QA Director - Voting
iBeta Quality Assurance
3131 S Vaughn Way, Suite 650
Aurora, CO 80014

Sent via email

Dear Ms. Coggins,

On April 14 2010, iBeta recommended for the Unity 5.0.0.0 system, the reuse of the unchanged Unity 3.0 New York Certification source code that was reviewed to the 2005 VVSG by SysTest Laboratories. A total of 236 discrepancies were found, of which 21 were potential logic issues. These 236 discrepancies represent non-conformities to the standard. EAC made an initial decision that an additional 30% source code audit was in order to determine if a more comprehensive review was necessary.

On April 28th 2010, ES&S and iBeta expressed concern that the decision to require a 30% audit of the Unity 5.0.0.0 source code was made without a full understanding of the status of the discrepancies. After additional documentation was provided EAC was better able to understand the nature of the 236 discrepancies and their potential impact on the system.

Based on this information, EAC has decided that iBeta shall conduct a 15% audit of the source code in order to determine if further review is necessary and if reuse of the prior testing will be allowed. The 15% audit shall be divided into three areas of focus. The initial 5% of the audit shall focus on areas determined by the EAC. An additional 5% of the review shall focus on code that has not been previously reviewed by iBeta. The remaining 5% shall focus on areas that iBeta believes pose the greatest risk to the reliability and functionality of the voting system. All non-conformities discovered as a result of this, or any other, audit must be resolved before an EAC certification is granted.

If you should have any questions regarding this decision or the impact it has on the Unity 5.0.0.0 testing engagement please do not hesitate to contact me. Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read "Brian Hancock".

Brian Hancock
Director, Testing and Certification
US Election Assistance Commission



U. S. ELECTION ASSISTANCE COMMISSION
Voting System Testing and Certification Program
1201 New York Avenue, NW, Suite 300
Washington, DC. 20005

05/24/2010

Steve Pearson
Election Systems & Software
11208 John Galt Blvd.
Omaha, NE 68137

Sent via email

Dear Mr. Pearson:

ES&S has applied for reuse of the unchanged Unity 3.0 New York Certification source code that was reviewed to the 2005 VVSG by SysTest Laboratories for the Unity 5.0.0.0 system. A total of 236 discrepancies were found in the initial 3% source code audit by iBeta, and EAC has therefore decided that an additional 15% source code audit is needed. Based on our recent telephone conversation with ES&S, EAC feels it would be in the best interest of both ES&S and EAC to focus the 15% source code audit on Election Reporting Manager (ERM). The 15% source code audit is 15% of the entire source code, not 15% of ERM. Please let the EAC know what percentage of ERM source code is equal to 15% of the entire source code for Unity 5.0.0.0 and how you arrived at this number.

Based on our review of the results of this additional 15% audit, the EAC will determine (in consultation with iBeta) if additional source code review is necessary or if EAC determines the remaining code is likely to be compliant with the 2005 VVSG and may be reused. All discrepancies found during the source audit must be resolved, regardless of the discrepancy's nature. Because additional source code review will add to both the time and cost of this test campaign, ES&S may wish to consider having iBeta perform a 100% audit of ERM at this time.

If you should have any questions regarding this decision or the impact it has on the Unity 5.0.0.0 testing engagement please do not hesitate to contact me. Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read "Brian Hancock". The signature is fluid and cursive.

Brian Hancock
Director, Testing and Certification
US Election Assistance Commission

From: [Pearson, Steve](#)
To: jfranklin@eac.gov
Cc: [REDACTED]; mmasterson@eac.gov; mskall@comcast.net; mmasterson@eac.gov; stephen.berger@ieee.org; [Carolyn Coggins](#); [Weber, Gary](#); [Carbullido, Ken](#); [McKay, Sue](#)
Subject: RE: ES&S NY Reuse Reallocation
Date: 06/01/2010 03:40 PM

Josh,

ES&S has reviewed the EAC's latest position regarding the reuse of unchanged Unity 3.0 New York source code with Unity 5.0.0.0 and are agreeing to have ERM undergo a 100% review by iBeta. We are currently in the process of addressing discrepancies found in ERM in the previous iBeta reviews. We expect those changes to be complete in approximately 2-3 weeks for iBeta to resume their review.

Thank you for your consideration in this matter.

Regards,

Steve Pearson

Vice President, Certification
Election Systems & Software |11208 John Galt Blvd | Omaha, NE 68137
Direct: 402-970-1225 | Cell: 402-212-4660 | smpearson@essvote.com
www.essvote.com

From: jfranklin@eac.gov [mailto:jfranklin@eac.gov]
Sent: Monday, May 24, 2010 1:04 PM
To: McKay, Sue; Pearson, Steve
Cc: [REDACTED]; mmasterson@eac.gov; mskall@comcast.net; mmasterson@eac.gov; stephen.berger@ieee.org
Subject: ES&S NY Reuse Reallocation

Sue,

Attached is EAC's response for the reallocation of focus for the 15% source audit . Please contact us if you have any questions.

Thank you,

Joshua M. Franklin
Computer Engineer
U.S. Election Assistance Commission
1201 New York Avenue, Suite 300
Washington, DC 20005
Tel. (202) 566-3100 (main office)
Tel. (202) 566-0358 (direct)
Fax (202) 566-3128
www.eac.gov

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