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Summary of Findings of the Pre-Election Assessment of the Dominican Republic's Automated Voting System

The International Foundation for Electoral Systems (IFES) contracted Pro V&V, Inc. on January 18, 2020, to perform a pre-election assessment of the automated voting system to be used in the Dominican Republic's February 16, 2020, municipal elections. The pre-election assessment is neither an audit nor a certification of the voting system; it is an evaluation of the voting system based on the assessor's expertise. Pro V&V's staff brought to this assessment more than 25 years of experience and expertise in testing voting systems, both in the United States and internationally. Pro V&V was asked to, first, evaluate the functionality and security of the voting system and, second, provide short-, medium- and long-term recommendations to improve the voting system and its transparency.

The assessment team arrived in Santo Domingo, Dominican Republic, on Sunday, January 19 and began the pre-election assessment on Monday, January 20. The first step in the assessment was for the Central Electoral Board (JCE) of the Dominican Republic to provide a detailed demonstration of the voting system. Pro V&V was allowed to stop the demonstration and ask questions at its discretion. Pro V&V found this very informative and received a good understanding of the system's inner workings from a technical point of view. The next step was to tour the production facilities and development environments on Tuesday, January 21. Pro V&V was then given a tour of the data center, development facilities, election materials production area and the warehouse used for collection, storage and distribution of the physical voting system components. On Wednesday, January 22, Pro V&V started its hands-on assessment of the voting system by conducting interviews, reviewing the development environment and source code and examining configuration management practices and physical security. Pro V&V was then provided two complete systems to analyze. This evaluation was performed on Thursday, January 23 and Friday, January 24. On Saturday, January 25, Pro V&V conducted a complete system integration test – from the unpacking and setup of the system to remote transmission of the results.

The assessment team did not identify any major deficiencies in the automated voting system being used in the February 16, 2020, municipal elections. However, they did offer a series of recommendations that will improve the transparency and auditability of the voting system. Below are the short-term recommendations intended for implementation ahead of the February elections, medium-term recommendations intended for implementation ahead of the May elections and long-term recommendations to improve the voting system:

Short-Term Recommendations

1. **Address inclusion of polling station officials and political party representatives in two voter lists.**
   The current system as provided allows for the polling station officials – president, secretary,

assistant secretary, etc. – and political party representatives to be in the voter list in two locations. The first location is the district where the official or representative resides and the other is where the official or representative is working. Because the officials and representatives are in the voter list twice, there is the possibility that they could vote twice, once in each location. While a simple search of the results after the election could determine if this occurred and for how many individuals, the assessment team recommends that the JCE either by regulation or by technical means address this issue before the February 16, 2020, municipal elections.

2. **Develop a new procedure for the use of the fingerprint scanner.** The automated voting system added a new fingerprint capture device that has not been used in previous elections. The assessment team observed many JCE employees vote in a mock election exercise. The team noted that everyone attempted to use only their index finger on their dominant hand. The assessment team recommends that the JCE develop a procedure for using different fingers if there is a problem capturing the first index finger. The team proposes that the procedure be to scan the index finger, followed by the thumb, followed by the ring finger on the dominant hand. If a fingerprint cannot be captured, retry in the same order using the nondominant hand. By attempting to use multiple fingers to capture the fingerprint, there may be more successful captures and fewer manual overrides. If the system fails to capture fingerprints from two consecutive voters, the poll station should contact the JCE for technical assistance.

Medium-Term Recommendations

3. **Select an escrow agent to hold voting system artifacts.** It is recommended that the JCE research and select an escrow agent to hold the final source code, executable, database and the accompanying hash value. The escrow agent may be the central bank, another government agency or a commercial software escrow agent. If an issue arises, or the election is called into question, the JCE can request that the escrow agent release the artifacts to a third party.

4. **Determine an amount of time before elections to halt system changes.** It is recommended that the JCE determine an amount of time before every election when development or changes to the voting system are halted. The amount of time before an election should be sufficient to allow independent third parties to review the source code.

Long-Term Recommendations

5. **Create a single audit log.** Although the assessment team was able to use the current logging for auditability, the JCE should work to pull together the information into a single audit log for the deployed voting system. A single audit log that is human readable would improve the system's transparency.

6. **Develop a formal process for tracking software defects.** It is recommended that the JCE develop a formal process for tracking software defects and that the JCE develop a formal software release process that includes change release notes. Best practices would be to have a formal process using tools that can communicate with more stakeholders.

7. **Automate the Secretary's Log.** It is recommended that the current Secretary's Log, which tracks all issues in the polling stations and is critical for a forensic examination, be automated. The current method of paper and pencil allows for changes and edits by simply using an eraser. An automated real-time system would ensure that no changes are made after transmission.

8. **Establish a formal software development process.** It is recommended that the JCE establish formal software development processes such as Capability Maturity Model Integration to formalize the processes and procedures used by the JCE in the development and maintenance of the voting system.