

2.03 - Democracy Suite[®] EMS Functionality Description

Version: 5.17-CO::4

May 2, 2023

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CHAPTER 1: INTRODUCTION

1.1 Document Use

This document is intended for use with the Democracy Suite[®] 5.17 platform.

1.2 Relevant Disclaimers

This document may make reference to certain Democracy Suite[®] functionalities that are not part of the current 5.17-CO campaign and should be disregarded throughout the document.

For a full list of relevant disclaimers, please see the “Relevant Disclaimers” section in the *2.02 - Democracy Suite[®] System Overview* document.

1.3 Introduction

Democracy Suite[®] Election Management System (EMS) represents a set of enterprise grade, N-Tier software applications for defining and managing election projects of various sizes and complexities. This document provides information specific to election domains to help all interested parties (developers, business stakeholders, etc.) understand the problem domain within Democracy Suite[®] Election Management System (EMS).

This document represents a functional description of the Democracy Suite[®] EMS software platform. The internal structure of the software is covered in the following documents:

- *2.02 - Democracy Suite[®] System Overview*
- *2.05 - Democracy Suite[®] EMS Software Design and Specification*
- *2.06 - Democracy Suite[®] System Security Specification*
- *2.07 - Democracy Suite[®] System Test and Verification*
- *Democracy Suite[®] EMS Standard System Installation and Configuration Procedure*
- *Democracy Suite[®] EMS Election Event Designer User Guide*
- *Democracy Suite[®] EMS Results Tally & Reporting User Guide*
- *Democracy Suite[®] EMS Audio Studio User Guide*
- *Democracy Suite[®] ImageCast[®] Adjudication User Guide*
- *Democracy Suite[®] EMS Election Data Translator User Guide*

- *Democracy Suite[®] EMS Results Transfer Manager User Guide*
- *Democracy Suite[®] EMS Mobile Ballot Production User Guide*
- *Democracy Suite[®] EMS ImageCast[®] Voter Activation User Guide*

1.4 Document Organization

This document is organized as follows:

- Section 1 - Purpose and Scope - provides introductory information about the system as well as a list of applicable (TDP) specification documents contained within the Democracy Suite[®] EMS technical data package.
- Section 2 - System Overview - provides an overview of the primary components and functions of the system. It also includes logical and physical views into the system, as well as a workflow depicting how the system is used. This section also describes the system requirements of the EMS platform.
- Section 3 - The Democracy Suite[®] EMS Domain Model - provides a description of the election domain model defined for the system including domain entities, domain stakeholders and domain implementation.
- Section 4 - System Security Description provides an introductory overview of the security aspects of the system. *2.06 - Democracy Suite[®] System Security Specification* includes a detailed description of the security aspects of the system.

1.5 Referenced External Documents

- *2.02 - Democracy Suite[®] System Overview*
- *2.05 - Democracy Suite[®] EMS Software Design and Specification*
- *2.06 - Democracy Suite[®] System Security Specification*
- *2.07 - Democracy Suite[®] System Test and Verification*
- *Democracy Suite[®] EMS Standard System Installation and Configuration Procedure*
- *Democracy Suite[®] EMS Election Event Designer User Guide*
- *Democracy Suite[®] EMS Results Tally & Reporting User Guide*
- *Democracy Suite[®] EMS Audio Studio User Guide*
- *Democracy Suite[®] ImageCast[®] Adjudication User Guide*
- *Democracy Suite[®] EMS Election Data Translator User Guide*

- *Democracy Suite[®] EMS Results Transfer Manager User Guide*
- *Democracy Suite[®] EMS Mobile Ballot Production User Guide*
- *Democracy Suite[®] ImageCast[®] Voter Activation User Guide*

CHAPTER 2: SYSTEM OVERVIEW

2.1 Democracy Suite[®] EMS Overview

The Democracy Suite[®] Election Management System (EMS) set of applications are responsible for all pre-voting and post-voting activities in the process of defining and managing elections. The complete EMS software platform consists of client (end-user) and server (back-end) applications as follows:

- Democracy Suite[®] EMS Election Event Designer - main pre-voting phase end-user application integrating election definition functionality.
- Democracy Suite[®] EMS Results Tally and Reporting - main post-voting phase end-user application integrating election results acquisition, validation, tabulation, reporting and publishing capabilities.
- Democracy Suite[®] EMS Audio Studio - end-user helper application used to record audio files for a given election project. As such, it is utilized during the pre-voting phase of the election cycle.
- Democracy Suite[®] EMS Adjudication Application - optional application that reviews voter intent on a ballot by ballot basis from the ImageCast[®] Central device utilized during either the absentee voting or post-voting activity phases.
- Democracy Suite[®] EMS File System Service - stand-alone service running on client machines enabling access to low level operating system API for partitioning CF cards, reading raw partition on ICP CF cards, etc.
- Democracy Suite[®] EMS Election Data Translator - end-user application used to export election data from election project and import election data into election project.
- Democracy Suite[®] EMS Results Transfer Manager - stand-alone application used to transfer result files from the remote locations to one or more central locations where the results can be tallied and reported on.
- Democracy Suite[®] EMS Mobile Ballot Production - Windows application that is used to search, preview and print ballots via a local printer device.
- Democracy Suite[®] Smart Card Helper Service - stand-alone service running on client machines enabling ability to read to and write from smart cards.
- Democracy Suite[®] ImageCast[®] Voter Activation - a Windows applications that is used by poll workers to activate voting sessions by means of smart cards.

- Democracy Suite[®] EMS Election Data Exchange Station - end-user helper application used to program the memory cards and iButton security key required to properly operate the ImageCast[®] series of ballot marking and counting devices. As such, it is utilized during the pre-voting phase of the election cycle.
- Democracy Suite[®] EMS Data Center Manager client - system-level configuration application used in EMS back-end data center configuration.
- Democracy Suite[®] EMS Application Server - server side application responsible for executing long running processes, such as rendering ballots, generating audio files and election files, etc.
- Democracy Suite[®] EMS Database Server - server side RDBMS repository of the election project database which holds all the election project data, including pre-voting and post-voting data.

Figure 2-1 shows a simplified, high-level logical block diagram of the Democracy Suite[®] system. The diagram includes EMS software components, as well as the ImageCast[®] series of ballot marking and counting devices. The diagram also contains election domain stakeholders, such as election administrative personnel and voters.

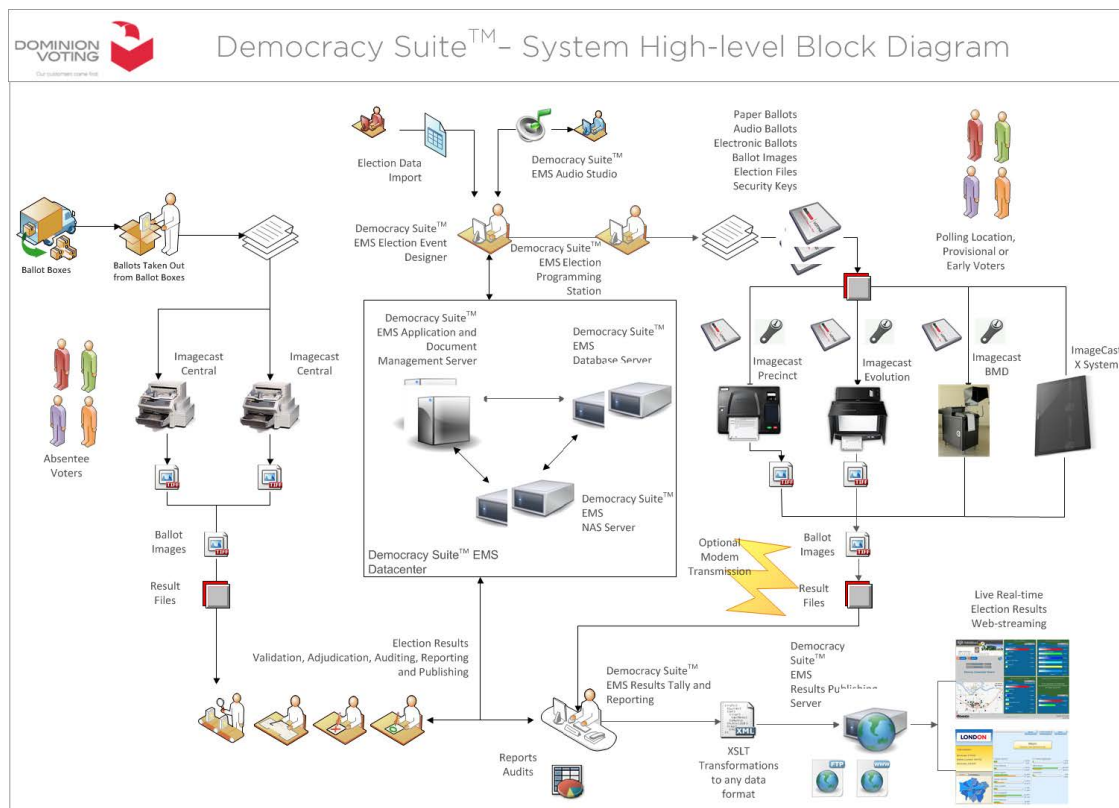


Figure 2-1: The Democracy Suite[®] High-level Block Diagram

As shown in Figure 2-1, election administrative officers and their designees use the Democracy Suite[®] EMS EED client application to define the election project either manually or by importing data from external sources. The system also allows users to define ballot styling parameters and record/synthesize

the corresponding audio files. Users can either utilize the audio synthesis capabilities of the EMS platform, or the audio recording capabilities of the EMS Audio Studio client application to perform this activity. As a primary output, this process provides ready to print ballot artwork, and if configured to do so, electronic ballots and audio files for AVS (Accessible Voting Session) voting.

The last step in election project definition is the generation of election definition and device behavioral and configuration files. This process analyzes the correlation between voting locations, geo-political divisioning and all election event related data, such as ballots, contests and candidates, creating a set of files for each instance of the ImageCast[®] device. These files are used to program memory cards and iButton security keys, smart cards or ImageCast[®] X voting systems for a particular election event. The EMS EED application provides integrated memory card, iButton and smart card security key programming functionality, which allows one card/iButton/smart card to be programmed at a time.

Before utilizing produced ballots, memory cards and iButton/smart card security keys for a real election event, Dominion recommends that the jurisdictions perform logic and accuracy testing to confirm that the system is ready for election day deployment. On election day, jurisdictions can utilize ImageCast[®] Precinct or ImageCast[®] Evolution or ImageCast[®] X ballot counter and marking devices for polling place voting, or ImageCast[®] Central ballot counters for central site processing of absentee, early voting or vote-by-mail ballots.

Each ImageCast[®] device is designed to provide a set of result files, log files and scanned ballot images. These files are acquired by the EMS RTR client application. This application is used to validate, tally, report and publish election results. Figure 2-2 provides a high-level block diagram of the EMS platform

components and illustrates how they correlate with each other to provide an integrated election management platform.

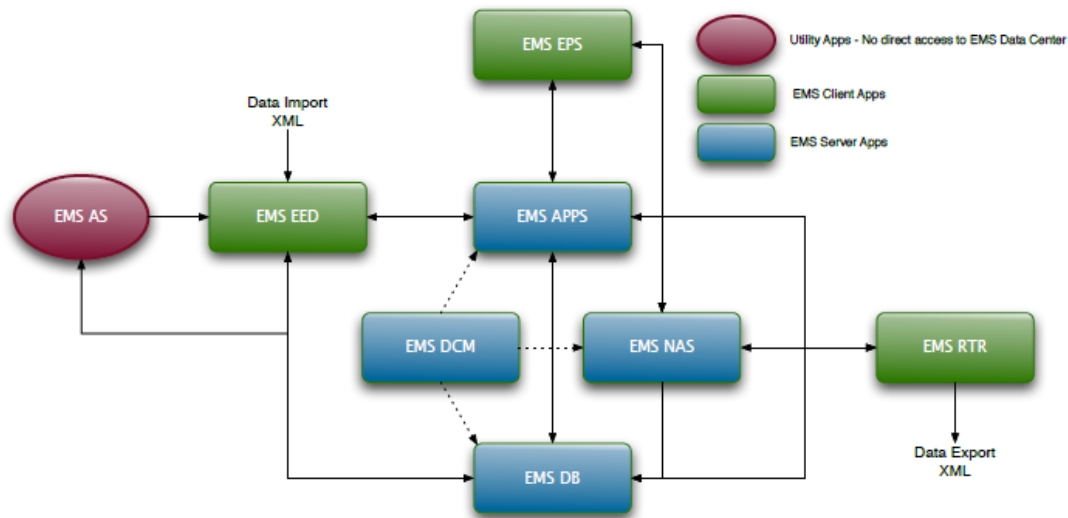


Figure 2-2: The EMS Flowchart

2.2 Democracy Suite[®] EMS Operational Environment

Depending on the deployment scenario, Democracy Suite[®] EMS system requirements can vary. However, due to its modularized architecture, it is possible to define the system requirements for each of the components. The Democracy Suite[®] EMS platform can be deployed in one of the following hardware configurations:

NOTE: 2.06 - Democracy Suite[®] System Security Specification and 2.09 - EMS System Maintenance Manual describe maintenance, transportation and storage procedures for all EMS applications. Please refer to manufacturer's documentation for preventative and corrective maintenance of EMS hardware.

- EMS Express hardware configuration - deploys all EMS software components on a single PC or laptop. Envisioned for jurisdictions with up to 250 electoral districts (precincts/polls).
- EMS Standard hardware configuration - local network deployment of EMS software components utilizing one or more client PC or laptop computers for end-user applications (EED, RTR, AS, ADJ, FSS, EDT and RTM) and a single server hosting back-end applications (DB, NAS, APPS, EMSService). Envisioned for jurisdictions with up to 1000 electoral districts (precincts/polls).

The Democracy Suite[®] EMS platform consists of multiple software components as listed below:

- EMS Election Event Designer (EED) - end-user application
- EMS Results Tally and Reporting (RTR) - end-user application
- EMS Audio Studio (AS) - end-user application
- EMS Adjudication Application (ADJ) - end-user application
- EMS File System Service (FSS) - service component
- Smart Card Helper Service (SCS) - service component.
- EMS Election Data Translator (EDT) - end-user application
- EMS Results Transfer Manager (RTM) - end-user application
- EMS Mobile Ballot Production (MBP): end-user application
- ImageCast Voter Activation (ICVA) - end-user application
- EMS Election Data Exchange Station (EDES) - end-user application
- EMS Application Server (APPS) - back-end application
- EMS Service (EMSService) - back-end application
- EMS Network Attached Storage (NAS) - back-end file repository component
- EMS Database Server (DB) - back-end database repository component
- EMS Data Center Manager (DCM) - back-end configuration component

Detailed information about EMS Configurations can be found in 2.02 - Democracy Suite[®] System Overview.

2.3 System Capabilities

Please refer to the following sections for descriptions on overall system capabilities, pre-voting, voting and post-voting capabilities and maintenance, transportation and storage capabilities.

2.3.1 Overall System Capabilities

- Security: Chapter 4
- Accuracy: Section 3.5.2
- Error Recovery: Section 4.4.2
- Integrity: Section 4.1.4
- System Auditability: Section 3.5.5
- Election Management System: This document provides a description of the Democracy Suite[®] Election Management System.

- Vote Tabulation: Section 3.4.6
- Telecommunications: Please see the *Democracy Suite[®] EMS Results Transfer Manager User Guide*.
- Data Retention: Section 4.1.4

2.3.2 Pre-Voting Capabilities

- Ballot Preparation, General Capabilities, Ballot Formatting, Ballot Production: Section 2.1
- Election Programming: Section 3.4.6.7
- Ballot and Program Installation and Control: Section 3.4.6.7
- Readiness Testing: Section 3.3
- Verification at the Polling Place: Section 3.5.2.3

2.3.3 Voting Capabilities

- Opening the Polls, Precinct Count Systems, Paper-Based Systems, DRE System Requirements: N/A
- Activating the Ballot: Please see the *Democracy Suite[®] EMS ImageCast[®] Voter Activation User Guide*.
- Casting a Ballot, Common Requirements, Paper-based System Requirements, DRE Requirements: N/A

2.3.4 Post-Voting Capabilities

- Closing the Polls: N/A
- Consolidating Vote Data: This document provides a description on consolidating vote data.
- Producing Reports: Section 3.4.7
- Broadcasting Results: Section 3.5.3

2.3.5 Maintenance, Transportation, and Storage Capabilities

- Maintenance, Transportation, and Storage: Section 2.2

CHAPTER 3: THE DEMOCRACY SUITE[®] EMS ELECTION DOMAIN MODEL

One of the challenges of implementing an election domain model is the heterogeneity of different jurisdictions. To reduce this complexity, the characteristics of the various processes in individual jurisdictional areas must be generalized in order to form a model which can be applied to many different situations.

3.1 The Election Domain Entities

Democracy Suite[®] EMS functionality is based on the election domain model which consists of the following domain entities:

- An election project represents a top-level election domain element within the EMS election domain model.
- All other election domain entities are defined under the election project. Each election project contains its own instance of the election data model in the EMS database and can be created, edited, saved, etc.
- Each election project has an associated set of project files (reports, ballot files, audio files, etc.) stored on the EMS NAS server. In this sense, an election project entity represents a placeholder for all election domain related entities and associated election event artifacts.

Each election project can be in one of many possible states. The following states are defined:

- State 1 - Election Project Definition
 - The initial state of the election project which covers the steps of creating an election project, configuring system properties, and defining election entities such as political divisioning, language profiles, offices, contests and choices. These election entities can be imported into the system from external systems, or entered manually.
 - Once an election event is defined in EMS EED, the ballot structure must be defined. Ballot creation does not represent the generation of ballot file artifacts, such as PDFs, PNGs, XMLs, etc. Ballots represent a logical or abstract collection of ballot election entities (choices, contests, etc.) and other ballot related attributes. Ballots are defined for a specific combination of geo-political, elector grouping and language profile associations. Once ballots are created in the EMS Database, the election project transitions from the “Election Project Definition” to the “Election Project Styling” state.
- State 2 - Election Project Styling

- This state covers the styling of paper and accessible voting session (AVS) ballots according to the defined language profiles supported within the election project. Choice and contest representations on the physical (PDF or PNG) ballot can be defined, as well as templates for ballot headers, contests, choices and other static text on the ballot. In this state, the user can preview ballot artwork in the form of PDF files.
- Once the ballot artwork has been deemed satisfactory, the process of generating official ballot manifestations is initiated. Ballot manifestations are generated in PDF, PNG and XML file formats. Once official ballots are generated, they are stored on the EMS NAS server for a given election project. Optionally, the system can synthesize audio files for a given set of language profiles. Once this step is finished, the election project transitions to the “Ballots Generated” state.
- State 3 - Ballots Generated
 - A state of the system in which official ballots already exist on the EMS NAS server for a given project. In this state, the user can proofread generated ballots and play synthesized audio files or attach pre-recorded audio files (if required), as well as modify information about voting locations and tabulators.
 - Once the final preparation of election project data is finished, election files/databases for tabulators are generated. As a result, a set of election files/databases will be stored on the EMS NAS server for all tabulators defined for a given election project. Finally, the election project transitions to “Ready for Election” state.
- State 4 - Ready for Election
 - In this state, the system is ready for the election and the user can program memory cards and iButton security keys for an election event.
 - Once memory cards and iButton/smart card security keys are programmed and labeled, the system can be used for voting. Voting can be performed using different voting channels absentee voters can vote by mail, or election day voters can use tabulators to cast their ballots on the voting location. In any case, if the official voting session is initiated at this point, this also concludes ‘Cycle 1’ of Election Definition for the election project.
- State 1A - Last Minute Definition
 - Allows late modifications to be made within the system even after election files have been created and the initial voting session starts (i.e. absentee vote by mail). Its functionality is based on the election definition cycles which allow users to define election projects and even perform some of the advanced voting features (such as mailing absentee ballots) while still correcting (modifying, adding or disabling) some

election project data (such as adding or disabling a candidate, contest, etc.) for election day voting.

- In the transition to the “Last Minute Definition” state, the system enters ‘Cycle 2’ of the Election Definition. After performing the desired set of modifications, the user initiates a new cycle of the project.
- Election Definition Cycle 2: State 2A, 3A and 4A - Election Project Styling, Ballots Generated and Ready for Election
 - Once the election project has passed from “Last Minute Changes” to “Election Project Styling”, the system creates new ballot instances based on the newly defined data. In this state, the user can filter and delete ballots (abstract ballots, not official ballots) that are not needed. When transitioning to the new “Ballots Generated” state, the system will only create ballot manifestations (PDF and PNG) files for the missing (altered) abstract ballots. In the final transition to the “Ready for Election” state, the system will contain all data from all election definition cycles. As a result, election files will be applicable for all ballots from all election cycles.
- State 5 - Election Project Closed
 - Prepares the system for archiving of the election project. In this state, the election project cannot be used for election event organization.

See Figure 3-1 for a visual representation of election project states.

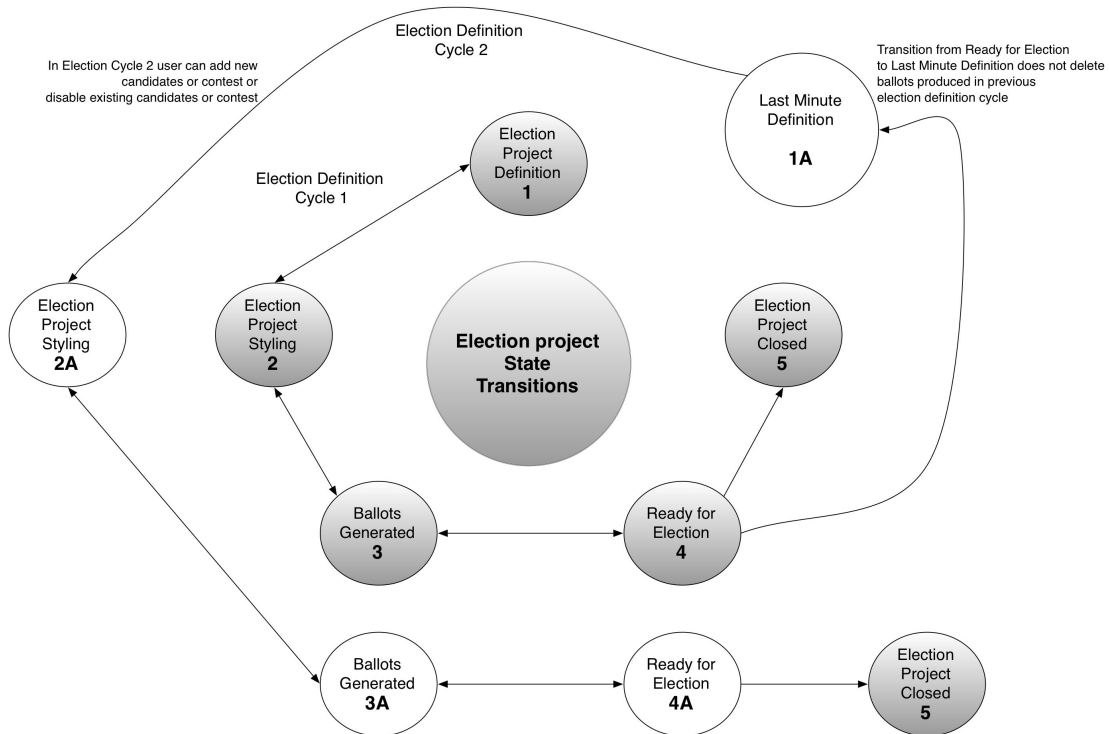


Figure 3-1: The Election Project State Diagram

According to the EMS architecture, it is not possible to skip or bypass any of the states starting with State 1. This means that none of the defined actions from state $i + 1$ can be performed if state is not defined and the project state has changed to state $i + 1$. For example, the system is not allowed to produce ballots if the Election Event domain entity is not defined. Transitioning from a lower state ($i-1$) to an upper state (i) is performed implicitly by the system. If the user wants to perform an action from state $i - 1$ (for $i > 1$) while the election project is in state i , he/she has to explicitly change the state before the action can be performed. In this case, some of the information will be lost, and certain actions will need to be repeated. However, this approach provides full data consistency.

Election project state transitions are controlled by the EMS internal state machine. In the case, when user tries to execute a certain action that is not allowed in the given state, or to try to transition the election project from one state to the other out of sequence, he/she will be notified with the error message. To validate the successful transition from one state to the other, user can verify that all the file artifacts are created by the system. For example, when system transitions from Ballot Styling to Ballots Generated state, system generates a set of ballot PDF files with all the corresponding additional files (such as audio files, etc.). In the case that system is not capable of completing the requested operation for a given state, user will be notified with the error message.

3.1.1 Election Project Divisioning and Domain Objects

NOTE: States and counties are the major legally defined political and administrative units in the United States. A county is generally a sub-unit of regional self-government within a sovereign jurisdiction, such as a state.

See below for a list of divisions and domain objects comprising an election project.

- Jurisdiction - represents a top-level administrative division for which the election project is defined. This can be State, County² or in some cases, Municipality, Township, Town, Borough, Incorporated Place (City), etc.
- Subdivisions - represents a hierarchical tree-like structure of administrative, electoral and geographical areas defined within the election project. The Jurisdiction domain entity represents a top-level division for which the election project is defined. The top-level entity (i.e. jurisdiction) is seen below in the complete hierarchy of subdivision domain objects that can be defined (see Table 3-1 and Figure 3-2). Subdivisions are characterized by type and instance below.

For example, a constituency with a representative in US Congress is a Congressional District that can be defined within the Federal State. In this example, Congress represents an Office domain entity, while a Congressional District represents a type of Subdivision domain entity. An instance of this Subdivision is Congressional District 1, Congressional District 2, etc. Each US

Federal State is organized into one or more such subdivisions (in this case, Congressional District type). Only voters living within each of the Congressional Districts are allowed to vote in the election for the member of the Congress from that district.

Political Divisioning Types		
Borough	Parish	State
Canton	Prefecture	Sub-district
City	Province	Territory
County	Region	Town
District	Republic	Township
Federal state	Rural district	Village
Municipality	Shire	Ward

Table 3-1: Examples of Political Divisioning Types.

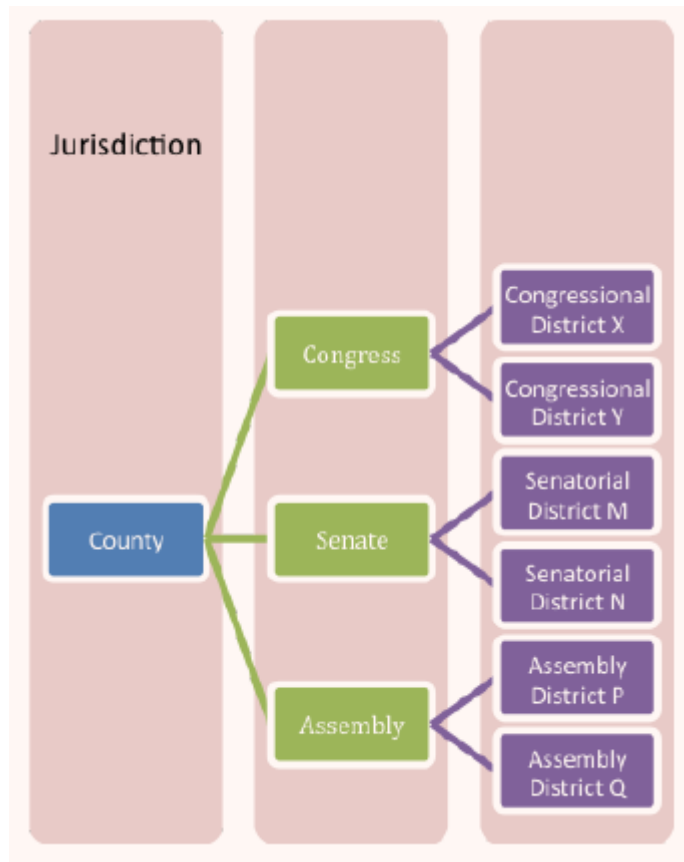


Figure 3-2: Example of Political Divisioning Structure

- Polling Subdivisions - represents the election domain object that is the lowest level administrative subdivision within which a voter is allowed to vote that does not have a separate governmental authority. In the United States, these polling subdivisions are called precincts and in some cases, electoral districts (EDs). Note that polling subdivision is commonplace terminology in the elections industry.
 - A precinct is generally the lowest-level minor civil division in the United States. Precincts usually do not have separate governmental authorities, but for the purpose of conducting elections, the next highest-level MCD, such as a county or township, is subdivided into precincts and each address is assigned to a specific precinct. Each precinct has a specific location where its residents go to vote. Sometimes several precincts will use the same polling location. A 2004 survey by the United States Election Assistance Commission reported precincts in the United States contain an average of approximately 1100 registered voters.

NOTE: Minor Civil Division (MCD) is a term used by the US Census Bureau to designate the primary governmental and/or administrative divisions of a county or township, town, incorporated place (City) or borough.

There are different types of divisions and correlations amongst jurisdictions, subdivisions and polling subdivisions:

- Hierarchical divisioning - This type of divisioning takes the top subdivision area and divides it into smaller sub-areas (subdivisions), and each sub-area is then subdivided into smaller portions. A polling subdivision can be as large as the smallest area (subdivision type C), or it can be a subdivision of this type again. For example, Subdivision C2 could contain a set of Polling Subdivisions (see Figure 3-3).
- Independent Divisioning - This type of divisioning can be seen in Figure 3-3. It allows the top subdivision area to be divided in many different independent subdivisions. A Polling Subdivision is a member of various subdivisions. The borders of Polling Subdivisions are usually determined by the overlaying area borders of all subdivisions, which in turn create disjointed smaller areas.

NOTE: Note that polling subdivision is commonplace terminology in the elections industry and does not appear in the application. Please be advised that the term that appears is precinct.

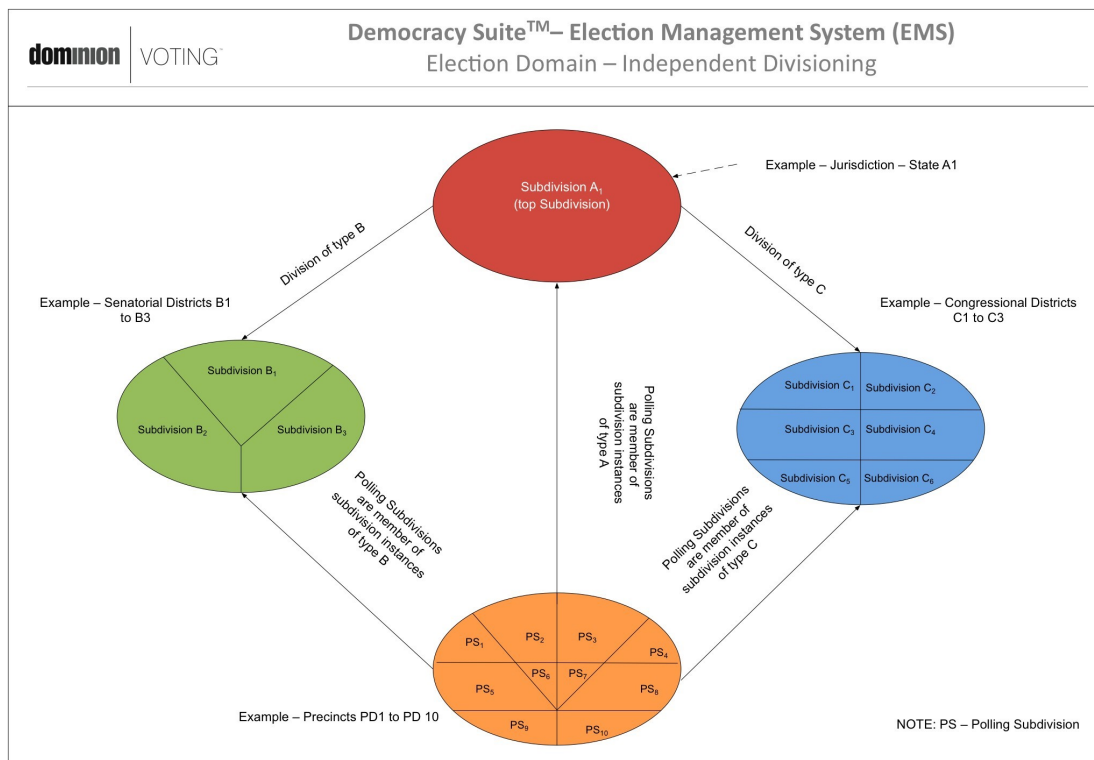


Figure 3-3: The Election Domain - Independent Divisioning

- **Offices** - represents a set of positions to which people or political parties are elected. Offices are closely related to subdivisions and elector groups. An office is applicable to a certain subdivision, which represents an administrative or geographical grouping of electors. This means that people living in a given subdivision can vote and elect members to office. On the other hand, offices can be applicable to elector groups, which clusters electors in a non-geographical manner, so that only members of the given elector group can vote for that office. Sometimes there is a need to organize offices into office groups, which are used to collect and present related offices on the ballot (i.e. State offices, Judicial office, etc.).
- **Language Profile** - represents a domain entity for definition of different language presentations of EMS outputs (ballots, audio files for AV Sessions etc ...). They are divided into two types: “audio” and “ballot content” (textual) profiles. Single textual profiles can have one or more corresponding audio profiles.

NOTE: For example “English textual profile” has the “English audio profile” as its counterpart. However, if the ballot is required to have both English and Spanish text, then an “English/Spanish” textual profile would be defined and the two corresponding audio profiles (“English” and “Spanish”) as well. These profiles would be connected to the “English/Spanish” textual profile.

- **Elector Group and Ballot Group** - a non-geographical grouping of electors (voters) in a given election. This grouping can be based on different classification criteria, including political party membership, school board support, early voters, absentee voters, polling day voters, etc. Within the domain model, there is always one default election group entity, which encompasses all eligible voters (default election group). When different groups of electors are only allowed to vote in certain contests for certain offices, a separate elector group instance is created. Each elector group is characterized by its type and instance. (see Figure 3-4).

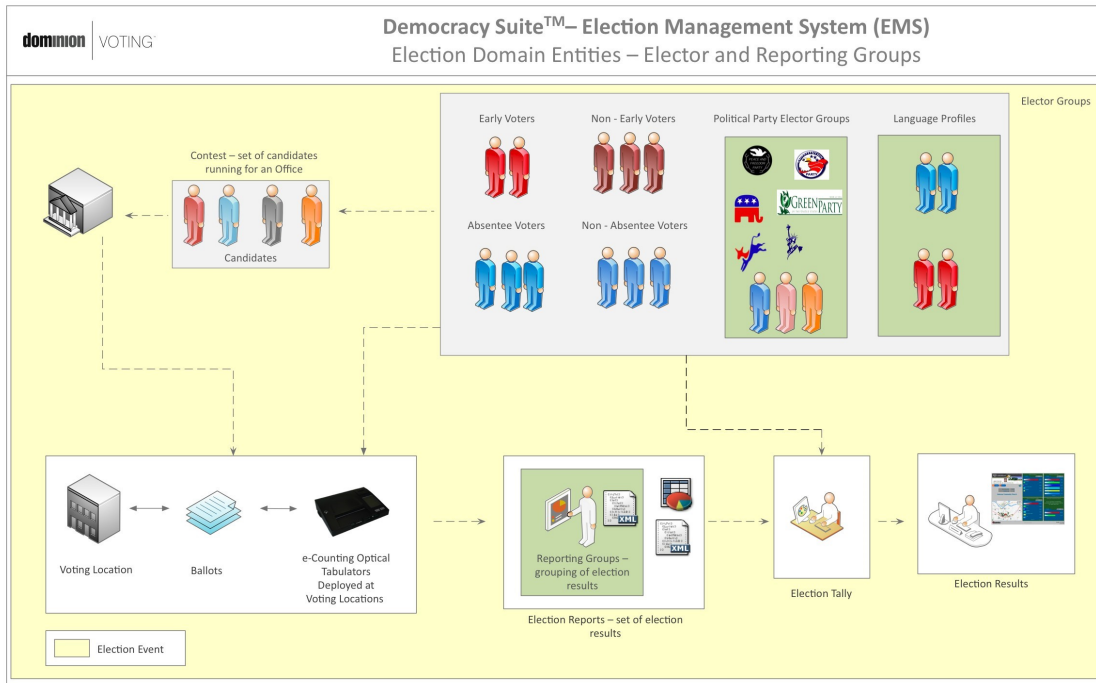


Figure 3-4: The EMS Domain Model - Elector and Reporting Groups (Example)

- **Political Party** - represents a registered political party organization or group of people active within the jurisdiction. Typical examples are the Democratic and Republican parties in the United States.
- **Election Event** - represents an instance of the election in time with its set of contests, candidates, polling locations and ballots (see Figure 3-5). Election Events are characterized by the Election Event Qualifiers, which define the type of election event: General Election and Closed Primary. In addition, the election event can contain different options, such as rotation rules.

NOTE: Please reference Democracy Suite[®] EMS Election Event Designer User Guide for supported functionalities.

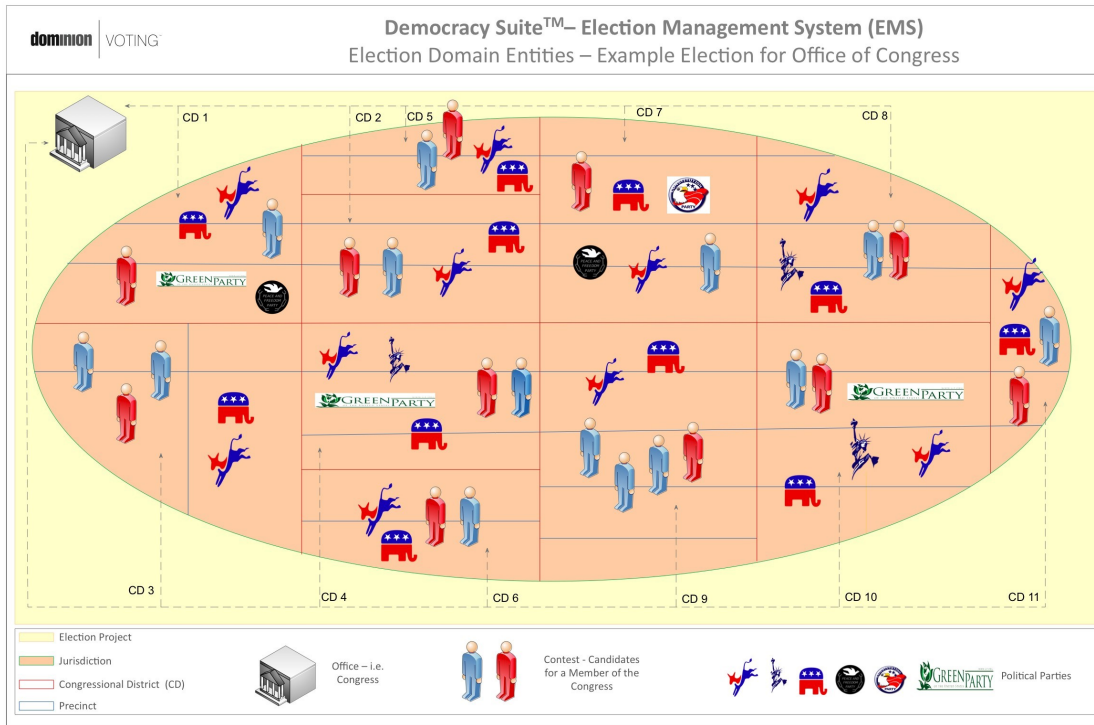


Figure 3-5: The EMS Election Domain - Election for Office of Congress (Example)

Primary Elections

- **Open Primary:** In this type of election, the elector does not declare a party. He/she is given a ballot with all parties, issues, and non-partisan contests on one ballot. In the private voting booth, the person decides which of the partisan tickets to vote for. If the elector votes for Democrats and Republicans, the partisan ballot is not counted, but proposition-type contests (i.e. questions) and non-partisan contests (such as school board) are counted.
- **Closed Primary:** Primary election in which voters receive a ballot listing only those candidates running for office in the political party with which the voters are affiliated. In some states, non-partisan contests and ballot issues may be included. In some cases, political parties may allow unaffiliated voters to vote in their party's primary.
- **Pick-a-Party:** Similar to an open primary, but the first office/contest is a question as to the voter's party preference. If the elector selects political party X, but then he/she strays over to vote for a political party Y, the votes for party Y are ignored.
- **Blanket/Jungle primary:** In the United States, the blanket primary (also known as a jungle primary) is a system used for selecting party candidates in a primary election. In a blanket primary, electors may pick one candidate for each office without regard to political party lines; for instance, a voter might select a party X candidate for governor and a party Y candidate for senator. The candidates with the highest votes by party for each office advance to the general election as the respective party's nominee. This type of Primary differs from the open primary which allows voters to pick candidates regardless of their own party registration, but stick to candidates from a single party.

General Elections

- **Straight Party ticket:** the first contest on the ballot is a vote for all candidates of party X or party Y. This will give a vote to all candidates associated with that party. The elector must continue to vote for propositions/referendums and non-partisan offices on the remaining ballot contests.
- **Direct votes:** elector marks individual candidates.
- **Inclusive straight rules:** applicable when a contest has both direct votes and straight party selections. When a contest has more than one maximum vote and the combination of direct voting and straight party voting creates an overvote, only the direct vote is counted. If the straight party vote and direct vote do not create an overvote, all votes are counted.
- **Exclusive straight rules:** if both direct voting and straight party voting are used for a contest, then straight party votes are not counted; only direct votes.

- Contest - represents a domain entity which contains one instance or representation of the set of candidates running for an office. Due to rotations or other contest criteria, contests can differ from one ballot to another. This entity is defined within the model as a contest manifestation. In addition, each contest has an associated language profile which defines the way contests are presented on the ballot and within election reports.
- Choice - represents a domain entity which defines a single or composite candidate record or referendum question. A referendum question contains a set of options (votes or answer options), but is always counted as a single vote. In addition, each choice has an associated language profile, which defines the way choices are presented on the ballot and within election reports.
- Voting Location - represents a domain entity which defines a physical place where electors cast their ballots during an election event. This entity is sometimes defined as a polling location or a polling place. Depending on the election automation model deployed (decentralized or centralized), ballots can be cast using Dominion decentralized polling subdivision devices at each of the voting locations (i.e. ImageCast[®] series), or by using regular ballot boxes in which case Dominion central devices are used for ballot processing.
- Ballot - represents a domain entity which is an instance or representation of the ballot to be used during the election event. Ballot headers, contests and options including layout, content and language profiles characterize the ballot representation (see Figure 3-6).

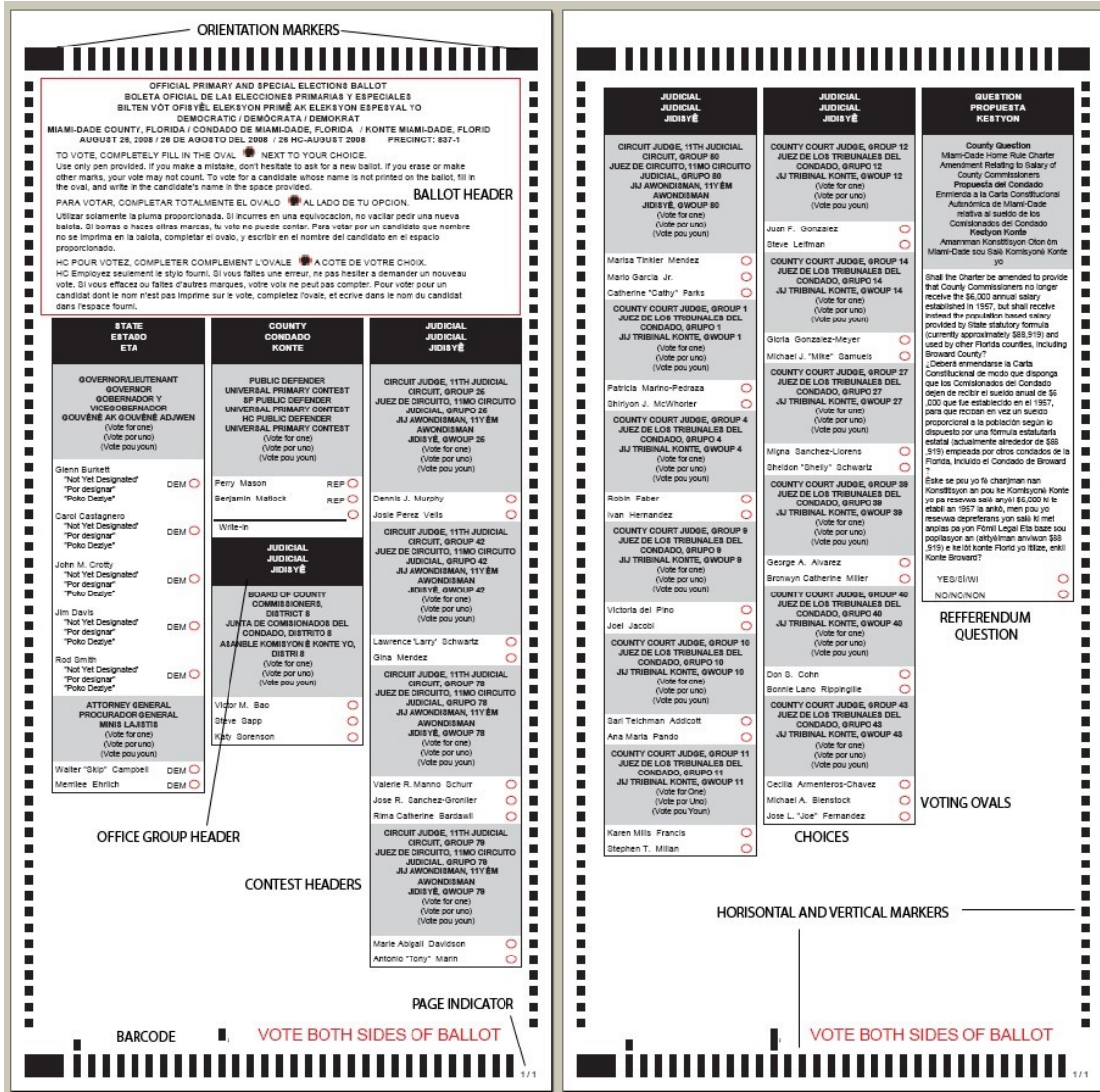


Figure 3-6: The Ballot Composition - Ballot Headers, Contests and Options

- Tabulator - represents a domain entity used to scan, analyze and tabulate ballots during an election event. A distinction is made between decentralized and centralized ballot counting devices:
 - ImageCast[®] Precinct and ImageCast[®] Central optical ballot scan counters.
- Election Result - a domain entity which defines the results produced by a single instance of the tabulator domain entity. Results are acquired from tabulation devices (ImageCast[®] Precinct, ImageCast[®] Evolution and ImageCast[®] Central) and are used to produce election reports after the results are validated.

- Election Results Tally - represents a domain entity which summarizes the individual election result entities. The election tally is not only based on individual election results, but also on the defined political divisioning structure.
- Election Report - represents a domain entity which defines a set of election reports created for a given election event. The level and type of reporting that occurs is based on the report types.
- Election Auditing - represents a domain entity which defines the complete audit log for given election results (scanned paper ballots and log files produced by the tabulators).

3.2 The Election Domain Stakeholder

Within the election domain model, the following stakeholders are defined (see Figure 3-7):

- Democracy Suite[®] EMS EED Administrator - an electoral office role with a full set of supervisory permissions and rights for using the EMS EED application. This includes a full set of rights for defining an election project domain entity with all associated domain sub-entities, requiring a deep knowledge and understanding of the EMS system. In addition, this role has permission to create and configure all other users of the system for both EMS EED and RTR. This role also acts as a main interface for the Dominion technical and project management team. One or more users of this role can be defined within the system. However, by default, the system is delivered, installed and configured with only one EMS EED administrative user.
- Democracy Suite[®] EMS EED Operator - a member of the electoral office team with a limited set of permissions for using the EMS EED application. This role is defined to be used for some of the more time-consuming tasks, such as defining contests and candidates, creating ballot samples, and running unofficial reports. Users of this role create the EMS EED administrative user. One or more users of the EMS EED Operator role can be defined within the system.
- Democracy Suite[®] EMS EED Technical Advisor - a member of the Dominion technical team knowledgeable in every aspect of the EMS EED system. This role acts as the primary Dominion contact for the electoral office administrator.
- Democracy Suite[®] EMS EED Languages Operator - a special non-administrative role for operators who define different language translations within the system. This role is primarily used for translating ballot elements and tabulator display messages.
- Democracy Suite[®] EMS RTR Administrator - an electoral office role with a full set of supervisory permissions and rights for using the EMS RTR

application. This includes a full set of rights for acquiring, validating, publishing, reporting and auditing election results. One or more users of this role can be defined within the system. There are no users of this role created by default, which means that the EMS EED Administrator must create users of this role type.

- Democracy Suite[®] EMS RTR Operator - a member of the electoral office team with a limited set of permissions for using the EMS RTR application. The user of this role can acquire election results and create reports, but cannot validate, publish or audit election results.
- Democracy Suite[®] EMS RTR Auditor - a member of the electoral office team who only has permission to audit election results.
- Democracy Suite[®] EMS RTR Technical Advisor - a member of the Dominion technical team with deep knowledge of every aspect of the EMS RTR system. This role acts as the primary Dominion contact for the electoral office administrators.

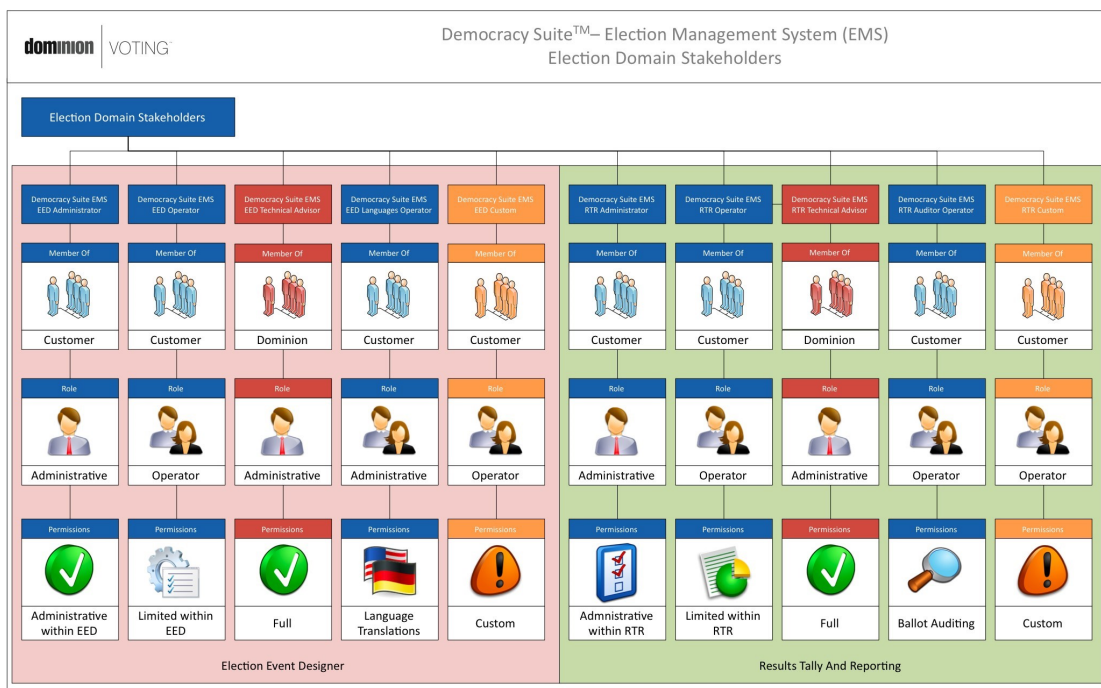


Figure 3-7: The Democracy Suite[®] EMS Election Domain Stakeholders

3.3 The Basic EMS Workflow

The following steps are the main high-level activities to be performed when using the Democracy Suite[®] EMS Election Event Designer for defining elections and are also outlined in Figure 3-8:

1. System data center installation, configuration and testing based on the applicable deployment scenario. This includes making the appropriate system architecture layout and component selections keeping in mind the size, type and complexity of the election project. During this step, the baseline set of Configuration Items (CIs) for the system will be established for a given project, causing a CMDB update and preparing the system for further service support processes.
2. Hands-on training sessions for different types of stakeholders with appropriate examples on how to use the system. The purpose of this step is to help election project teams become acquainted with different usage scenarios and perform mock-up election project definitions.
3. Initial starting of the application and creation of a new election project for a given jurisdiction. This includes its main attributes, generic settings for applicable language profiles, database settings, network configuration, backup and other system options. After this step, the system will have created an instance of the EMS database that is ready to define the election project structure. Only the default administrative users of the platform will be allowed to do so.
4. Definition of users, roles and permissions for the system. The system is delivered with a set of predefined system roles with a defined set of permissions for each role. In addition, only one default user of the administrative role exists within the system upon its installation and initial startup. The default administrative user will create additional users according to the election organization structure. Custom roles can be defined as needed.
5. Generating and reviewing a baseline election and system report showing how the system is configured. This top-level system report contains basic information about the election project and its settings, as well as a list of all defined users and their roles.
6. Defining or importing the administrative, geographical and political divisioning of the jurisdiction for which the election project is to be defined. This step starts with the definition of the political divisioning hierarchy with the jurisdiction node as a root node. The following activities within this step include definition of political parties, elector groups, subdivisions, polling subdivisions, and offices.
7. Producing and reviewing the divisioning reports. These reports show the political divisioning structure of the jurisdiction for which the election project is defined, including subdivisions, polling subdivisions, offices, political parties and elector groups.
8. Defining the election event with its attributes, options, counting groups, contests, candidates, polling locations, etc. At this point, the data needed to program election files and produce ballots is defined. If needed, the style and

appearance of the content, including language translations, can be performed during this step.

9. Defining and producing ballots for the given election event. After correctly performing step 8, this process is mostly automatic. After selecting the ballot template, contest and candidate information is rendered on the ballot, allowing users to preview created ballot styles.
10. Producing and reviewing election event reports which validate that the election event is defined as required and that ballot layouts are correct. Users are ensured that all candidate and contest information is defined correctly, and that produced ballot styles are valid.
11. Defining and configuring optical tabulators - Democracy Suite® ImageCast® Precinct , ImageCast® Evolution and ImageCast® Central devices. This process includes the creation of the Device Configuration Files (DCF), Machine Behavioral Settings (MBS) and Voting Information Files (VIF) needed for the proper operation of the tabulator devices.
12. Configuring any add-on system options (e.g. AVS voting capabilities).
13. Producing and reviewing the optical tabulator definitions. This step includes producing and reviewing the tabulator definition report, as well as the creation of the Logic and Accuracy test set used for performing the system readiness tests.
14. Inspecting the assignment of optical tabulators to designated polling locations.
15. Producing the election master configuration files for optical tabulator programming as well as final ballot layouts for printing. This phase also includes producing (programming) the Compact Flash memory packs with election files for tabulator devices and programming the iButton security keys for tabulator access control activities.
16. Producing and reviewing the auditing report. Before the system is officially declared ready for deployment, the auditing report is inspected. This report lists all the actions performed for the current election project.

17. Saving, backing-up and exporting the election project.



Figure 3-8: The EMS Election Event Designer Workflow

The main high-level steps to be performed when using the Democracy Suite[®] EMS Results Tally and Reporting client application (see Figure 3-9) to process election results are:

1. System installation, configuration and testing according to the deployment scenario. This step involves making the appropriate system architecture layout and component selections keeping in mind the size, type and complexity of the election project. At this step, the baseline set of CIs (Configuration Items) for the system will be established for a given project. This will also cause a CMDB update and prepare the system for further service support processes.
2. Hands-on training sessions for different types of stakeholders. This includes appropriate examples on how to utilize the system. At this stage, Logic and Accuracy testing based on the test data sets produced by EED will be performed as well.
3. Acquisition of the election results using one of the supported methods. These methods are: loading results from e-Counting device memory packs, processing results uploaded using the modem from the e-Counting devices, or manual data entry of the results.
4. Validation of the acquired election results. This includes inspection of the contest and ballot level results. At this stage, ballot images can be inspected

as well. When validating election results, current election result totals are updated.

5. Publishing of the election results. This generates an XML representation of the current validated election result totals.
6. Generating and previewing election reports.
7. Auditing by inspecting ballot images and the corresponding recorded votes.

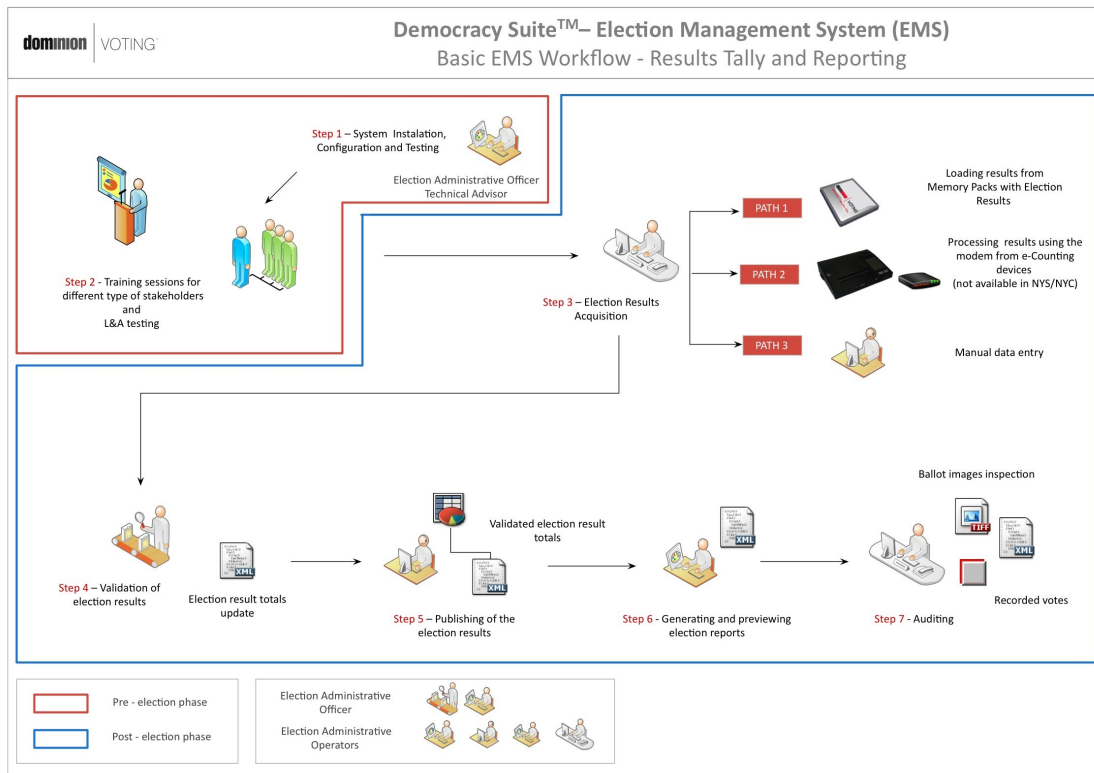


Figure 3-9: The EMS Results Tally and Reporting Workflow

3.4 Domain Implementation - Election Event Designer

3.4.1 Election Project

Election Event Designer is an election project-oriented software tool. This means that each instance of the election (i.e. an election event for a given jurisdiction) is defined as a project and has its own instance within the EMS database. Access to the database is tightly controlled and uses two-levels of authentication: access to the EMS Database Server and to the EMS client application (EED or RTR).

NOTE: For a detailed description of the system security mechanisms, see Section 4.3.

Each Election Project domain entity is characterized by the following attributes:

- Create
- Open Projects
- Close Project
- Save Project As
- Create Backup
- Import
- Export
- Exit

The following list defines each attributes in detail:

- **Create** - action used to define a new election project. Selecting this activity triggers a set of dialogs for the definition of a new election project, its file system structure and associated election database. A new instance of the project is created with its file system structure on the network attached storage drive (used to store associated files such as reports, ballots, election configuration files, etc.), and on the database. The database name is a combination of the election project name and the date of the election event. The database is used to store all the election data model entities and their relationships. This action is only allowed for users belonging to the administrative role.
- **Open Project** - action for opening an existing election project which is related to its corresponding database. This feature allows users to start defining the election project at one time and continue the definition process at some other time. In addition, this feature allows a number of application users to concurrently work on defining the same election project, possibly from different physical locations, in a distributed and transactional manner.
- **Close Project** - action for closing a currently open election project.
- **Save Project As** - action for saving/copying an election project under a different name. This feature creates a new instance of the database with the created election data model. The AES key and vector, common HMAC tabulator key, EED digital certificate, and tabulator user passwords (if password type is “Default”) will be reset after creating copy of a project.
- **Create Backup** - action for creating election project backup package, which contains a backup of the election project database instance from the EMS DB Server and can also contain a set of associated project files from the EMS NAS Server, such as reports, audio files, ballots, etc.
- **Import** - action for importing election entities. This function allows a variety of election project data (such as elector counts) from other legacy systems or EMS to be imported. The intermediate file format used for exchanging data

between election projects is XML. This action is only available to users belonging to the administrative role. In addition, the import function allows users to import dynamic audio files, template keywords, device configurations and reports.

- **Export** - action for exporting audio library definition files, ballot on demand definition files (depending on selected ballot style) and elector counts (in XML format). The audio library definition file is used by the EMS Audio Studio application to record or attach required audio files for a given election project. All synthesized audio files along with the xml file can be exported. On the other hand, ballot on demand definition files correlate ballot IDs and polling subdivisions and can be used by Ballot on Demand applications for at-the-poll ballot printing. The Elector Counts xml file is used for adding numerous electors. This action is only available to administrative users.

Table 3-2 lists Election Project activities and attributes with their description, visibility/configurability status, and required roles.

Election Project		
Activity		
Name	Description	Visibility/Configurability
Name	Unique name of the election project.	Configurable by the user.
Date	Date of the election.	Configurable by the user.
Type	Type of election - General Election or Closed Primary.	Configurable by the user.
Jurisdiction	Name of the jurisdiction for which election project is defined. The jurisdiction also represents a top level area.	Configurable by the user.
Jurisdiction Type	Type of jurisdiction for which the election project is defined. For possible jurisdiction type values, see 3.1.1.	Configurable by the user.
Description	Free-text description of the election project object.	Configurable by the user.

Table 3-2: The Election Project Entity Attributes and Activities

Election Project		
Database	<p>Database configuration string parameters including server name, authentication credentials, etc.</p> <p>Access to the database requires database-level authentication in addition to application-level (election project) authentication.</p>	Not directly configurable by the user.
File System	<p>File system structure for election project output files - (reports, ballots, device definitions, audio files, etc.).</p> <p>This file structure is created on the NAS.</p>	Not configurable by the user.
ID	Unique Election Event ID.	Directly configurable by the user.
External ID	Used for data import and export from external systems.	
Digital Certificate X.509	Common digital certificate for digitally signing ballots produced by the EMS system.	Not configurable by the user.
Common AES Key	<p>Common encryption key for the AES algorithm used for protecting election files. The key is 128 bits long.</p> <p>One AES key is defined per election project.</p>	Not configurable by the user.
Common SHA-256 Key	<p>Common encryption key for HMAC algorithm used for signing of election files and other files produced by the EMS system.</p> <p>One SHA key is defined per election project.</p>	Not configurable.
Activity		
Name	Description	Role Required

Table 3-2: The Election Project Entity Attributes and Activities (Continued)

Election Project		
Create	Create a new election project.	Any Role.
Open Project	Open existing election project.	Any Role.
Close Project	Close the currently active election project.	Any Role.
Save Project As	Copy the active election project to a new one.	Any Role.
Create backup	Create an election project backup package for the active election project.	Any Role.
Import	Import applicable XML formatted project data into the election project. Import applicable files: Dynamic Audio files, Template Keywords, Device Configurations (DCF and MBS), Reports and Electoral Counts.	Any Role. Import election project data to XML file and Import Device Configurations file is allowed for Administrative role.
Export	Export project data from the election project to XML format. Exportable files: Audio Studio definition file, Ballot on Demand definition file and Electoral Counts.	Export can be performed by any role.
Exit	Exit application.	Any Role.

Table 3-2: The Election Project Entity Attributes and Activities (Continued)

3.4.2 Administration

3.4.2.1 User Management

User management within Democracy Suite® EMS relies upon a role-based security framework. This means that the system defines a set of applicable roles with certain sets of permissions. Users can only belong to one of these roles.

The User Management system within EMS EED integrates the following actions:

- Roles - action for defining user roles. Each role corresponds to one of the predefined user stakeholder profiles, but custom roles can be created as well. Each role is characterized by a set of permissions under the permissible

objects of the application for the members (i.e. user) of that role. The roles are defined as specified in Table 3-3.

Each role is characterized by the following attributes:

- ID
- Name
- Application
- Password Type
- System Role Flag
- Admin Role Flag
- Set of Permissions
- Set of Users

Role	Level	Configurability	Application
EMS EED Administrator	Administrative	System Default	EED
EMS EED Operator	Operator	System Default	EED
EMS EED Technical Advisor	Administrative	System Default	EED
EMS EED Languages Operator	Operator	System Default	EED
EMS EED Custom	Operator	Configurable	EED
EMS RTR Administrator	Administrative	System Default	RTR
EMS RTR Operator	Operator	System Default	RTR
EMS RTR Technical Advisor	Administrative	System Default	RTR
EMS RTR Auditing Operator	Operator	System Default	RTR
EMS EED Custom	Operator	Configurable	RTR

Table 3-3: The EMS System Roles

Default system roles cannot be deleted and are created by default upon the installation of application. Only users of administrative and technical advisory roles can modify other roles and define custom roles.

In general, roles can contain the following actions: Lookup, Filter, Create New, Edit, Delete, Sort and Print Preview (see Table 3-4 for more details).

Roles		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique role ID (GUID - globally unique ID).	Not directly configurable by the user.
Name	Unique name of the role. The names of the system roles can not be changed.	Directly configurable by the user for non-system (custom) roles only.
Application	Application to which the role is applicable. Two possibilities exist - EED and RTR.	Directly configurable by the user for non-system (custom) roles only.
Password Type	Password Strength for a given role: Weak (6 characters - lower and upper case characters), Default (8 characters - Lower and upper case characters and digits), Strong (10 characters - Lower and upper case characters, digits and special characters).	Directly configurable by the user for non-system (custom) roles only.
System Role Flag	Read-only flag which shows the given custom role or system role.	Not directly configurable by the user.
Admin Role Flag	Editable flag used to mark a given role as an administrative role.	Configurable by the user.
Permissions	Set of permission target objects and permissions for a given role.	Directly configurable by the user for non-system (custom) roles only.
Users	Set of users defined as members of a given role.	Indirectly configurable by the user.
Activity		
Name	Description	Role Required

Table 3-4: The Roles Entity Attributes and Activities

Roles		
Lookup and Filter	Perform a lookup/filtering for a specific role.	Any Role.
Create New	Create a new role object.	Administrative.
Edit	Open for editing an existing role object.	Administrative.
Delete	Delete one or more of the selected role objects. Only custom roles can be deleted if they are not linked to any of the user accounts.	Administrative.
Sort	Advanced sorting and ordering of role records based on the associated attributes.	Any Role.
Print Preview	Allows users to preview and print a list of roles.	Any Role.

Table 3-4: The Roles Entity Attributes and Activities (Continued)

- Permissions - the EMS system, based on the set of domain entities, actions and commands over those domain entities, defines a set of permissible target objects within the EMS system. End-users cannot define these permissions. They can only define what permission is given to the custom role. The permissible target objects include:
 - Actions - create, modify, delete.
 - Associations - links between the different election domain objects.
 - Execute - set of custom commands within the system.
- Users - action for defining users of the system. Users of all EMS application domains are managed from within the EMS EED User Management system. This action is characterized by the following attributes:
 - ID
 - User Name
 - Password
 - Role
 - Status
 - First Name
 - Last Name
 - Position

- Description
- Contact Address
- Contact Phone 1
- Contact Phone 2
- Contact Email

The following actions are defined for User entities: Lookup, Filter, Create New, Edit, Sort and Print Preview (see Table 3-5 for details).

NOTE: User records cannot be deleted so that auditing trail records can be preserved.

Users		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique user ID.	Not directly configurable by the user.
User Name	Unique user name	Directly configurable by the user for non-system (custom) users only.
Password	Unique user password with a minimum length of 6 and a maximum length of 10 characters. The password has an associated password strength profile.	Dynamically created by the system.
Role	Role of the user.	Directly configurable by the user for non-system (custom) users only.
Status	The user account is either in initial, active or inactive status.	Configurable by the user.
First Name	Full first name of the user.	Configurable by the user.
Last Name	Full last name of the user.	Configurable by the user.
Position	Optional position of the user.	Configurable by the user

Table 3-5: The Users Entity Attributes and Activities

Users		
Description	Optional description of the user. For example, user department and other info can be defined within this field.	Configurable by the user.
Contact Address	Optional address record for the user in free form.	Configurable by the user.
Contact Phone 1	Optional primary phone number for the user.	Configurable by the user.
Contact Phone 2	Optional secondary phone number for the user.	Configurable by the user.
Contact Email	Optional email address for the user.	Configurable by the user.
Activity		
Name	Description	Role Required
Lookup and Filter	Perform a lookup/filtering for a specific user.	Any Role.
Create New	Create a new user object.	Any Role.
Edit	Open for editing an existing user object.	Any Role.
Sort	Advanced sorting and ordering of user records based on associated attributes.	Administrative
Print Preview	Allows user to preview and print a list of users.	Operator

Table 3-5: The Users Entity Attributes and Activities (Continued)

3.4.2.2 Database Management

This activity allows the user to restore the election project package. The election project package represents a collection of election project database backup file and can contain a complete set of associated project files (reports, audio files, ballots, etc.) from the EMS NAS server. This operation can be used to restore a complete election project on the NAS.

3.4.2.3 Network Management

This activity is related to the management of the network settings for the EMS Application Server. The EMS EED and EMS RTR client applications have to be configured to communicate with the designated EMS Application Server.

Within the Network Management administrative activity, user can define the default EMS Application Server address, applicable TCP communication port and name of the server instance. The configured EMS APPS associated network settings are stored within the EMS EED configuration file.

3.4.2.4 System Settings

This activity updates the EMS database, permissions, device configurations, scanning configuration, reports, security files and upgrade template keywords.

The EMS Database model will be updated based on the latest EMS domain model. This feature is used when there is existing election project database in the system, but the new release of the EMS platform is released.

3.4.2.5 Document Viewers

This activity allows the user to set the Acrobat Reader application path for previewing ballot manifestations.

3.4.3 Help

3.4.3.1 Help Documentation and About Box

All EMS client applications have an embedded Help Menu (User Guide). Each User's Guide uses a variety of methods to communicate with the reader, providing background information on problem domains, procedures for executing functions within the application, as well as instructive images and illustrations. In addition to its user documentation, every EMS application has information about application version, supported ballot types (e.g Universal Three Column Ballot Style, New York State General and Primary Elections and Florida General and Primary Elections) and localization settings (see 3.4.3.2.).

3.4.3.2 Localization Settings

The EMS platform incorporates localization differences of the user interface for the end-user client applications (EED and RTR). Localization settings allow users to have language and election terminologyspecific translations of the GUI elements. For example, depending on the localization settings selected, the GUI label for polling subdivision can be presented as precinct, polling subdivision or ED (election district). The EMS client applications are delivered and installed with a pre-defined set of localization settings resource files:

- Default localization settings - English language
- State of Florida localization settings - English language
- State and City of New York localization settings - English language

The user can dynamically change localization settings from within the client application.

3.4.4 Divisioning

Each election project contains different types of divisioning information: administrative, political, geographical, etc. Within Democracy Suite[®] EMS EED, a divisioning set of actions are defined to provide the means for defining and manipulating these election related entities. The following section does not include the navigation menu structure. Rather, it groups together a variety of activities that are related to divisioning.

3.4.4.1 Subdivision Types

This subsection details the actions that must be followed to define the hierarchical structure of the administrative, geographical and electoral areas for the jurisdiction for the election. In essence, this action defines subdivision types and their hierarchy within the jurisdiction. Each divisioning entity is characterized by the following attributes:

- ID
- Name
- Abbreviation
- External ID
- In Ballot List
- Global Order
- Association
- Level

This activity includes the sub-activities “Create New”, “Edit” and “Delete” (see Table 3-6 for more details).

Subdivision Types		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique subdivision type ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Unique name of the subdivision type.	Configurable by the user.
Abbreviation	Abbreviated name of the subdivision type. For example, this is a two character State identifier (USA only).	Configurable by the user.
External ID	Used for data import and export from external systems.	
In Ballot List	Used for presenting the list of subdivisions that are associated with contest. Directly a related to keywords (Area List)	Configurable by the user.
Global Order	Used for setting the order of the divisions	Configurable by the user.
Associations	Links toward one or more parent/child subdivision type objects in the hierarchy.	Configurable by the user.
Level	Indicates the level in the hierarchy, 1 indicates that it is at the top of the hierarchy, every subsequent number is one level down the hierarchy. Is not required to be set.	Configurable by the user.
Activity		
Name	Description	Role Required

Table 3-6: The Political Divisioning (Subdivision Types) Entity Attributes and Activities

Subdivision Types		
Create New	Create a new subdivision type object.	Administrative.
Edit	Open for editing an existing subdivision type object.	Administrative
Delete	Delete one or more of the selected subdivision type objects.	Administrative

Table 3-6: The Political Divisioning (Subdivision Types) Entity Attributes and Activities (Continued)

3.4.4.2 Subdivisions

This subsection details how to define subdivisions for the jurisdiction divisioning structure defined previously in the Subdivision Types activity. Each subdivision is characterized by the following attributes:

- ID
- Name
- Subdivision type
- Parent Subdivision
- Abbreviation
- External ID
- Global Order
- Description
- Polling Subdivision Associations

This activity includes the sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Sort”, “Print Preview”, “Polling Subdivision Association/Disassociation”, “Create Batch”, “Move Up”, “Create Batch”, “Create Tabulators”, “Move Down”. (see Table 3-7 for more details).

Subdivision		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique subdivision ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Name of the subdivision. The maximum length is 64 characters.	Configurable by the user.
Subdivision Type	Type of the subdivision according to the structure defined under the Political Divisioning activity.	Configurable by the user.
Parent Subdivision	Parent subdivision for the selected subdivision.	Configurable by the user.
Abbreviation	Abbreviated name of the subdivision. For example, this is a two-character State identifier for the United States.	Configurable by the user.
External ID	Used for import and export data from external systems.	Configurable by the user.
Global Order	Used for setting the order of the divisions.	Configurable by the user.
Description	Free-text description of the subdivision object. The maximum length is 256 characters.	Configurable by the user.
Polling Subdivision Associations	Set of polling subdivisions (precincts or electoral districts) associated with the given subdivision.	Configurable by the user.

Table 3-7: The Subdivisions Entity Attributes and Activities

Subdivision		
Attributes		
Name	Description	Role Required
Lookup and Filtering	Perform a lookup/filtering for a specific subdivision	Any Role.
Create New	Create a new subdivision object.	Administrative
Edit	Open to edit an existing subdivision object.	Administrative
Delete	Delete one or more of the selected subdivision objects.	Administrative
Reorder	Reorder one or more subdivisions in desired order.	Any Role.
Sort	Advanced sorting of subdivision records based on associated attributes.	Any Role.
Polling Subdivision Association	Associate (connect) one or more Polling Subdivisions with a given subdivision.	Operator
Polling Subdivision Disassociation	Disassociate (disconnect) one or more Polling Subdivisions from the given subdivision.	Operator
Print Preview	Allow users to preview and print a list of subdivisions.	Operator
Batch Subdivision Creation	Allows user to create all subdivision instances for the subdivision type.	Administrative
Batch Tabulator Creation	Allows user to create tabulator instances for the subdivision type.	Administrative

Table 3-7: The Subdivisions Entity Attributes and Activities (Continued)

3.4.4.3 Polling Subdivisions

Polling subdivisions are the smallest geographical and administrative entities. The equivalent term for the US is “precinct”. Each polling subdivision is characterized by the following attributes:

NOTE: Polling subdivision is common terminology in the elections industry and does not appear in the application. The term that appears is precinct.

- ID
- Name
- Number of Electors
- Subpolling District Flag
- Include in X of Y Report Check box
- External ID
- Key in ID
- Global Order
- Subdivision Associations
- Language Profile Associations
- Elector Counts
- Tabular Associations
- Ballot Associations

A polling subdivision becomes split when a portion of it falls into a different voting area than the rest of the polling subdivision. For example, Precinct 1, School District 1, and Precinct 1 School, District 2 would vote for the same contests except for school board contests.

The number of eligible electors is the total number of electors within the given polling subdivision, regardless of elector groups. On the other hand, elector counts is an attribute which defines the number of electors associated with a given polling subdivision within an elector group. This attribute helps produce canvass reports.

Within each election project, there is one default language profile for paper and AVS ballots, as well as for tabulator on-screen instructions. However, additional language profiles may need to be associated with a given polling subdivision in some cases. Desired subdivisions and tabulators also need to be connected to the polling subdivision. Ballots are automatically associated with the appropriate polling subdivision after generating ballot content.

This activity includes the following sub-activities: “Lookup/Filter”, “Create New”, “Edit”, “Delete”, “Reorder”, “Sort”, “Print Preview”, “Subdivision Association/

Disassociation”, “Language Profile Association/Disassociation”, “Tabulator Association/Disassociation” (see Table 3-8 for more details).

Polling Subdivision		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique polling subdivision ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name/ number	Unique name of the polling subdivision. Polling subdivision can consist of three subfields - prefix, name and suffix or one name field depending on selected localization settings.	Configurable by the user.
Split Precincts	Optional list of polling subdivision identifiers (if the polling subdivision is split).	Configurable by the user.
Number of Eligible Electors	Number of eligible electors within the polling subdivision.	Configurable by the user.
Subpolling District	Polling Subdivision identifier (if its main polling subdivision is split).	Indirectly configurable by the user.
Number of Eligible Voters	Number of eligible electors within the polling subdivision.	Configurable by the user.
External ID	Used for import and export data from external systems.	Configurable by the user.
Key in ID	Used for import and export data from external systems.	Configurable by the user.
Subdivision Associations	Set of subdivisions connected to the given polling subdivision.	Configurable by the user.
Global Order	Used for setting the order of the divisions..	Configurable by the user.

Table 3-8: The Polling Subdivision Entity Attributes and Activities

Polling Subdivision		
Language Profile Associations	Set of language profiles connected to the given polling subdivision in addition to the default English language profile.	Configurable by the user.
Elector Counts	A list of ballot group and the corresponding number of eligible voters within the elector group for a given polling subdivision.	Configurable by the user.
Tabulator Associations	Set of tabulators connected to the given polling subdivision.	Configurable by the user.
Ballot Associations	Set of ballots connected to the given polling subdivision.	Indirectly configurable by the user.
Activity		
Lookup and Filtering	Perform a lookup/filtering for a specific subdivision	Any Role
Create New	Create a new polling subdivision object.	Administrative
Edit	Open to edit an existing polling subdivision object.	Administrative
Delete	Delete one or more of the selected polling subdivision objects.	Administrative
Reorder	Reorder one or more polling subdivisions in desired order.	Operator
Sort	Advanced sorting and ordering of polling subdivision records based on associated attributes.	Operator
Subdivision Association	Associate a set of subdivisions with a given polling subdivision.	Operator
Subdivision Disassociation	Disassociate a set of subdivisions with a given polling subdivision.	Operator

Table 3-8: The Polling Subdivision Entity Attributes and Activities (Continued)

Polling Subdivision		
Language Profile Association	Associate a set of language profiles with a given polling subdivision.	Administrative
Language Profile Disassociation	Disassociate a set of language profiles with a given polling subdivision.	Administrative
Elector Counts Association	Associate a set of count of electors per group with a given polling subdivision.	Operator
Elector Counts Disassociation	Disassociate a set of count of electors per with a given polling subdivision.	Operator
Tabulator Association	Associate a set of tabulators with a given polling subdivision.	Operator
Tabulator Disassociation	Disassociate a set of tabulators with a given polling subdivision.	Operator
Print Preview	Allow users to preview and print a list of polling subdivisions.	Operator
Batch Polling Subdivision Creation	Allows user to create all polling subdivision instances.	Administrative
Batch Tabulator Creation	Allows user to create tabulator instances for one or more polling subdivisions.	Administrative

Table 3-8: The Polling Subdivision Entity Attributes and Activities (Continued)

3.4.4.4 Political Parties

Defined political parties are registered and active within the jurisdiction. The defined political party list is used to define elector groups, endorse candidates, create partisan contests in a primary election, as well as create closed primary ballots. Each political party is characterized by the following attributes:

- ID
- Name

- Abbreviation
- Description
- For Independent Candidates check box
- External ID
- Global Order
- Political Party Logo
- Language Profile Associations
- Audio Profile Associations
- Choices Associations
- Settings (applicable only to NYS ballot styles)

This activity includes the sub-activities “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Reorder”, “Sort”, “Audio Profiles” and “Choices” Association/Disassociation, “Print Preview” and “Batch Elector Groups Creation” (see Table 3-9 for more details).

Political Parties		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique party ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Unique name of the political party.	Configurable by the user.
Abbreviation	Three character abbreviation name of the political party. For example, DEM, REP, IND, etc.	Configurable by the user.
Description	Free-text description of the political party record. Maximum number of characters is 256.	Configurable by the user.
Elector Group	Defines the association between a political party and an elector group.	Configurable by the user.
External ID	Used for import and export data from external systems.	Configurable by the user.

Table 3-9: Political Parties Entity Attributes and Activities

Political Parties		
Political Party Logo	A graphical file representing a political party crest or logo. For ballot production, these graphic files must be of high-resolution (300 dpi). The file format of the images must use RGB color space.	Configurable by the user.
Global Order	Used for setting the order of the divisions.	Configurable by the user.
Language Profile Associations	Set of language profiles connected to the given political party in addition to the default English language profile. Used for paper and electronic ballot presentation.	Configurable by the user.
Audio Language Profile Associations	Set of audio language profiles connected to the given political party. Used for audio ballot presentation.	Configurable by the user.
Choices Associations	Set of choices connected to the given political party.	Configurable by the user.
Independent Affiliation Flag	Flag used to mark one or more independent entities affiliating candidates for a given election event.	Configurable by the user.
Party Line Index	(Applicable only to NYS ballot style) Defines a row index on the ballot for a given political party. Used for general elections only.	Configurable by the user.
Party Letter Identifier	(Applicable only to NYS ballot style) Defines a letter identifier for a given political party. Used for primary elections only.	Configurable by the user.

Table 3-9: Political Parties Entity Attributes and Activities (Continued)

Political Parties		
Party Header Text Color	(applicable only to NYS ballot style) Defines a text color on a ballot header for a given political party. Used for primary elections only.	Configurable by the user.
Party Header Background color	(applicable only to NYS ballot style) Defines a background color on a ballot header for a given political party. Used for primary elections only.	Configurable by the user.
Activity		
Name	Description	Role Required
Lookup and Filtering	Perform a lookup/filtering for a specific political party.	Operator
Create New	Create a new political party object.	Operator
Edit	Open for editing an existing political party object.	Operator
Delete	Delete one or more of the selected political party objects.	Operator
Reorder	Reorder one or more political parties in desired order.	Any Role
Sort	Advanced sorting of political party records based on associated attributes.	Operator
Language Profiles Association	Associate one or more language profiles for paper and electronic ballot presentation. Allows users to translate political party content to multiple languages.	Languages Operator
Language Profile Disassociation	Disassociate one or more language profiles for paper and electronic ballot presentation.	Languages Operator

Table 3-9: Political Parties Entity Attributes and Activities (Continued)

Political Parties		
Audio Language Profiles Association	Associate one or more audio language profiles for AVS ballot presentation. Allows user to translate political party content into multiple languages.	Languages Operator
Audio Language Profiles Disassociation	Disassociate one or more audio language profiles for AVS ballot presentation.	Languages Operator
Choices Association	Associate a set of choices with a given political party.	Operator
Choices Disassociation	Disassociate a set of choices with a given political party.	Operator
Print Preview	Allow users to preview and print a list of political parties.	Operator
Batch Elector Groups Creation	Allows user to create partisan elector group instances for one or more political parties.	Administrative

Table 3-9: Political Parties Entity Attributes and Activities (Continued)

3.4.4.5 Elector Groups

Elector groups are defined on a non-geographical basis. Electors can be grouped based on a variety of factors, including political party membership, language profile, etc. Within this activity, elector groups are created based on the previously defined elector types. Each elector group is characterized by the following attributes:

- ID
- Name
- Type
- Abbreviation
- Description
- Default check box
- Has Count check box
- Apply Crossover Rule check box

- External ID
- Global Order
- Column Index
- Contest Associations
- Elector Counts Association
- Language Profiles Association
- Elector Count Precinct Associations
- Audio Association

This activity includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Sort”, “Print Preview”, and “Contest Association/Disassociation” (see Table 3-10 for more details).

Elector Groups		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique elector group ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Unique name of the elector group.	Configurable by the user.
Type	Type of the elector group as defined in Elector Group Types activity.	
Abbreviation	Abbreviated name of the elector group.	Configurable by the user (using Elector Group Types activity).
Description	Free-text description of the elector group record.	Configurable by the user
Top Flag	Defines is the given elector group belongs to default elector group type	Not configurable by the user.
Global Order	Used for setting the order of the divisions.	Configurable by the user.

Table 3-10: The Elector Groups Entity Attributes and Activities

Elector Groups		
Column index	Indicates which column the section for an associated party in an open primary should appear in.	Configurable by the user.
Electoral Group Associations	Set of electoral counts connected to the given ballot group	Not directly configurable by the user.
Elector Counts Associations	Set of polling subdivisions connected to the given elector group via elector count.	Configurable by the user.
Omitted flag	Defines if the elector group is omitted and cannot be selected for a con-test. This flag is used when defining a contest in the Election Event set of activities.	Configurable by the user.
Ignore Rotation flag	Defines if rotations are ignored for contests connected to the elector group.	Configurable by the user.
External ID	Used for import and export data from external systems.	Configurable by the user.
Contest Associations	Set of contests connected to the given elector group. Allows users to define for what contests a given elector group is applicable to.	Configurable by the user
Activity		
Name	Description	Role Required
Lookup and Filtering	Perform a lookup/filtering for a specific elector group.	Any Role
Create New	Create a new elector group object.	Administrative
Edit	Open for editing an existing elector group object.	Administrative

Table 3-10: The Elector Groups Entity Attributes and Activities (Continued)

Elector Groups		
Sort	Advanced sorting of elector group records based on associated attributes.	Any Role
Delete	Delete one or more of the selected elector group objects.	Administrative
Print Preview	Allow users to preview and print a list of elector groups.	Operator
Contests Association	Associate one or more contests to a given elector group.	Administrative
Contests Disassociation	Disassociate one or more contests to a given elector group.	Administrative
Elector Counts Associations	Associate one or more precinct to a given elector group.	Administrative
Elector Counts Disassociation		Administrative

Table 3-10: The Elector Groups Entity Attributes and Activities (Continued)

3.4.4.6 Ballot group

Electors can be gathered in one or more groups, based on different criteria. An elector can be a member of multiple elector groups, but a member of only one ballot group. Within this activity, elector groups are created based on the previously defined elector types. The system automatically combines all defined elector groups.

Each ballot group is characterized by the following attributes:

- ID
- Name
- External ID
- Global Order
- Ignore Rotation check box
- Consolidate checkbox
- Electoral Group Associations

- Omitted Counting Groups association
- Background Color on Ballot

This activity includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Sort”, “Print Preview”, “Recreate” (see Table 3-11 for more details).

Ballot Group		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique elector group ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Group Name	Unique name of the ballot group.	Configurable by the user.
External ID	Used for import and export data from external systems.	Configurable by the user.
Global Order	Used for setting the order of the divisions.	Configurable by the user.
Consolidate checkbox	Indicates that ballots produced for this Ballot Group should always be consolidated.	Configurable by the user.
Omitted Counting Groups Associations	Indicates the list of counting groups for which this ballot group will be omitted when producing election files for associated tabulators.	Configurable by the user.
Background Color on Ballot	Indicates the background color used for ballots in this ballot group.	Configurable by the user.
Activity		
Name	Description	Role Required
Lookup and Filtering	Perform a lookup/filtering for a specific ballot group	Any Role

Table 3-11: The Ballot Group Entity Attributes and Activities

Ballot Group		
Recreate	Recreate new set of ballot group objects.	Administrative
Edit	Open for editing an existing elector group combination object.	Administrative
Recreate	Create again (recreates) ballot group objects	Administrative
Sort	Advanced sorting of ballot group records based on associated attributes.	Any Role
Delete	Delete one or more of the selected ballot group objects.	Administrative
Print Preview	Allow users to preview and print a list of elector groups.	Operator
Electoral Group Associations	Associate one or more electoral counts to a given ballot group.	Administrative
Electoral Group Disassociation	Disassociate one or more elector count to a given elector group.	Administrative
Omitted Counting Groups Association	Associate one or more counting groups to a given ballot group.	Administrative
Omitted Counting Groups Disassociation	Associate one or more counting groups to a given ballot group.	Administrative

Table 3-11: The Ballot Group Entity Attributes and Activities (Continued)

3.4.4.7 Offices

Office is an administrative position (i.e. “City Mayor”). In our domain, an office is a template from which each particular contest is created. It contains common attributes and business logic for the belonging contests (i.e. if there is a region with five cities, there will be five contests for mayor, sharing the same definition).

Each office is characterized by the following attributes:

- ID
- Name
- Office Type
- Description
- Subdivision Type
- Number of Write-ins
- Vote For
- Term Length
- Ballot Markers per Position
- Paper Index
- Acclamation Type
- Major Office Flag
- Cannot be duplicated
- Straight party override by rank
- External ID
- Global Order
- Settings (applicable only to certain ballot styles)
- Ranked Choice Voting (applicable only to certain ballot styles)
- Rotation (applicable only to certain ballot styles)

The creation of offices includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Reorder”, “Sort”, “Elector Group Types Association/Disassociation”, “Print Preview” and “Batch Contest Creation” (see Table 3-12 for more details).

Offices		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique office ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Unique name of the office.	Configurable by the user.

Table 3-12: The Offices Entity Attributes and Activities

Offices		
Office Type	Type of office. For example, Candidacy, Nomination, Measure, etc.	Configurable by the user.
Description	Free-text description of the office record.	Configurable by the user.
Subdivision Type	Type of subdivision associated with the given office.	Configurable by the user.
Number of Write-ins	Number of write-ins for a given office.	Configurable by the user.
Vote For	Number of positions to be elected for a given office.	Configurable by the user.
Term Length	Defines the number of years a candidate(s) will hold the office position.	Configurable by the user.
Ballot Markers per Position	Number of ballot markers defines width of the contest (NYS ballot style) or height needed for choice name (portrait ballot styles)	Configurable by the user.
Acclamation Type	Three options are available: None (acclaimed contests or contests without choices for a given office will be presented on a ballot); Remove Empty (contests without any candidates will not be presented on a ballot).Remove Acclaimed (acclaimed contests and contests without candidates will not be presented on a ballot)	Configurable by the user.
Major Office	Results of error conditions during scanning can be configured differently for major offices.	Configurable by the user.

Table 3-12: The Offices Entity Attributes and Activities (Continued)

Offices		
Cannot be duplicated	Indicates that results for this office cannot be duplicated when using the conditional vote resolution.	Configurable by the user.
Straight party override by rank	Indicates that straight party override behavior should use ranks.	Configurable by the user.
Paper Index	Defines where the given office will be positioned on multi-page ballots.	Configurable by the user.
External ID	Used for import and export data from external systems.	Configurable by the user.
Global Order	Used for setting the order of the divisions.	Configurable by the user.
Column Position	Defines office column position on a ballot.	Configurable by the user.
Rotation Type	Detailed information for the selected rotation type (if any).	Configurable by the user.
Rotation Details	Type of rotation for a given office.	Configurable by the user.
Write-in Flag	Write-in option allowed or not for a given office.	Configurable by the user.
Number of Positions	Number of positions to be elected for a given office.	Configurable by the user.
Column Position	Defines office column position on a ballot.	Configurable by the user.
Column Span	Office can be spanned in a multiple columns on a ballot depending on the ballot style.	Configurable by the user.
Paper Index	Defines where the given office will be positioned on multi-page ballots.	Configurable by the user.

Table 3-12: The Offices Entity Attributes and Activities (Continued)

Offices		
Activity		
Name	Description	Role Required
Lookup and Filtering	Perform a lookup/filtering for a specific office.	Operator
Create New	Create a new office object.	Any Role
Edit	Open to edit an existing office object.	Operator
Delete	Delete one or more of the selected office objects.	Operator
Reorder	Reorder one or more offices in desired order. The order of offices reflects on contest order on a ballot.	Operator
Sort	Advanced sorting and ordering of subdivision records based on associated attributes.	Operator
Elector Group Types Association	Associate one or more elector group types to a given office.	Operator
Elector Group Types Disassociation	Disassociate one or more elector group types to a given office.	Operator
Print Preview	Allows users to preview and print a list of offices.	Operator
Batch Contest Creation	Allows users to create all contest instances for one or more offices.	Administrative

Table 3-12: The Offices Entity Attributes and Activities (Continued)

3.4.4.8 District Rotations

District Rotations- activity for defining the rotation relationship where the district associated with a contest has its rotation calculated based on a rotation area. Each rotation area is assigned a rotation index which starts with 0. When district

rotation is applied the actual rotation value is calculated based on the number of candidates and the rotation index of the rotation area.

Each office is characterized by the following attributes:

- ID
- Contest Area ID
- Rotation Area ID
- Rotation Index

The creation of offices includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Sort”, “Print Preview”, “Set Item Count” and “Import”. (see Table 3-13 for more details).

District Rotations		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique office ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Contest AreaID	External ID of Contest District	Configurable by the user.
Rotation Area ID	External ID of Rotation District	Configurable by the user.
Rotation Index	Index used to calculate rotation value (starts at 0)	Configurable by the user.
Activity		
Name	Description	Role Required
Lookup and Filtering	Perform a lookup/filtering for a specific office.	Operator
Set Item Count	Sets the number of items (rows) to be presented in the screen	Any Role
Create New	Create a new District Rotation object.	Any Role
Edit	Open to edit an existing District Rotation object.	Operator

Table 3-13: The District Rotations Entity Attributes and Activities

District Rotations		
Delete	Delete one or more of the selected District Rotation objects.	Operator
Sort	Advanced sorting and ordering of District Rotation records based on associated attributes.	Operator
Print Preview	Allows users to preview and print a list of District Rotations.	Operator
Import	Allows for importing of District Rotation records.	Operator

Table 3-13: The District Rotations Entity Attributes and Activities (Continued)

3.4.4.9 Line

This activity allows users to define the line on which candidates of a particular party will appear.

Each line is characterized by the following attributes:

- ID
- Name
- Number
- Letter
- General
- Override
- Political Parties
- Choices

The creation of line includes the following sub-activities: “Save”, “Save and Close”, “Add”, “Remove”(see Table 3-14 for more details).

Line		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique line ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Unique name of the line.	Configurable by the user.
Number	Specify line number (required).	Configurable by the user.
Letter	Candidate reference (for example: A, B, C, D)	Configurable by the user.
Override	RTF should be defined and attached to desired ballot cards.	Configurable by the user.
Political Parties Association	Associate political party with a line	Configurable by the user.
Activity		
Name	Description	Role Required
Lookup and Filtering	Perform a lookup/filtering for a specific office.	Operator
Set Item Count	Set the number of items (rows) to be presented in the screen	Any Role
Create New	Create a new District Rotation object.	Any Role
Edit	Open to edit an existing District Rotation object.	Operator
Delete	Delete one or more of the selected District Rotation objects.	Operator

Table 3-14: The Line Entity Attributes and Activities

Line		
Sort	Advanced sorting and ordering of District Rotation records based on associated attributes.	Operator
Print Preview	Allows users to preview and print a list of District Rotations.	Operator
Import	Allows for importing of District Rotation records.	Operator

Table 3-14: The Line Entity Attributes and Activities (Continued)

3.4.5 Election Event

3.4.5.1 Election Event Properties

This activity allows users to define the top-level attributes of the election event defined within the active election project. Most election event attributes are defined when a new election project is created (see Section 3.4.1). However, this activity is used to preview already defined attributes and change them if needed. Furthermore, additional election event attributes can be defined within this activity.

Each election event is characterized by the following attributes:

- ID
- Name
- Date
- Election Event Type
- Description
- Election Project Status
- Signature
- Jurisdiction Name
- Jurisdiction Type
- Election Event ID
- External ID
- Ballot Settings
- Audio Settings
- Audio Language Profile Associations Currently available ballot styles are:
- Florida General and Primary Elections

- New York State General and Primary Elections
- New Jersey Ballot Style
- Universal Multi Column Ballot Style

This activity only has editing capabilities. See Table 3-15 for more details.

Election Event		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique election event ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Unique name of the election event.	Configurable by the user.
Election Event Date	Date of the election event.	Configurable by the user.
Type	Type of the election event.	Configurable by the user.
Description	Free-text description of the election event record.	Configurable by the user.
Election Project	State of the election project (as defined in Section 3.1)	Configurable by the user.
Signature	A randomly generated value, which uniquely identifies the current EMS project.	Automatically set on project creation.
Jurisdiction Name	Name of the jurisdiction organizing the election event.	Configurable by the user.
Jurisdiction Type	Type of the jurisdiction organizing the election event.	Configurable by the user.
Election Event ID	Election event ID defined by user.	Configurable by the user.
External ID	Used for import and export data from external systems.	Configurable by the user.
Ballot Settings	Setting of ballot style.	Configurable by the user.

Table 3-15: The Election Event Entity Attributes and Activities

Election Event		
Audio Settings	Type of AVS ballot support: none, full audio (used in combination with the ImageCast® Evolution device) or compressed AVS ballot.	Configurable by the user.
Audio Language Profile Associations	Set of audio language profiles connected to the given election event. Used for audio ballot presentation.	Configurable by the user.
Activity		
Name	Description	Role Required
Edit	Open for editing an existing election contest object.	Administrative
Export Digital Certificate	Export digital certificate (X.509) for the election event.	Operator
Audio Language Profiles Association	Associate one or more audio language profiles for election event content presentation. Allows user to translate election event content in multiple languages.	Administrative
Audio Language Profiles Disassociation	Disassociate one or more audio language profiles for election event content presentation. Allows user to translate election event content in multiple languages.	Administrative
Language Profiles Association	Associate one or more language profiles for election content audio presentation. Allows user to enter and translate election event content in multiple languages.	Languages Operator

Table 3-15: The Election Event Entity Attributes and Activities (Continued)

Election Event		
Language Profiles Disassociation	Disassociate one or more language profiles for election event content presentation.	Languages Operator

Table 3-15: The Election Event Entity Attributes and Activities (Continued)

3.4.5.2 Project Parameters

This activity allows users to define default project parameters that are related to ballot generation, tabulator options, audio, security and rotation settings (see Table 3-16).

Each project settings-project parameters are characterized by the following attributes:

- Consolidation Type
- Ballot Content Creator
- Create Splits Manually
- Tabulation Options: Tabulator User Password Type, Default Tabulator User Password, Unify Tabulator Security Keys and Set Tabulator Number Automatically
- Straight Party Rule
- Card Partition Size
- Overvote Type
- Use Raw results
- Write-in Handling Method
- Create WinEDS Mapping Files
- Apply Write-in Precedence Rule
- Audio Configuration Settings and Tabulator Support
- Security Settings
- Audio Settings
- Audio Language Profile Associations
- Rotation
- RTR

Project Parameters		
Attributes		
Name	Description	Visibility/Configurability
Consolidation Type	Choice of “None”, “Medium” or “Maximum”	Configurable by the user.
Tabulation Options	Enables options such as: “Tabulator User Password and “Default Tabulator User Password”. If the “Default” option is selected, all tabulators will have default administrative password that has been entered as the “Default Tabulator User Password”. If the “Random” option is selected, the system will generate random a password for each tabulator.	Configurable by the user.
Straight Party Rule	Enable “Exclusive” and “Inclusive” options for a straight party office.	Configurable by the user
Card Partition Size	Sets partition size of the memory cards that store the election files. Available options are: 256 or 512	Configurable by the user.
Overvote Type	Sets one of two available options: “Single” and “Number of Position” overvote types. When selecting the “Single” option, the overvotes are counted as the number of times a contest was overvoted. When selecting the “Number of Position”, the overvotes are counted as the number of times a contest was overvoted multiplied with the number of positions (Vote For) for that contest.	Configurable by the user.

Table 3-16: The Project Settings Entity Attributes and Activities

Project Parameters		
Use Row Results	Information about each scanned ballot within the election files. The option is selected by default. If it is not selected, the system will present only the “Total Results” in enough detail for election night, but not for auditing	Configurable by the user.
Include Splits in Progress Reporting	Influences the way the number of polling subdivisions (X/Y) are calculated. The system will calculate the votes per split polling subdivisions. The numbers are presented in “Contest Overview Data” reports in the EMS RTR.	Configurable by the user.
Create WinEDS Mapping Files	Files that allow the WinEDS application to load results produced by the ImageCast [®] Precinct and ImageCast [®] Central. The system creates encrypted mapping files (comma separated values files) stored on the EMS NAS.	Configurable by the user.
Ballot Content Creator	Indicates the source of an election definition and affects certain processing calculations which are not needed for the more complete election import.	Configurable by the user.
Audio Configuration Settings and Tabulator Support	View predefined audio synthesis voices path; generate audio ballots; set pause between words in audio, create audio for Write-ins and select if ballot images files are always created. In addition, select the device(s) to be used (ICE, BMD, BMD Lite, CF 200).	Configurable by the user.

Table 3-16: The Project Settings Entity Attributes and Activities (Continued)

Project Parameters		
Security Settings	Sets type of the crypto algorithm (Mode 1)	Configurable by the user.
RTR	Sets Results Tally and Reporting properties.	Configurable by the user.

Table 3-16: The Project Settings Entity Attributes and Activities (Continued)

NOTE: Please refer to *Democracy Suite® EMS Election Event Designer User Guide*.

NOTE: If the election has three or more languages, select the 512 MB size partition rather than the 256 MB size partition.

NOTE: Please refer to *TDP 2.06 - Democracy Suite® System Security Specification*.

3.4.5.3 Ballot Style

This activity allows the user to define default ballot parameters. Depending on the ballot style selected, a different set of ballot parameters is provided.

The following attributes are available in this activity:

- Default Candidate Font Size (in points)
- Default Contest Font Size (in points)
- Default Political Party Font Size (in points)
- Default Font Family (type)
- Minimum Ballot Length in inches (allowed values 11, 14, 17, 20 and 22)
- Use Black Polling Box Flag (polling box can be presented in black or red)
- Mark Resized Text
- Starting Ballot ID (integer)
- Voting Box Type (depending on the ballot style, available options are: square, arrow or oval)
- Multi-Process Factor (number of concurrent CPU processes used for ballot production)
- Color Profile

State-Specific Settings:

- FL State Specific: Barcode on Ballot Header
- NY State Specific: Voting Instructions Position (bottom or left)

- NY State Specific: Voting Instructions Width (in number of ballot markers, applicable only when voting instructions are on the left side of the ballot)
- NY State Specific: Party Header Column Width (in number of ballot markers)
- NY State Specific: Number of Political Party Lines (not including contest header and writein rows on the ballot) - depends on the position of the voting instructions. When voting instructions are located at the bottom of the ballot, the number of party lines can be 6, 8 or 10. When voting instructions are located at the left side of the ballot, the number of party lines can be 8, 10 or 12.
- NY State Specific: White Background for Name Flag
- NY State Specific: DVS Style For Primaries Flag
- NY State Specific: Party Font Size within the Candidate Cell on the Ballot (in points)
- NY State Specific: Voting Box Position (left upper, left lower, right upper or right lower corner of the candidate cell on the ballot)
- NY State Specific: Voting Box Position (left upper, left lower, right upper or right lower corner of the candidate cell on the ballot)

3.4.5.4 Prototypes

This activity allows the user to define contest and choice prototypes. A “Contest prototype” is a template for a contest. Unlike offices, which encapsulate business logic and relations to other entities (electoral groups, administrative types etc), the contest prototype only relates to choice prototypes. Each contest made from a prototype has the same number of choices (with same attributes) as its template (see Table 3-17).

The following case scenario illustrates the importance of this functionality. Assume that an election event has N proposition contests (referendum questions). Each of the N proposition questions can have one of two answers - Yes and No. However, the same election event can require that these answers are presented on the ballot and during the AVS voting sessions in English and Spanish. Thus, the answer Yes becomes Yes/Si, while the negative answer becomes No/Non. Instead of creating N instances of these answers within the election for ballot representation purposes, proposition contest prototypes can be defined with two choice prototypes - Yes/Si and No/Non. This functionality greatly improves system usability and ease of use.

Each prototype is characterized by:

- Contest Prototype Name
- Description
- Contests List

- Choice Prototype List
- Choice Prototype Name
- Language Profile Association
- Audio Language Profile Association

This activity includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Contest Prototypes Association/Disassociation”, “Choice Prototypes Association/Disassociation”, “Language Profile Association/Disassociation” and “Audio Language Profiles Association/Disassociation”.

Prototypes		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique ballot profile ID.	Not directly configurable by the user.
Contest Prototype Name	Unique name of the contest prototype.	Configurable by the user.
Description	Free-text description of the contest prototype record.	Configurable by the user
Contest Associations	Associations between the contest prototype and contests.	Configurable by the user
Choices	A set of choice prototypes associated with a given contest.	Configurable by the user.
Choice Prototype Name	Number of positions to be elected within the contest.	Configurable by the user.
Language Profile Associations	A collection of rich text representations of the choice prototype name in different languages	Configurable by the user.
Audio Language Profiles	A set of audio language profiles for a given choice prototype.	Configurable by the user.
Activity		
Name	Description	Role Required

Table 3-17: The Prototypes Entity Attributes and Activities

Prototypes		
Lookup and Filtering	Perform a lookup/filtering for a specific contest prototype.	Any Role
Create New	Create a new contest prototype object.	Operator
Edit	Open for editing an existing contest prototype object.	Operator
Delete	Delete one or more of the selected contest prototype objects.	Operator
Contests Association	Associate one or more propositions with a given contest.	Operator
Contests Disassociation	Disassociate one or more propositions with a given contest.	Operator
Choice Prototypes Association	Associate one or more choice prototypes with a given contest.	Operator
Choice Prototypes Disassociation	Disassociate one or more choice prototypes with a given contest.	Operator
Language Profiles Association	Associate one or more language profiles for paper and AVS ballot presentation. Allows user to translate choice prototype content in multiple languages.	Languages Operator
Language Profiles Disassociation	Disassociate one or more language profiles for paper and AVS ballot presentation.	Languages Operator
Audio Language Profiles Association	Associate one or more audio language profiles for AVS ballot presentation. Allows user to translate contest content in multiple languages.	Languages Operator

Table 3-17: The Prototypes Entity Attributes and Activities (Continued)

Prototypes		
Audio Language Profiles Disassociation	Disassociate one or more audio language profiles for AVS ballot presentation.	Languages Operator

Table 3-17: The Prototypes Entity Attributes and Activities (Continued)

3.4.5.5 Contests

This activity is used to define and associate contests for a given election event.

Contests represent manifestations of defined office entities and are defined by a unique set of choices which run for the same position. For example, an office may be defined as Congressional, while its contests can be Congress Ward 1, Congress Ward 2, etc.

Each contest is characterized by the following attributes:

- ID
- Administrative Name
- Office
- Parent District
- District
- Disabled Flag
- External ID
- Global Order
- Rendering Type (for measure)
- Vote For
- Number of Ballot Markers per Position
- Number of Write-ins
- Choices
- Elector Group Association
- Language Profiles Association
- Textual Units Representation
- Audio Language Profiles Association
- Layout (applicable only to certain ballot styles)
- Straight Party Voting Contest Association (applicable only to certain ballot styles)

- Rotation (applicable only to certain ballot styles)
- Choices Groups
- Logo Overriding (applicable only on NYS ballot style)
- Contest Column Starting Number (applicable only on NYS Primary Election)

This activity includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Sort”, “Choices Association/Disassociation”, “Elector Group Association/Disassociation”, “Language Profile Association/Disassociation”, “Audio Language Pro-files Association/Disassociation”, “Contest Association/Disassociation”, “Print Preview” and “Disable” (see Table 3-18 for more details).

Contests		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique contest ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Unique name of the contest.	Configurable by the user.
Text	If the office for the contest falls into the category of measure or referendum question, the text of the measure is stored in this field.	Configurable by the user.
Office	Association between the contest and office.	Configurable by the user.
Subdivision	Association between the contest and subdivision.	Indirectly configurable by the user.
Disable Flag	Used to flag disabled contests. Required for ballot content, ballot or election files generation.	Configurable by the user.
Reduced Rendering Flag (If Available)	Only the contest header and two choices next to the contest header will be rendered on a ballot.	Configurable by the user.
External ID	Data import and export from external systems.	Configurable by the user.

Table 3-18: The Contest Entity Attributes and Activities

Contests		
Global Order	Set the order of divisions.	Configurable by the user.
Vote For	Number of positions to be elected within the contest.	Configurable by the user.
Number of Ballot Markers per Position	Define width of the contest (NYS ballot style) or height needed for choice name (portrait ballot styles).	Configurable by the user.
Number of Write-ins	Number of write-ins to be defined within the contest.	Configurable by the user.
Choices	A set of choices associated with a given contest.	Configurable by the user.
Language Profiles Associations	A collection of rich text representations of the contest name in different languages	Configurable by the user.
Textual Units Representation	Representation of the contest name in units of text.	Configurable by the user.
Audio Language Profiles Associations	A set of audio language profiles for a given contest.	Configurable by the user.
Column Index	Defines contest column position on a ballot.	Configurable by the user.
Column Span	Contest can be spanned in a multiple columns on a ballot depending on the ballot style.	Configurable by the user.
Contests Association	A set of contests associated with a given straight party contest.	Configurable by the user.
Disable Rotation Flag	If office rotation must be excluded for a given contest.	Configurable by the user.
Start Rotation Index	Zero by default.	Configurable by the user.

Table 3-18: The Contest Entity Attributes and Activities (Continued)

Contests		
Logo Overriding	Override party logo for a given contest.	Configurable by the user.
Contest Column Starting Number	Defines contest column starting number.	Configurable by the user.
Activity		
Name	Description	Role Required
Lookup and Filtering	Perform a lookup/filtering for a specific contest.	Any Role
Create New	Create a new contest object.	Administrative
Edit	Open for editing an existing contest object.	Administrative
Delete	Delete one or more of the selected contest objects.	Administrative
Sort	Advanced sorting and ordering of contest records based on associated attributes.	Operator
Choice Association	Associate a set of choices with a given contest.	Operator
Choice Disassociation	Disassociate a set of choices with a given contest.	Operator
Language Profiles Association	Associate one or more language profiles for paper and electronic ballot presentation. Allows user to translate contest content in multiple languages.	Languages Operator
Language Profiles Disassociation	Disassociate one or more language profiles for paper and electron ballot presentation.	Administrative

Table 3-18: The Contest Entity Attributes and Activities (Continued)

Contests		
Audio Language Profiles Association	Associate one or more audio language profiles for AVS ballot presentation. Allows user to translate contest content into multiple languages.	Languages Operator
Audio Language Profiles Disassociation	Disassociate one or more audio language profiles for AVS ballot presentation.	Administrative
Print Preview	Allows users to preview and print a list of contests.	Languages Operator
Contests Association	Associate one or more contests with a given straight party contest.	Operator
Contests Disassociation	Disassociate one or more contests with a given straight party contest.	Operator
Print Preview	Allow users to preview and print a list of contests.	Any Role
Disable	Allows user to disable a contest. The contest will not be included in a ballot content, ballots or election files generation.	Any Role

Table 3-18: The Contest Entity Attributes and Activities (Continued)

3.4.5.6 Choices

This activity is used to define choices, such as candidates, referendum questions, options, etc. Each choice entity is characterized by the following attributes:

- ID
- Name
- Contest
- External ID
- Choice Group
- Global Order
- Type

- Disable Flag
- Incumbent Flag
- Has Prototype Flag
- Language Profiles Association
- Textual Units Representation
- Political Party Affiliation
- Audio Language Profiles Association
- Contact Personal Info Association
- Text Overrides
- Column Index (applicable for NYS General Elections only)

This activity includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Reorder”, “Sort”, “Political Party Association/Disassociation”, “Language Profile Association/Disassociation”, “Audio Language Profiles Association/Disassociation,” “Choice Personal Info Association/Disassociation”, “Print Preview” and “Disable” (see Table 3-19 for more details).

Choices		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique choice ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Unique name of the choice.	Configurable by the user.
Contest	A contest with which the given choice is associated.	Indirectly configurable by the user.
External ID	Data import and export from external systems.	Configurable by the user.
Global Order	Set the order of divisions.	Configurable by the user.
Type	Choice between “Regular” and “No Candidate” options. “Regular” is the default option, while “No Candidate” is used when there is no candidates or less then the Vote For number	Configurable by the user.

Table 3-19: The Choice Entity Attributes and Activities

Choices		
Disable Flag	Used to flag disabled choices. Required for ballot content, ballot or election files generation.	Configurable by the user.
Incumbent Flag	Used to flag incumbent choices.	Configurable by the user.
Has Prototype Flag	Used to flag choices connected to a contest prototype.	Indirectly configurable by the user.
Political Party Association	One or more political parties associated with a given choice (if any).	Directly configurable by the user.
Language Profiles Association	A collection of rich text presentations of the choice name in different languages.	Configurable by the user.
Textual Units Representation	Collected units of text for the presentation of the choice name (for example, the first unit may be the candidate's first name while the second unit may be the candidate's last name).	Configurable by the user.
Audio Language Profiles Association	A collection of audio presentations of the choice name in different languages.	Configurable by the user.
First Name	First name of the choice.	Configurable by the user.
Last Name	Last name of the choice.	Configurable by the user.
Address	Address of the choice.	Configurable by the user.
Contact Phone	Phone of the choice.	Configurable by the user.
Contact Email	Email of the choice.	Configurable by the user.
Date of Birth	Date of birth of the choice.	Configurable by the user.
Gender	Gender of the choice.	Configurable by the user.

Table 3-19: The Choice Entity Attributes and Activities (Continued)

Choices		
Column Index	Defines choice column index.	Configurable by the user.
Activity		
Name	Description	Role Required
Lookup and Filtering	Perform a lookup/filtering for a specific contest.	Operator
Create New	Create a new contest object.	Administrative
Edit	Open for editing an existing contest object.	Administrative
Delete	Delete one or more of the selected contest objects.	Administrative
Reorder	Ordering of contest records within a contest.	Operator
Political Party Affiliation	Associate a set of Political Parties with a given choice.	Administrative
Political Party Disassociation	Disassociate a set of Political Parties with a given choice.	Operator
Language Profiles Association	Associate one or more language profiles for paper and electronic ballot presentation. Allows users to translate choice content into multiple languages.	Languages Operator
Language Profiles Disassociation	Disassociate one or more language profiles for paper and electronic ballot presentation	Languages Operator
Audio Language Profiles Association	Associate one or more audio language profiles for AVS ballot presentation. Allows users to translate choice content into multiple languages.	Languages Operator

Table 3-19: The Choice Entity Attributes and Activities (Continued)

Choices		
Audio Language Profiles Disassociation	Disassociate one or more audio language profiles for AVS ballot presentation.	Languages Operator
Choice Personal Info Association	Associate a choice personal info with a given choice.	Any Role
Choice Personal Info Disassociations	Disassociate a choice personal info with a given choice.	Any Role
Print Preview	Allows users to preview and print a list of choices.	Operator
Disable	Allows user to disable a choice. The choice will not be included in a ballot content, ballots or election files generation.	Any Role

Table 3-19: The Choice Entity Attributes and Activities (Continued)

3.4.5.7 Ballot Types

Domain entity which represents an instance of a unique set of contests and rotation sets calculated for the election event. This entity is sometimes referred in the industry as a ballot style, especially when no rotations are involved in the election event.

Each ballot type entity is characterized by the following attributes:

- Name
- External ID
- Abbreviation
- Ballot group
- Ballot Contest Association
- Polling Subdivision Association
- Ballot Cards Association

This activity includes the following sub-activities: “Edit”, “Sort”, “Print Preview”, “Delete”, “Filter”, “Recreate Ballots”, “Advanced Sorting”, “Set Item Count”, “Print” (see Table 3-20 for more details).

Ballot Types		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique choice ID. GUID (Globally Unique ID).	Not directly configurable by the user.
External ID	Data import and export from external systems.	Configurable by the user.
Abbreviation	Abbreviated name of the Ballot Type. For example, a two-number ballot type identifier.	Configurable by the user.
Ballot Contest Association	A collection of associated contests.	Not directly configurable by the user.
Ballot Group Association	A collection of associated ballot groups.	Not directly configurable by the user.
List of Polling Subdivisions	A collection of associated Polling Subdivisions.	Not directly configurable by the user.
Polling Subdivision Association	A collection of associated Polling Subdivisions.	Not directly configurable by the user.
Ballot Cards	Single physical piece of paper containing a front and back image. Each ballot card contains a set of contests. A set of one or more ballot cards will make up the entire ballot type which will be provided to a individual voter.	Configurable by the user
Activity		

Table 3-20: The Ballot Types Entity Attributes and Activities

Ballot Types		
Name	Description	Role Required
Edit	Open for editing an existing ballot type object.	Administrative
Sort	Advanced sorting and ordering of ballot type records based on the associated attributes	Any Role
Lookup and Filtering	Perform a lookup/filtering for a specific contest.	Operator
Print Preview	Allows users to preview and print a list of ballot types.	Operator
Set Item Count	Sets the number of items (rows) to be presented in the screen	Any Role
Delete	Delete one or more of the selected ballot types objects.	Administrative
Recreate Ballots	Allows users to make changes to ballot related properties (e.g. Ballot Index).	Any Role
Ballot Cards	Associate Front and Back Ballot Headers to Associated Ballot Cards. In addition, change Paper Index within the Card Contest	

Table 3-20: The Ballot Types Entity Attributes and Activities (Continued)

3.4.5.8 Activation Codes

Domain entity which represents a unique combination of polling district (on the precinct portion level) and ballot group automatically created for the election event. This entity is used to store external codes used in voter registration system to refer to a specific polling district and ballot group in EMS. This information is later used on the voting location to activate a voter session using the code provided by the voter registration system. Each activation code entity is characterized by the following attributes:

- Code
- Description
- Polling District association
- Ballot Group association

- Ballot Type association

This activity includes the following sub-activities: Edit, Sort, Print Preview, Export, Import (see Table 3-21 for more details).

Language Profiles		
Attributes		
Name	Description	Visibility/Configurability
Code	A unique alpha-numerical value typically used by an external Voter Registration system to refer to a unique combination of polling district and ballot group.	Configurable by the user.
Description	Free-text description of the activation code record.	Configurable by the user.
Polling District Association	Indicates which polling district this activation code is for.	Not directly configurable by the user.
Ballot group association	Indicates which ballot group this activation code is for.	Not directly configurable by the user.
Ballot Type associations	Indicates which ballot types this activation code is for.	Not directly configurable by the user.
Activity		
Name	Description	Role Required
Edit	Open for editing an existing activation code object	Administrative
Sort	Advanced sorting and ordering of activation code records based on the associated attributes	Administrative
Print Preview	Allows users to preview and print a list of activation codes.	Administrative
Set Item Count	Sets the number of items (rows) to be presented in the screen	Any Role
Export	Allows user to export activation codes to CSV format.	Administrative

Table 3-21: The Activation Codes Entity Attributes and Activities

Language Profiles		
Import	Allows user to import activation codes in CSV format.	Administrative

Table 3-21: The Activation Codes Entity Attributes and Activities (Continued)

3.4.5.9 Language Profiles

This activity is used to define the set of language profiles to be used in the election event. The defined language profiles are used in the definition of ballots, both paper and AVS. This activity is not used in the translation functionality, but rather only to define the set of languages to be supported by the system for a given election event.

Each language profile is characterized by the following attributes:

- ID
- Name
- Purpose
- One of the following:
 - Language Profile Association (for audio language profile)
 - Audio Language Profile Association (for ballot content language profile)
- Audio voices (audio language profile)
- Precincts Association

The following actions are defined for user entities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Sort”, “Language Profile Association/Disassociation” or “Audio Language Profile Association/Disassociation”, “Polling Subdivision Association/Disassociation” and “Print Preview” (see Table 3-22 for more details).

Language Profiles		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique language profile ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Unique language profile name.	Configurable by the user.

Table 3-22: The Language Profiles Entity Attributes and Activities

Language Profiles		
Purpose	Purpose of the language profile - is this language profile used for paper ballot style definition or for AVS ballots (BMD).	Configurable by the user.
Language Profile Associations	Set of ballot content language profiles associated with the given audio language profile.	Configurable by the user.
Audio Language Profile Associations	Set of audio language profiles associated with the given ballot content language profile.	Configurable by the user.
Template Number	Unique template number for audio file synthesis for multilingual ballots. Only available if the purpose of the language profiles is audio.	Configurable by the user.
Audio Voices	Audio voices for audio file synthesis. Only available if the purpose of the language profiles is audio.	Configurable by the user.
Polling Subdivision Associations	Set of polling subdivisions (precincts or electoral districts) associated with the given language profile. Only available if the purpose of the language profiles is ballot content.	Configurable by the user.
Activity		
Name	Description	Role Required
Lookup and Filtering	Perform a lookup/filtering for a specific language profile.	Any Role
Create New	Create a new language profile object.	Operator
Edit	Open for editing an existing language profile object.	Languages Operator

Table 3-22: The Language Profiles Entity Attributes and Activities (Continued)

Language Profiles		
Delete	Delete one or more of the selected language profile objects.	Operator
Sort	Advanced sorting and ordering of the language profile records based on the associated attributes.	Any Role
Language Profile Association	Associate one or more language profiles with a given language profile.	Operator
Language Profile Disassociation	Disassociate one or more language profiles from the given language profile.	Operator
Audio Language Profile Association	Associate one or more audio language profiles with a given language profile.	Operator
Audio Language Profile Disassociation	Disassociate one or more audio language profiles from the given language profile.	Operator
Polling Subdivision Association	Associate (connect) one or more Polling Subdivisions with a given language profile.	Operator
Polling Subdivision Disassociation	Disassociate (disconnect) one or more Polling Subdivisions from the given language profile.	Operator
Print Preview	Allows users to preview and print a list of language profiles.	Operator

Table 3-22: The Language Profiles Entity Attributes and Activities (Continued)

3.4.5.10 Templates

Templates define the characteristics and appearance of paper ballots, including voting instructions, contest representation and choice representation. Each Ballot Profile entity is characterized by the following attributes:

- ID
- Name
- Purpose
- Language
- One of the following
 - Collection of Contests
 - Collection of Ballots
- Template

This activity includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete” and “Contest Association/Disassociation” or “Ballot Association/Disassociation” (see Table 3-23 for more details).

Templates		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique ballot profile ID.	Not directly configurable by the user.
Name	Unique name of the template profile.	Configurable by the user.
Purpose	Purpose of the template: voting instructions, contest header or choice.	Configurable by the user.
Language	One of the defined languages for a given election project.	Configurable by the user.
Contest Association	If the purpose of the template is contest header template, a collection of associated contests is assigned to that template. If the purpose of the template is choice representation, a collection of associated contests is assigned to that template.	Configurable by the user.

Table 3-23: The Template Entity Attributes and Activities

Templates		
Contests Association	If the purpose of the template is voting instructions, a collection of associated ballots is assigned to that template. If the purpose of the template is contest header, a collection of associated contests is assigned to that template. If the purpose of the template is choice representation, a collection of associated contests is assigned to that template.	Configurable by the user.
Ballot Association	If the purpose of the template is ballot header template, a collection of associated ballots is assigned to that template.	Configurable by the user.
Template	A rich text representation of the template includes keywords. For contest and choice templates, keywords are based on textual units of contest or choice name representation. For voting instruction templates, keywords are based on a variety of election related entities - polling subdivisions, political parties, dates, election name, jurisdiction name, etc.	Configurable by the user.
Activity		
Name	Description	Role Required
Lookup and Filtering	Lookup/filter for a specific template.	Any Role
Create New	Create a new ballot profile object.	Operator
Edit	Open to edit an existing ballot profile object.	Operator

Table 3-23: The Template Entity Attributes and Activities (Continued)

Templates		
Delete	Delete one or more of the selected ballot profile objects.	Operator
Contest Association	Associate one or more contests with a given contest header or choice template.	Operator
Contest Disassociation	Disassociate one or more contests from the given contest header or choice template.	Operator
Ballot Association	Associate one or more ballots with a given ballot header or choice template.	Operator
Ballot Disassociation	Disassociate one or more ballots from the given ballot header template.	Operator

Table 3-23: The Template Entity Attributes and Activities (Continued)

3.4.5.11 Contest Headings

This subsection describes how to group contests under the same title. Each contest heading is characterized by the following attributes:

- Name
- Rule
- Set of Associated Languages
- General
- Contests
- Audio

This activity includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Sort”, “Delete” (see Table 3-24 for more details).

Contest Headings		
Attributes		
Name	Description	Visibility/Configurability
Name	Unique name of the template profile.	Configurable by the user.

Table 3-24: Contest Headings

Contest Headings		
Rule	Rule defines appearance of the contest headings	Configurable by the user.
Language Profile Associations	Set of ballot content language profiles associated with the given audio language profile.	Configurable by the user.
Contest Association	A collection of associated Contests	Configurable by the user.
Activity		
Name	Description	Role Required
Lookup and Filtering	Lookup/filter for a specific template.	Any Role
Create New	Create a new ballot profile object.	Operator
Edit	Open to edit an existing ballot profile object.	Operator
Delete	Delete one or more of the selected ballot profile objects.	Operator
Sort	Advanced sorting of polling subdivision records based on associated attributes.	Any Role

Table 3-24: Contest Headings (Continued)

3.4.5.12 Ballots

This subsection details the act of previewing ballots with the possibility of altering the ballot style and regenerating ballot manifestations. Each ballot instance is characterized by the following attributes:

- File Name
- Key In ID
- External ID
- Description
- Language Profile
- Header Front
- Header Back
- Set of Contests

- Set of Associated Polling Subdivisions

This activity includes the following sub-activities: “Lookup”, “Filter”, “Edit”, “Delete”, “Sort”, “Print Preview”, “Assign Values” and “Create Selected Proofing Ballots”. When editing a ballot, style-related information can be changed, creating additional ballot manifestations. As a result, this activity includes additional ballot header, contest style and choice style modifications (see Table 3-25 for more details).

Ballots		
Attributes		
Name	Description	Visibility/Configurability
File Name	Unique name of the ballot.	Configurable by the user.
Key In ID	Unique ballot ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Description	Free-text description of the ballot record.	Configurable by the user.
External ID	Data import and export from external systems.	Configurable by the user.
Language Profile	Language profile associated with a given ballot instance.	Not directly editable by the user.
Header Front	Associated voting instructions header for the front side of the ballot.	Configurable by the user.
Header Back	Associated voting instructions header for the back side of the ballot.	Configurable by the user.
Set of Contests	Set of contests associated with the ballot instance.	Indirectly configurable by the user.
Set of Polling Subdivisions	Set of polling subdivisions associated with the ballot instance.	Indirectly configurable by the user.
Activity		
Name	Description	Role Required
Lookup and Filtering	Lookup/filter for a specific contest.	Any Role

Table 3-25: The Ballot Entity Attributes and Activities

Ballots		
Edit	Open to edit an existing ballot object.	Any Role
Delete	Delete one or more of the selected polling subdivision objects.	Any Role
Sort	Advanced sorting of polling subdivision records based on associated attributes.	Any Role
Print Preview	Allow users to preview and print a list of ballot manifestations.	Any Role
Assign Values	Allow users to assign ballot numbers, descriptions or file names for selected ballot manifestations or for all ballot manifestations.	Any Role
Create Selected Proofing Ballots	Allow users to create one or more proofing ballots on the EMS NAS.	Operator

Table 3-25: The Ballot Entity Attributes and Activities (Continued)

3.4.5.13 Ballot Production

The ballot production activity produces print-quality ballots for the given election event. After ballot content and styling is defined, the ballot production process will create PDF and compressed PNG versions of all ballots within the system and upload them to the project space on the EMS NAS (Network Attached Storage) server. The PDF version of the ballots is used for ballot printing, while the PNG version of the ballots is used for ImageCast® AVS voting capabilities. The paper ballots created are in PDF/X-1a:2001 format, optimized for the ballot printing process, and digitally signed using the digital certificate (X.509) generated during the creation of the currently active election project.

Ballots produced by the system will contain unique codes and marks that distinguish each ballot format/style.

In addition, EMS can create audio files, XML ballot definition files and PCL ballot printing definition files for ImageCast® BMD Lite functionality.

3.4.6 Tabulation

For descriptions on the ballot counters used to tabulate scanned ballots and lifecycle usage, please refer to the following documents:

- *2.03 - Democracy Suite[®] ImageCast[®] Precinct Functionality Description*
- *2.03 - Democracy Suite[®] ImageCast[®] Evolution Functionality Description*
- *2.03 - Democracy Suite[®] ImageCast[®] Central System Functionality Description*

3.4.6.1 Voting Locations

The Voting Location activity is used to define the place where people cast their paper or AVS ballots. Counting center locations, such as a central e-Counting centers, can also be defined. Each Voting Location entity is characterized by the following attributes:

- ID
- Name
- Number
- External ID
- Global Order
- Description
- Detailed Info
 - Infrastructure (Number of phone lines, internet access type, Number of Toilets, Building accessibility, Internet Access)
 - Address (Address, Latitude, Longitude)
- Contact Info Association
- Tabulator Association

This activity includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Batch Tabulator Creation”, “Sort”, “Contact Info Association/Disassociation”, “Tabulator Association/Disassociation”, “Print Preview” and “Assign Values” (see Table 3-26 for more details).

Voting Location		
Attributes		
Name	Description	Visibility/Configurability

Table 3-26: The Voting Location Entity Attributes and Activities

Voting Location		
ID	Unique voting location ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Unique name of the voting location.	Configurable by the user.
Global Order	Set the order of divisions.	Configurable by the user.
Number	Unique number of the voting location.	Configurable by the user.
Description	Free-text description of the voting location record.	Configurable by the user.
Detailed Info	Detailed information about the given voting location and its characteristics such as: Address (including geo-coding information), Contact Information, Capabilities Information (access for people with disabilities, communication characteristics, etc.)	Configurable by the user.
Contact Info Association	Set of contacts associated with this voting location.	Configurable by the user.
Tabulator Association	Set of tabulators associated with this voting location.	Configurable by the user.
Activity		
Name	Description	Role Required
Lookup and Filtering	Lookup/filter information for a specific voting location.	Any Role
Create New	Create a new voting location object.	Administrative
Edit	Open to edit an existing voting location object.	Operator
Delete	Delete one or more of the selected voting location objects.	Operator

Table 3-26: The Voting Location Entity Attributes and Activities (Continued)

Voting Location		
Batch Tabulator Creation	Allows user to create all tabulator instances for one or more voting locations.	Any Role
Sort	Advanced sorting and ordering of voting location records based on associated attributes.	Any Role
Contact Info Association	Associate one or more contacts with a given voting location.	Operator
Contact Info Disassociation	Disassociate one or more contacts from the given voting location.	Operator
Tabulator Association	Associate one or more tabulators with a given voting location.	Operator
Tabulator Disassociation	Disassociate one or more tabulators from the given voting location.	Operator
Assign Values	Allow users to assign voting location names or numbers for selected voting locations or for all voting locations.	Any Role
Print Preview	Allow users to preview and print a list of voting locations.	Any Role

Table 3-26: The Voting Location Entity Attributes and Activities (Continued)

3.4.6.2 Tabulators

This activity is used to define instances of ImageCast[®] tabulation devices (both Precinct and Central). Each Tabulator device is characterized by the following attributes:

- ID
- Name
- Number
- Type
- Device Configuration
- Voting Location
- Counting Group

- Programming Group
- External ID
- External Type ID
- Global Order
- Polling Subdivision Association
- Users Association
- Ballots Association
- Precincts Association
- Security Association
- Networking Association

This activity includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Generate Election Files”, “Sort”, “Program Memory Card”, “Initialize Backup Card”, “Polling Subdivision Association/Disassociation”, “Add User”, “Edit User”, “Delete User”, “Program Security Key”, “Prepare Exchange Card”, “Import Public Key”, “Print Preview”, “Batch Tabulator Creation”, “Assign Values” and “Create Labels” (see Table 3-27 for more details).

Tabulators		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique tabulator ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Unique name of the tabulator instance.	Configurable by the user.
Number	Unique number of the tabulator instance.	Configurable by the user.
Type	Type of the tabulator device - ImageCast [®] Precinct, ImageCast [®] Evolution, ImageCast [®] Central.	Configurable by the user.
Device Configuration	A device specific settings object.	Configurable by the user.

Table 3-27: The Tabulator Entity Attributes and Activities

Tabulators		
Voting Location	Associated voting location for a given tabulator.	Configurable by the user.
Counting Group	Identifies the level of election results collected using the given tabulator instance.	Configurable by the user.
Programming Group	Associated programming group for a given tabulator.	Configurable by the user.
External ID	Data import and export from external systems.	Configurable by the user.
Global Order	Used for setting the order of the divisions.	Configurable by the user.
Polling Subdivision Association	A collection of associated (one or more) polling subdivisions.	Configurable by the user.
Username	Unique username of the tabulator user instance.	Configurable by the user.
User Type	Type of tabulator user.	Configurable by the user.
First Name	First name of the tabulator user.	Configurable by the user.
Last Name	Last name of the tabulator user.	Configurable by the user.
Ballots Association	A collection of associated (one or more) ballots for a given tabulator.	Not directly configurable by the user.
Activity		
Name	Description	Role Required
Lookup and Filtering	Lookup/filter for a specific set of tabulators.	Any Role
Create New	Create a new tabulator object.	Operator
Edit	Open to edit an existing tabulator object.	Operator
Delete	Delete one or more of the selected tabulator objects.	Operator

Table 3-27: The Tabulator Entity Attributes and Activities (Continued)

Tabulators		
Generate Election Files	Generate election files for one or more tabulators.	Operator
Sort	Advanced sorting and ordering of tabulator records based on associated attributes.	Operator
Program Memory Card	Initialize and copy election files on CF card for a given tabulator.	Operator
Initialize Backup Card	Initialize CF card for a given tabulator.	Any Role
Polling Subdivision Association	Associate one or more polling subdivisions with a given tabulator.	Operator
Polling Subdivision Disassociation	Disassociate one or more polling subdivision from the given tabulator.	Operator
Add User	Create a new tabulator user for a given tabulator.	Operator
Edit User	Open for editing a user object for a given tabulator.	Operator
Delete User	Delete one or more users from a given tabulator.	Operator
Program Security Key	Program security key for a given tabulator user.	Operator
Prepare Exchange Card	Copy EMS public key, keyGen application and tabulator ID for a given tabulator (applicable for security mode Mode 2 only).	Any Role
Import Public Key	Import tabulator public key (applicable for security mode Mode 2 only).	Any Role
Print Preview	Allow users to preview and print a list of tabulators.	Any Role

Table 3-27: The Tabulator Entity Attributes and Activities (Continued)

Tabulators		
Batch Tabulator Creation	Allows user to create all tabulator instances.	Operator
Assign Values	Allow users to assign tabulator names or numbers for selected tabulators or for all tabulators.	Any Role

Table 3-27: The Tabulator Entity Attributes and Activities (Continued)

3.4.6.3 Counting Groups

This activity groups tabulator instances, facilitating reporting in EMS RTR (see section 3.5.4 for more details about EMS RTR reports).

Each Counting Group is characterized by the following attributes:

- ID
- Name
- External Id
- Global Order Include in X of Y report Tabulator Association

This activity includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Sort”, “Tabulator Association/Disassociation” and “Print Preview” (see Table 3-28 for more details).

Counting Group		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique configuration profile ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Unique name of the Counting Group.	Configurable by the user.
External ID	Data import and export from external systems.	Configurable by the user.
Tabulator Association	Associate one or more tabulators.	Configurable by the user.
Activity		

Table 3-28: The Counting Groups Entity Attributes and Activities.

Counting Group		
Name	Description	Role Required
Lookup/ Filter	Perform a lookup/filtering for a specific counting group.	Any Role
Create New	Create a new counting group object. Predefined value is “election day”	Administrative
Edit	Open an existing counting group object.	Technical Advisor
Delete	Delete one or more of the selected counting group objects.	Administrative
Sort	Advanced sorting and ordering of counting group records based on associated attributes.	Any Role
Tabulator Association	Associate one or more tabulators.	Administrative
Tabulator Disassociation	Disassociate one or more tabulators.	Administrative
Print Preview	Allow users to preview and print a list of counting group.	Any Role

Table 3-28: The Counting Groups Entity Attributes and Activities. (Continued)

3.4.6.4 Programming Groups

This activity groups tabulators in order to split work on multiple EDES (Election Data Exchange Station) applications.

Each Programming Group is characterized by the following attributes:

- ID
- Name
- External ID Global Order Tabulator Association

This activity includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Sort”, “Tabulator Association/Disassociation” and “Print Preview” (see Table 3-29 for more details).

Programming Groups		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique configuration profile ID. GUID (Globally Unique ID).	Not directly configurable by the user.
Name	Unique name of the Programming Group.	Configurable by the user.
External ID	Data export and import from external systems.	Configurable by the user.
Global Order	Used for setting the order of the divisions.	Configurable by the user.
Tabulator Association	Associates one or more tabulators.	Configurable by the user.
Activity		
Name	Description	Role Required
Lookup/Filter	Perform a lookup/filtering for a specific Programming group.	Any Role
Create New	Create a new Programming group object.	Administrative
Edit	Open an existing counting group object.	Technical Advisor
Delete	Delete one or more of the selected programming group objects.	Administrative
Sort	Advanced sorting and ordering of programming group records based on associated attributes.	Any Role
Tabulator Association	Associate one or more tabulators.	Administrative

Table 3-29: The Programming Groups Entity Attributes and Activities.

Programming Groups		
Tabulator Disassociation	Disassociate one or more tabulators.	Administrative
Print Preview	Allow users to preview and print a list of programming group.	Any Role

Table 3-29: The Programming Groups Entity Attributes and Activities.

3.4.6.5 Networking

Networking is used to configure modem settings and parameters, such as ISP and File transfer server.

Networking characterized by the following attributes:

- ID
- Name
- Global Order
- Communication Protocol Type
- Retry Count
- Retry Interval
- Primary ISP Phone
- Backup ISP Phone
- Primary ISP Username
- Primary ISP Password
- Access Point Name
- APN Server
- APN Username
- APN Password
- Server Name
- IP Address
- Port Number
- Server Username
- Server Password
- Server Directory Name
- Tabulators Association

This activity includes the following sub-activities: “Lookup”, “Filter”, “Create New”.

3.4.6.6 Configurations

The configuration activity depends on the created target ImageCast[®] device:

- Device Configuration File (DCF) profile for the ImageCast[®] Precinct and ImageCast[®] Central.
- Device Machine Behavioural Settings (MBS) profiles for the ImageCast[®] Evolution.

These files define device level operational characteristics. Each ImageCast[®] tabulator requires a single configuration file to operate. The DCF file is in optimized binary format, while MBS file is in XML format. Administrative users define the DCF/MBS configuration using the GUI interface. The defined parameters are stored within the EMS Database. Later on, these files are uploaded to the EMS NAS server and to the Compact Flash memory pack. Security configuration settings are stored on the secure iButton key.

Each Device Configuration Profile is characterized by the following attributes:

- ID
- Name
- Etalon
- Settings
- Device Configuration Data
- Tabulator Association

This activity includes the following sub-activities: “Lookup”, “Filter”, “Create New”, “Edit”, “Delete”, “Sort”, “Tabulator Association/Disassociation” and “Print Preview” (see Table 3-30 for more details).

Configuration Profiles		
Attributes		
Name	Description	Visibility/Configurability
ID	Unique configuration profile ID. GUID (Globally Unique ID).	Not directly configurable by the user.

Table 3-30: The Configuration Profiles Entity Attributes and Activities.
(Continued)

Configuration Profiles		
Name	Unique name of the configuration instance.	Configurable by the user.
Tabulator Type	Type of configuration profile - ImageCast® Precinct, ImageCast® Evolution, ImageCast® Central .	Configurable by the user.
Settings	Etalon of the device configuration for a given tabulator type.	Not directly configurable by the user.
Device Configuration Data	Numerous ImageCast® device settings: Administrative options, Security options, Printing options, User interface (LCD) options, AVS options	Configurable by the user.
Tabulator Association	Associated tabulators for a given device configuration.	Configurable by the user.
Activity		
Name	Description	Role Required
Lookup/Filter	Perform a lookup/filtering for a specific set of device configuration.	Any Role.
Create New	Create a new device configuration object.	Administrative
Edit	Open for editing an existing device configuration object.	Technical Advisor
Delete	Delete one or more of the selected device configuration objects.	Administrative
Sort	Advanced sorting and ordering of device configuration records based on associated attributes.	Any Role.

Table 3-30: The Configuration Profiles Entity Attributes and Activities.
(Continued) (Continued)

Configuration Profiles		
Tabulator Association	Associate one or more tabulators with a given device configuration.	Administrative
Tabulator Disassociation	Disassociate one or more tabulators from the given device configuration.	Administrative
Print Preview	Allow users to preview and print a list of device configurations.	Any Role.

Table 3-30: The Configuration Profiles Entity Attributes and Activities.
(Continued) (Continued)

3.4.6.7 Programming

This subsection details the actions that must be followed in order to prepare and program the set of configuration items needed for the ImageCast[®] tabulators to operate as expected.

For the ICP platform this set includes:

- Device Configuration Files (DCF) - in binary file format
- Voting Information Files (VIF) - in binary file format
- Static and dynamic audio files (ImageCast[®] BMD, DRE or BMDLite)
- AVS ballot images in PNG file format (ImageCast[®] BMD)
- XML ballot definition files (ImageCast[®] BMD, DRE or BMD Lite)
- PCL ballot print definition files (ImageCast[®] BMD Lite)
- iButton Security Keys

For the ICE platform this set includes:

- Machine Behavioral Settings file (MBS) - in XML file format
- Election Database - in SQLite database file format
- Dynamic audio files
- AVS ballot images in PNG file format
- Resource and configuration files
- iButton Security Keys

Table 3-31 shows the characteristics of these configuration items.

Tabulator Configuration Items		
Name	Description	Format
DCF	The Device Configuration File defines the ICP device level operational characteristics.	Binary files
MBS	The Machine Behavioural Settings File defines behavioural settings for a given Instance of ICE tabulator.	XML files
VIF	Voting Information File is an election definition file for ICP. It defines voting (contest, choice, ballot) processing characteristics.	Binary files
Election DB	Election database (election definition for ICE)	SQLite
Dynamic Audio Files	Dynamic audio files (RIFX (WAV) for ICP or OGG (SPX) format for ICE devices) are optimized audio recordings for the election event, political parties, contest and choice entities.	Audio RIFX (WAV) files for ICP or audio OGG (SPX) files for ICE devices.
Ballot Images	Ballot images (PNG) are used to present electronic ballots on the ImageCast [®] BMD or ImageCast R Evolution LCD screen during an AVS voting session.	PNG image files
XML Ballot Definition	Ballot image definitions (XML) are used to define ballot layout for electronic ballot presentation on the LCD screen as part of the AVS voting using the ImageCast [®] BMD, BMD Lite or ICP DRE device.	XML files

Table 3-31: The Tabulator Configuration Items.

Tabulator Configuration Items		
PCL Ballot Printing Definition	Ballot printing definition (PCL) is used to print paper ballots after AVS voting session using the ImageCast [®] BMD Lite integrated ballot printer.	PCL files
iButton Security Keys	Set of security credentials for device administrative functions.	Binary information

Table 3-31: The Tabulator Configuration Items. (Continued)

In the course of this action, all needed configuration items are created based on defined election data from the EMS Database, and stored on the NAS storage system. For each instance of the tabulator, a predefined configuration container is created on the NAS. In the next step, items from the configuration container are uploaded to the designated Compact Flash memory packs and iButton security keys.

3.4.7 Reporting

3.4.7.1 Election Project

A top-level Election Project report of the configured system can be generated and previewed. Audio Import reports are created during import of dynamic audio files.

This report group lists the following system attributes:

- Election Status
- Description of the election status
- Election Project Name
- Description of the election event
- Jurisdiction Name
- Jurisdiction Type
- Election Event Date
- Election Event Type
- Ballot Style
- Security Settings
- Audio Ballot Type
- Number of subdivisions

- Number of polling subdivisions
- Number of political parties
- Number of offices
- Number of contests
- Number of choices
- Number of ballots
- Number of tabulators
- Number of tabulator users

The Election project report group also contains the Audio Import option.

- List of audio files imported
- List of audio files not imported

NOTE: The Audio Import Report cannot be created on demand. It is created automatically after importing the Audio Library file.

The reports are generated in simple text format and can be exported into PDF, HTML or MS Excel format. The created reports are stored on the NAS and signed using the election project key. Reports are created with the assigned date, and multiple reports can be generated.

The Election project report group also contains the Audio Studio File Names report. In order to import audio files, they have to be named according to a specific convention (Entity Name, Entity Text and Entity Audio file name).

3.4.7.2 Divisioning

The activity is used to generate and preview a report containing Divisioning-related information. This report group lists the following system attributes:

- List of subdivision types hierarchy
- List of defined subdivisions
- List of defined polling subdivisions (i.e. precincts)
- List of defined elector groups
- List of political parties
- List of defined offices
- List of district rotation definition

The Subdivision Types report shows data which was entered during the definition of subdivision types (“Subdivision Type Name” and “Number of Subdivision” instances).

The Elector Group Types report shows data which was entered during the definition of the Elector Group Types (“Elector Group Type Name”). In addition, it shows whether the elector group type is set to partisan or not.

The Subdivisions report shows “Subdivision Name”, “Subdivision Type”, “Parent Subdivision Name”, “Subdivision Abbreviation”, “Description” and a list of assigned polling subdivisions.

The Polling subdivisions report shows the “Polling Subdivision Name”, “Number of Voters” in the polling subdivision, “Language Profile”, specifies whether the polling subdivision is split or not, and also provides the names of assigned polling subdivision instances.

Elector Groups report shows the “Elector Group Name”, “Abbreviation”, “Description”, “Elector Group Type”, whether the force ballot creation option had been chosen, whether the elector group types is partisan, and whether the description had been entered.

The Political Parties report shows the “Political Party Name”, “Abbreviation”, “Political Party Description” and “Logo”.

The Office report shows the “Office Name”, “Office Type”, “Subdivision Type”, the number of positions the candidates are running for, “Description” and “Number of Write-Ins”. The Office report also specifies whether the force ballot creation option had been chosen, how many “Ballot Markers per Position” have been entered, as well as the term length and number of “Paper Index”.

District Rotation Definition report includes “Contest Area External Id”, “District Name-Contest Area Name”, “Rotation Area External Id”, “District Name-Rotation Area Name”, “Rotation Index”.

The reports are generated in simple text format and can be exported into PDF, HTML or MS Excel format. The created reports are stored on the NAS and signed using the election project key. Reports are created with the assigned date, and multiple reports can be generated.

3.4.7.3 Election Event

The activity used for generating and previewing Election Event-related information in the form of a report.

This report lists the following system attributes:

- List of defined contests
- List of defined choices
- Status of ballot production
- List of defined ballots content
- Ballot Overview

- List of defined ballots per polling subdivision
- List of defined ballots per voting location
- List of defined ballots per tabulator
- List of consolidated ballots
- List of ballot types
- List of contest positions on ballot
- List of contest Precinct Rotation
- List of Contest and Choices List
- List of Ballot Text for Political Parties
- List of Ballot Text for Contests
- List of Ballot text for Contest Heading
- List of Ballot Text for Choice
- List of Ballot Text for Ballot Header and Footer

The contest report shows the following set of attributes for each individual contest: the name, number of positions, name of the assigned office, subdivision and parent names,. It also specifies whether the contest is acclaimed or disabled, provides column index number and value, and indicates whether the column index had been rewritten (the values are dependent on ballot style). In addition, this report shows the language of the audio and ballot content profiles. It lists the choices names and elector groups.

The choices report shows the candidates name, the contest name, the office name and the subdivision name. In addition, this report shows the language profiles of the ballot, as well as the audio option and the party support.

The ballot content report shows the initial size, file name, key-in ID, description, language profile and size. Additionally, this report shows the list of choices (“Choice Name” and “Contest Name”).

The ballot overview report shows includes the key-in ID, ballot file Nname, description, language profile, and a list of precincts.

The consolidated ballots report shows ballot files and a list of contests.

The ballot distribution per polling subdivision report shows polling subdivisions, key-in ID and a description (which includes polling subdivisions).

The ballot distribution per voting location report shows the voting location number, the voting location name, a list of tabulators, polling subdivisions, key-in ID, a description (including polling subdivisions) and the number of eligible voters.

The ballot distribution per tabulators report shows the tabulator name, key-in ID and a description (including polling subdivisions).

The contest positions on ballot report shows the contest name, number of votes, number of pages and columns.

The ballot types report shows the ballot type number, abbreviation, contest name, office name, subdivision name and rotation. In addition, this report shows polling districts and the number of External IDs.

The contest precinct rotation report shows the contest name, rotation and assigned precinct splits.

The contest and choices list report includes the contest name, number of positions, write-ins, choices and party affiliation.

The ballot text for political parties report includes the political party name and language.

The ballot text for contests report includes the language and contest name.

The ballot text for contest heading report includes the contest heading name and language.

The ballot text for choice report includes the choice name, language, choice prototype and language.

The ballot text for ballot header and footer report includes the language, a description and the ballot content type.

The reports are generated in simple text format and can be exported into PDF, HTML or MS Excel format. Only “Ballot Content” and “Ballot Distribution” reports cannot be generated in PDF format. The created reports are stored on the NAS and signed using the election project key. Reports are created with the assigned date, and multiple reports can be generated.

3.4.7.4 Tabulation

This activity is used to generate and preview tabulation-related information in the form of a report. This report shows the following system attributes:

- A list of tabulators with their defined parameters, including the assignment information
- A list of tabulator users
- A list of voting locations

The Tabulator report shows the “Tabulator Name”, “Voting Location (Polling Location) Name”, “Tabulator Type”, “Counting Group” and “Device Settings” data. In addition, this report represents the associated polling subdivision data (“Polling Subdivision Name”, “Number of Voters”) as well as a list of Tabulator

Users (user name, users first and last name). The Tabulator Users report shows the “Tabulator Name”, “Polling Subdivision Name”, “User Name” and the user’s first and last name. The Voting Locations report shows main data and infrastructure-related information. Main data information includes: “Voting Location Name”, “Number” and “Description”. The infrastructure-related information includes the number of phone lines, internet access type, number of washroom facilities, building accessibility, address name and number, longitude and latitude.

The reports are generated in simple text format and can be exported into PDF, HTML or MS Excel format. The created reports are stored on the NAS and signed using the election project key. Reports are created with the assigned date, and multiple reports can be generated.

3.4.7.5 System Report

This activity is used to generate and preview system-related information in the form of a report. This report group lists the following system attributes:

- Application Users
- Application Roles
- Language Profiles
- Database Security Information

The application user report shows the “User name”, “First and Last Name”, “Role”, “Status”, “User Position”, “Description”, “Address”, “Phone Number” and “Email”.

The Application Role report shows the “Application User Name”, “Password Type” and whether the role is a System Role. In addition, the set of permissions are listed. The application role related data are presented for each role in a separate spreadsheet. The Language Profile report shows the “Language Profile Name”, its purpose and whether the language option is Default. The Database Security report shows the “Database Name”, “Date of Creation”, date of modification, the key from the database and the key from NAS.

The reports are generated in simple text format and can be exported into PDF, HTML or MS Excel format. Only Ballot Content and Ballot Distribution reports cannot be generated in PDF format. The created reports are stored on the NAS and signed using the election project key. Reports are created with the assigned date, and multiple reports can be generated.

3.4.7.6 Audit Log

From the start of the application, every activity performed within the EMS EED system is recorded into the EMS Database, including who did what and when. The

auditing activity displays this auditing report on the screen of the EMS EED client application.

In addition to recording the activities in the EMS Database, the same set of log entries are also entered into the Windows Event Log.

The reports found in the Audit Log Report Group are associated with the usernames that have been created within the EMS EED (e.g. Admin and Tech Advisor). That is to say, the produced reports will log each action that a specific user performed at a certain period of time.

These reports show details such as “User Name”, “Report for Time Period”, “Time” and “Action”.

The report is generated in simple text format and can be exported into PDF, HTML or MS Excel format. The created report is stored on the NAS and signed using the election project key. Reports are created with the assigned date, and multiple reports can be generated.

The following activities are logged by EMS applications:

- User log on and off (this is actually logged by default by Windows in Windows Logs/Security)
- Application start (this is actually logged once an election project has been opened by the application)
- Application stop (including user request and confirmation to close the application and the election project)
- Printing (Mobile Ballot Production specifically)
- Election event status
- Management of election data (Precincts, Districts, Polling Centers, etc)
- Programming of tabulators with election data
- Loading of results from tabulators

3.5 Domain Implementation - Results Tally and Reporting

Figure 3-10 illustrates the EMS Results Tally and Reporting main activities structure, which outlines the top-level main activities available in the system, as well as their sub-activities. This diagram does not include the navigation menu

structure, but it does group together a variety of activities that can be performed within the EMS RTR application.

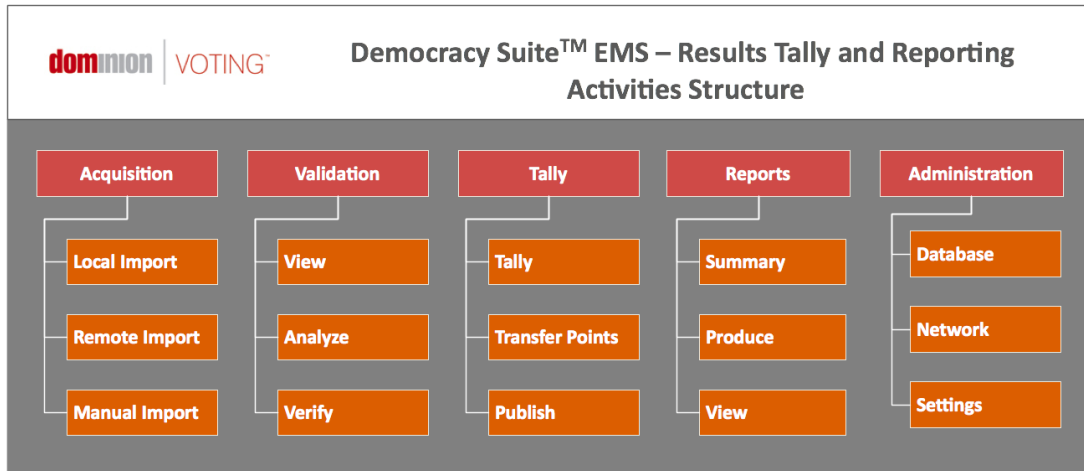


Figure 3-10: The EMS Results Tally and Reporting Activities Structure.

The main purpose of EMS RTR is processing election results. In doing so, the EMS RTR is responsible for processing election results from ImageCast[®] Precinct, ImageCast[®] Evolution and ImageCast[®] Central optical ballot scan tabulators. ImageCast[®] Precinct and ImageCast[®] Central platforms produce election results in RIF format (Results Information File), in addition to scanned ballot images and log files. ImageCast[®] Evolution produces election results in XML format.

The diagram presented in Figure 3-11 shows the processing paths and state transitions. A detailed description of the election results processing steps is provided in the sections that follow.

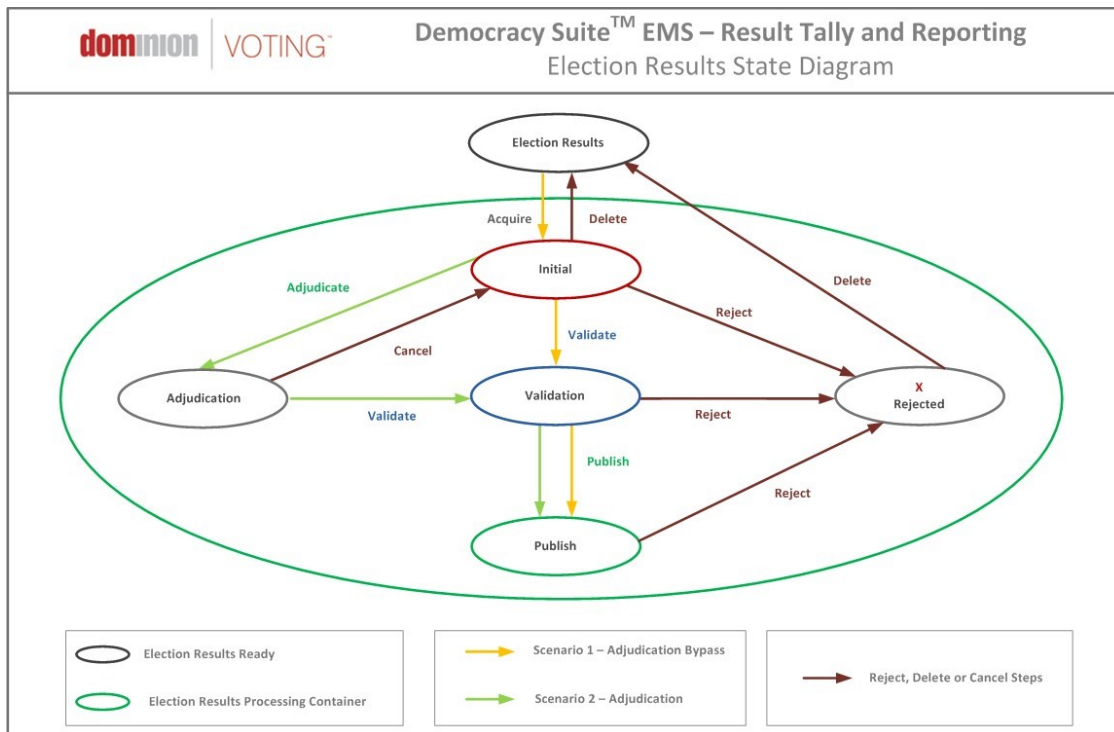


Figure 3-11: The Election Results Processing State Diagram.

3.5.1 Results Acquisition

This activity is responsible for acquiring election results. Upon successfully starting and logging in, EMS RTR appears in the initial state. In this phase, the main application screen displays a list of known tabulators that are waiting for results. This list of tabulators expecting election results is known to EMS RTR because it uses the same EMS Database as the EMS EED application used to define tabulator instances.

3.5.1.1 Local Import

Local import refers to the acquisition of election result files (RIFs from ICP/ICC or XMLs from ICE) from the Compact Flash memory packs. These results were initially acquired from the PCOS tabulation devices. Before an election result file is declared valid, EMS RTR has to validate the RIF/XML file. Validation is performed by decrypting the RIF/XML file using the AES-128 algorithm and recalculating its message authentication code (MAC) using the keyed SHA-256 HMAC algorithm. If the file is valid, its content is parsed and the status of the tabulator transitions into its initial state. This transition is visually displayed on screen.

NOTE: PCOS (Precinct Count Optical Scanner) refers to any ImageCast[®] precinct tabulator, that is ImageCast[®] Precinct and ImageCast[®] Evolution

3.5.1.2 Manual Entry

In some cases, there is a need to manually type-in the election results. In this case, EMS RTR provides a manual data entry screen where the user can enter the number of votes (and other significant data, such as the number of overvotes, undervotes, etc.) for each choice and each contest on the ballot.

When the system is configured with this option, manual entry can also be used to enter data from write-in ballots. In this scenario, the tabulators separate ballots with write-ins into a different compartment of the ballot box. These ballots are analyzed following the election and write-in votes are entered into the EMS RTR using the manual entry option.

3.5.2 Results Validation

From a logic and accuracy point of view, the process of validating election results can either be triggered in the initial state of the election result file or after adjudication is performed.

3.5.2.1 View

In the view phase, a user inspects the acquired results file by previewing the number of votes that appear on the ballot and contest levels. In this case, ballot level refers to cumulative results for a specific ballot style, while contest level refers to cumulative results for contests for all ballots. These results are displayed on the EMS RTR application screen.

3.5.2.2 Analyze

A user will only declare election results files as valid if he/she does not identify any unusual data within the file. If the user spots any illogical data (i.e. too many overvotes), the user has the ability to reject the file. In this case, the file's status will reverse to 'rejected'. However, if results appear normal, the user will proceed with file validation.

3.5.2.3 Validate

File validation is the action in which a user declares an election file to be valid. This action will in turn change the state of the election file from 'initial' to 'validated', and at the same time, update the current result totals within the EMS Database. The results can be validated per selected tabulator (Validate option), all results can be validated at once (Validate All option) or validated and published (Validate and Publish option).

3.5.3 Results Publishing

Results publishing is used to publish unofficial election results to interested parties. Some examples include notifying the media about the current unofficial results, or using the data for real-time dynamic public results presentations. EMS only provides aggregate results and does not provide data for individual ballots or allow unofficial electronic reports and files to access the storage devices of official data. When broadcasting unofficial results (as defined in VVSG Vol. 1 Section 2.4.4), the ImageCast[®] unofficial result publishing presentations clearly indicate that the results are unofficial.

3.5.3.1 Transfer Points

Transfer points represent locations that can be reached by some form of network, and in turn, where results can be published. The user defines these transfer points. Depending on the type of transfer point, each point is defined by an appropriate set of parameters. The following transfer point types are defined:

- FTP: Defined by the name (or IP address) of the FTP server, TCP port, and set of credentials with write permissions on the FTP server (not available in the NYS version of EMS).
- Network drive: A shared network location accessible from the system.

3.5.3.2 Publishing

Results reporting depends on the result types defined by the EMS EED client application during the election event definition phase. The EMS RTR application has the ability to extract and format election results. Every report can be produced in Microsoft Excel or HTML format. EMS is designed to prevent data from being altered or destroyed by report generation.

3.5.4 Results Reporting

Results reporting depends on the result types defined by the EMS EED client application during the election event definition phase. The EMS RTR application has the ability to extract and format election results. Every report can be produced in Microsoft Excel or Adobe PDF format. EMS is designed to prevent data from being altered or destroyed by report generation.

3.5.4.1 Summary

The summary report is a generic election results report which collects the complete set of election results. In turn, this type of report can be used to produce an initial zero report of the election results, as well as a cumulative representation of the election results for a given election event.

3.5.4.2 Produce

In addition to the summary report, which is available within the system by default, the user can create other types of reports by selecting the desired report type(s) and triggering the report generation process. Created reports are stored on the NAS device, and the EMS RTR displays a list of all created reports, including their type and date of creation.

3.5.4.3 View

Created reports can be previewed directly from the EMS RTR application using Excel and/or HTML viewer applications. Sometimes the created reports can become quite large. In that case, the user can utilize filtering options to narrow down the reports size.

3.5.5 Results Auditing

After processing election results in most cases, there is a need to inspect the system operation in a more detailed manner. As a result, the EMS RTR client application has the ability to produce a detailed audit report on how ballots were marked and how they were interpreted by tabulator devices. In addition, EMS RTR collects and copies all relevant ballots scans to be visually inspected.

Furthermore, all ImageCast[®] log files are visible through the RTR application.¹⁴

For full details on the ImageCast[®] system's audit functions as required by VVSG Vol. 1 Section 2.1.5, please refer to the following user guides:

- Democracy Suite[®] EMS Election Event Designer User Guide
- Democracy Suite[®] EMS Results Tally & Reporting User Guide

3.5.5.1 Lookup

The first step when performing an audit is to lookup the list of scanned ballot images and log files based on specific criteria. The generation of audit record entries will not be terminated or altered by program control, or by the intervention of any person. The physical security and integrity of the record are maintained at all times. The user can export audit images for a subset of result files, for a single contest or for all contests. For each export a separate subfolder will be created. Inside the subfolder maximum two subfolders can be created:

- published: Folder containing all images belonging to published results.
- notpublished: Folder containing all images belonging to non-published results.

If no contest was selected the following subfolders will be created inside these folders:

- BlankBallot: No contest was marked on the ballot.
- Blank: At least one contest did not have any votes on the ballot.
- UndervotedNotBlank: At least one contest was undervoted on the ballot.
- Overvoted: At least one contest was overvoted on the ballot.
- Regular: Each contest was fully voted on the ballot.
- Write-in: Write-ins were marked on the ballot.

A similar approach is available for log files produced by the ImageCast[®] tabulator devices. In this case, filtering can be performed based on tabulator instance.

3.5.5.2 Ballots

This activity represents the previewing of ballot images. ImageCast[®] devices are unique due to their ballot fingerprinting technology, which records how the device interprets ballot markings, and appends this information to the bottom of the scanned ballot image. Using this activity, and after lookup is performed, a user can select and inspect ballot images.

Ballot Image audit records can be printed. As per VVSG Vol. 1, this printing procedure meets the following requirements:

- The generation of audit trail records does not interfere with the production of output reports.
- The entries can be identified to facilitate their recognition, segregation, and retention.
- The audit record entries are kept physically secure.

3.5.5.3 Logs

This activity represents a simple text viewer function for previewing the log files produced by ImageCast[®] devices. Audit Log records can be printed. As per VVSG Vol. 1, this printing procedure meets the following requirements:

- The generation of audit trail records does not interfere with the production of output reports.
- The entries can be identified to facilitate their recognition, segregation, and retention.
- The audit record entries are kept physically secure.

3.5.6 Administration

Keeping in mind that the EMS RTR client application is part of the larger Democracy Suite[®] EMS system, there is always the need to configure some

aspects of the application's behavior. In contrast to the EMS EED application, the EMS RTR application does not have user management capabilities. EED and RTR share the same EMS Database data repository and users, but roles and permissions are exclusively defined using the EMS EED application. Consequently, EMS RTR has a limited set of integrated administrative functions.

3.6 Domain Implementation - Audio Studio

The EMS Audio Studio (AS) module represents a separate application used to record audio files for the given election event. Its operation is based on the audio definition library (XML) file exported from the EMS EED application and loaded into the EMS AS application. From this point on, the EMS AS application allow the user to record audio, attach previously recorded files and play back recorded files. Recorded files can be exported from EMS AS and imported back into the EMS EED application in OGG (SPX) or RIFX (WAV) audio file format. Files are compressed into a ZIP archive for an easier import into EMS EED.

NOTE: Results auditing is not available in NYS version of EMS.

3.7 Domain Implementation - EMS Adjudication

EMS Adjudication (“Adjudication”) is an application used by election officials to review and adjudicate ballot images from ImageCast[®] tabulators. The application utilizes tabulator results and scanned images to allow stakeholders to make non-destructive adjudications to ballots with auditing and reporting capabilities.

The application works in two basic modes: election project setup and adjudication. Adjudication project setup is limited to adjudication users with administrative privileges. Standard adjudication users only have the ability to adjudicate ballots, while adjudication administrator users have additional capabilities of viewing configured project parameters and generating reports.

3.7.1 Adjudication Project Setup

The default state of the application, after installation, is adjudication project setup. While in this state, adjudication administrator users using the client on the machine with the EMS Adjudication Services installed may choose the election event to adjudicate, configure ballot filtering, configure which ballot contests will receive highlighting, and configure miscellaneous adjudication options.

3.7.1.1 Outstack Conditions

The adjudication system utilizes a concept called an outstack condition that virtually separates ballots by pre-determined ballot characteristics. Outstack conditions are used to filter which ballots are served to users in order to

streamline the adjudication workflow. For instance, if a jurisdiction wishes only to adjudicate write-in contests, they may filter out all ballots without write-in contests to reduce the overall number of ballots which need to be reviewed. A ballot may have multiple outstack conditions.

3.7.1.2 Common Outstack Conditions

The following outstack conditions are common to most all elections and are always available to be selected for adjudication.

Outstack Conditions: None

This condition indicates that no conditions exist for the given ballot.

Out stack conditions: Overvote

This condition indicates that a ballot contains one or more overvoted contests. This condition is applied at the contest level.

Outstack conditions: Undervote

This condition indicates that a ballot contains one or more undervoted contests. This condition is applied at the contest level.

Outstack conditions: Write-in

This condition indicates that a ballot contains one or more contests where write-ins are marked. This condition is applied at the contest level.

Outstack conditions: Write-in (Qualified)

This condition indicates that a ballot contains one or more contests having qualified write-ins, where write-ins are marked. This condition is applied at the contest level.

Outstack conditions: Blank Ballot

This condition indicates that a ballot contains no valid votes. A ballot containing one or more marginal marks may qualify for this condition. This condition is applied at the ballot level.

Outstack conditions: Blank Contest

This condition indicates that a ballot contains one or more contests where no votes were detected. If a contest contains only marginal marks, this condition will exist. This condition is applied at the contest level.

Outstack conditions: Marginal Mark

This condition indicates that a ballot contains one or more choices that were detected as marginal marks. This condition is applied at the contest level.

3.7.1.3 RCV Outstack Conditions

The following outstack conditions may occur when a ranked-choice vote (RCV) contest is defined in the election project. Each is applied at the contest level.

Outstack condition: Duplicate ranking

This condition indicates that a ballot contains an RCV contest where a candidate is marked in more than one ranking.

Outstack condition: Inconsistent ordering

This condition indicates that a ballot contains an RCV contest where a candidate is ranked both above and below another candidate.

Outstack condition: Overvoted rank

This condition indicates that a ballot contains an RCV contest where a ranking has been overvoted.

Outstack condition: Skipped ranking

This condition indicates that a ballot contains an RCV contest where a ranking was skipped.

Outstack condition: Unvoted contest

This condition indicates that a ballot contains an RCV contest that is not voted.

Outstack condition: Unused ranking

This condition indicates that a ballot contains an RCV contest with an unused ranking at the end of the contest.

3.7.1.4 Additional Outstack Conditions

Additional outstack conditions may occur depending on the election project configuration and the types of contests defined in the election:

Outstack condition: Crossover

This condition indicates that a cross-over rule violation was detected on the ballot. This occurs when the voter votes in mutually-exclusive contests, for example,

voting in different partisan contests on an open primary ballot. This condition is applied at the ballot level.

Outstack condition: 'No Preference' choice overridden

In jurisdictions that include a 'No Preference' choice this condition indicates that a vote for 'No Preference' was overridden because it would result in an overvote. This condition is applied at the contest level.

Outstack condition: Overridden by write-in

This condition indicates that a vote for a regular candidate was overridden by a vote for a write-in candidate to prevent an overvote in jurisdictions where this rule applies. This condition is applied at the contest level.

Outstack condition: Party preference

This condition indicates that a party preference rule violation was detected on the ballot. This occurs when the voter votes for one party in a party preference contest and then votes for a candidate in a different party. This condition is applied at the ballot level.

Outstack condition: Removed cross-endorsed mark

This condition indicates that a ballot contains a contest where the voter voted twice for a candidate affiliated with multiple parties. Only the top mark is counted. This condition is applied at the contest level.

Outstack condition: Strict Inclusive overvote

This condition indicates that a ballot contains a contest where an overvote occurred through the combination of explicit votes and implicit votes from a straight-party contest. This condition is applied at the contest level.

Outstack condition: Strict vote for

In jurisdictions with contests where the voter is required to vote for a particular number of candidates, this condition indicates a contest where the voter marked a number of candidates different than the contest "vote for". This condition is applied at the contest level.

3.7.2 Starting Adjudication

When the administrator has finished configuring all adjudication project parameters and is ready to begin adjudicating ballots, a button is pressed which signals to the services that batch and ballot processing can begin. At this point, all clients will begin receiving non-filtered ballots.

NOTE: Project parameters cannot be changed after this point.

3.7.3 Results Acquisition

Once adjudication is started, the EMS Adjudication Services request results from the Cast Vote Record service that have been loaded into RTR. The EMS Adjudication Services iterate through each tabulator and batch to transfer the data into the adjudication system.

3.7.3.1 Cast Vote Record (CVR) Service

Adjudication communicates with EED and RTR through the EMS Application Server. Specifically results that have been loaded into RTR are served through the CVR service according to the filtering rules selected in the Adjudication Election Wizard. Once a ballot in a results file has been adjudicated, that results file will appear as not synchronized in RTR until the batch has been submitted back to RTR in Adjudication.

3.7.3.2 Batches

Batches contain ballots and are the primary groupings used within the application. Although the tabulator name is also visible, ballots are not organized hierarchically under tabulators, but under batches. Batches are also the unit under which results may be accumulated, reported on, and submitted back to RTR.

The application will attempt to serve all ballots within a batch before moving on to another batch.

Batches have six states that they move through: In-progress, Review, Pending, Submitted, in error state, or read error. In-progress batches are batches that have been acquired by the system and have ballots being served to clients. Any batches which contain ballots that could not be read will have their status changed to Read Error and the administrator will be alerted. When all ballots for a given batch have been adjudicated, its status changes to Review. A batch in review is available to be re-opened and adjudicated, and for reporting and submission to RTR. Once a batch has been submitted to RTR, its status changes temporarily to Pending while it is put into RTR. When the system confirms that a batch has successfully been sent, its status changes to Submitted. If unsuccessful, the status changes to In Error State.

3.7.4 Adjudication

While adjudication is in progress, all clients will receive ballots to adjudicate based on the filtering set up by the administrator in the adjudication project setup steps. Ballots are automatically served to each client. Adjudication administrator users have a menu available to them that lets them view batch statistics, selected ballot and contest filters, contest highlighting, configured qualified write-ins, and

to generate reports. Non-admin users may only adjudicate ballots and do not see the administrator menu.

To adjudicate a ballot, a user clicks and drags on a ballot to pan the ballot viewing area. A mouse wheel (or Ctrl+/Ctrl-) may be used to zoom in an out on the ballot image. The left and right arrow keys on a keyboard may be used to quickly move between highlighted contests. A ballot navigation menu exists on the right side of the user interface providing a toggle switch for switching overlays on/off. There are buttons to view front and back ballot images as well as a button to view the Audit Mark. Human marked ballot faces may be accessed using the keyboard shortcuts: F(ront), B(ack), A(udit Mark).

The ballot navigation menu also includes a button to quarantine a ballot. This allows a user to set a ballot aside with a note, if it is not clear how to adjudicate it. The ballot can then be reviewed by an administrator. The administrator can either readjudicate the ballot directly or unquarantine it with an additional note. If the administrator unquarantines the ballot, it is released into the pool of available ballots, and will be served to an adjudicator.

There is a line of text below the toggle switches that shows information about the ballot, such as the tabulator and batch number as well as which number it is in the sequence for the batch. The user can also hover over this line with the mouse, in order to display the number of ballots remaining in the batch, plus the total number of unadjudicated ballots.

When all ballots have been adjudicated for a batch, the batch status changes to review and is available for reporting and submission to RTR. If a batch is not completing due to a stuck ballot (a user may have left with an active ballot on their screen, etc.), an administrator may right-click on that batch and choose to reset any open ballots and re-serve them to open clients.

3.7.4.1 Ballots

Ballots consist of both a logical structure containing vote results for contests and scanned ballot images from tabulators. Ballot images are presented to users with overlays representing whether or not the vote was originally counted by the tabulator and the confidence percentage of each mark. Both the front and back images (where applicable) as well as the original Audit Mark image are visible to the user.

Digital ballot images, such as those produced from machine marked barcode ballots, consist of human readable text indicating the voter's choices. Adjudicators are presented with a write-in resolution panel containing all contests with write-in votes to allow an adjudicator to resolve them.

Ballots have five potential statuses in the application: New, In-progress, Quarantined, Adjudicated, and Filtered. When ballots are first acquired by the system, they are either marked as new or filtered, depending on how the adjudication project was configured. Once a ballot is served to a client, its status

becomes In-progress. When adjudication is complete, it changes to Adjudicated. When a ballot is quarantined, its status changes to Quarantined. When a quarantined ballot is released, its status changes to New. A reopened ballot remains in its former status until an administrator saves it, at which point it becomes Adjudicated, regardless of its previous status.

3.7.4.2 Contests

Contests contain choices with corresponding vote targets. In the application, administrators may setup contest highlighting that will outline contests that require special attention based on outstack conditions.

Additionally, an informational icon is overlaid in the top right corner of each contest that contains an outstack condition. The icon provides information about detected outstack conditions for each contest when the user hovers over it with their mouse.

Digital ballot contests contain text representing the choices voted for in each contest. No overlays are drawn on the ballot image; instead, a write-in resolution panel appears allowing an adjudicator to resolve write-in choices. The Show\Hide toggle switch can be used to change the visibility of the write-in resolution panel.

3.7.4.3 Choices

A choice is the base ballot artifact in the system. For each choice on a human marked ballot with a detected mark in its target area, the system will overlay a colored highlight on the choice text indicating how the tabulator read the mark: yellow for marginal marks, green for counted marks. For counted marks, the system overlays a green target indicator with a check mark icon in the target area. Overlays for both choices and contests may be toggled on and off by the user to allow unobstructed viewing of the target area. Finally, choices which are detected as marginal marks (mark confidence between the lower and upper marginal mark thresholds) will display a confidence percentage when the user places their mouse over the choices target.

To adjudicate a contest on a human marked ballot, a user clicks on the target area of the ballot to toggle its vote status. If the choice was previously counted as a vote, clicking on it will remove the vote and a red overlay with an “X” icon will appear over the target. If the choice was not previously counted (including if it was detected as a marginal mark), clicking the target will add a vote for that choice and a green overlay with a check mark icon will appear. For write-in contests, a pop-up dialog is shown that lets the user resolve the write-in to a qualified write-in name or to reject the write-in vote as invalid with a listed rejection reason. If the write-in is resolved to a qualified write-in name, the overlay will green with a check mark icon. If the write-in is rejected, it will be displayed red with an “X” icon.

To adjudicate a contest on digital ballots, a user finds the contest in the write-in resolution panel and clicks the Resolve write-in button to show the pop-up dialog.

Because the ballot targets are not available as they are in human marked ballots, the candidate names drop-down contains all the candidates in the contest as well as the qualified write-in names so that an adjudicator can resolve a write-in to a ballot candidate had the voter written in a ballot candidate name. From there, write-in resolution is identical to that of a human marked ballot. When write-in resolution is complete for a given choice, the write-in resolution button changes to display either Resolved (resolved to a qualified write-in name or accepted as-is) or Rejected. These labels may be clicked on again to reveal the pop-up window and allow an adjudicator to change their original resolution.

Qualified write-in names may only be used once per contest. For example, in a vote for two contest, a single qualified write-in name may only be applied to one write-in choice. Once a candidate name is selected and assigned to a choice, it is no longer available for subsequent name resolution within that ballot.

3.7.4.4 User Notifications

User notifications are displayed to users to confirm certain actions or display system information. Alerts can either be green (vote added or other information), yellow (cautionary information), or red (vote removed or error information). Alerts show up in a bar at the top of the user interface for a configurable amount of time. The duration that an alert is shown can be changed in the applications configuration file by changing the value of the setting `NotificationDurationInSeconds`.

3.7.5 Reopening a ballot

Administrator users may double-click on a ballot on the Batch Management screen to reopen a ballot. Only ballots which have already been adjudicated or quarantined will be available for reopening and will appear under their respective batch in either the In-Progress or Review panes. To view ballots, a user must click on the expander (arrow or plus icon, depending on the Windows theme used) next to a batch with adjudicated ballots. Each ballot listing shows the ballot number along with the date and time it was adjudicated and by whom.

The In-Progress pane also includes quarantined and in-progress ballots, plus filtering options for what types of ballots to show.

Once a ballot is double-clicked, the administrator will immediately be taken to the reopened ballot in its original state - not reflecting previous adjudications - with the exception of saved audit marks from previous sessions, which will be visible. If another ballot was already open with changes made to it, the administrator will be asked to save the changes, discard changes, or cancel the reopen operation. If no changes have been made to the currently open ballot or no ballot was already open, the reopened ballot will simply be displayed. Upon completing the ballot, the administrator will have the option to save the ballot (overwriting any previous adjudications), or to revert to the adjudications that were done previously.

When the reopened ballot has been completed, the administrator will re-enter the normal ballot queue and receive new ballots, if any exist. Reports for the batch containing a reopened ballot that was saved will be regenerated. If an administrator has already generated a report based on a batch containing the reopened ballot, they will be alerted that the report may be out of date and asked to regenerate it. If changes to a reopened ballot are discarded, reports are not regenerated.

Throughout the reopen process, ballot statuses are never changed. If a reopened ballot is saved, it will temporarily change the report status of its containing batch in order to regenerate reports.

3.7.6 Spoiling Batches

Spoiling a batch is a last-resort remedy for completely removing an in-progress batch from Adjudication when there is something wrong with the batch. For example, a batch may need to be spoiled when there are bad ballot images that prevent ballot adjudication. A spoiled batch will no longer be shown in the Batches view nor be available to run reports on. No ballots from that batch will be served to users, and any adjudications made on ballots within the spoiled batch will be ignored. To re-introduce those ballots to Adjudication they must be validated in RTR.

To spoil a batch, reject its respective result file in RTR. When adjudication polls the Cast Vote Record service for updates any rejected batches will be spoiled in Adjudication and any ballots belonging to that batch will be recalled from clients.

3.7.7 Reporting

Adjudication administrators may generate four types of report: Activity, Write-In Resolution, Statistics, and Quarantine. All reports are available for either completed or submitted batches. The Quarantine report is available for in-progress batches as well. The election project name is defaulted into the election title text box but may be changed by the user. Additionally, a user may enter their own title for the report. Reports may be generated as Adobe PDF, Microsoft Excel, or generic CSV files. Excel and CSV formats allow users to import the results into other systems. If a ballot is reopened and saved, the reports service will automatically regenerate its containing batch's reports and alert the user that any generated reports may be out of date, if applicable. If this message is received, the user must regenerate the report to clear the message.

3.7.7.1 Activity Report

Activity reports show adjudication actions taken against each ballot and are grouped by tabulator and batch. Each action shows the user name of the logged-in adjudication user along with the date/time of the action. The following actions are listed: Mark added, mark removed, write-in accepted, write-in rejected (with

reason). Ballots which were filtered out of adjudication are labeled appropriately in the report.

3.7.7.2 Write-In Resolution Report

The Write-In Resolution report shows a breakdown of adjudication actions made specifically to resolve write-in choices. The report breaks down the actions into the number of choices accepted as-is, the number of choices that were resolved to a qualified write-in candidate and what candidate they were resolved to, and the number of choices that were rejected and for what reason they were rejected.

3.7.7.3 Statistics Report

The Statistics report gives a numerical breakdown of the total number of ballots adjudicated compared to the total number of ballots in the selected batch or batches. The report shows Adjudicated Ballots: x of y where x is the number of ballots adjudicated and y is the total number of ballots. Below this is a breakdown of the number of ballots that were adjudicated for each given outstack condition selected in the project set-up. Because ballots may match more than one outstack condition, the total here may be more than the total number of ballots in the batch or batches.

The first, bolded section of the report shows the totals for all batches selected for the report. A batch-by-batch breakdown follows with totals for each respective batch.

3.7.7.4 Quarantine Report

The Quarantine report gives information on ballots that have been quarantined at some point in their history. For each applicable ballot, it contains an entry for each time the ballot was quarantined. Each entry contains a timestamp, the user that quarantined the ballot, the current status of the ballot, and the quarantine reason entered by the user.

3.7.8 Stopping Adjudication

After completing all adjudication actions, the administrator will stop adjudication. All open clients will be notified that adjudication has been stopped and any ballots remaining on client machines will be removed. Changes made to ballots that remain open on client machines after stopping adjudication will not be saved. Stopping adjudication is normally the final step in the processing of an adjudication project. However, it is possible to resume processing of a project after it has been stopped, in the case where a new project has to be set up. Adjudication can only process one project at a time. After stopping, no further actions on the project are allowed, including reporting, unless the project is resumed. The local administrator client will be taken back to the adjudication project setup wizard. At this point, the system will be ready to set up and begin

processing a new election project, or to resume a project that was previously stopped.

CHAPTER 4: DEMOCRACY SUITE[®] EMS SECURITY DESCRIPTION

Detailed security specifications for the Democracy Suite[®] platform are provided in the separate *TDP 2.06 - Democracy Suite[®] System Security Specification* document. This section provides a high-level, functional description of the EMS security controls.

The overall Democracy Suite[®] platform, and all of its related project and development processes, closely follow the relevant security best practices and principles from the ISO 27000 series of recommendations (ISO 27001 and ISO 17799/27002). Therefore, the security mechanisms applied are based on previous risk analysis and the appropriate risk mitigation decisions. However, it is important to state that for proper system security protection, appropriate processes must be defined and followed by all the business stakeholders within the system, including election staff members of the jurisdiction and Dominion as the vendor. With this in mind, the Democracy Suite[®] EMS provides enabling techniques that allow business stakeholders to follow the best security practices and processes.

4.1 Access Control

4.1.1 Access Control Policy

The access control policy defines important aspects of the access control mechanism. The two main aspects are the business requirements for access control, which are defined by the jurisdiction within the access policy statement, and the access control rules, which clearly state which rules are mandatory, optional or conditional.

The Democracy Suite[®] EMS platform implements role-based user management for the provisioning of the access control mechanisms. Each user accessing the system using one of the two client applications (EED or RTR) is a member of one of the pre-defined or custom-made roles. Each role, on the other hand, has its own set of permissions or actions that users of that role are allowed to perform within the system. The management of access control policies is integrated within the User Management activity of the EMS EED client application (see Section 3.4.2.1). This activity is only available to users with administrative privileges.

Mapping of users to pre-defined system roles, or to custom created roles, is dependent on the defined business access control policy which is specific to each jurisdiction defining and managing election projects.

Section 3.2 lists pre-defined user roles as defined by the EMS architecture. Users of pre-defined administrative roles can create custom-made roles to satisfy user mapping to specific set of system permissions. Sections 3.4 and 3.5 define a variety of system activities integrated within the EMS platform. The tables that summarize the mapping between the pre-defined roles and the possible system activities are presented in TDP 2.06 Democracy Suite® System Security Specification.

Please be advised that search option is available to all EED and RTR users without any restrictions. However, the election definition cannot be affected by the search function.

In addition to the pre-defined roles, the system allows users to define custom roles with a desired set of permissions. This activity can be performed from the EMS EED client application and is only available to users with administrative rights.

The defined roles and associated users seen above are part of the EMS client applications. This means that these users do not have rights to directly access the EMS Application and Database Server components, except by using the EMS EED or EMS RTR client applications. In addition, these roles and users should not be mixed with the operating system or network system roles or users, which are defined separately during the overall system installation and setup.

4.1.2 EMS User Access Management

A user account must be established for each user that requires access to the EMS system. These users are created by the administrative user and are usually one of the first steps in configuring the system after the election project is created. The system does not impose any limits to the number of users that can be created within the system. When defining a new user, a set of security credentials is assigned to the user. These security credentials include a unique user ID and password. The user ID is entered by the administrative user creating the new user account, while the password is automatically generated by the system based on the user role and its corresponding, pre-defined password strength policy. Passwords are established in such a way to ensure they meet a certain level of randomness, and to eliminate any potential spelling errors the system may recognize. Created passwords are not stored within the EMS EED (nor RTR) client applications, but rather in the EMS Database in a cryptographically protected format (using one-way hash functions).

The system does not allow user accounts to be deleted because of the integrity of the audit logs kept by the system. Users are assigned an account status (initial, active or void) and only users with an 'active' account status can use the system. When a user account becomes obsolete, it is not deleted, but instead its status is changed to void.

After a user account has been created, the system creates a new user account in 'initial' status and produces a printable record statement (see Figure 4-1). In addition to the user information and list of privileges assigned to the user, this record contains a password confidentiality statement to be signed by the user. Upon signing the statement, the new user account can be activated (the user account status changes from 'initial' to 'active').

**Democracy Suite[™] Election Management System
Computer Awareness and Data Security Compliance Statement**

COMPUTER AND SYSTEM USAGE

I understand that the unauthorized use or misuse of Democracy Suite Election Management System (EMS) data center facilities (servers, client workstations, networking equipment), computer applications, computer systems, and/or electronic communications systems constitutes an infraction of the accepted data and computing policies/guidelines.

I will not share or release any login, operator ID or password used to access Democracy Suite Election Management System (EMS) data, computer systems, or electronic communications systems. I will keep my password(s) confidential. I will not store access passwords in batch files, in automatic login scripts, in terminal function keys, in computers without access control or in other locations where another person might discover them. I will not intentionally write, produce, generate, copy, propagate or attempt to introduce a computer virus, worm, Trojan horse, etc. into any Democracy Suite Election Management System (EMS) computer system or any computers linked to the Democracy Suite Election Management System (EMS) computer system. I further acknowledge that I will not use University data or computing systems (e.g., software, hardware, network components, etc.) in any illegal, unethical or unauthorized commercial activities.

DATA CONFIDENTIALITY

I recognize my individual responsibility for safeguarding the integrity, accuracy and confidentiality of data that I access as dictated by state and federal law, and Democracy Suite Election Management System (EMS) policies and procedures. I will not improperly release any information obtained as a result of my authorized access. I will properly create, access, use and dispose of Democracy Suite Election Management System (EMS) data based on the data's classification.

YOUR RESPONSIBILITIES

I recognize my overall responsibility to exercise the degree of care required to maintain control of Democracy Suite Election Management System (EMS) computing systems and resources (e.g., data, software, hardware, network components, etc.) and agree to abide by established policies/guidelines and procedures. I acknowledge that failure to comply with data and computing related policies/guidelines/procedures might result in: the loss or restriction of my computer access; reprimand; suspension; dismissal, or other disciplinary or legal action.

Print Name	Signature	Date
Department	Phone Number	Email

Figure 4-1: The Computer Awareness and Data Security Compliance Confidentiality Statement

Individual users are not allowed to manipulate (edit or delete) their accounts and they cannot change their assigned credential information. Only administrative users can perform these actions. If a user forgets his or her assigned set of user credentials, the administrative user will have to create a new set of credentials.

4.1.3 Monitoring System Access and Use

From the moment the project is created to the moment the project becomes deactivated (see Section 3.1), the EMS system keeps an activity log within the EMS Database. This activity log stores every action performed by any user within the system, and thus functions as a detailed audit log that can be analyzed and printed in the form of an audit report. The audit information cannot be modified or permanently deleted from the EMS client applications. However, the report can be exported for archiving purposes as part of the record retention policy. Keeping in mind that audit logs can contain a significant amount of information, it is the responsibility of the administrative user to regularly archive log information. Doing so will clear the log and create more space for new records.

4.1.4 Data Retention

To preserve system integrity, voting and audit data are kept on nonvolatile data storage mediums. In case of the Democracy Suite[®] EMS, data is kept on hard drives. In case of ImageCast[®] set of devices, the voting and audit data are kept on the compact flash memory cards. Both hard drives and compact flash memory cards can be removed from the system/devices and transported to another location for readout and report generation. It is required that any storage media used in the system has demonstrated error free data retention capabilities for a period of at least 22 months as per the manufacturer's specifications.

4.1.5 ImageCast[®] Precinct User Access Management

In addition to EMS user access management, the EMS EED client application is responsible for creating user accounts for the PCOS series of optical ballot scan tabulators. Multiple user accounts can be created for each instance of the tabulator, however, all created users are of the same administrative role.

This role allows for the following set of permissions:

- Starting the PCOS device.
- Verifying and loading the PCOS device voting application and configuration files.
- Opening and closing the poll.
- Printing reports and administering the PCOS devices.
- Initiating AVS voting sessions on the device.

User accounts for the PCOS devices are managed through the ‘Programming’ sub-activity found within the Tabulators activity within the EMS EED client application. All user accounts created within this activity are stored within the EMS Database. When creating user accounts, the EMS EED application allows iButton security keys to be programmed. Each iButton security key contains a unique identifier (a 64-bit number), and, in turn, can be linked to an individual user account record.

4.1.6 ImageCast[®] Central User Access Management

The user accounts for the ImageCast[®] Central workstation operators are also created using the EMS EED application. Credentials are in the form of a user name and password. The password is used as the secret for a keyed HMAC (Hash-based Message Authentication Code) algorithm. The digest value (the result of a keyed, one-way hash function) is stored on an iButton device.

4.2 Data Integrity and Confidentiality

When designing the data integrity and confidentiality security controls within EMS, the following areas

have been considered:

- Completeness of data.
- Data quality.
- Preservation of data for intended use.
- Protection from data tampering.
- Data authenticity.
- Prevention from eavesdropping.

In all these areas, the access control mechanisms described previously have an important role to only allow authenticated and authorized access to data. To protect against accidental modification, a variety of input data validations are implemented using regular expressions such as checking for out-of-range values, invalid characters in data fields, missing or incomplete data, etc. In addition, the internal logic of EMS forces a database commit action to occur after every user action, which ensures data integrity in an internally maintained domain model (within the application) and in a relational data model (within the database). Using this approach, accuracy, correctness and validity of data is maintained, while the occurrence of some common data integrity errors (such as primary key / foreign key relationship problems) are eliminated. Finally, every data operation is based on transactional processing, which allows for roll-back operations to occur in the case of exceptions.

As described earlier (Chapter 2), the EMS system includes EED and RTR client applications, which communicate with the EMS back-end components over the network. These system components utilize SSL communication channels to post and retrieve information, which helps prevent tampering and message forgery (in addition to confidentiality). In this configuration, the EMS Application Server has an SSL digital certificate which is trusted by the EED and RTR client applications. By utilizing publickey cryptography, symmetric ciphers and one-way functions, several data integrity and confidentiality functions are provided:

- A digital certificate (X.509) is used to authenticate the back-end system components which prevents man-in-the-middle attacks and back-end server impersonation.
- Public-key encryption is used to exchange the symmetrical encryption key exchange between client applications (EED and RTR) and the back-end system.
- Symmetrical key encryption is used to provide data confidentiality.
- One-way hash functions create message authentication codes (MAC) to transport data level integrity.

The described SSL mechanism is designed for point-to-point data confidentiality and integrity when transferring data from one system component to another. It is, however, necessary to protect data while it is stored in the system (primarily all output files in the system such as reports, audit logs, election files, etc.). The following table (Table 4-1) shows a matrix of data to be protected, as well as implemented data confidentiality and integrity mechanisms:

File Type	Storage Place	Confidentiality	Integrity
Election files (ICP) and election database (ICE), DCF (ICP) and MBS (ICE), result files (ICP/ICE)	NAS and Compact Flash	AES-128/256	HMAC (SHA-256)
Reports and Logs	NAS and Compact Flash	AES-128/256	HMAC (SHA-256)
Ballot Images	NAS and Compact Flash	-	HMAC (SHA-256)
Official Ballots	NAS	X.509 Digital Certificate	
User Credentials	iButton	HMAC (SHA-1)	HMAC (SHA-1)

Table 4-1: File Type to Security Algorithm Mapping.

In this process of data protection, when the election project is created, EMS EED creates several cryptographic keys or secrets:

- AES key (128 bits): Common for the election project - used to encrypt and decrypt election files, reports and logs.
- X.509 digital certificate: Common for the election project - used to encrypt, decrypt and digitally sign official ballots (PDF)
- HMAC key (for SHA-256): Common for the election project - used to sign election files and all other output files produced by EMS
- In addition, when creating and configuring ImageCast tabulator devices, EMS EED creates additional security elements:
 - Device operator credentials (user name and password) - used as an access control mechanism in combination with SHA-1.
 - HMAC key (for SHA-256): unique for each tabulator - used to sign ImageCast[®] output files such as RIF or XML files, ballot images and log files.

4.3 System Level Security

System level security involves processes and technical procedures to follow in order to establish a satisfying security level for the overall system. These include system installation, startup and configuration recommendations and mandatory steps to follow.

4.3.1 System Configuration

In the most common physical deployment scenario the following high-level components of the system are used:

- EMS Data Center: EMS Application and Database servers, the NAS storage system and additional power protection equipment.
- EMS EED client application workstations: Local and remote installations of EMS EED applications.
- EMS RTR client application workstations: Local and remote installations of EMS RTR applications.
- ImageCast[®] Central: ImageCast[®] Central scanner and workstation.

Before any of the Democracy Suite[®] EMS applications can be installed, the system must be configured with all prerequisite software. After installing operating system software (Windows Server 2019 and Windows 10) on the designated server and client computers, the system can be appropriately configured. In

addition to OS installation, the system requires that SQL Server 2019 SP 2 database server and additional prerequisite components be installed (anti virus software, Adobe Reader, etc.).

Once all the system-level components are installed, a set of configuration procedures must be satisfied. The main system components are interconnected both physically and logically. All EMS Data Center components are collocated within the rack unit. All server items are interconnected using the gigabit switch if local LAN EMS hardware configuration is used (and allowed). In addition, all client workstations are interconnected using the gigabit switch if local LAN EMS hardware configuration is used (and allowed). However, from a logical point of view, the EMS Application Server is the main interconnecting point between EMS Data Center components and client workstations.

When configuring the system components, the following rules apply:

- All system devices (client and server components) have static IP addresses.
- The EMS Application Server is configured with the SSL digital certificate (HTTPS).
- The EMS Application Server is configured to only allow the defined set of static IP addresses to access the system according to the IP address assignment of client workstations.
- The EMS Database Server and EMS NAS storage system is configured to only allow access from the static IP address assigned to the EMS Application Server.

4.3.2 System Installation

During the system installation step, the EMS Application Server, EMS DMS, EMS AS, EMS EED and EMS RTR client applications are installed on the designated system devices. The installation process for EMS EED and RTR clients is identical to any Windows application installation and does not require any special procedures. On the other hand, the installation of EMS Application Server software requires additional steps. After the EMS Application Server software is installed, it must be configured to ensure it executes as a long-running process under the supervision of Windows Server IIS 10.0. This step allows all the benefits of executing EMS Application Server software under a secure environment to be used to configure client application access privileges.

4.3.3 System Startup

Before the EMS EED and RTR client applications can be started, the back-end system shall be operational. After successfully logging in to the Windows operating system, the user can start the EMS client application. There is no special login procedure for EMS EED, while in the case of EMS RTR, the user must log in to EMS system before the application can start.

EMS EED does not have a login screen when the application is first started. However, users at startup are only allowed to create a new project or open an existing election project. The system requires that the user provide login information (user name and password) to proceed with either activity. This approach is used because each election project can have a different set of configured users, and therefore, the login process is applicable on the level of the election project and not on the level of the EMS EED application because it can manage any of the election projects.

On the other hand, the EMS RTR client application has the traditional user login screen. When a user starts the EMS RTR application, he/she will be asked to provide his/her user name and password before the application main screens will appear. User credentials for EMS RTR (as well as for EMS EED) are stored within the EMS Database. When the EMS RTR application is used, the EMS Database has already determined which users are authorized to use the system. The election project to be used is known and recorded within the EMS RTR XML configuration file.

Immediately after starting the application, both client applications start to collect auditing information for each user using the system.

4.4 Error Message Comprehension

4.4.1 Democracy Suite[®] EMS EED Error Handling

The Democracy Suite[®] EMS EED application logic allows the user to validate input data and track error and warning states of objects. EED logs critical (fatal) errors and provides information about the object's state. Tracking of changes is performed using the Nlog logging framework to log to a file on the EMS application server, and/or directly to the EMS database userlog table. Client applications receive information through the application GUI immediately, and end-users can access the file system log file for detailed error or warning messages.

The whole process can be divided into several parts:

- Validating of input data.
- Tracking errors, critical errors, warnings and information of objects status.
- Logging errors, critical errors, warnings and object status information through program execution,
- Notifying client applications through application GUI.
- Recovering from an illegal state.

4.4.1.1 Validating Input Data

The validation of input data and program settings is divided into several levels:

- **Critical Error:** The client application will receive a message indicating that the process cannot continue until all critical errors are corrected.
- **Error:** The logging developer logs all exceptions for Dominion Voting software and generic operating system exceptions.
- **Runtime Critical (Fatal) Error:** If the critical (fatal) error of no-recovery exception occurs, the program will immediately stop and the client application will be notified. The logging developer will log all unexpected events leading up to the end of the application. The application will be terminated. Runtime processes will be stopped immediately if one or more critical (fatal) errors occur.
- **Runtime Error:** The error will stop the current operation and the object will rollback to an earlier state. The client application will receive an error trace and obtain information on the critical data/settings.
- **Warning:** If a non-critical (fatal) error occurs, the process can be executed. However, warnings will be generated and logged to the log file or database log table (userlog).
- **Runtime Warning:** All warnings during the runtime process will be collected and the client application will be notified after the operation. If the application is allowed to move to another state, the client will be notified of all non-critical errors through the warning exceptions.
- **Object State and Progress:** All important changes of objects and data are logged to the file system log file or a database log table (userlog).

4.4.1.2 Tracking Errors, Warnings and Status Information of Objects

The class that allows tracking of errors and warnings is `DVS.Framework.MemoryCore.API.ValidationTracker`. The `IsFatal` flag is one method used by this class to track errors. When flag `IsFatal` is set to false, the class will track and log warning levels. Otherwise, if the `IsFatal` flag is set to true, a validation error will raise the error exception level. All messages in this class will be logged through `NLogLogger` (`DVS.Utilities.Common.Misc`) using the `Nlog` logging framework and the logging information will be saved to the file system file and `userlogtable` in the EMS database. The `Nlog` library is well known logging framework and has its roots in `log4j` and `log4net`. It can be configured to log messages to many targets (event log, text file, different database types, email, tcp port, udp port) and can be reconfigured at runtime without restarting the application (as a watchdog mechanism for configuration file). The logging system provides all relevant information for a subsequent log audit, including all relevant arguments for method invocation, and any local variables that can give important data in log analysis.

The most important log error levels can be divided to:

1. NLogLogger.Error: Writes the diagnostic message at the error level in the case when an error exception does not exist.
2. NLogLogger.ErrorException: Writes the diagnostic message at the error level when an error exception exists.
3. NLogLogger.Warn: Writes the diagnostic message at the warning level when a warning error exception exists.
4. NLogLogger.WarnException: Writes the diagnostic message at the warning level when a warning error exception exists.

4.4.2 Error Recovery

4.4.2.1 Memory Object Recovery

All memory objects change with the transaction mechanism. In the case of any error exception, data in transaction will be rolled back and returned to the previous state. The method for rollback `ThrowOrRollback(ex)` has exception-like input parameters and implements the log strategy. The `Transaction` class implements a simple transaction mechanism. Each elementary action is wrapped in transaction. Transactions around each other can be viewed as the single transaction that is nested around all others. The transaction object is one per thread. It has counter that is incremented in `StartTransaction` and decremented with `CommitTransaction`. The `StartTransaction` method increments the internal counter and the `CommitTransaction` method decrements it. When it comes to 0, the actual commit is performed. This logic allows recovery of memory data on every failed transaction.

4.4.2.2 Database Redundant Server Recovery

Failover Clustering System

A failover cluster consists of more than one computer hosting a single instance of SQL database server. One (primary) computer provides the service in a normal situation. The second, failover computer runs the service when the primary system fails. The database server will continue running and be available if the primary computer fails. The secondary computer will recognize the crash of primary computer and restart database services. A failover cluster consists of one or more servers with two or more shared disks. In the case of SQL Server 2019, a shared disk hosts the database data. The node is the independent server in the cluster. A combination of shared disks and nodes is the resource group. The virtual server (resource group, server name and IP address) is limited to a single instance of SQL server. To the client applications on the network, the SQL Server 2019 virtual server appears to be a single computer. If one of the nodes in a cluster fails, the application automatically fails over to another node in the cluster. From

a client point of view, nothing appears to have changed on the network nothing and the database continues to respond. This configuration supports a close to real-time recovery strategy. In the case of High-availability clusters, the system will immediately recognize the crash of the primary node and the secondary node will restart the database service.

4.4.2.3 Database Recovery

Simple Recovery Mode

In this mode the SQL Server truncates the transaction log on a transaction checkpoint or after each backup. The transaction log only contains basic information. The advantage of this mode is a very small transaction log. With this recovery model, the user has the ability to do complete (full) backups (an entire copy) or differential backups (any changes since the last complete backup). In the case of the database damage (corrupted data) will be recovered only to the last point at which it was backed up.

Full Recovery Model

The full recovery is the best option to prevent data loss, although the transaction log may become very large. This type of recovery can make database data and transaction log backups. The full recovery mode can also provide protection against media failure. The transaction log is hosted on fault tolerant RAID (Redundant Array of Independent Disks) or on SAN (Storage Area Network). RAID or SAN allow the disk subsystem to be independent from any single disk drive. An optional SQL Server 2019 SP 2 can back up the transaction log during a normal data or differential backup.

Bulk-Logged Recovery Model

Bulk recovery model is a full recovery mode that cannot create a log in special cases (index creation or bulk imports). The advantage of this mode is better performance and better log space consumption.

4.4.3 ImageCast® Error Handling

ImageCast® tabulator are designed so that all error messages requiring operator or precinct official intervention are displayed or printed clearly in an easily understandable text. Comprehensive error notifications are provided using both text and visual indicators.

ImageCast® tabulators meet the VVSG Vol. 1 requirement 2.1.5.1.b.iii, and, as such, when the voting system uses numerical error codes for maintenance or repair by a trained technician, the text corresponding to the code is self-contained and displayed simultaneously. This is intended to reduce inappropriate reactions

to error conditions, and to allow problems to be quickly and effectively corrected. As per VVSG Vol. 1, ImageCast[®] tabulators have been designed to be compliant with the following requirements:

- All error messages for which corrections will impact the recording and processing of votes, are written in a manner that is understandable to an election official who has been trained on the system use and operation, but has not undergone technical training with regards to servicing and repair.
- The message cue for ImageCast[®] tabulators clearly state what action needs be performed in the event that a voter or operator response is required.
- The ImageCast[®] tabulator design ensures that erroneous responses will not lead to irreversible errors.
- Nested error conditions are corrected in a controlled sequence so that the voting system will be restored to the state it was in before the first error occurred.
- ImageCast[®] tabulators display and report critical status messages in English or through clear indicators. The voting system does not need to display non-critical status messages at the time they occur. Voting systems may display non-critical status messages (i.e., those that do not require operator intervention) in the form of numerical codes for subsequent interpretation and reporting as unambiguous text.

4.5 Network Security

The EMS platform uses a private network infrastructure that is not connected to a public network of any type (i.e. Internet). Therefore, network level security is structured on the level of the individual EMS server and workstation components as well as on the level of the gigabit switch and private VLANs. As a result, connectivity between system components is private and based on IP and MAC address filtering. In addition, all EMS system components have their own firewall and anti-virus installations, which help protect against offline malicious codes and attacks.

4.6 System Availability and Continuity of Operation

As with any system relying on ICT technology, the system may experience unpredictable system component failures. Typical examples are power outages or system component failures, such as hard drive failures, etc. The EMS system is designed to minimize the impact of such unpredictable situations.

Some of the protection measures designed within the EMS system are:

- Utilization of uninterruptible power supply (UPS) devices.

- Server with dual, redundant power supplies.
- Utilization of RAID disk arrays in each server system.
- Implementation of scheduled automated backups of database files.
- Redundant network interfaces between the EMS Application, EMS Database and EMS NAS storage devices (not available/applicable in NYS version of EMS hardware configuration).

NOTE: Note that the EMS system will generate, store, and report all error messages to the user as they occur.

APPENDIX A: EMS ERROR MESSAGES LIST

This section lists error messages that will be displayed to the user should any faults occur while performing tasks in any EMS components. Next to each message is a brief description of the fault and any applicable steps to rectify the problem.

A.1 EED Client Error Messages

Table A-1 contains a set of error messages associated with potential problems in the EMS EED.

Error message	Description	Action to overcome
You have to close the current election project to be able to create new election project	The system does not allow the user to create a new project, while there is still a current project opened.	Close current project before creating new project.
It is not allowed to modify Template Keywords in current project status	It is not allowed to modify Template Keywords in current project status.	You have to roll the project back to the definition or styling state in order to update template keywords.
System detected that another keyword template is present, and will be overwritten. Would you like to continue?	Template keywords are already imported into the system, and they will be overwritten with new one that are about to be imported.	The user should confirm this action if appropriate.
Could not open electoral count file. Make sure the file is not currently opened in Excel.	The import file with the count of electors per polling district (precinct) cannot be open.	If file is currently opened in Excel, close it and re-try the action.
You have to set Election Event audio ballot type to: Full Audio Ballot to be able to generate Audio Studio Definition File.	The type of project has to be set to Full Audio Ballot in order to be able to generate Audio Studio definition file.	Set project to Full Audio Ballot and repeat action.

Table A-1: EED Client Error Messages

Error message	Description	Action to overcome
You do not have permission to create the Audio Studio Definition File in this project status. This action is allowed in Election Project Styling and Ballot Generated only.	The user does not have permission to create the Audio Studio Definition File in this project status. This action is allowed in Election Project Styling and Ballot Generated only.	The user should get the project in either the Election Project Styling or Ballots Generated status and repeat action.
You don't have appropriate permission to perform this operation. You have to be a member of EED Technical Advisor role to be able to perform this action.	You don't have appropriate permission to perform this operation. You have to be a member of EED Technical Advisor role to be able to perform this action.	Log in as Technical Advisor and repeat action.
Operation cannot be performed if the project is not in consistent state.	Changing the security key is not allowed if database is not in consistent state.	Fix database inconsistencies before initiating security key change action.
Application start failed, strong name validation failed! Assembly name: 'name'	The EED application failed to start because assembly name failed to pass verification of its strong name signature.	Contact technical support.
Application start failed, DLL or assembly is not authentic. Assembly name: 'name'	The EED application failed to start because assembly name is not authentic.	Contact technical support.
There is no validation in current status	The current project status does not allow for the 'Ready For Election' and 'Closed' validation process.	No action required.
Error archiving of project.	Informs the user that a backup of the election project could not be created.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Application Server is not set.	Informs the user that the application server configuration is not set correctly.	Contact technical support.
You do not have permission to create the Ballot on Demand Definition File in this project status. This action is allowed in Ballots Generated in this project status. This action is allowed in Ballots Generated and Ready for Elections status only.	The user does not have permission to create the Ballot on Demand Definition File in the current project status. This action is allowed in the Ballots Generated and Ready for Elections status only.	The user should get the project in either the Ballots Generated or Ready for Election status and repeat action.
Are you sure you want to leave Election Event Designer?	The user attempted to close EED, the system is asking the user for confirmation.	The user should confirm this action if appropriate.
File file name is not valid report package file	The user attempted to import a report package, but selected a file which is not a valid report project package.	The user should verify that the selected file is an actual report package.
You have to close the current election project to be able to open another election project	The system does not allow the user to open another, while there is still a current project opened.	Closecurrentproject before opening another project.
Please, check system parameters in Administration menu or contact EMS application administrator	For the election project with name (project name), system parameters are not set or not correct. Check system parameters in Administration menu or contact EMS application administrator.	Make sure that all project configuration setting are correct. If further assistance is required, contact support staff.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Update process finished with errors.	Database structure update was not successfully synchronized with the latest model definition.	Contact technical support.
The election project structure you are trying to update is outdated. However, system is capable of updating the project with some limitations. If you continue with this action, existing users, roles and permissions will be reset to the default values. Are you sure you want to continue with this action?	The system is asking for confirmation from the user.	The user should confirm this action if appropriate.
You do not have permission to Import the Audio Studio Definition File in this project status. This action is allowed in Election Project Styling and Ballot Generated only.	The user can only import audio studio definition files if the current project is in either Election Project Styling or in Ballots Generated state.	The user should get the project in either the Election Project Styling or Ballots Generated status and repeat action.
Ballots will be created based on the following parameters. Press Continue to continue the process. 'list of project parameters included in requested action'	Informs the user that current project settings will be used in process of creating ballots.	Press 'Continue' to start ballot generation. Press 'Cancel' to abort the process.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Election Files will be created based on the following parameters. Press Continue to continue the process. 'list of project parameters included in requested action'	Informs the user that current project settings will be used in process of creating election files.	Press 'Continue' to start election files generation. Press 'Cancel' to abort the process.
Failed archive data of project 'project name'	Informs the user that a backup of the election project could not be created.	Contact technical support.
Are you sure you want to import machine configuration?	Displayed when import machine configuration is started.	Confirm, if appropriate.
Configuration File is missing.	Informs the user that the import of machine configuration files has started but a configuration file is missing.	Contact technical support.
Ambiguous Configuration File.	Informs the user that the import of machine configuration files has started but there are multiple configuration files in the directory.	Contact technical support.
Unable to verify file consistency! File is changed, or corrupted.	Informs the user that the import of machine configuration files failed due to a failure to verify file consistency.	Contact technical support.
Could not delete static audio folder on storage	Informs the user that the static audio folder could not be deleted on storage.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Definition file not found. Unable to proceed	Informs the user that the static audio definition file cannot be found.	Contact technical support.
Files in folder are not correct. Unable to proceed	Informs the user that the static audio files in folder are not correct.	Contact technical support.
Definition file is not correct. Unable to proceed	Informs the user that the static audio definition file is not correct.	Contact technical support.
Number of files is not correct. Unable to proceed	Informs the user that the number of static audio files is not correct.	Contact technical support.
Static bmd folder on storage could not be deleted!	Informs the user that the static bmd folder on storage could not be deleted.	Contact technical support.
You need to restart system to make settings take effect. Click Yes to restart now or No if you plan to manually restart later.	Informs the user that the saved settings will only be applied once the system is restarted.	Confirm this action, if appropriate.
Unspecified error occurred. Please see log for details.	General error message	Contact technical support.
Login failed. Wrong user name or password.	Informs the user that the user credentials were incorrect.	Try again and make sure that the username and password are entered correctly.
Unable to connect to Database server. Check Database Server Name and try again.	Informs the user that the connection to database server failed.	Contact technical support.
You need to login to DB to get project list!	The user has tried to access the project list before logging in to DB.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
You need to login to DB to open project!	The user has tried to open the project before logging in to DB.	Contact technical support.
You specified invalid project name!	An invalid project name has been entered.	Contact technical support.
Supplied credentials were invalid!	The user has supplied invalid credentials.	Contact technical support.
You need to login to DB to get NAS server name!	Informs the user that login to the DB must be performed before researching the NAS server name.	Contact technical support.
You need to login to Project to get NAS server name!	Informs the user that login to the Project must be performed before researching the NAS server name.	Contact technical support.
Top area is already created!	The system attempted to create more than one top area.	Contact technical support.
Cannot delete top subdivision type!	The user is not allowed to delete the top subdivision type.	No action required.
There is no permission to modify the Subdivision Type global order value. Reason: Election project status does not allow this action to be performed.	Re-ordering of subdivision type is not allowed in the current election project status.	Change the project status to Election Definition state before changing order of subdivision types.
Cannot delete subdivision (subdivision name) because it has child subdivisions	The parent subdivision cannot be deleted while it has child subdivisions associated to it.	Delete all child subdivisions before deleting the parent subdivision.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Subdivision name is not set.	The user attempted to create new subdivision without setting the name.	Specify the name of the subdivision.
Subdivision name must be unique	The user attempted to create new subdivision using an already existing name.	Specify a unique name of the subdivision.
There is no permission to modify the Subdivision global order value. Reason: Election project status does not allow this action to be performed.	Re-ordering of subdivisions is not allowed in the current election project status.	Change the project status to Election Definition state before changing order of subdivisions.
The length of name is too big number of characters used characters. Maximal length for name is maximum allowed number of characters characters.	The length of the name is above of the limit.	Shorten the length of the name.
There is no permission to modify the Polling Subdivision global order value. Reason: Election project status does not allow this action to be performed.	Re-ordering of polling subdivisions is not allowed in the current election project status.	Change the project status to Election Definition state before changing order of polling subdivisions.
It is not allowed to modify Key in Id if the ballot has been created in one of the previous ballot generation cycles	The user is unable to modify the key-in id of a ballot that has been created in a previous ballot generation cycle.	No action required.
It is not allowed to modify Key in Id in Ready for Election status	Changing the key-in id of a ballot is not allowed in the specified status.	Change the project status to the Styling state before modifying the key-in id.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Ballot number must be set	A ballot number must be entered	Specify a ballot number.
Ballot number must be between 1 and (max value)	The ballot number is outside of the allowed range.	Enter a value from the specified range.
Error in creating ballot name. Check error log for details”	Error during parsing of ballot information.	Contact technical support.
Only Multiprocess Factor parameter is allowed to modify in Ballots Generated status”	The system found that the user does not have permission to change the parameters.	Change the project status to the Styling state before modifying the project parameters.
Invalid characters in (field name) field	Invalid characters were entered for the field name.	Remove invalid characters from the name.
Value for (field name) is too big	A value was entered that was above the limit.	Lower the value.
It is not allowed to modify Multiprocess Factor in current election project status	The project is in a status which does not allow for the modification of the multi-process factor.	Change the project status to any value except Ready for Elections and modify multi-process factor.
It is not allowed to modify Starting Ballot ID parameter in current election project status	The project is in a status which does not allow for the modification of the Starting Ballot ID.	Change the project status to the Definition state before modifying the Starting Ballot ID parameter.
Value for Starting Ballot ID is incorrect	Informs the user that this value is incorrect.	Correct the value.
Value for Starting Ballot ID can be between low value and high value	The value for Starting Ballot ID is outside the specified range.	Correct the value.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
There are too many candidates from (name) party	There are too many candidates with the same party affiliation within the contest.	Make sure that the party affiliation of the candidates is correct.
The name must be set	The name of the object has to be set before it can be stored.	Set the name of the object.
Disabled flag cannot be changed in this state	The user attempted to disable/enable a contest or choice but this is not allowed in current project state.	Move the project to a state where this is allowed and re-try.
Not valid date of birth!	The user attempted to enter an invalid birth date.	Correct birth date.
You can't change Subdivision in current status	The user attempted to change the associated subdivision connected to a contest, but this is not allowed in current project state.	Make sure that the project state is set to Election Definition and re-try.
Only contest without prototype can have candidates	The user attempted to add candidates to a contest which has an associated prototype - this is not allowed.	Either remove association to prototype, or do not create candidates for contest.
Only contest without candidates can be linked to prototype object	The user attempted to link a prototype to a contest that already had associated candidates - this is not allowed.	Either remove existing candidates, or do not attach a prototype.
Administrative title must be set	The administrative title of a contest is a mandatory field.	Fill this field before attempting to store the contest.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
It is not allowed to modify number of (write-ins/positions) in the current election state	The user attempted to modify either the number of write-ins or positions for a contest in a state that does not allow it.	Make sure the project state is set correctly before attempting to modify these fields.
There is no permission to modify the contest global order value. Reason: Election project status does not allow this action to be performed.	Re-ordering of contests is not allowed in the current election project status.	Change the project status to the Election Definition state before changing the order of contests.
This operation requires a defined subdivision for this Contest	The system is attempting to perform an action that requires that a subdivision is assigned to a contest.	Make sure all contests are assigned to a subdivision.
This operation requires defined elector groups for this Contest	The system is attempting to perform an action that requires that at least one elector group is assigned to a contest.	Make sure all contests are assigned to at least one elector group.
You must enter the value for contest area external ID	The user attempted to store a district rotation without entering all mandatory fields.	Make sure all mandatory fields are filled before saving an object.
You must enter the value for Rotation Area External ID	The user attempted to store a district rotation without entering all mandatory fields.	Make sure all mandatory fields are filled before saving an object.
You must enter the value for Rotation Index	The user attempted to store a district rotation without entering all mandatory fields.	Make sure all mandatory fields are filled before saving an object.
Value for Rotation Index is too big	User has entered a value outside the range for the Rotation index	Choose a lower value.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Value for Rotation Index must be greater than 0	The user has entered a negative value for the Rotation Index.	Specify a value greater than 0.
It is only allowed to modify Ranked Choice Voting Parameters in Election Event Definition state	Modifying ranked choice voting parameters in an office is not allowed in the current election project status.	Change the project status to the Election Definition state before modifying object.
There is no permission to modify the office global order value. Reason: Election project status does not allow this action to be performed.	Re-ordering offices is not allowed in the current election project status.	Change the project status to the Election Definition state before changing order of office.
Changing attribute name is not allowed in current project status. attribute name can be defined in Project Definition state.	The user attempted to modify an attribute of an object, which can only be modified in the Project Definition state.	Change the project status to the Election Definition state before modifying the attribute.
Office name is not set	In process of defining offices, the user has forgotten to specify an office name.	Specify an office name.
Office name must be unique	In process of defining offices, the user has specified a name that has already been used.	Enter unique office name.
If party doesn't create voting box, other party, to which vote will go has to be set.	The user has to indicate at least one party endorsement that has a voting box.	The user has to indicate at least one party endorsement that has a voting box.
There is no permission to modify the Political Party global order value. Reason: Election project status does not allow this action to be performed.	Re-ordering Political Parties is not allowed in the current election project status.	Change the project status to the Election Definition state before changing the order of political parties.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
There is no permission to modify Political Party 'For Independent Candidates' attribute. Reason: Election project status does not allow this action to be performed	The user attempted to modify an attribute of an object which can only be modified in Project Definition state.	Change the project status to the Election Definition state before modifying attribute.
Project status is changed outside of this application! Unable to change state	The project status was changed unexpectedly.	Verify that no other instances of EED are running.
Value for Election Event ID is too big	This message is displayed when program detects that the value for the Election Event ID is not valid.	Enter correct value.
You don't have permission to change attribute name in project status different than Election Event Definition	The user attempted to modify an attribute of an object which can only be modified in Project Definition state.	Change the project status to the Election Definition state before modifying the attribute.
You don't have permission to change Election Event ID in (project state) project status	The user attempted to modify the Election Event ID in a state in which it is not allowed.	Change the project status to any state preceding Ready for Elections and modify Election Event ID.
It is allowed to modify Consolidation Type only in definition state	The user attempted to modify an attribute of an object which can only be modified in the Project Definition state.	Change the project status to the Election Definition state before modifying the attribute.
It is allowed to modify Ballot Content Creator only in definition state	The user attempted to modify an attribute of an object which can only be modified in the Project Definition state.	Change the project status to the Election Definition state before modifying the attribute.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
It is not allowed to modify Set Tabulator Number Automatically property after creating election files	The user attempted to modify an attribute of an object which can only be modified before the Ready for Elections state.	Change the project status to an earlier state before modifying the attribute.
It is not allowed to modify 'Regenerate Security elements before generating election files' property after creating election files.	The user attempted to modify an attribute of an object which can only be modified before the Ready for Elections state.	Change the project status to an earlier state before modifying the attribute.
It is not allowed to modify (attribute name) property in Closed status	The user attempted to modify an attribute of an object which can only be modified before the Closed state.	Change the project status to an earlier state before modifying the attribute.
There is no permission to Set project parameters. Reason: Election project status does not allow this action to be performed.	This message is displayed when the user wants to change the property in a state which does not allow this operation.	Change the project status to a correct state before modifying the attribute.
Invalid characters in Pause between words field	This message is displayed when program encounters an error in process of parsing the user's input value.	Please correct invalid characters.
Cannot delete top Electoral Group	The user has tried to delete the top electoral group.	No action required.
Abbreviation is mandatory	The user attempted to store an object without entering all mandatory fields.	Make sure all mandatory fields are filled before saving an object.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
It is allowed to modify Group name only in definition state	This message is displayed when user wants to change the property in state which doesn't allow this operation.	Change the project status to a correct state before modifying the attribute
The (identifier name) is not set	The value for this identifier cannot be null or an empty string.	Please set a value for this field.
Input values are not valid	An incorrect value was entered for a given parameter.	Please set the correct value for this field.
The (identifier name) must be unique	An incorrect value was entered for a given parameter.	Please set the correct value for this field.
Cannot delete default language profile	The user has tried to delete a default language profile.	No action required.
The (attribute name) is not set	The user attempted to store an object without entering all mandatory fields.	Make sure all mandatory fields are filled before saving an object.
Attribute (name) cannot be changed in Election Styling state.	The user attempted to modify an attribute of an object which can only be modified in the correct state.	Change the project status to the correct state before modifying the attribute.
Language Profile must be unique	The name of each language profile has to be unique.	Specify a unique name for the language profile.
It is not allowed to modify object.	The user has tried to modify an object that the program does not allow to be changed.	Change the project status to the correct state before modifying the attribute.
First name must be set	The program has detected that the first name is not set.	Please set the name.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Last name must be set	The program has detected that the last name is not set.	Please set the name.
Name of Programming group has to be set	The name of the programming group must be set.	Set the name field.
Value for Tabulator Number must be greater than 0	The user has not set the tabulator number value.	Set tabulator number value.
Value for Tabulator Number is too big	The value has exceeded the maximum.	Lowerthetabulator number value.
Tabulator (name) has generated election files, it cannot be changed	The user has tried to generate election files for a tabulator that already contains election files.	Skip this tabulator in the process of manually generating election files.
You must enter User name	The user has tried to create a tabulator user without defining the User Name.	Define a User Name.
User name already in use	The user has tried to create a tabulator user with a user name that is already in use.	Enter a unique user name.
You must enter First name	The user has tried to create a tabulator user without defining a First Name.	Enter the First Name.
You must enter Last name	The user has tried to create a tabulator user without defining a Last Name	Enter the Last Name.
Synchronize drawing ballots call failed.	The call to synchronize action failed,	Check the application server connection parameters.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Preview ballot call failed.	The call to preview ballot function failed.	Check the application server connection parameters.
Rename ballots call failed.	The call to rename action on the server failed.	Check the application server connection parameters.
Archive project call failed.	The call to archive action on the server failed.	Check the application server connection parameters.
Restore project call failed.	The call to restore action on the server failed.	Check the application server connection parameters.
Create xml model call failed.	The call to action for creating an XML file with the system model data failed.	Check the application server connection parameters.
Creation of transform data call failed.	The call to transformation function failed.	Check the application server connection parameters.
Setting party affiliation call failed.	The call to action for setting party affiliation failed.	Check the application server connection parameters.
Getting of initial configuration data call failed.	The call to action for preparing configuration data failed.	Check the application server connection parameters.
Ballot(s): (list of ballots) are potentially used on some tabulators. If you proceed, system will not be able to tabulate results for them. Do you want to continue?	The user has tried to regenerate ballots that are in use.	This error can occur in Last Minute Definition process. Select 'Yes' to regenerate ballots. Select 'No' to skip those ballots during the regeneration process.
There is no permission to assign values. Reason: Election project status does not allow this action to be performed.	The user has tried to assign values to specified object, but the project status does not allow that action.	Either do not set the values, or return to previous project status and repeat the action.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Office is not set.	Informs the user that an office is not set for the creating contest action.	Set an office for this action
Specified office does not have assigned subdivision	Define subdivisions for specified office.	Review the election definition and make sure that subdivisions have been defined.
Contest (name) cannot be created, name is longer than 128 characters	The specified contest name is too long.	Modify election definition parameters so that the generated contest name will be shorter.
Subdivision type is not set.	The office for which contest creation was initiated did not have its subdivision type set.	Make sure that offices have their subdivision type set.
System detected existing contests for the office(s): If you continue all contests and candidates for the office will be deleted.	The selected offices already contain contests and, if the process continues, existing contests will be deleted.	Select Continue to delete exiting contests and create new ones. Select Cancel to abort the action.
No permission to create contest	The user role does not allow this action.	Log in with a role that allows the creation of contests.
Language profile is not set!	An action was initiated that requires that a Language Profile to be set.	Set a Language Profile and repeat the action.
Purpose of the template must be set.	The purpose of template file must be specified before saving.	Select a purpose from list and repeat the action.
Language of the template must be set.	The language for template file must be specified before saving.	Select a language from list and repeat the action.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
No permission to delete objects because they are placed on already rendered ballots.	The delete action for ballot objects is not allowed because the objects are in use.	Avoid this action, or return to previous state of the election project and repeat action
You have to go back to Project Definition or Last Minute Definition in order to disable choice.	The current project status does not allow disabling choices.	Change project status to Definition or Last Minute Definition
You are about to disable choice (name). This action cannot be reversed, without going back to the definition state. Are you sure you want to proceed?	The disable choice action is activated.	Confirm action or choose cancel to abort action.
You have to go back to Project Definition or Last Minute Definition in order to disable contest.	The current project status does not allow disabling contests.	Change the project status to Definition or Last minute definition
You are about to disable contest (name). This action cannot be reversed, without going back to the definition state. Are you sure you want to proceed?	The disable contest action has started.	Confirm action or choose cancel to abort action.
Contest should have at least one electoral group assigned!	The newly created contest does not have an electoral group assigned to it.	Define electoral group and repeat the save action.
Subdivision is not set!	An action was initiated that requires that a subdivision to be set.	Make sure that a subdivision has been set.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Remove choices or set that contest doesn't have prototype.	The user has created a Contest Prototype, but has assigned a candidate to the contest.	Remove candidates or specify that the contest type is regular.
Setting party is allowed for Closed Primary Elections	The user attempted to automatically set party affiliation for candidates. This only works in a closed primary.	Review election definition to make sure that the election type is set correctly.
Setting party is allowed in Project Definition only	The party cannot be set in the current project status.	Avoid this action, or return to previous status of the election project and repeat the action.
Precinct with this name already exists.	A polling subdivision (Precinct) with the specified name already exists in the project.	Specify a different name and repeat the action.
It is allowed to import district rotations only in Definition state.	The district rotation import action is not allowed in the current project status.	Return the project to the Definition state and repeat the action.
You cannot save the District Rotation with same values for Contest Area Id and Rotation Area Id	Different values for Contest and Area identifier must be entered before creating the rotation.	Enter different values for the Area and Contest identifiers.
You cannot save the District Rotation with the given Contest Area Id and Rotation Area Id because a District Rotation with the same values for those IDs already exists in election project database.	The specified combination of input data is already in use.	Change the input values so it is unique.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Default tabulator user password value is not correct. It has to be numerical, 8 digits.	The entered tabulator user password is not valid.	Enter the specified tabulator user password which is 8 digits long.
Maximum deviation has to be a value between 0 and 100.	The rotation deviation must be in defined boundaries.	Re-evaluate assigned rotations to contests and make sure that the each possible rotation value is distributed fairly.
Invalid characters in maximum deviation field.	Entered rotation deviation values contain invalid characters	Only use digits for defining deviation value
There were no Elector Groups created	The system attempted to create elector groups for each selected political party. There were no parties selected.	First select at least one political party before initiating the action.
It is not allowed to delete the default elector group.	The delete action is not allowed for default elector group.	No action required.
Static text record for the chosen language profile and static text type has already been created.	Static text for specified input parameters already exist.	No action required.
You must generate Password	The password for newly-created tabulator user is not generated.	Use the Generate button to create a password and repeat the save action.
Etalon object is not valid.	Basic objects for creating DCF settings are not valid.	Contact technical support.
Data structure is not valid.	Basic objects for creating DCF settings are not valid.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
For selected tabulators election files and keys will be regenerated. All previous result files will be invalid. Do you want to continue?	The regenerate action will delete existing tabulator files and create new files.	Select 'Yes' to start the regeneration action. Select 'No' to abort the action.
This action is only allowed in Ready For Election state	The current project status does not allow the selected action.	Make sure that the action is performed in the correct state.
No permission to perform action in this project status	The current project status does not allow the selected action.	Make sure that the action is performed in the correct state.
Tabulator names list have created election files. Do you want to continue?	Some of selected tabulators for the delete action have generated election files.	Select 'Yes' to execute the delete tabulator action. Select 'No' to abort the action.
Please select drive containing Compact Flash card. The card in the drive will be initialized (all data will be erased).	The process of creating a backup card will format the existing card and that a drive should be selected.	Select the drive containing the memory card that should be initialized.
Unable to find CF Card device.	The system was unable to find a memory card reader containing a compact flash card.	Check that the card is in the card reader.
Tabulator adapter for type (type name) could not be loaded.	The necessary data for creating election files are missing.	Contact technical support.
CF Card has been initialized, please remove.	The process of creating an election card is finished.	Remove card.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Checksum of copied file (file name), does not match checksum of original file.	After copying all election files to the memory card, the system verifies that all files were copied successfully. This message indicates that a file was not copied successfully	Repeat programming of the memory card, if the same problem occurs again replace the memory card with another and make sure that the old memory card is not used again.
Error extracting file	The selected file for import cannot be opened.	Check the origin of the file or contact technical support.
Error creating process.	The import audio package file cannot start.	Check the application server connection parameters, or contact technical support.
Unable to delete (file name) file on NAS	The import audio package process was unable to remove the specified file from Network Attached Storage disk.	Check the application server connection parameters, or contact technical support.
Unable to create objects!	The audio editor cannot create the necessary audio components.	Check the application server connection parameters, or contact technical support.
Problem loading file (error details)	Problem loading file.	See details and contact technical support.
Input file is not correct.	The selected audio file for import is not correct.	Check the origin of the file for import, or contact technical support.
Problem saving file.	The system was unable to store the selected audio file.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Unsupported file format!	The selected audio file for importing is not in the proper format.	Check the origin of the file for import, or contact technical support.
Problem playing file.	The system was unable to play the stored audio file.	Check the application server connection parameters, or contact technical support.
It is not allowed to modify parameters displayed in 'Setting' tab in current election project status.	Ballot settings cannot be changed in the current election project status.	Avoid changing ballot style parameters, or return to election status that allows the operation to be performed.
Link to party will be deleted. Are you sure you want to proceed?	The connection between candidate and party will be removed.	Select Yes to continue. Select No to cancel.
Choice is not set!	The action for creating choice additional info is missing its parent choice.	Select choice to create additional personal info.
Personal Info will be deleted. Are you sure you want to proceed?	Choice personal info data will be removed.	Select Yes to delete choice personal info. Choose No to cancel the action.
Link to line will be deleted. Are you sure you want to proceed?	The connection between candidate and ballot line will be removed.	Select Yes to delete the connection between candidate and ballot line. Choose No to cancel the action.
Contest is not set!	The action for assigning choices to a contest is missing a parent contest.	Select a contest for the assigned action.
Reordering is only allowed when all contest headings are listed. Please clear contest heading name field and press Search button.	The reorder process cannot be performed because search criteria is applied on contest list.	Clear all search criteria and repeat reorder action.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
It is not allowed to link Language Profile to Contest Heading in election status name status.	The requested operation for connecting a Language Profile and Contest Heading is not allowed in the current election status.	Revert the election project to an earlier state or avoid this action.
It is not allowed to unlink Language Profile and Contest Heading in (election status name) status.	The requested operation for disconnecting a Language Profile and Contest Heading is not allowed in the current election status.	Revert the election project to an earlier state or avoid this action.
It is not allowed to link Contest to Contest Heading in (election status name) status.	The requested operation for connecting a Contest and Contest Heading is not allowed in the current election status.	Revert the election project to an earlier state or avoid this action.
It is not allowed to unlink Contest and Contest Heading in (election status name) status.	The requested operation for disconnecting a Contest and Contest Heading is not allowed in the current election status.	Revert the election project to an earlier state or avoid this action.
The USB port number must be higher than 0!	The entered USB port number can't be 0.	Enter the correct number of the USB port on the computer.
The entered number is not valid for port!	The system cannot detect a USP port for the provided number.	Enter the correct number of the USB port on the computer.
Security key has not been found on the USB port number.	The system is unable to detect a security key on the specified USB port.	Plug the Security Key device in the specified port or change the port number.
This operation could take a few minutes. Would you like to continue?	Informs the user that the process of automatically detecting the Security Key could take some time.	Select Yes to start the automatic detection process. Select No to cancel the action.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Security key has not been found on any port!	No Security Key was detected during the automatic detection process.	Check the Security Key connection or contact technical support.
Prefix is not valid.	The prefix value for the new Division name is not valid.	Enter a valid prefix text.
Postfix is not valid.	The postfix value for the new Division name is not valid.	Enter valid postfix text.
Elector count will be deleted. Are you sure you want to proceed?	The specified elector count value will be deleted.	Select Yes to continue, or No to cancel the action.
There are no unlinked Elector Groups for this Polling Subdivision	There are no available Elector Groups for the assigned action.	No action required.
Reordering is only allowed when all offices are listed. Please clear office name field and press Search button.	The reorder process cannot be performed because search criteria is applied on contest list.	Clear all search criteria and repeat the reorder action.
Link to choice will be deleted. Are you sure you want to proceed?	The connection between choice and party will be deleted.	Select Yes to continue or No to cancel the action.
Suffix is not valid.	The postfix value for the new Polling Subdivision name is not valid.	Enter valid suffix text.
Device setting property must be defined!	Tabulator device settings must be defined before the creation process can continue.	Select device settings from the list and repeat the operation.
Counting Group must be defined!	The Tabulator Counting Group must be defined before the creation process can continue.	Select a Counting Group from list and repeat the operation.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Range is not valid!	The specified number range for creating a Polling Subdivision is not valid.	Enter valid values for this range the start index must be less than the end index.
Prefix contains forbidden text!	The prefix value for the new Polling Subdivision name is not valid.	Enter valid prefix text.
Postfix contains forbidden text!	The postfix value for the new Polling Subdivision name is not valid.	Enter valid postfix text.
Link to Polling Subdivisions will be deleted. Are you sure you want to proceed?	The link between a specified Polling Subdivision and Language Profile will be deleted.	Select Yes to continue or No to cancel the action.
Ballot Style must be set.	The Ballot Style must be set before closing the Election Properties Dialog.	Select the Ballot Style tab in the dialog and a specified ballot style from the list.
You cannot change the election project status to 'Closed' status if the current election project status is different than 'Ready for Elections'.	The project cannot be closed in the current project status.	Do not try to set project status to 'Close'.
You cannot manually change the status of election project to 'Project status name'. Election project state will be automatically changed to the next level after all activities for the current state are performed.	The project status cannot manually be changed to higher state.	No action required.
You do not have permission to change election state.	User permission does not permit changing the project status.	Log in with a role that allows this operation.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Are you sure you want to close the project?	Asks the user to confirm the decision to set project status to 'Close'.	Select Yes to close the project. Select No to cancel the action.
By changing the state of the election project from higher to lower state level, some election entities will be affected. (List of changes)	The user has decided project status to lower level and some project entities will be deleted in the process. The message lists entities that will be deleted and asks for confirmation.	Select 'Continue' to change the project status. Select 'Cancel' to abort the action.
This action will close all opened dialogs.	The required action will close all open dialogs.	Select OK to close all opened dialogs and continue. Select Cancel to abort the operation.
Style setting could not be performed	The selected ballot style settings could not be applied.	Contact technical support.
Selected Election Event Type: (name) is not supported. Please change settings	The selected election event type is not allowed for this ballot style.	Select a different election event type.
Are you sure you want to regenerate all security values in application?	User confirmation is requested before the system resets all security elements in project.	Select OK to close the dialog and continue. Select Cancel to abort the action.
System detected that Project Properties are changed. Please Apply changes before starting regeneration process.	All changes must be saved before starting the regeneration process.	Save all changes.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
<p>System has detected that a cryptographic key exchange card has already been created for the active election project. If you select Yes, system will re-generate cryptographic keys and initiate a creation of new cryptographic key exchange card. If you select No, this operation will be cancelled.</p>	<p>The current project already contain cryptographic exchange keys.</p>	<p>Select Yes to re-generate cryptographic keys and initiate the creation of a new cryptographic key exchange card. Select No to cancel the operation.</p>
<p>Please insert memory card to be programmed as a cryptographic key exchange card. The memory card will be initialized and programmed with the new set of cryptographic keys.</p>	<p>The system is asking the user to insert the memory card that will be programmed.</p>	<p>Insert the memory card and press the OK button.</p>
<p>Cryptographic keys will be copied now.</p>	<p>The process of saving Cryptographic keys will start. Press OK to continue with the operation. Press Cancel to abort the operation..</p>	<p>Press OK.</p>
<p>Cryptographic key exchange card has been successfully created. Click the OK and eject the card.</p>	<p>The new cryptographic key exchange card has been successfully created.</p>	<p>Press OK.</p>
<p>First You must create Exchange card.</p>	<p>The necessary security elements are missing and the process of creating a copy of the exchange card cannot continue.</p>	<p>Create the initial exchange card before continuing with the copy process.</p>

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Please insert the previously programmed cryptographic key exchange card you want to copy. Insert the card and click the OK button to proceed.	Prompts the user to insert the initial exchange card.	Insert the initial exchange card.
Provided card is not created in this project.	The inserted exchange card is not created in current process and the operation cannot continue.	Provide the proper exchange card.
A copy of the original cryptographic key exchange card has been successfully created. Please eject the card. You can create multiple copies of the cryptographic key exchange card. If you select Yes, you will be prompted to create another copy of the original cryptographic key exchange card. If you select No, this dialog will be closed.	Informs user about the procedure for creating a copy of the exchange card.	Follow the instructions in the message.
Please insert a memory card to be programmed as a copy of the cryptographic key exchange card. The memory card will be initialized and programmed with the original set of cryptographic keys.	The data from the original exchange card will be saved on a new memory card.	Insert a memory card.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Necessary files missing	The system has detected that necessary exchange files are missing on provided exchange memory card.	Provide the proper exchange card.
Invalid ICP private key	The provided exchange card contains an invalid cryptography key.	Provide the proper exchange card or contact technical support.
Invalid EMS public key	The provided exchange card contains an invalid cryptography key.	Provide the proper exchange card or contact technical support.
Could not find tabulator with key exchange id: (number)	The tabulator with specified identifier does not exist in project.	Check the exchange card origin or contact technical support.
Key file not found for tabulator (name)	The data tabulator with the specified name does not exist in the project.	Check the exchange card origin or contact technical support.
Error during processing tabulator: (name)	Informs the user that errors occurred during the process of importing cryptography keys from exchange card.	Check the exchange card origin or contact technical support.
Please insert memory card to be programmed as a cryptographic key exchange card. The memory card will be initialized and exchange data will be saved.	Prompts the user to provide an empty memory card for programming.	Insert the memory card and press the OK button.
Card will be prepared now.	Informs the user that the system has detected the memory card and that the process of saving files will start	Select OK to close the dialog and continue. Select Cancel to abort the action.
Voting location Name or ID must be part of name!	The composed tabulator name must contain voting location names or IDs.	Specify the correct element for the name.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Cannot create new Voting Location	The process of creating a new voting location failed.	Contact technical support.
Invalid characters entered. Please try again.	Some of characters in the voting location name are not allowed	Delete invalid characters.
Insert Security Key device.	Prompts the user to insert the security key into the security key reader.	Presses OK to continue with programming the security key action. Press Cancel to abort the operation.
This action is not allowed in current security mode.	Programming the exchange card is not allowed in current cryptography mode.	Set security mode to Mode 2, or skip this action.
Process of creation of tabulator must be finished to proceed with this action.	The prerequisites for this action are missing.	Enter the tabulator name and save the object before repeating this action.
Please insert the previously created cryptographic key exchange card. Insert the card and click the OK button to proceed.	Prompts the user to insert the original exchange card before creating a copy.	Provide the original exchange card and press OK. Press Cancel to abort the action.
Card does not contain key for this tabulator	The provided memory card is not a valid exchange card.	Provide a valid exchange card or contact technical support.
Please insert the exchange card. Insert the card and click the OK button to proceed.	Prompts the user to insert the initial exchange card.	Insert the memory card and press OK.
Error occurred during creation of information file!	Informs the user that an error occurred during the creation of the Tabulator User information file.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Unable to verify file consistency! File is maybe changed, or corrupt.	Informs the user that the provided exchange card contain invalid files.	Provide a valid exchange card or contact technical support.
Generation of preview is already requested.	Informs the user that a ballot preview file has already been requested.	No action required.
File was not created on server	Informs the user that generation of the ballot preview file failed.	Check the application server connection parameters, or contact technical support.
Error generating drawing ballot preview	The generation of the ballot preview file failed.	Check the application server connection parameters, or contact technical support.
File name must be set	Informs the user that the import or export file name must be specified before starting the export process.	Enter the import or export file name.
Separators must be different	The defined separator of the import/export file is not correct.	Define a different separator value for the pair separator value.
Password must be 6-12 characters long and must contain letters and numbers!	Informs the user of the required password format.	Enter a proper password according to message's system.
Password must be 6-12 characters long!	Informs the user of the required password format.	Enter a proper password according to message's system.
This role can't be deleted.	The selected role cannot be deleted because it is a system role (protected role).	No action required.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
There are users that own this role. Please reconnect those users before deleting role	The selected role cannot be deleted because it is in use.	No action required.
Missing source file	The template file for the user argument is missing.	Contact technical support.
There is no permission to print confirmation file	User permission does not allow the specified action.	Log in with the proper role and repeat the action.
Error creating role.	An error occurred while the system was trying to create a role.	Contact technical support.
Cannot modify system role.	The system role cannot be changed.	No action required.
You must enter role name.	The role name must be provided.	Fill in all mandatory fields.
This role already exists.	Informs the user that a role with the specified name already exists.	A unique role name should be filled in.
Invalid password format.	The provided password does not fulfill security requirements.	Change the password to fulfill the requirements.
Please enter username.	A username must be provided.	Enter a username.
This username already exists.	The specified username is already in use.	Enter a different username.
Problem loading file. File is too big (limit depends on system properties, such as available memory).	The provided import file is too big.	Check the origin of the file or contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Problem loading file. (error details)	The provided audio file is not correct. The message depends on the Windows error mechanism.	Check the origin of the file or contact technical support.
Import of Audio Files is already requested.	The import audio files process is already active.	No action required.
Saving File Error : (error details)	The audio file storing process failed.	Contact technical support.
Project with the same name already exists. Please choose another project name!	The specified project name is in use.	Enter a different project name and repeat the operation.
Project (name) has been incorrectly defined. Please fill in the correct project information and try again.	The new project data are not valid.	Provide proper project parameters and repeat the action.
You did not fill in all required fields: (list)	Informs the user of missing data in project definition.	Provide all values requested for the creation of a new project.
Content for header has modified dimensions	The ballot rendering module was not able to fit all header content in the specified dimensions.	Review size of header and increase if possible, or re-organize the content to fit better.
Contest (name) has invalid span, larger than number of columns	Indicates that the specified contest has a span larger than the number of existing columns.	Reduce the column span for indicated contest.
Contest X has invalid span.	Indicates that the contest X has an invalid span.	Modify the column span for indicated contest.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
No Drawing Workbench file found	Indicates that the workbench file for drawing cannot be located.	Contact technical support.
No required paper dimensions	Message indicating that the required paper dimensions are not present.	Ensure all dimensions have been entered.
Referendum question 'name' could not be rendered	The ballot rendering module was not able to render the specified referendum question.	Review styling parameters and re-try.
Referendum question (name) could not be rendered because there is no space on ballot	The ballot rendering module was not able to render the specified referendum question because of lack of space on the ballot.	Review styling parameters and re-try.
Referendum question (name) could not be rendered because the number of units is too low	The ballot rendering module was not able to render the specified referendum question, because the number of markers is too low.	Increase the number of markers for this contest and re-try.
Unable to find font (name) in any style	Indicates that the specified font cannot be found in any font style.	Make sure that this font is installed on the system.
Failed to draw text: 'text'. 'error message'	The rendering module failed to render the specified text because of an exception specified in the error message.	Contact technical support.
There is already object with such name	This message indicates that the rendering module encountered problems with the layout the various objects.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
This template does not contain GridInfo object	This message indicates an internal error during rendering.	Contact technical support.
Header for ballot is too wide	This message will be displayed when the ballot header is too wide.	Make the ballot header less wide.
There is no support for landscape ballot styles with rank choice voting	Ranked choice voting ballot styles do not support landscape orientation.	No action required.
Invalid signature for file (error details)	The rendering module attempted to load a DWF file and found it to have an invalid signature.	Contact technical support.
Progress Information	This message is displayed on the project restore form while the project is restoring.	
Restoring the database file...	The project is being restored.	Contact technical support.
Restore database error: (error message)	Updating EMS Application server configuration.	Contact technical support.
Election project (name) has been successfully restored. To continue, click the OK button below. Extract project package error... (error message) Error deleting remote folder: (error message) (folder name)	The remote folder could not be deleted.	Contact technical support.
Empty project name is invalid	Shown during project restoration.	Set non-empty for the existing project copy.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Error remote saving file: (error message)	Shown during project restoration. Caused by a lack of privileges.	Contact technical support.
Copy project package error... (error message)	The project file cannot be copied.	Contact technical support.
Extract project package error... (error message)	The project could not be extracted. The file corrupted or there are insufficient privileges to write it.	Contact technical support.
Create process error...	The process for extracting project data could not be created.	Contact technical support.
Remote object is null.	The connection to the application server cannot be established.	Check if the application server is operational.
Connection to server failed. Please check your settings.	The connection to the application server cannot be established.	Check if the application server is operational.
Error loading PackageInfo file.	The selected file was not a package file created by EMS.	Select the proper package file.
No permission to perform this action.	The EED user does not have permission to perform the required action.	Log in with the required password and retry the operation.
Action Failed: (failure reason)	Informs the EED user that the required action has failed.	Contact technical support.
Error connecting: error message	The ftp connection could not be established.	Contact technical support.
Operation failed.	Informs the EED user that required operation failed to complete.	Check the log file for the details and contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Failed to archive project name of project.	Informs the EED user that archiving of the project failed.	Contact technical support.
Invalid arguments.	Informs the EED user that the input for the ballot preview is invalid.	Contact technical support.
Rename ballot command failed.	An attempt to rename the ballot has failed.	Contact technical support.
Ballots renaming failed.	An attempt to rename ballots has failed.	Contact technical support.
Access to file is denied: (file name)	The system could not access the file with the given name.	Check if file exists or if it is open.
Restoring of database failed.	Informs the EED user that database restoration failed.	Check the log file for the details and contact technical support.
Invalid Public key for import.	Public key could not be imported.	Contact technical support.
Crypto Algorithm Key could not be created	Informs the EED user that the cryptography key could not be created.	Contact technical support.
Signing of the XML file failed.	Informs EED user that the signing of a particular file failed.	Contact technical support.
Unable to sign file.	Informs the EED user that the signing of a particular file failed.	Contact technical support.
Crypto Algorithm could not be created, file system error.	Informs the EED user that the crypto file could not be created.	Contact technical support.
Crypto Algorithm could not be created, chain error.	Informs the EED user that the crypto file could not be created.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Connection to database failed. Please check parameters.	Informs the EED user that the database credentials are incorrect.	Check whether the database server is up and running, start Application Server Manager application and set the correct credentials.
Empty Election project database creation has failed: (error message).	Informs the EED user that project creation failed due to the given reason.	Contact technical support.
EMS database user assignment has failed: (failure reason)	Informs the EED user that user assignment failed due to the given reason.	Contact technical support.
Data tables and custom views creation has failed: (failure reason)	Informs the EED user that custom views have not been created.	Contact technical support.
Storing of default data to EMS database has failed: (failure reason)	Informs the EED user about the failure of default EMS data.	Contact technical support.
Project creation finalization has failed: (failure reason)	Informs the EED user that the finalization of the election project has failed.	Contact technical support.
All tasks have not been completed successfully.	Informs the EED user that there are some problems in project creation.	Check the log file and contact technical support.
Failed to backup project (project name) Error: (failure reason)	Informs the EED user that the backup of the project failed.	Check if the database server is up and running.
Failed to archive project (project name)	Informs the EED user that project archiving has failed.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Failed to copy project (project name) to location (target path)	Informs the EED user that project copying has failed.	Contact technical support.
Failed to backup (project name) project.	Informs the EED user that project backup creation failed.	Contact technical support.
Error: (reason) Target: project project name	Informs the EED user of an error that appeared during project compressing.	Contact technical support.
Failed to delete project (project name)	Informs the EED user that a project could not be deleted.	Contact technical support.
Unzip file (file name) failed.	Informs the EED user about a failure in unzipping the project.	Contact technical support.
Error restore database (project name).	Informs the EED user about a failure during database restoration.	Contact technical support.
Login Failed. Reason : ilogin failure reasonç	Informs the EED user of a database login failure.	Contact technical support.
Creation of new project failed.	Informs the EED user of a project creation failure.	Contact technical support.
No data for binary serialization.	Informs the EED user of problems in cloning DCF data structures.	Contact technical support.
Invalid path for binary files.	Informs the EED user of problems in cloning DCF data structures.	Contact technical support.
Invalid input.	Informs the EED user of problems in updating DCF data structures.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Upgrading can only be applied to root nodes.	Informs the EED user of problems in updating DCF data structures.	Contact technical support.
Endianness must be set to both nodes and equal.	Informs the EED user of problems in updating DCF data structures.	Contact technical support.
Port is not set.	Informs the EED user of a problem programming iButtons.	Contact technical support.
There are nothing to write.	Informs the EED user about of a problem programming iButtons.	Contact technical support.
Error writing data to Security Key.	Informs the EED user of an error in writing data to security key.	Contact technical support.
Could not detect security key.	Informs the EED user of a problem detecting security key.	Contact technical support.
Error verification of data on Security Key	Informs that EED user that problems occurred in verifying the security key.	Contact technical support.
Line (line number) contained Rotation Index that was an invalid integer: (invalid integer)	Informs the EED user about inconsistent rotation data.	Contact technical support.
Line (line number) contained (list of columns), while (list of columns) were expected.	A column list mismatch has occurred during district rotation file importing.	Check the import file format.
Line (line number). Values for Contest Area Id and Rotation Area External Id cannot be the same.	Contest Area Id and Rotation External Id cannot be the same in the single record.	Check the import file.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Line (line number) contains the combination of Contest Area Id and Rotation Area External Id which is not unique in the selected import file.	Import data is not valid.	Check the import file.
Error receiving Security Key data.	Occurs during the creation of the XML file used for programming CF cards.	Contact technical support.
Some links are not created due to an error. Check log file for details.	Occurs when database batch command is executed.	Contact technical support.
Invalid input type.	Internal error during batch command execution.	Contact technical support.
Batch creation failed.	Occurs on unsuccessful batch command execution.	Contact technical support.
Batch creation failed: Tabulator name must be unique.	Notifies the user of an unsuccessful tabulator creation.	Set a unique tabulator name.
Failed to delete directory for (tabulator number) tabulator. Error Message: (error details)	Occurs on unsuccessful batch deletion of tabulators.	Check whether the files in the directory are already used or locked.
Tabulator folder deletion failed for (tabulator count) tabulator(s). For more details check the error log.	Occurs on unsuccessful batch deletion of tabulators.	Check whether the files in the directory are already used or locked.
Import failed. (error details)	Displayed in case of error after mass data change process.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Exporting data	Displayed in progress bar during mass data change.	
Missing replacement data for (item) line number	Displayed in case of error after mass data change process.	Check import file.
Duplicated item (item ID)	Displayed in case of error after mass data change process.	Check import file.
Input file problem: (error details) Please check import settings (separators).	Displayed in case of error after mass data change process.	Check import file.
Unable to get connection instance.	Displayed in case of error after mass data change process.	Check import file.
This field does not exist.	Displayed in case of error during data validation in mass data change process.	Check import file.
Value must be integer.	Displayed in case of error during data validation in mass data change process.	Check import file.
Value must be in proper Date Time format	Displayed in case of error during data validation in mass data change process.	Check import file.
Value must be boolean	Displayed in case of error during data validation in mass data change process.	Check import file.
Error during export action!	Occurs on unsuccessful export of project data to XML.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
XML file is not valid!	Selected file does not have a valid xml format.	Select the correct file.
Error creating info file	Occurs on printing user's credentials.	Contact technical support.
Problems with NAS disk. Please call technical support.	Indicates a problem accessing NAS server.	Contact technical support.
File not found	Occurs when trying to rename file on NAS.	Check log file and contact technical support.
Unable to create command	Occurs when trying to create report on server.	Contact technical support.
Unable to create server	Occurs when trying to create report on server.	Contact technical support.
Error coping file	Occurs when copying large files on NAS.	Contact technical support.
Unable to create directory (path) Please check folder path and make sure you have permission to write to it.	Occurs when copying files on NAS.	Contact technical support.
Unable to save file: (file path) Please check file path and make sure you have permission to write to folder.	Occurs when copying files on NAS.	Contact technical support.
Remote error.	Occurs when trying to access server's file manager.	Contact technical support.
Import Failure	Displayed on unsuccessful import.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Problem with creating report. Please check NAS parameters and status.	Occurs when report is created.	Please wait for previous request to complete and try again.
There is no permission to Create selected report. Reason: User role does not allow this action to be performed.	Occurs when a report is requested by a user who does not have permission to create it.	Log on the project with a role which has elevated permissions.
Problem creating report. Please contact support	Occurs when creation of a report is requested.	Contact technical support.
Cannot initialize communication	Occurs when there is no response from the server side.	Check whether application server is operational.
Create report failed for report (report name)	Creation of report failed due to internal reasons.	Contact technical support.
Input XML error	Creation of report failed due to internal reasons.	Contact technical support.
No data path node	Creation of report failed due to internal reasons.	Contact technical support.
No data source nodes	Creation of report failed due to internal reasons.	Contact technical support.
Error connecting node with results	Creation of report failed due to internal reasons.	Contact technical support.
Can't create node for data	Creation of report failed due to internal reasons.	Contact technical support.
Can't create query for data	Creation of report failed due to internal reasons.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Query type is not specified	Creation of report failed due to internal reasons.	Contact technical support.
Failed to append new data node to parent	Creation of report failed due to internal reasons.	Contact technical support.
Error adding attribute (key): (value)	Creation of report failed due to internal reasons.	Contact technical support.
Reader is null	Creation of report failed due to internal reasons.	Contact technical support.
Error creating xml report: (error details)	Creation of report failed due to internal reasons.	Contact technical support.
No report created	Occurs on unsuccessful report creation.	Contact technical support.
Invalid transformation	Occurs when the user tries to apply an invalid XSLT transformation during report creation.	Contact technical support.
Transformation manager is not set	Occurs when the user tries to apply an XSLT transformation during report creation.	Contact technical support.
Problem with applying transformation	Occurs when the user tries to apply an XSLT transformation during report creation.	Contact technical support.
Error occurred during deleting file(s)	Occurs on unsuccessful report deletion.	Contact technical support.
Unable to render PDF file. Error code: (error code)	Occurs on unsuccessful report transformation to PDF.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Error occurred during importing package. (error details)	Occurs on unsuccessful import of report.	Contact technical support.
Report (report id) not created	Occurs on unsuccessful import of report.	Contact technical support.
Invalid input parameters.	Occurs on unsuccessful uploading of file on FTP.	Check connection parameters.
File upload failed for file: (file name)	Occurs on unsuccessful uploading of file on FTP.	Check if FTP server is operational.
Audio file generator does not exist on defined location: (location)	Occurs when audio file generator does not exist or is installed on different location.	Set correct location of Cepstral application in Application Server Manager settings.
Invalid ballot manifestation identifier.	Internal error during ballot generation.	Contact technical support.
PDF file of ballot manifestation doesn't exist on server.	Occurs when ballot with given id was not found on the server.	File was deleted from the server.
Preview couldn't be created!	Occurs when preview creation failed.	Contact technical support.
Could not load validator.	Internal error during ballot rendering.	Contact technical support.
Unexpected error occurred. Please contact technical support.	Internal error during generation of ballot preview.	Contact technical support.
Input ballot type is not set.	Occurs when ballot type is not set.	Contact technical support.
Merging failed	Internal error during ballot rendering.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Drawing ballot card for manifestation: (ballot ID) failed to render.	Internal error during ballot rendering.	Contact technical support.
Unable to get drawing ballot card for manifestation: (ballot ID).	Internal error during ballot rendering.	Contact technical support.
Merging failed for image: (file path). Check log file for details.	Internal error during ballot rendering.	Contact technical support.
PDF file (file name) is not digitally signed. Please contact application support.	Internal error during ballot rendering.	Contact technical support.
Paper dimensions for ballot (document name) are missing. Check error log for details	Contact technical support.	Contact technical support.
Move files failed, check log file for details.	Occurs when moving rendered ballots from temp directory to destination.	Check if destination directory is locked or drive is full.
Ballot (ballot ID) - some of contests are not rendered	Some contests could not be placed on the ballot.	Check project configuration.
Png file (file name) failed to convert.	Failed to convert .pdf file to .png.	Contact technical support.
Error in (png" to (pcl" conversion. Error message: graphics unit in given image is not supported. Please, contact administrator!	Occurs when converting files from .png to .pcl.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Creation RIFF file (file name) failed because process was unable to finish	Creation of audio file failed.	Contact technical support.
Problematic text: (text from file)	Message will appear when the Cepstral application cannot convert text of specific file to audio because that file contains some characters which Cepstral cannot recognize.	Change input text.
Conversion RIFF file (file name) failed.	Message will appear when the Speex convertor cannot convert file from RIFF to speex or MP3 format.	Contact technical support.
Error message: (error message)		
Could not create audio file for (file path).	Audio file could not be created.	Contact technical support.
Connecting audio failed: (error message)	Failed to attach audio file.	Contact technical support.
Could not find a matching drawing ballot card for ballot manifestation (ballot id)	Internal error during ballot rendering.	Contact technical support.
Process failed. For details check log file and contact technical support.	This message appears in case of ballot content creation has failed.	Contact technical support.
Election files generation for tabulator (tabulator name) failed.	Occurs on unsuccessful generation of election files.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Preparing security elements for tabulator (tabulator name) failed.	Occurs on unsuccessful generation of election files.	Contact technical support.
Tabulator (tabulator name) does not have polling district attached. Election files are not created.	Occurs on unsuccessful generation of election files.	Attach a polling district to the specified tabulator.
Election files for tabulator (tabulator name) could not be created. (error details)	Occurs on unsuccessful generation of election files.	Contact technical support.
Validation failed: (error details)	Occurs on unsuccessful generation of election files.	Check error details and follow the instructions.
Validate Tabulation Files	Displayed on progress bar during election files creation.	
Copy election files failed! (error details)	Occurs on unsuccessful generation of election files.	Check if target directory on NAS server is locked or if the disk is full.
Temporary folder missing	Occurs on unsuccessful generation of election files - internal error.	Run Application Server Manager and follow the instructions.
Line (line number) contained an elector count that was an invalid integer: (CSV value).	Occurs during import of electoral counts.	Check import file.
Import process failed.	Displayed when error occurs during import of DCF file.	Contact technical support.
DCFManager Import from file failed.	Displayed when error occurs during import of DCF file.	Contact technical support.
Configuration import failed.	Displayed when an error occurs during import machine settings.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
RTR File name of result file has been altered, cannot load result file.	The result file has been altered outside of the voting machine.	
Could not unpack write-in results file for result file (file name), because decryption failed.	The decryption of the result file failed therefore write-in results could not be read.	Contact technical support.
Unhandled Tabulator Type	The given tabulator is of an unknown type.	Contact technical support.
To be able to produce the audit report/images you first have to copy images for result file (file name).	Prior to creation of audit report, images need to be copied from result file.	Copy images from result files.
Raw results file (file name) was not present on NAS.	The result file with the given name is not present on NAS.	Perform the copy images action in RTR on the memory card containing the referenced result file.
Could not unpack result file (file name), because decryption failed	The result file could not be unpacked since decryption problems appeared.	Contact technical support.
Database server parameters are not correct: Connection to database failed. Please check parameters.	The provided application server parameters are not correct.	Check entered parameters contact technical support
There was an error occurred when saving data to the file.	The application parameters saving process was not successful.	Check entered parameters contact technical support.
Could not load content creator.	Indicates that a component of EMS is not installed property.	Contact technical support.
Could not load ballot style discriminator.	Indicates that a component of EMS is not installed property.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
You must select folder for result file	A folder must be specified in which to save the Audio Studio Definition file.	Contact technical support.
File (o) is not valid Template Keyword file	The selected file for upload is not a valid template keyword file.	Contact technical support.
You must check one file for importing!	One file must be selected for to execute the import action.	Select one file in list of available files.
Select Report package.	One file must be selected for to execute the import action.	Select one file in list of available files.
Root data for report missing.	The specified report package file is not correct.	Contact technical support.
Definition file name for report missing.	The specified report package file is not correct.	Contact technical support.
Report code is missing	The specified report package file is not correct.	Contact technical support.
Are you sure you want to delete selected write-ins?	Prompts for confirmation before deleting write-in candidate.	Select Yes to continue or No to cancel.
Are you sure you want to delete the selected results?	Prompts for confirmation before deleting result file.	Select Yes to continue or No to cancel.
Polling district was incorrectly selected for following: (error details)	The specified Polling District cannot be selected for the Manual Result Entry owner.	Select the correct Polling District.
Failed to get automatic result loading status.	The system cannot get information from the results loading process.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Result loader service cannot be started.	The system cannot start the automatic results loading process.	Contact technical support.
Result loader service cannot be stopped.	The system cannot stop the automatic results loading process.	Contact technical support.
Some of the selected result files were rejected. Are you sure you want to (action) these result files?	Some of the selected files for the Validate and/or Publish action are in the 'Rejected' status.	Confirm Validate and/or Publish action on those files or cancel the process.
Choice Prototype Name must be set!	The choice prototype name is mandatory and must be specified.	Define a name for the choice prototype.
Contest Prototype Name must be set!	The contest prototype name is mandatory and must be specified.	Define a name for the contest prototype.
All selected ballots renamed successfully.	The renaming action on the ballots is finished.	No action required.
You must select one or more ballots for processing.	Ballots must be selected in order to be renamed.	Select on or more ballots before starting the action.
You select (number) ballots for processing. Limit for this action is (number).	The number of ballots selected to rename is over the limit.	Reduce the number of selected ballots.
Contest that has prototypes can't have separate choices!	The specified contest uses the prototype mechanism to create candidates.	Delete existing candidates, or disconnect contest from prototype
Subdivision type is not selected!	A subdivision type must be specified for the newly-created Subdivision.	Specify Subdivision type from available list of types.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Parent Subdivision is not selected!	A parent subdivision must be specified for the newly-created subdivision.	Specify a parent subdivision type from the available list of subdivisions.
You have to select the Polling Subdivisions.	One or more polling subdivisions must be specified before creating tabulators.	Select one or more polling subdivisions before creating Tabulators.
This will create default Electoral Group for selected parties. Continue?	Prompts for confirmation of the creation of Electoral Groups for selected Political Parties.	Accept or deny the action.
You have to select the Political Parties.	One or more political parties must be selected before creating Electoral Groups.	Select one or more political parties before creating Electoral Groups
Invalid Election Status.	The Printing Label action is not allowed in current status.	Revert to an earlier state of the project, or avoid this action.
There is no permission to Create Labels.	The Printing Label action is not allowed for current user role.	Log in with the required credentials, or avoid this action.
You have to select the Voting Locations.	Parent Voting Locations must be specified before of creating tabulators.	Select one or more Voting Location before starting the creation process.
It is not allowed to Restore Defaults in (status name) status.	Restore Defaults drawing information is not allowed in the current election status.	Abort restoration action.
Operation failed for some of selected contests.	The setting party action for some of the specified contests failed.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Subdivision Batch Creation: Prefix is not valid.	The specified prefix is not valid for the Subdivision Batch Creation action.	Specify a valid prefix and try again.
Subdivision Batch Creation: Postfix is not valid.	The specified Postfix is not valid for the Subdivision Batch Creation action.	Specify a valid postfix and try again.
Please select subdivision type.	The subdivision type must be specified before subdivisions are created.	Specify the subdivision type before subdivisions are created.
Please select Parent Subdivision.	The parent subdivision must be specified before subdivisions are created.	Specify parent subdivision before subdivisions are created.
Subdivision Batch Creation: Invalid Range.	The specified creation range is not valid.	Change the range and repeat the operation.
Batch Creation: Suffix is not valid.	The specified suffix is not valid for the Polling Subdivision Batch Creation action.	Specify a valid suffix and try again.
Batch Creation: Range is not valid.	The specified range is not valid for the Polling Subdivision Batch Creation action.	Specify a valid range and try again.
Batch Creation: Prefix is not valid.	The specified prefix is not valid for the Polling Subdivision Batch Creation action.	Specify valid prefix and try again.
Batch Creation: Postfix is not valid.	The specified postfix is not valid for the Polling Subdivision Batch Creation action.	Specify valid postfix and try again.
You have not selected the desired cell properly	The specified postfix is not valid for the Polling Subdivision Batch Creation action.	Specify a valid postfix and try again.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Invalid characters entered(/, :, *, ?)	The object name contains characters that are not allowed.	Specify a valid name.
Tabulator is not set!	The tabulator is not updated and users cannot be created.	Save tabulator before adding users.
Project name is not valid.	The specified project name is not valid.	Type in a valid project name.
Jurisdiction name is not valid.	The specified jurisdiction name is not valid.	Type in a valid jurisdiction name.
Description is not valid, invalid characters entered (/ , : , * , ?)	The object description contains characters that are not allowed.	Specify a valid description.
The newly created copy of the project will have different security settings than the original.	The newly-created copy will be different than the original in terms of the security specification.	Any result file from original will not be usable in a copy.
Value ivaluel can't be imported in selected field. (reason)	The import action failed because of specified reason.	Contact technical support.
There is no permission to Create selected report.	The current user role does not allow creation of reports.	Log in with credentials that allow this action or avoid this action.
Could not get Result loader service status.	The result loader status cannot be resolved.	Contact technical support.
Operation is not allowed.	General message indicating that the selected action is not allowed.	
Loading result files failed.	The result loading action failed.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Failed to delete directory: Windows error	The folder could not be deleted. The message details indicate the reason.	Contact technical support.
Service already started.	The Automatic Loading Service is already started.	No action is required.
Folder doesn't exist: (folder name)	The result folder does not exist.	Contact technical support.
Given interval: (value) is less than minimal allowed interval of time: (value) or greater than max allowed interval of time: (value)	The results loading parameters are not correct.	Specify valid parameters.
Given chunk size: (value) is greater than max allowed chunk size: (value)	The number of parallel process operating while results are loading is too large.	Decrease the number of parallel processes.
Creating of this report can be performed in status (name) or later.	The selected report cannot be created in current Election Event Status.	Transition the project to a status which allows this action or avoid this action.
Ballot (name) is not updated	The content of specified ballot is not valid.	Start the synchronization process for listed ballots.
Ballot (name) does not have any voting contest	The specified ballot does not have any usable contests.	Inspect the specified ballot and decide whether the generation process should continue.
Template selection failed.	Template processing failed.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Audio Text: (text) Contains a pause argument that does not define the unit of time (s, ms...)	The specified text contains an invalid time unit.	Inspect the text and fix the time unit or contact technical support.
Creation RIFF file (name) failed. Error message: (error message text).	The system did not create the audio file because of the listed error.	Contact technical support.
Contest (name) use prototype.	The specified contest use prototype mechanism. Manually adding candidates is not allowed.	Remove manually added candidates or detach the contest from the prototype.
Selected ballot creator type does not allow manually adding of the objects. This (might/will) cause that system fails. Please remove/delete all objects that were added after data was imported.	The system detected objects that were added after importing project data.	All objects that are added after importing data will not be consistent. Remove them.
Tabulator (name) contains more connected modem settings than it is allowed	The specify tabulator has more than the maximum allowed transfer points connected to it.	Remove some of the transfer points.
There is not enough space on disk to create election files.	The system detected a lack of disk space for creating election files.	Clear space on NAS disk.
Info: Result file (file name) has not been closed and it's not loaded.	The selected result file comes from a tabulator that is not closed. It has not been loaded.	Either change project settings for this situation or return the card into the tabulator and close it.

Table A-1: EED Client Error Messages (Continued)

Error message	Description	Action to overcome
Contest (o) placed improperly regarding its order.	The specified contest cannot be placed on the requested spot on the ballot.	Check contest settings and/or contact technical support.
Contest (o) could not be rendered. Check Page and Column settings for this contest.	The specified contest cannot be placed on the requested spot on the ballot.	Check Page and Column settings for specified contest and change them.
Cannot allocate candidate: contest = (name), candidate = (name), line = (value).	The candidate cannot be placed on the requested spot on the ballot.	Check contest settings and/or contact technical support.
Header (ballot or contest) or static text dimension has been modified.	The system has reduced the size of the header.	Inspect the specified header and change its settings.
Pdf reader could not be created for file (name).	The system was unable to create a pdf document for specified file.	Contact technical support.
Drawing Workbench file not found.	Informs the user that system components are missing.	Contact technical support.

Table A-1: EED Client Error Messages (Continued)

A.2 Adjudication Client Application Error Messages

Table A-2 contains a set of error messages associated with potential problems in the Adjudication.

Message	Description	Action
Adjudication could not be started. Check that the Election File Manager Service is running properly and refer to error details for more information.	Shown in the Election Wizard when the user requests to start adjudication but an error occurs.	Contact an administrator to verify what the message specifies and then try starting adjudication again. Otherwise, check the error details in the log and/or contact technical support.
Adjudication Started	Adjudication has been started by an administrator.	No action required.
The administrator has stopped adjudication. No ballots will be available until adjudication is started again.	Adjudication has been stopped by an administrator.	Accept the notification and close the client. In certain cases the administrator may need to stop adjudication only to start it again, in that case, wait for a new ballot to appear.
The administrator has stopped adjudication. No ballots will be available until adjudication is started again. The current ballot will be ignored.	Adjudication was stopped by an administrator, but a ballot was being adjudicated.	Accept the notification and close the client. In certain cases the administrator may need to stop adjudication only to start it again, in that case, wait for a new ballot to appear.

Table A-2: Adjudication Client Application Error Messages

Message	Description	Action
Ballot was ignored	Adjudication was stopped by an administrator, but the user was in the process of confirming submission of an adjudicated ballot.	Accept the notification and close the client. In certain cases the administrator may need to stop adjudication only to start it again, in that case, wait for a new ballot to appear.
Batch [ID], Tabulator [ID] [total] - of [total] ballots processed. [total] in progress.	Shown when the user clicks on a batch in the Batch Management screen.	No action required.
”[Description of a failed operation] It’s most likely that the application key is not installed, or is installed incorrectly. Contact an administrator to verify that this machine has the application key and you have permission to use it.”	Shown when an operation fails due to a problem with the application key that secures communication.	Contact an administrator to verify that the machine has the application certificate and key installed and that the Windows user running the application has permission to use the key. Otherwise, check the error details in the log and/or contact technical support.
“Changes have been saved but the screen could not be refreshed. Please ensure the EMS Adjudication Services are running and then reopen this screen.”	Shown in the Write-In Management screen when an error occurs after changes to a write-in have been saved.	Contact an administrator to verify communication with the EMS Adjudication Services and then try entering the screen again. Otherwise, check the error details in the log and/or contact technical support.

Table A-2: Adjudication Client Application Error Messages (Continued)

Message	Description	Action
<p>Could not save changes. Please ensure the EMS Adjudication Services are running and then try again.</p>	<p>Shown in the Write-In Management screen when an error prevents changes to a write-in from being saved.</p>	<p>Contact an administrator to verify communication with the EMS Adjudication Services and then try editing the write-in again. Otherwise, check the error details in the log and/or contact technical support.</p>
<p>Could not retrieve write-in contests. Please ensure the EMS Adjudication Services are running and then try again.</p>	<p>Shown in the Write-In Management and Ballot Viewer screens when an error prevents loading write-in data.</p>	<p>Contact an administrator to verify communication with the EMS Adjudication Services and then try entering the screen again. In the Ballot Viewer screen, you may need to move to a different contest, or reopen the application, in order to retry. Otherwise, check the error details in the log and/or contact technical support.</p>
<p>Could not obtain statistics. Please ensure the Adjudication Data Service is running.</p>	<p>Shown in the Batch Management screen when the user clicks on a batch but batch information cannot be obtained.</p>	<p>Contact an administrator to verify communication with the EMS Adjudication Services and then try selecting a batch again. Otherwise, check the error details in the log and/or contact technical support.</p>

Table A-2: Adjudication Client Application Error Messages (Continued)

Message	Description	Action
Once the ballot is saved, changes will be permanent and you will not be able to modify adjudicated contests. Are you sure you want to mark this ballot as adjudicated and move to the next ballot?	Shown in the Ballot Viewer screen when the user requests to save the current ballot and go the next.	Select OK to save adjudications to the ballot, or Cancel to continue adjudicating it.
Click OK to reset all in-progress ballots for this batch. The safest way to do this is to first have all clients close their applications to release any currently in-progress ballots. Ballots that are currently open may lose their work if the ballot is sent to another client before the original is saved.	Shown in the Batch Management screen when the user requests to reset any in-progress ballots for a batch.	Select OK to reset all in-progress ballots for this batch; Cancel otherwise.
Click OK to resubmit Tabulator [ID] - Batch [ID].	Shown in the Batch Management screen when the user requests to resubmit a pending batch.	Select OK to resubmit the batch; Cancel otherwise.
After starting the election you will no longer be able to change your selected outstack filters (if any) or edit qualified write-ins. Are you sure you want to start the election?	Shown at the end of the Election Wizard when the user requests to start adjudication.	Select OK to start adjudication; Cancel otherwise.

Table A-2: Adjudication Client Application Error Messages (Continued)

Message	Description	Action
[Description of a failed operation] Please ensure the EMS Adjudication Services are running and then try again.	Shown when an operation fails due to a problem communicating with EMS Adjudication Services.	Contact an administrator to verify communication with the EMS Adjudication Services and then try the operation again. Otherwise, check the error details in the log and/or contact technical support.
Choice “[name]” is disabled, and cannot be adjudicated.	Shown in the Ballot Viewer screen when the user selects a choice that has been disabled in the current election.	No action required.
Duplicate write-in name.	Shown in the Write-In Management screen when the user attempts to add a write-in name that has already been added.	Edit the name being added so it doesn't conflict with a previous one.
Clicking OK will set the election project. You will not be able to change the election project again until adjudication is started and then stopped.	Shown when the user selects an election project in the Election Wizard and requests to move to the next step in the wizard.	Select OK to set the election project that will be adjudicated; Cancel to change your selection.
Could not load election status.	Shown when the application is starting but the election status cannot be obtained due to an error.	This message will usually be shown with details specific to the situation. Please follow any troubleshooting instructions shown, otherwise contact an administrator to check the error details in the log and/or contact technical support.

Table A-2: Adjudication Client Application Error Messages (Continued)

Message	Description	Action
<p>”[Description of a failed operation] An invalid application key is installed.</p> <p>Contact an administrator to have an up-to-date key installed with the proper permissions.”</p>	Shown when an operation fails due to having an incorrect application key installed.	Contact an administrator to verify that the machine has the correct application certificate and key installed (e.g., maybe an old key is installed). Otherwise, check the error details in the log and/or contact technical support.
There was an error loading the ballot image. Please alert an administrator. Select “Yes” if you choose to continue; however, other ballot images may also not load. Do you want to continue adjudication?	Shown in the Ballot Viewer screen when an error prevents displaying a ballot for adjudication.	Contact an administrator as specified, and select Yes to try to load the next available ballot; No otherwise.
Vote [action] for choice “[name]”	Shown in the Ballot Viewer screen when the user changes the voter mark for a choice.	No action required.

Table A-2: Adjudication Client Application Error Messages (Continued)

Message	Description	Action
<p>”[Description of a failed operation] There was a problem communicating securely with services. Please ensure that:</p> <p>The time on this computer matches the Adjudication server’s time, including the time zone.</p> <p>This version of the application is compatible with the EMS Adjudication Services you’re connecting to.”</p>	<p>Shown when an operation fails due to a problem establishing secure communication with the services.</p>	<p>Contact an administrator to verify the items specified in the message and then try the operation again. Otherwise, check the error details in the log and/or contact technical support.</p>
<p>Election contains no write-in contests. Qualified write-in entry is not applicable.</p>	<p>Shown upon entering the Write-In Management screen if no write-in contests are available for the selected election.</p>	<p>No action required.</p>
<p>Qualified write-ins have been updated.</p>	<p>Shown in the Write-In Management screen when updates (add/edit/remove) to qualified write-ins have been saved.</p>	<p>No action required.</p>
<p>Failed to reset ballots for batch.</p>	<p>Shown in the Batch Management screen when the user’s request to reset in-progress ballots fails.</p>	<p>Contact an administrator to verify communication with the EMS Adjudication Services and then try the operation again. Otherwise, check the error details in the log and/or contact technical support.</p>

Table A-2: Adjudication Client Application Error Messages (Continued)

Message	Description	Action
Failed to resubmit batch [Tabulator ID] - [Batch ID].	Shown in the Batch Management screen when the user's request to resubmit a batch fails.	Contact an administrator to verify communication with the EMS Adjudication Services and then try the operation again. Otherwise, check the error details in the log and/or contact technical support.
You must select an election project name to continue.	Shown in the "Setup election project" step of the Election Wizard if the user requests to go to the next step without selecting an election first.	Select an election project name before continuing to the next step.
"[Description of a failed operation] Please ensure the EMS Adjudication Services are running and then try again. Note: the services take a few minutes to start after the Adjudication server starts. If the server has just been restarted, please wait before trying again, or ask an administrator to start the services manually."	Shown during application startup if one of the operations that contact the services fails.	Contact an administrator to verify whether the server has been recently restarted, and if so, follow the instructions in the message before trying again. Otherwise, an administrator should verify that the services are running, check error details in the log and/or contact technical support.

Table A-2: Adjudication Client Application Error Messages (Continued)

Message	Description	Action
“You are about to end adjudication. Once you do this, you will no longer be able to submit batches to tally, adjudicate ballots, or create adjudication reports. Click OK to confirm that you would like to end adjudication for this election project.”	in the Reporting screen when the user requests to end adjudication.	Select OK to acknowledge the message’s warnings and end adjudication. Select Cancel to continue adjudicating.
Submitting batch(es).	Shown in the Batch Management screen when the user requests to submit one or more batches for tallying.	No action required.
A completed batch must be selected. It is possible that the status of the selected batch has changed.	Shown in the Reporting screen when the user requests a report without selecting a batch first.	Select a batch from the list before requesting a report. If there are no batches available, wait for them to appear, as the system may still be processing them.
You are not authorized to carry out adjudication tasks. Contact an administrator to authorize access.	Shown during application startup if the Windows user running the application has been granted permission to the application key but has not been added to (or has been removed from) one of the groups that define the user’s role in the system.	Contact an administrator to ensure the exact user’s name is present in one of the Adjudication groups on the server (or on the current machine, if this is a single-machine install).
Updating Batches.	Shown in the Batch Management or Reporting screens when the application is about to update the list(s) of batches.	No action required.

Table A-2: Adjudication Client Application Error Messages (Continued)

Message	Description	Action
Could not determine user authorization.	Shown when the application is starting but an error prevents determining whether the user running the application is authorized to do so.	This message will usually be shown with details specific to the situation. Please follow any troubleshooting instructions shown, otherwise contact an administrator to check the error details in the log and/or contact technical support.
Waiting For Batches	Shown periodically on the Batch Management screen if the application has not received any batches to display from the services.	Wait for batches to arrive; depending on server resources, the size of the election, outstack conditions selected for adjudication, and conditions actually present in the batches, this may take from seconds to minutes. It may be necessary for an administrator to check the services' logs for processing errors and/or contact technical support.
An unexpected error occurred; please notify technical support. The application will now close.	Shown when an unexpected error occurs and the application cannot continue running.	Contact an administrator to check the error details in the log and/or contact technical support.
An unexpected error occurred; please notify technical support.	Shown when an unexpected error occurs but the application can continue running.	Contact an administrator to check the error details in the log and/or contact technical support.

Table A-2: Adjudication Client Application Error Messages (Continued)

Message	Description	Action
The selected batch for the activity report was null or could not be found	Message shown when selected batch is null when trying to generate reports	
Updates are available	Shown when updates to batch are available on the Batch Management screen.	Click refresh to refresh batches.
An error occurred retrieving the ballot.	Shown if there was a problem retrieving a double-clicked ballot in the Batch Management screen	Contact an administrator to verify communication with the EMS Adjudication Services and then try the operation again. Otherwise, check the error details in the log and/or contact technical support.
Reopening a ballot closes your current ballot. Click Yes to save changes to the current ballot, No to discard changes, or Cancel to keep the current ballot and cancel the re-open.	Shown if a ballot with changes was already open when an administrator reopens a ballot.	Select the appropriate button to complete the desired action.
Click Yes to save this ballot. No to close this ballot without saving. Cancel to return to the ballot	Shown when saving a reopened ballot.	Select the appropriate button to complete the desired action.

Table A-2: Adjudication Client Application Error Messages (Continued)

Message	Description	Action
Failed to submit one or more batches. Please try refreshing the screen and resubmit if necessary.	Shown when batch submission fails, typically when batch status is out of date due to reopening a ballot.	Refresh the batch management screen and try resubmitting the batch, if it is completed. Otherwise, contact an administrator to verify communication with the EMS Adjudication Services and then try the operation again.
This report may be out of date. Regenerate the report to get the latest data.	Shown on the Reports screen when a generated report has been rendered out of date by a ballot reopening operation.	Regenerate required reports.

Table A-2: Adjudication Client Application Error Messages (Continued)

A.3 DCM

Table A-3 contains a set of error messages associated with potential problems with Data Center Manager.

Error message	Description	Action to overcome
Invalid operating system. Configuration cannot continue.	Displayed during installation from command line if operating system is invalid.	Start installation on correct OS.
IIS service is not installed or the service is not running. Installation cannot be completed!	Displayed when server settings are changed.	Please contact technical support for more help on this issue.
SQL is not installed, the service is not running or the number of the SQL instances is more than one. Installation cannot be completed!	Tests if SQL is running and one instance is available.	Please contact technical support for more help on this issue.

Table A-3: DCM Error Messages

Error message	Description	Action to overcome
Application will exit now! Please contact our technical support!	Displayed when necessary files are missing.	Please contact technical support for more help on this issue.
Not all of the EMS DataCenter security settings have been applied successfully. (Error codes: error details). Please look in the event log for more details. Press OK button to continue.	Displayed when some of the security settings have not been applied successfully.	Please contact technical support for more help on this issue.
You need to restart system to make settings take effect. Click Yes to restart now or No if you plan to manually restart later.	Displayed when settings are saved and system has to be restarted.	Confirm this action if appropriate.
There was an error occurred during EMS DCM removing! Please look in the event log for more details.	Displayed if an error occurred during removal of the DCM utility.	Please contact technical support for more help on this issue.
User name cannot be blank! Please try again.	Displayed when no user name has been entered into the log-in form.	Please enter a user name.
Invalid characters found: (message details)! Please enter new user name!	Displayed when invalid characters have been entered in the user name field on the log-in form.	Ensure that no invalid characters are entered in the user name field.
Password cannot be blank! Please try again.	Displayed when no password has been entered into the log-in form.	Please enter a password.

Table A-3: DCM Error Messages (Continued)

Error message	Description	Action to overcome
Entered passwords do no match! Please try again.	The values entered in the password field and its corresponding confirmation field do not match.	Re-enter the password and confirmation field to make sure the values match.
Entered password is too short (password details characters)! Please enter new password (at least 6 characters long)!	Displayed when password is too short.	Pick a password with at least 6 characters.
Invalid characters found: (match details)! Please enter new password!	Displayed when invalid characters have been entered in the password field on the log-in form.	Please enter the correct password.
SQL is not installed or the service is not running.	Displayed when SQL is not installed or the service is not running.	Please contact technical support for more help on this issue.
The number of running SQL instances is (message details)	Displays the number of SQL instances running	Please contact technical support for more help on this issue.
SQL 'sa' account disabled: (message details)	Displayed if the SQL 'sa' account is disabled.	Please contact technical support for more help on this issue.
Common directory already exists. Do you want to replace all existing static files in the NAS Common directory?	Displayed when the check for existing instances of the common folder is performed and the folder already exists.	Please contact technical support for more help on this issue.
(description details) (identity details) already exists. Do you want to reset the account password? If you click Yes, you will be prompted for the new password. If you click on No, no changes to your account will happen.	Displayed if the user account already exists, and asks the user if they wish to change the password.	Follow the instructions in the message.

Table A-3: DCM Error Messages (Continued)

Error message	Description	Action to overcome
Please enter a password for the (user description details)(user identity details):	Displayed when the user needs to enter a password	Enter the password.
Please enter the new password for the (user description details)(user identity details):	Displayed when the user needs to enter a new password.	Enter a new password.
Please enter password for the account (user identity details):	Displayed when the user needs to enter a password	Enter the password.
There was an error creating (user description details). Error: (error details) Do you want to try again?	Displayed when creating user or setting flags failed. Try again. If problem re-appears, contact technical support.	
There was an error resetting (user description details) password. Do you want to try again?	Displayed if an error occurs while resetting user's password.	Try again. If problem reappears, contact technical support.
Firewall is on: (error details)	The DCM application is informing the user that the firewall is on.	Turn off firewall.

Table A-3: DCM Error Messages (Continued)

A.4 Framework

Table A-4 contains a set of error messages associated with potential problems in the EMS framework.

Error Message	Description	Action
No Instance to link with	The system failed to create a new object and link to an existing object, because the reference to the existing object was empty.	Contact technical support.
No Link Hook to Hook the Link	The system attempted to link together two objects, but was unable to do so.	Contact technical support.
No Class for Instantiation	The system was unable to retrieve information about a certain class of objects.	Contact technical support.
No association end for required association	The system attempted to link together two objects, but was unable to do so.	Contact technical support.
No class for path (class path)	The system was unable to create a new instance of a certain class specified in (class path).	Contact technical support.
Link cannot be null	The system was unable to delete a link between two objects	Contact technical support.
Inconsistent link state.	The system was unable to delete a link between two objects.	Contact technical support.
Object(s) will be deleted. Do you want to continue?	The user chose to delete an object or set of objects and the system is asking for confirmation.	Confirm this action if appropriate.

Table A-4: Framework Error Messages

Error Message	Description	Action
Both Source and Target instance IDs must not be null	The system attempted to relink one object to another object, but the identifiers provided were null.	Contact technical support.
No link hook required on source instance	The system attempted to relink one object to another object, but there was a problem with the existing relationship.	Contact technical support.
No association end for link hook	The system attempted to relink one object to another object, but there was a problem with the existing relationship.	Contact technical support.
Moving up/down of items is allowed only if the default sort order is applied to the grid.	The user attempted to change the order of an item in a list that is currently sorted according to some custom sort order. This is not allowed.	Remove the custom order before re-ordering elements in the list.
Image is too big! It should be maximum (width) width and (height) height.	The user added an image inside an image control that exceeds the maximum dimensions specified in (width) and (height).	Adjust the image to the appropriate size.
Object is not saved and all changes will be lost. Do you want to continue?	The user attempted to close a dialog without first saving any changes made; the system is asking the user for confirmation.	Confirm action if appropriate.
User must have a password	Message indicating that a password is required.	Enter the password

Table A-4: Framework Error Messages (Continued)

Error Message	Description	Action
Password confirmation failed	Message indicating that password confirmation failed.	The password confirmation field has to match the password field.
Invalid number (probably too big)	The user attempted to adjust the number of visible rows in a grid, but entered an invalid number.	Review and correct entered data.
Could not create link if meta model is wrong.	The system attempted to create a link between two objects, but failed.	Contact technical support.
Could not create link if one of ends is null.	The system attempted to create a link between two objects, but failed.	Contact technical support.
Could not delete link when one of ends is null	The system attempted to delete a link between two objects, but failed.	Contact technical support.
At least one link hook is null.	The system attempted to create a link between two objects, but failed.	Contact technical support.
At least one link hook does not have its association end.	The system attempted to create a link between two objects, but failed.	Contact technical support.
Link hooks do not belong to the same association.	The system attempted to load or create a link between two objects, but failed.	Contact technical support.
No Class for Object creation.	The system attempted to create or modify an object, but failed.	Contact technical support.
No Instance for deletion.	The system attempted to delete an object, but failed.	Contact technical support.
No Instance for discarding.	The system attempted to remove an object from memory, but failed.	Contact technical support.

Table A-4: Framework Error Messages (Continued)

Error Message	Description	Action
No instance to persist.	The system attempted to persist an object, but failed.	Contact technical support.
No LinkHook to load.	The system attempted to load a relationship, but failed.	Contact technical support.
No LinkHook to load.	The system attempted to load a relationship, but failed.	Contact technical support.
At least one link hook does not have its association end.	The system attempted to load a relationship, but failed.	Contact technical support.
No reference to attribute	The system was unable to modify an object.	Contact technical support.
Invalid link hook behavior	The system was unable to modify an object.	Contact technical support.
No attribute name	The system was unable to modify an attribute in an existing object.	Contact technical support.
Cannot reload null.	The system was unable to reload an object.	Contact technical support.
Null link cannot be reordered	The system was unable to reorder the relationship between two objects.	Contact technical support.
Reorder can be done for links with the same hook.	The system was unable to reorder the relationship between two objects.	Contact technical support.
Side of link must not be null.	The system was unable to reorder the relationship between two objects.	Contact technical support.
Delete directory (path), failed	The system was unable to delete the folder at the specified location (path).	Contact technical support.

Table A-4: Framework Error Messages (Continued)

Error Message	Description	Action
Create directory failed: (path)	The system was unable to create a folder, due to the reason specified in message (path).	Contact technical support.
Move directory failed: (error message)	The system was unable to move a folder, due to the reason specified (error message).	Contact technical support.
Source folder (path) missing	The system was unable to move the folder (path), because the folder does not exist.	Contact technical support.
Move directory failed: (error message)	The system was unable to move a folder, due to the reason specified in (error message).	Contact technical support.
Validation failed!	String validation failed for text entered in a user control. This can indicate an attempt at SQL insertion.	Contact technical support.
Unable to create link	The system attempted to create a link between two objects, but failed.	Contact technical support.
Null instance cannot be processed	The system encountered a reference to an object that was empty. This is not allowed.	Contact technical support.
MoInstance must have class	The system encountered an object which does not have a valid class. This is not allowed.	Contact technical support.
Null in class hierarchy	The system encountered a reference to a class that was empty. This is not allowed.	Contact technical support.

Table A-4: Framework Error Messages (Continued)

Error Message	Description	Action
Command cannot be null	The system encountered a reference to a command that was empty. This is not allowed.	Contact technical support.
DataType is null	The system encountered a reference to a data type that was empty. This is not allowed.	Contact technical support.
Recordset is null	The system encountered a reference to a record set that was empty. This is not allowed.	Contact technical support.
Recordset is Empty	The system encountered a reference to a record set that was empty. This is not allowed.	Contact technical support.
Link is null	The system encountered a reference to a link that was empty. This is not allowed.	Contact technical support.
Side A instance is null	The system encountered a reference to a link that was empty. This is not allowed.	Contact technical support.
Side B instance is null	The system encountered a reference to a link that was empty. This is not allowed.	Contact technical support.
Link's association is null	The system encountered a reference to a link that was empty. This is not allowed.	Contact technical support.
Link Hook is null	The system encountered a reference to a link that was empty. This is not allowed.	Contact technical support.

Table A-4: Framework Error Messages (Continued)

Error Message	Description	Action
Association end is null	The system encountered a reference to a link that was empty. This is not allowed.	Contact technical support.
Association end owner is null	The system encountered a reference to a relationship that was empty. This is not allowed.	Contact technical support.
Object is deleted	The system attempted to perform an action on a object, but the object was deleted previously.	Contact technical support.
'algorithm' and 'keyfile' have to be specified for EncryptionClientSinkProvider	A problem occurred during encryption with remote service communications.	Contact technical support.
Specified keyfile does not exist	A problem occurred during encryption with remote service communications.	Contact technical support.
Not supported for now	An unsupported database action was executed.	Contact technical support.
The method or operation is not implemented.	An unsupported database action was executed.	Contact technical support.
Not used by framework	An unsupported database action was executed.	Contact technical support.
Not supported	An unsupported database action was executed.	Contact technical support.
Not supported property	An unsupported database action was executed.	Contact technical support.

Table A-4: Framework Error Messages (Continued)

Error Message	Description	Action
Could not initialize control, because there is no connection to application server.	A problem with the connection has occurred.	Contact technical support.
Number of rows or columns cannot be 0.	A table was inserted into an RTF editor where the number of columns = 0 or the number of rows = 0.	Change the number of columns and the number of rows.
Check document properties settings in order to open document!	A document was created with illegal margins.	Check document properties settings (margins, height, width).
Failed to apply settings!	A document was created with illegal margins.	Check document properties settings (margins, height, width).
Not authorized to perform this action.	An unauthorized database action was executed.	Contact technical support.
Could not get project list	An error occurred while retrieving the project list.	Contact technical support.
Missing localization manifest in the assembly	Missing localized text has been detected.	Contact technical support.
FileLoadException loading manifest in the assembly	A problem has occurred while translating resources.	Contact technical support.
Missing localization manifest in the assembly	A problem has occurred while translating resources.	Contact technical support.

Table A-4: Framework Error Messages (Continued)

A.5 Utilities

Table A-5 contains a set of error messages likely to occur across a set of components which can be used by any EMS application.

Error message	Description	Action
File Copy error: (file name path)	An error has occurred during file creation.	Check user permissions. Please contact technical support for more help on this issue.
Delete file error: (error display)	An error has occurred during file deletion.	Check user permissions. Please contact technical support for more help on this issue.
Delete folder error : (display error)	An error has occurred during folder deletion.	Check user permissions. Please contact technical support for more help on this issue.
Object(s) will be deleted. Do you want to continue?"	The user has attempted to delete object(s).	Please contact technical support for more help on this issue.
Open File error: (error details)	An error has occurred during while opening a file.	Please contact technical support for more help on this issue.
If target folder contains files/subfolders with the same name(s) as the files you want to copy, they will be overwritten. Continue?	Warning message that appears before copying files.	Please contact technical support for more help on this issue.
Create archive error: (file name path)	Archive creation has failed.	Check user permissions. Please contact technical support for more help on this issue.
Create archive error: (error details)	An error has occurred while a folder was being created.	Check user permissions. Please contact technical support for more help on this issue.

Table A-5: Utilities Error Messages

Error message	Description	Action
The method or operation is not allowed.	This message appears to indicate that the selected operation is not allowed.	Check user permissions. Please contact technical support for more help on this issue.
Uploading on FTP is not allowed	An error has occurred while uploading a file via FTP.	Check user permissions. Please contact technical support for more help on this issue.
Delete File on FTP is not allowed	An error has occurred while deleting a file via FTP.	Check user permissions. Please contact technical support for more help on this issue.
FTP provider has not been set	An FTP provider has not been set.	Set the FTP provider.
Error while connecting (error details)	An FTP connection error has occurred.	Check the FTP settings.
Error while receiving list of folders (error details)	An FTP error has occurred while receiving a list of folders.	Check the FTP settings.
Error while receiving list of files (error details)	An FTP error has occurred while receiving list of files.	Check the FTP settings.
Error while deleting folder (error details)	An FTP error has occurred during folder deletion.	Check the FTP settings.
Error while getting working folder action (error details)	An FTP error has occurred while getting the working folder.	Check the FTP settings.
Error while deleting file (error details)	An FTP error has occurred during while the file was being deleted.	Check the FTP settings.
Error during upload of file	An FTP file error has occurred while the file was being uploaded.	Check the FTP settings.

Table A-5: Utilities Error Messages (Continued)

Error message	Description	Action
Error while receiving list of files (error details)	An FTP error has occurred while a list of files was being received.	Check the FTP settings.
Delete Folder Action not supported	Folder deletion is not supported	Check the FTP settings.
Timed out waiting on server to respond.	The server is not responding.	Check the FTP settings.
Failed to connect for data transfer: (error details)	An error has occurred while connecting for data transfer.	Check the FTP settings.
Failed to parse the local address: (local address)	The local FTP address is incorrect.	Check the FTP settings.
No server has been set.	The IP address or hostname for the FTP location is not set.	Check the FTP settings.
No username has been set.	The FTP username has not been set.	Check the FTP settings.
No password has been set.	The FTP password has not been set.	Check the FTP settings.
Input Value for ConvertFTPDateToDate Time method was too short	An error has occurred during ftp data conversion.	Check the FTP settings.

Table A-5: Utilities Error Messages (Continued)

A.6 File System Service

Table A-6 contains errors that could occur when working in the EMS File System.

Error message	Description	Action
Invalid drive name specified: (driveName)	The drive name is invalid.	Please contact technical support for more help on this issue.
Failed to open device	An error has occurred while opening the device	Please contact technical support for more help on this issue.

Table A-6: File System Service Error Messages

Error message	Description	Action
Failed to open device: (error message)	An error has occurred while opening the device	Please contact technical support for more help on this issue.
Invalid arguments for initializing CF	The arguments for initializing the CF card are invalid.	Please contact technical support for more help on this issue.
Invalid drive name specified: (drive)	The drive name is invalid.	Please contact technical support for more help on this issue.
Could not open removable medium: (drive)	An error has occurred while opening the Removable Medium	Please contact technical support for more help on this issue.
Could not find images on Removable Medium	An error has occurred while looking for images on the Removable Medium	Please contact technical support for more help on this issue.
Could not find Removable Medium	An error has occurred while looking for the Removable Medium	Please contact technical support for more help on this issue.
Error copying images	An error has occurred while images were being copied.	Please contact technical support for more help on this issue.
Could not find image source file (source name)	An error has occurred while looking for image source files	Please contact technical support for more help on this issue.
Source image is too large for disk	The size of the source image is too large for the available space on the disk	Please contact technical support for more help on this issue.
Error writing image.	An error has occurred while writing the image to disk.	Please contact technical support for more help on this issue.
Unable to find CF Card device.	An error has occurred while looking for the CF Card device	Please contact technical support for more help on this issue.

Table A-6: File System Service Error Messages (Continued)

Error message	Description	Action
Invalid argument - drive root is null or empty	The file system service for memory cards was called with incorrect parameters.	Please contact technical support for more help on this issue
CF Card has been initialized, please remove and reinsert the CF card and press OK	The CF card has been initialized.	Remove the card, re-insert it, and press 'OK'.
Invalid drive selection.	An error has occurred while looking for the removable drive.	Select a drive that contains a memory card.
Invalid argument - source image path is null or empty	Source image path is invalid.	Please contact technical support for more help on this issue.

Table A-6: File System Service Error Messages (Continued)

A.7 USB File System

Table A-7 contains a set of error messages likely to occur during file operations with Compact Flash Cards associated with the USB interface.

Error message	Description	Action
Unable create folder: (foldername) Please check folder path and make sure you have permission to write to this path.	The system was unable to create a folder with the path indicated by the error message on the compact flash.	Check whether the system has permission to write to the folder path specified.
Unable to copy file: (sourceFilePath) to: (destinationFilePath) Please check source and destination file path and make sure you have permission to write to destination folder.	The system was unable to copy a file from specified source path to specified destination path.	Check whether the system has permission to write to the folder path specified.

Table A-7: USB File System Error Messages

Error message	Description	Action
Could not read entire length	The system could not process the scanned image data successfully from the compact flash card.	Extract image data from the backup memory card.
FAT16 does not support partitions larger than 2 GB	The system attempted to format a compact flash card using FAT16 partition type and the disk size is larger than 2 GB.	Use card sizes smaller than 2 GB for tabulator types that require this partition type (e.g. CF200).
Could not load entire block	After copying election files to the card, the system verifies each file to make sure that they are correctly copied. This error message can indicate that the compact flash card is corrupted.	Replace the compact flash card and repeat the action.
Could not load remainder	After copying election files to the card, the system verifies each file to make sure that they are correctly copied. This error message can indicate that the compact flash card is corrupted.	Replace the compact flash card and repeat the action.
Error Initializing First Partition	The system attempted to format a compact flash card and was unsuccessful.	Replace the compact flash card and repeat the action.
Setting the Drive Layout Failed	The system attempted to format a compact flash card and was unsuccessful.	Replace the compact flash card and repeat the action.

Table A-7: USB File System Error Messages (Continued)

Error message	Description	Action
Retrieving the Drive Layout Failed	The system attempted to read from or write to the compact flash card but was unsuccessful.	If this error message occurs during reading, use the backup memory card. If this error message occurs during formatting, replace the compact flash card and repeat the action.
Error reading file	The system could not process the scanned image data successfully from the compact flash card.	Extract image data from the backup memory card.
Error writing file	The system attempted to format a compact flash card and was unsuccessful.	Replace the compact flash card and repeat the action.
Invalid Handle Value	The system attempted to read from or write to the compact flash card but was unsuccessful.	If this error message occurs during reading, use the backup memory card. If this error message occurs during formatting, replace the compact flash card and repeat the action.
Retrieving the Storage Device Number Failed	The system attempted to read from or write to the compact flash card but was unsuccessful.	If this error message occurs during reading, use the backup memory card. If this error message occurs during formatting, replace the compact flash card and repeat the action.

Table A-7: USB File System Error Messages (Continued)

Error message	Description	Action
Ejecting media failed	The system attempted to eject/unmount the compact flash card, but was unsuccessful.	If this error message occurs during election card programming, then repeat the action after replacing the compact flash card. Otherwise, no further action is required.
Disk update properties failed	The system attempted to format a compact flash card and was unsuccessful.	Replace the compact flash card and repeat the action.
Dismounting volume failed	The system attempted to format a compact flash card and was unsuccessful.	Replace the compact flash card and repeat the action.
Unlocking volume failed	The system attempted to format a compact flash card and was unsuccessful.	Replace the compact flash card and repeat the action.
Locking volume failed.	The system attempted to format a compact flash card and was unsuccessful.	Replace the compact flash card and repeat the action.
Partition Number has to be 1..4	The system attempted to format a compact flash card and was unsuccessful.	Replace the compact flash card and repeat the action.
Retrieving Geometry Failed	The system attempted to read from or write to the compact flash card but was unsuccessful.	If this error message occurs during reading, use the backup memory card. If this error message occurs during formatting, replace the compact flash card and repeat the action.

Table A-7: USB File System Error Messages (Continued)

Error message	Description	Action
The DVS Signature is corrupt, this memory card may have been tampered with.	The system could not process the scanned image data successfully from the compact flash card.	Extract image data from the backup memory card.
Drive X should be ignored	The system attempted to format a drive that should not be used for election card programming.	Repeat the action but select a drive that contains a compact flash card.
Could not open Removable Medium.	The system attempted to read from or write to the compact flash card but was unsuccessful.	If this error message occurs during reading, use the backup memory card. If this error message occurs during formatting, replace the compact flash card and repeat the action.
Could not set drive layout of the disk.	The system attempted to format a compact flash card and was unsuccessful.	Replace the compact flash card and repeat the action.
Could not write the FAT32 partition header to disk.	The system attempted to format a compact flash card and was unsuccessful.	Replace the compact flash card and repeat the action.
Could not write the DVS partition header to disk.	The system attempted to format a compact flash card and was unsuccessful.	Replace the compact flash card and repeat the action.

Table A-7: USB File System Error Messages (Continued)

REVISION HISTORY

Rev.	Date	Summary
4	05-02-2023	Revised content in Table A-1
3	04-14-2023	Content and grammar revisions throughout
2	04-03-2023	Revised document based on feedback
1	02-07-2023	Branched for 5.17-CO

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