

# EchoMail® Audit of Ballot Images & Cast Vote Record (CVR) from 2020 U.S. Presidential Race in Maricopa County, AZ

If A.I. Driven Electronic Voting Systems Continue To Be Used, Legislatures (Not Private Corporations) Must Define the Parameters Used By Such A.I. In Vote Tabulation

#### Dr. Shiva Ayyadurai, MIT Ph.D.

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Uncorrupted Ballot Images Received:

EchoMail® Ballot Image Analysis Completed:

Draft Report Completed:

Report Posted to Public:

December 7, 2021

January 7, 2022

January 22, 2022

February 16, 2022

#### **Delivered to:**

#### **Honorable Senator Karen Fann**

President of the Senate
Arizona State Senate
1700 West Washington Street
Phoenix, AZ 85007

#### **Honorable Mark Brnovich**

Attorney General of Arizona Senate Office of Attorney General 2005 N. Central Avenue Phoenix, AZ 85004-2926





#### **AUTHOR'S BIO**

Dr. Shiva Ayyadurai, MIT PhD, S.M.M.E., S.M.V.S., S.B.E.E., the inventor of email and polymath, holds four degrees from MIT, is a world-renowned engineer, systems scientist, inventor and entrepreneur. He is a Fulbright Scholar, Lemelson-MIT Awards Finalist, India's First Outstanding Scientist and Technologist of Indian Origin, Westinghouse Science Talent Honors Award recipient, and a nominee for the U.S. National Medal of Technology and Innovation. He holds multiple patents, is the author of twenty books, and has published original research, in leading peer-reviewed high-impact scientific journals including *IEEE*, *IJPRAI*, *Nature Neuroscience*, *CELL Biophysical Journal*, that have received thousands of citations. He has started seven successful high-tech companies, received numerous industry awards, consults for Global 2000 organizations and government, and has been invited to present Keynote and Distinguished lectures at leading institutions such as NSF, NIH, FDA, Harvard, and at MIT, where he delivered the Presidential Fellows Lecture. I

In 1978, as a 14-year-old, he was recruited as a Research Fellow by the University of Medicine and Dentistry of New Jersey (UMDNJ), in Newark, NJ after graduating with Honors from a special program in Computer Science at the Courant Institute of Mathematical Science at NYU. At UMDNJ, he invented email – **the system** as we know it today – when he was the first to convert the old-fashioned *interoffice paper-based mail system* consisting of the Inbox, Outbox, Memo (To:, From:, Date:, Subject:, Cc:, Bcc:), Attachments, Folders, etc. into its electronic equivalent by writing 50,000 lines of code to create a software system, which he named "Email," – a term never used before in the English language – and went on to be awarded the first U.S. Copyright TXu 111-775 for "EMAIL, COMPUTER PROGRAM FOR ELECTRONIC MAIL SYSTEM" recognizing him as the inventor of email at a time when Copyright was the only legal mechanism to protect software inventions. Only in 1994 did the Federal Circuit recognize software as a "digital machine" allowing for software patents. Email is not the simple exchange of text messages. Dr. Shiva has never claimed to be the inventor of electronic messaging, which predates email - the system that he created in 1978.<sup>2,3</sup>

Recognizing his talents in software programming, UMDNJ gave him the opportunity to conduct medical research focused on developing pattern recognition classification methods for categorization of sleep signature patterns from babies with Sudden Infant Death Syndrome (SIDS). His research was published in IEEE and presented at the IEEE-EMBS conference in Espoo, Finland. Since that time and for more than forty years, his research and development efforts in academia and industry have been focused in the field of pattern recognition classification systems, systems science, and development of large-scale computational systems for analysis of diverse signals and signatures across a range of industries: biology and medicine, engineering (e.g. aeronautical, civil, mechanical, electrical), banking, finance, and, government, as well as across a diversity of applications including handwriting recognition of courtesy amounts on bank checks, automatic analysis and classification of electronic documents e.g. email, ultrasonic and radar wave signature classification for non-destructive evaluation (NDE), signals analysis of Tadoma



<sup>&</sup>lt;sup>1</sup>Dr. Shiva Ayyadurai, Biography and Curriculum Vitae, <a href="https://vashiva.com/about-va-shiva-ayyadurai/">https://vashiva.com/about-va-shiva-ayyadurai/</a>

<sup>&</sup>lt;sup>2</sup>Facts on the invention of email, <a href="https://www.inventorofemail.com/thefacts/">https://www.inventorofemail.com/thefacts/</a>

<sup>&</sup>lt;sup>3</sup>The Man Who Invented Email, TIME, https://techland.time.com/2011/11/15/the-man-who-invented-email/

#### AUTHOR'S BIO (CONT.)

feature identification, biomarker analysis for determining signatures of efficacy for multi-combination therapies, image analysis for cardiology, and signal detection of fluid flow anomalies in fluidized bed reactors.

He earned a Bachelors in Electrical Engineering and Computer Science, a Masters in Mechanical Engineering, and another Masters in Visual Studies from the MIT Media Laboratory. In the midst of his PhD research in 1993, where he aimed to create a generalized platform – Information Cybernetics – for pattern recognition, he won an industry-wide competition sponsored by the White House, Executive Office of the President, to automatically analyze and classify President Clinton's email, resulting in his developing EchoMail® - a platform for automatic classification of electronic documents –, and subsequently launching EchoMail, Inc., a company that grew to nearly \$200 million in market valuation. EchoMail today applies its technologies across a diversity of applications.

In 2003, he returned to MIT complete his doctoral work in systems biology in the department of Biological Engineering where he developed CytoSolve®, a scalable computational systems biology platform for mathematically modeling the whole cell. Following his PhD, Dr. Shiva was selected for a Fulbright Fellowship returning him to India where he discovered the systems theoretic basis of eastern systems of medicine resulting in Systems Health®, a new educational program that provides a scientific foundation for integrative medicine. In 2012, Dr. Shiva launched CytoSolve, Inc. with the aim of modeling complex diseases and biomolecular processes to discover multi-combination medicines. His efforts led to CytoSolve earning an FDA allowance for a multi-combination therapy for pancreatic cancer in a record eleven months, developing innovative nutraceutical products, and garnering numerous industry and academic partnerships.

As an educator dedicated to the field of systems science and systems thinking, Dr. Shiva pioneered Systems Visualization, a course he taught at MIT to graduate and undergraduate students, which integrated systems theory, narrative story telling, metaphors, and data science to provide a pedagogy for visualization of complex systems. He founded the International Center for Integrative Systems, a research and educational institution and home to Innovation Corps and R.A.W./C.L.E.A.N. Food Certified, for broader applications of systems science.

Dr. Shiva has appeared in The MIT Technology Review, TIME, The Wall Street Journal, New York Times, NBC News, USA Today and other major media. Dr. Shiva was named Top 40 Under 40 in the Improper Bostonian. He continues his passion for entrepreneurialism as Managing Director of General Interactive to incubate, mentor and fund new startups in various areas including healthcare, media, biotechnology, information technology, to name a few.

Dr. Shiva is a member of Sigma-Xi, Eta Kappa Nu, and Tau Beta Pi.





#### A Publication of the Election Systems Integrity Institute

The Election Systems Integrity Institute ("ESII") is dedicated to providing independent research and infrastructure to support Election System Integrity. This publication documents the work completed by EchoMail, Inc., which was commissioned by the Arizona State Senate.



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#### **Executive Summary**

Key Items for Attorney General & Senate to Consider

- Why was analysis of Ballot Images & CVR not performed as first step in the Maricopa Audit? Millions
  of tax payer dollars and time could have been saved, and such effort could have been directed to
  real issues e.g. chain of custody, signature verification to advance election systems integrity
  - EchoMail® A.I. Ballot Image analysis identified 15,546 and 16,437 ballots that did not concur with Dominion A.I.'s pre-adjudicated tabulation and post-adjudicated tabulation, respectively. The Audit should have focused on these paper ballots versus reviewing all 2,089,563 ballots.
- Why are 6,835 Modified Cards missing. Per policy, for every Early Voting Ballot (EVB) where an Original Card in the Presidential Race was flagged for adjudication, there should be a Modified Card.
- When is a vote a vote given the inconsistent use of 'IsVote' flag by the Dominion A.I. system? Even experienced election officials cannot explain the inconsistencies?
- Why are any ballots even one being adjudicated for the Presidential Race when the Original Card was never flagged for adjudication?
- The legislature, not a private corporation, <u>must define the actual parameters</u> that the A.I. should adhere to in determining a vote, write-in, undervote, overvote, or ambiguous.



"The EchoMail® analysis of Ballot Images and Cast Vote Records (CVRs) should be the first step in a an engineering systems approach to any election audit, for it provides a fast and cost-effective method to reveal <u>discrepancies in vote counts, inconsistencies in adjudication, and questions</u> <u>with policy and compliance</u> that election officials may address up-front.





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EchoMail completed this process in 1-month, for \$50,000 (which it has yet to be paid). Why did EchoMail have to struggle so hard to get the uncorrupted Ballot Images from Cyber Ninjas the official Audit firm, who had the uncorrupted Ballot Images in their possession since April 2021, and gave them to others, but not to EchoMail who was officially contracted to do the analysis?





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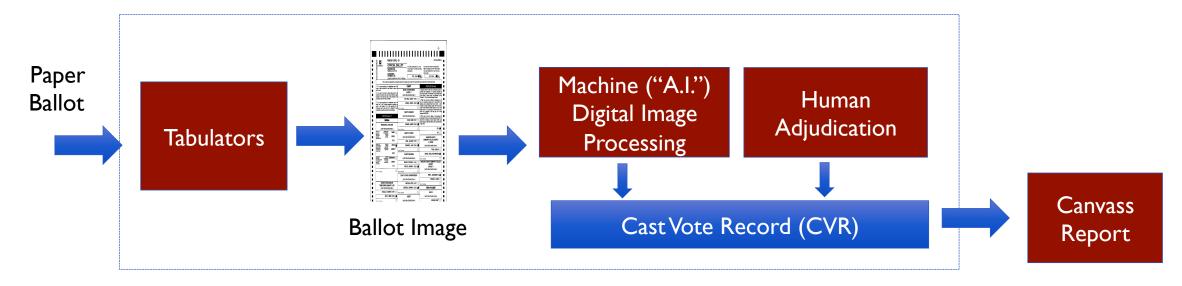
Why was this process the last step, done after the Audit?" - Dr. Shiva Ayyadurai



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- EchoMail® Ballot Image and CVR analysis, which was completed in 4 weeks:
  - 1. Revealed that except for disagreement on vote allocations on **15,546** ballots between EchoMail & Dominion, vote allocations on the remaining **2,074,017** ballots concurred
  - 2. Would have directed the initial phases of the Audit to review a finite set of 15,546 paper ballots versus reviewing all 2,089,563 ballots. This would have saved time, money, and directed efforts to investigate discrepancies in vote counts, inconsistencies in adjudication, and questions with policy and compliance for election officials to address up-front.
  - 3. Identified significant inconsistencies in the manner in which ballots are adjudicated
  - 4. Revealed need for transparency in how modern A.I. systems decide vote allocations



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  - 4. Revealed need for transparency in how modern A.I. systems decide vote allocations
- EchoMail was commissioned to perform Ballot Image analysis in August 2021.
   Cyber Ninjas had bona fide Ballot Images since April 2021. Yet, Cyber Ninjas never delivered those bona fide Ballot Images to EchoMail. Why?



 April 2021 - Cyber Ninjas received: 1) disk drives from County containing bona fide ballot images; as well as, 2) a "disk image" of the entire Dominion Election Management System.\*

> Disk Drives from County Containing Bona Fide Ballot Images

\*Ben Cotton Conversations with Dr. Shiva Ayyadurai, Early December 2021.



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Disk Image of the Dominion Election Management System

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• June 5, 2021 – Arizona State Senate contacts EchoMail, Inc. to discuss commissioning EchoMail® pattern recognition processing capabilities to analyze Dominion Ballot Images

• July 2021 – Verbal agreement reached for EchoMail to serve as sub-contractor to Cyber Ninjas to process Dominion Ballot Images and to start by August of 2021.

 Last Week of July 2021 - EchoMail receives Cast Vote Records in JSON format from Cyber Ninja.



<sup>\*</sup>Ben Cotton Conversations with Dr. Shiva Ayyadurai, Early December 2021.

• August 1, 2021 – Within 48 hours of receipt of CVR in JSON from Cyber Ninjas, EchoMail builds relational data structure, and requests Ballot Images from Cyber Ninjas.

 August 5, 2021 – Contract executed between EchoMail, Inc. and Cyber Ninjas for \$50,000.00 to process Ballot Images

- August 9, 2021 Cyber Ninjas uploads Ballot Images for EchoMail to begin processing.
   Within hours, EchoMail <u>discovers ~70% of the Ballot Images are corrupted and unusable</u>, and immediately notifies Cyber Ninjas
  - Cyber Ninjas attempts to convince EchoMail that the Ballot Images are "encrypted"
  - EchoMail demonstrates they are not encrypted
  - Cyber Ninjas acknowledges that the Ballot Images are corrupted
  - EchoMail informs Cyber Ninjas that project is on hold until EchoMail receives bona fide Ballot Images

• August 9-19, 2021 – Cyber Ninjas goes silent on the matter and never makes first payment due to EchoMail

- August 19, 2021 EchoMail terminates Agreement with Cyber Ninjas and informs
   Arizona Senate Liaison of "corrupted" Ballot Images. County is blamed by Cyber Ninjas for corrupting the Ballot Images.
- **September 1, 2021** EchoMail is commissioned by Arizona State Senate for signature presence detection on Early Voting Ballot (EVB) Envelope Images

• September 24, 2021 - EchoMail presents results of EVB Envelope image analysis to AZ Senate that expose various anomalies and raises new questions on signature verification.

 August 19, 2021 – November 23, 2021 – EchoMail persists to find out where are the uncorrupted Ballot Images.

- November 23, 2021 Randy Pullen, Arizona Senate Liaison, is able to locate the Bona Fide Ballot Images from Ben Cotton and makes arrangements for EchoMail to get Ballot Images
- **November 23, 2021** Dr. Shiva Ayyadurai meets with President Donald J. Trump in Mara-Lago and informs President Trump that Cyber Ninjas never gave EchoMail the Ballot Images. President Trump asks, "What are Ballot Images?" Dr. Shiva explains what are Ballot Images to President Trump.



• Early December 2021 - Ben Cotton informs EchoMail that Cyber Ninjas ALWAYS had the uncorrupted Ballot Images in their possession. Cotton reveals that Cyber Ninjas had indeed sent uncorrupted Ballot Images to two other parties back in June 2021. He is confused as to why Cyber Ninjas never sent the uncorrupted Ballot Images to EchoMail.

 December 7, 2021 – EchoMail finally receives uncorrupted Ballot Images from Ben Cotton, after the official Audit by Cyber Ninjas has been completed. In testimony to the Arizona State Senate, Cyber Ninjas alleged that the Ballot Images were corrupted by the County.

• January 7, 2021 – EchoMail completes Ballot Images and CVR analysis and presents findings to Arizona Senate Liaison.



• January 22, 2021 – EchoMail completes Draft Report on findings from Ballot Images and CVR analysis and gets feedback.

• February 16, 2021 – EchoMail presents Final Report: EchoMail® Audit of Ballot Images & Cast Vote Record (CVR) from 2020 U.S. Presidential Race in Maricopa County, AZ

- Pursuant to 52 USC 20701, which encourages citizens to conduct election audits, all records generated in connection with a Federal election are to be preserved for 22 months.
- "All records generated" include Ballot Images and Cast Vote Records
  - Ballot images include pre- and post-adjudicated ballot images
  - Cast vote records include both pre- and post-adjudicated data
- The Election Systems Integrity Institute in collaboration with EchoMail, Inc. is publishing the results of the EchoMail® Ballot Image and CVR Analysis of 2,089,563 Ballot Images from the 2020 Presidential Race in Maricopa County, Arizona



- This report documents EchoMail® Ballot Images and Cast Vote Record (CVR) analysis which was commissioned by the Arizona State Senate through its liaison in December of 2021.
- EchoMail completed the Ballot Images and CVR analysis in 4 weeks on January 7, 2022
- In precincts and counties using electronic voting systems, Artificial Intelligence (A.I.) is used to analyze Ballot Images to tabulate votes prior to adjudication (Pre-Adjudication)
- Before electronic voting systems, election officials used humans to review a ballot and determine vote counts as well as what ballots need adjudication.



- Adjudication is a process where more than one individual, likely one from each Party, reviews a questionable ballot to determine the vote allocation.
- Clear guidelines were established when humans reviewed a ballot to determine if it was a bona fide vote, undervote, overvote, write-in, and/or ambiguous
  - Any undervote, overvote, write-in, and ambiguous ballot was set for adjudication by human review.
  - For in-person voting, in some counties as in Maricopa, the adjudication is done by the voter
- Such guidelines included, for example, how much of the oval was filled in to be a vote, what "stray marks" constituted ambiguous, etc.



- In the modern world of electronic voting systems with "robots" Artificial Intelligence – determining votes, undervotes, overvotes, write-in, ambiguous, it now becomes important to know what are the standards being used by such robots i.e. A.I. in determining vote classifications
  - When is a vote a vote? What percentage of the circle or oval needs to filled in?
  - When is a vote determined by the A.I. to be an undervote? Suppose there are some minor marks.
  - When is a vote an overvote? Suppose one oval is filled in 95% and others are 5% filled in.
- There is a need for transparent standards of how A.I. on such electronic voting systems classify votes.\* This will serve a two-fold purpose:
  - 1) Improve the public's trust in electronic voting systems; and,
  - 2) Enable independent audits to occur faster, better, and cost effectively

<sup>\*</sup>If such standards exist, this should be made easily accessible to the public, without the need to file public records request. Public should be made fully aware of how their votes will be tabulated by the A.I.



#### **BALLOT IMAGES**

#### BALLOT IMAGES ARE THE "BALLOTS"

- Voters submit paper ballots via mail or in-person
- Paper ballots are processed geographically:
  - Centralized using tabulators at MCTEC for Early Voting Ballots (EVBs)
  - Decentralized using tabulators across Maricopa for in-person ballots
- All tabulators convert the paper ballots to Ballot Images
- The total number of paper ballots = 2,089,563
- The total number of ballot images = 2,089,563



# **BALLOT IMAGES & TABULATORS**

Tabulators are used to process paper ballots to generate Ballot Images

 2,089,563 Ballot Images, representing ALL ballots cast, were generated from 379 tabulators in Maricopa

• 1,923,719 Early Voting Ballot (EVB) generated images from 33 MCTEC centralize tabulators

 165,844 In-Person Ballot Images were produced from 346 non-MCTEC tabulators decentralized across multiple precinct locations

# CAST VOTE RECORDS (CVR)

- Cast vote records (CVR) are the central repository for documenting the vote allocations:
  - Original cards (vote allocations in pre-adjudicated state)
  - Modified cards (vote allocations in post-adjudicated state)
  - Deltas between Original and Modified
- CVR is used to tabulate the final vote count in the CANVASS Report

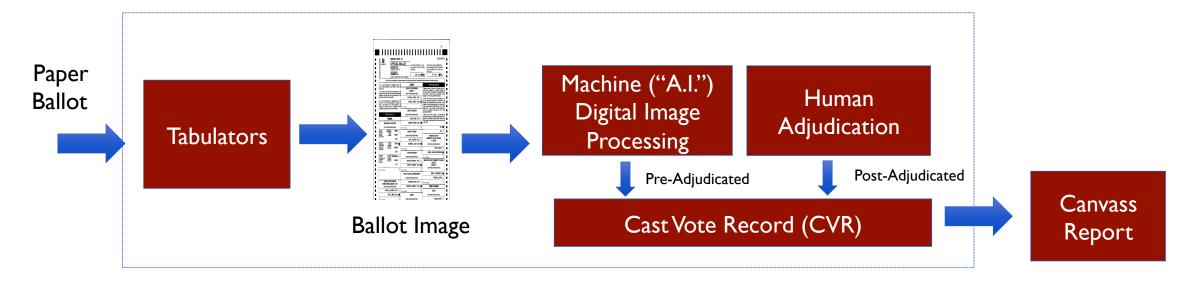


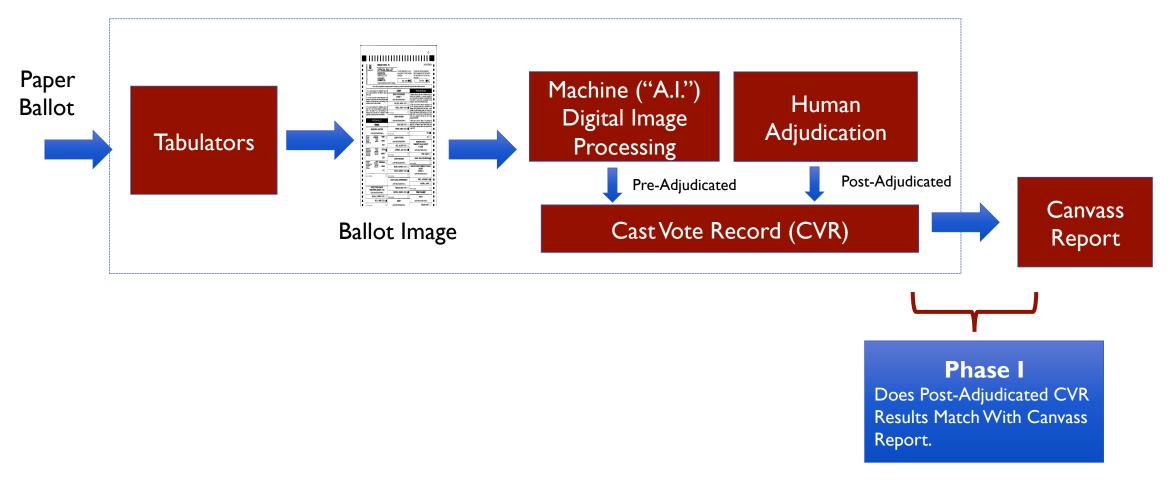
# **BALLOT IMAGES & CVR**

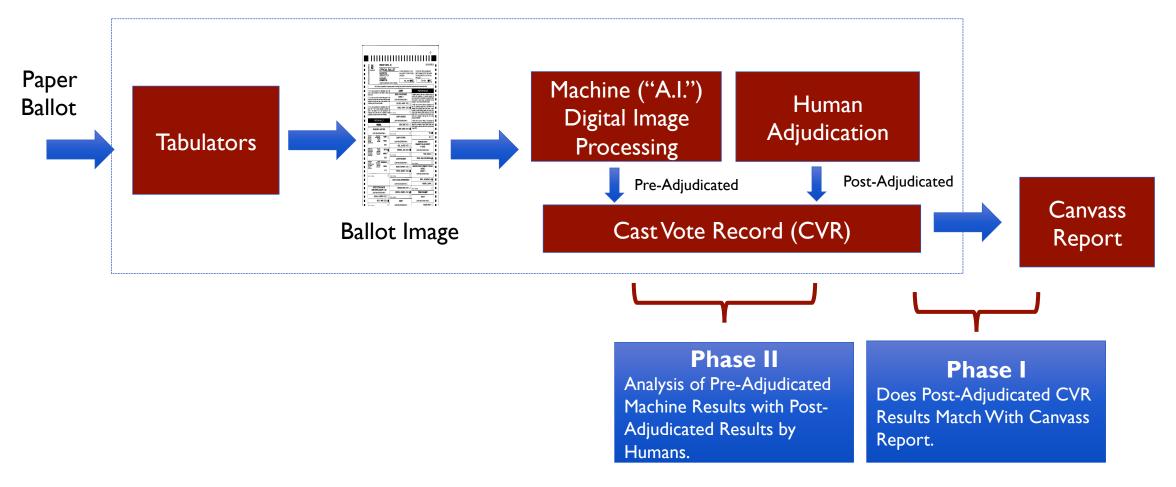
- A.I. on the tabulators performs image analysis
- A.I. determines vote counts for each race (or question)
- Vote counts are stored in the CVR as an "original card" (preadjudicated state)
- A.I. flags races on the original card for "adjudication"
  - Undervote, Overvote, Ambiguous, Write-In
- "Modified cards" are created for ballots flagged for adjudication
  - Every flagged race on original card must have a modified card
  - Exception is for in-person voting, where no modified card is generated

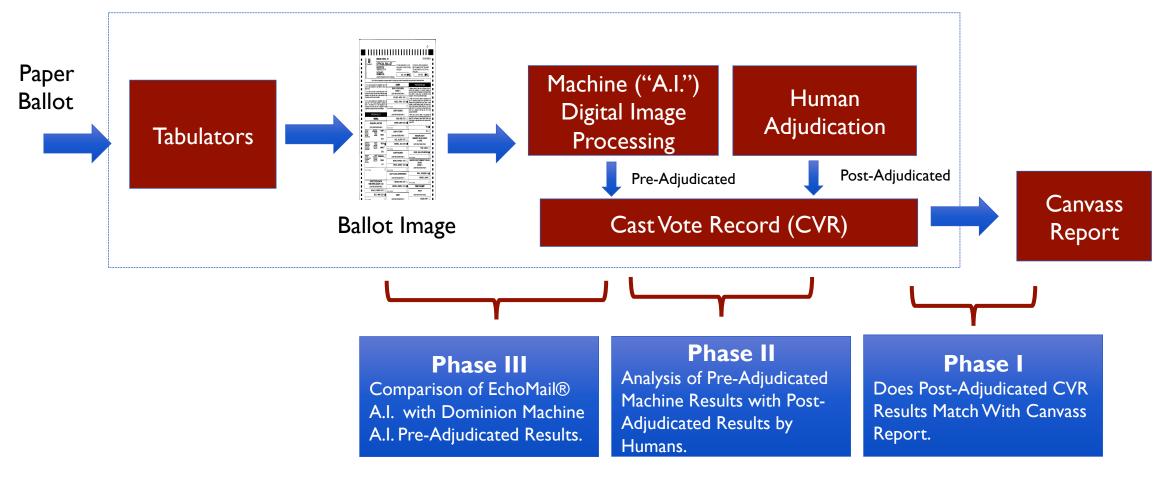
- Acquired Ballot Images and CVR for audit
- Organized Ballot Images & CVR into relational data warehouse
- Executed EchoMail® A.I. pattern recognition classification on Ballot Images to tabulate results
- Performed discrepancy analysis
  - Phase I: Post-adjudicated CVR vs. Maricopa County's CANVASS Report
  - Phase II: Pre-adjudicated CVR vs. Post-adjudicated CVR
  - Phase III: Comparison of EchoMail® A.I. analysis with Dominion A.I.
  - Phase IV: Comparison of EchoMail® A.I. analysis with CANVASS Report
- Itemized Issues and Concerns











Comparison of EchoMail® A.I. with Dominion Machine A.I. Pre-Adjudicated Results.

Analysis of Pre-Adjudicated Machine Results with Post-Adjudicated Results by Humans.

Does Post-Adjudicated CVR Results Match With Canvass Report.



## **RESULTS**



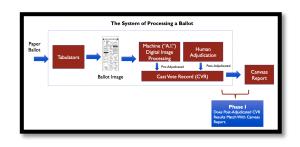
## PHASE I



#### **PHASE I**

# Comparison of EchoMail® CVR Analysis of Post-Adjudicated State Versus Maricopa *CANVASS* Report

Allocation	EchoMail® CVR Analysis	Maricopa Canvass	Variance
Trump	995,665	995,665	0
Biden	1,040,774	1,040,774	0
Jorgensen	31,705	31,705	0
Write-In	7,942	7,942	0
Undervotes	8,475	8,475	0
Overvotes	<u>5,002</u>	<u>5,002</u>	<u>0</u>
TOTAL	2,089,563	2,089,563	0



## **PHASE I - Summary**

EchoMail® CVR analysis of the post-adjudicated state reveals that the Maricopa *CANVASS* Report concurs with the post-adjudicated CVR, and there is no variance.

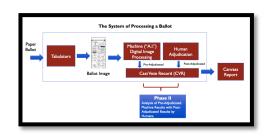


## PHASE II - PART 1



EchoMail® CVR Analysis to Determine How Many Ballots Were Flagged for Adjudication That Included Presidential Race

ltem	EchoMail <sup>®</sup> CVR Analysis
<b>Total Votes Cast</b>	2,089,563
Original Cards	2,063,866
Trump	993,973
Biden	1,038,321
Jorgensen	31,572
Flagged for Adjudication	25,697*



<sup>\*</sup>Appendix A – Contains the 25,697 ballot images that were flagged for adjudication

## Phase II - Part 1 Summary

EchoMail<sup>®</sup> CVR analysis of the pre-adjudicated state reveals that 25,697 ballots were flagged for adjudication that included the Presidential Race.

"Flagged for Adjudication" means those ballots that the Dominion A.I. determined to be: Write-Ins, Overvotes, Undervotes, and/or Ambiguous on the Presidential Race.

It is important to note that a ballot i.e. original card may be flagged for multiple reasons i.e. write in & undervote, write-in and undervote and ambiguous, etc.



## PHASE II — PART 2



EchoMail® CVR Analysis of 25,697 Original Cards Flagged for Adjudication with Actual Post-Adjudicated Modified Cards for Presidential Race

Item	EchoMail® CVR Analysis	
Flagged Original Cards WITH Modified Card with Changes	18,402	7
Early Voting Ballots (EVBs)	17,344	18,402
In-Person Ballots	1,058	
Flagged Original Cards WITHOUT Modified Card	7,295	]
Early Voting Ballots (EVBs)	6,835	7,295
In-Person Ballots	460	اِ
UN-Flagged Original Card WITH Modified Card with Changes	I I	
Early Voting Ballots (EVBs)	11	
In-Person Ballots	0	J

Note: In speaking with former County officials, every original card flagged for adjudication, not for ballots cast in-person, must have a modified card. EchoMail® CVR Analysis revealed 18,402 original cards flagged for adjudication had 18,402 modified cards; however, of these 1,058 were in-person, and should not have had modified cards, but they did. Separately, 7,295 original cards were flagged for adjudication but none had modified cards. Of these 7,295, 460 ballots were cast in-person, which should not have modified cards; however, 6,835 of these should have modified cards as they were EVBs. Finally, an additional 11 modified cards were present although there were no original cards flagged for adjudication.

Actual Original Cards: 25,697 Actual Modified Cards: 18,413 Expected Modified Cards: 24,179



## PHASE II – Part 2 SUMMARY

- EchoMail® CVR analysis of the pre-adjudicated state reveals that 25,697 ballots were flagged for adjudication, had original cards, that included the Presidential Race, and were flagged for write-in, undervote, overvote, ambiguous.
- Per policy, for every Early Voting Ballot (EVB) where the Original Card in the Presidential Race was flagged for adjudication (24,179), there should be a Modified Card; however, only 17,344 Modified Cards, originating from EVBs, actually exist. A total of 6,835 Modified Cards are missing.
- Of the 25,697, 1,518 were In-Person voting and per policy should not have modified cards. Therefore, a total of 24,179 modified cards should exist.
- However, only 18,413 modified cards for the Presidential Race exist in the CVR.
- Moreover, there were 1,058 modified cards for In-Person voting original cards that were flagged for adjudication. Per policy these modified cards should not exist.



## PHASE II – Part 2 SUMMARY

- EchoMail discovered potential inconsistency in policy issues on EVBs flagged for adjudication
- 11 EVBs were found to have modified cards; however, the original cards were NOT flagged in any manner for adjudication
- This 11 EVB inconsistency is explored later.
- A significant amount of research was required by EchoMail to decipher this inconsistency and raises a major policy issue: How can modified cards appear without any original card being flagged for adjudication?



## PHASE II – Part 2 SUMMARY

Supplementary Data File: Appendix A is attached herein which contains a ZIP file containing the 25,697 Ballot Images representing the ballots that were flagged for adjudication. These Ballot Images are divided into FIVE directories:

- 1. Directory 'EVBs-Flagged-Modified' containing 17,344 ballot images
- 2. Directory 'IN-Person-Flagged-Modified' containing 1,058 ballot images
- 3. Directory 'EVBs-Flagged-No-Modified' containing 6,835 ballot images
- 4. Directory 'IN-Person-Flagged-No-Modified' containing 460 ballot images
- 5. Directory 'EVBs-Not-Flagged-Modified' 11 ballot images



## PHASE II - PART 3



EchoMail® CVR Analysis of Potential Modifications Across the 25,697 Original Cards Flagged for Adjudication

Item	EchoMail® CVR Analysis
Original Cards Flagged for Adjudication	25,697
Potential Modifications Across All Original Cards Flagged for Adjudication	28,645*

\*It is important to note that a ballot i.e. original card may be flagged for multiple reasons i.e. write-in & undervote, write-in and undervote and ambiguous, as indicated in the CVR.

"Potential Modifications" indicate the various modifications that could occur to the original card based on the reasons for flagging.



**IsVote** 

**TRUMP** 993,973

**BIDEN** 

1,038,321

JORGENSEN 31.572 EchoMail® CVR Analysis of Potential Modifications Across All Original Cards Flagged for Adjudication

These are the allocation of votes determined by Dominion's Artificial Intelligence System based on analysis of the Ballot Images in the pre-Adjudicated State.

These vote allocations in CVR are tagged as ONLY having the 'IsVote' flag, without any other flags being set.

None of these ballots should be adjudicated as they are not flagged as Write-In, Undervote, Overvote, Ambiguous.

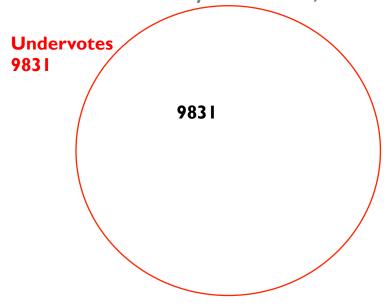


EchoMail® CVR Analysis of 28,645 Potential Modifications



**IsVote** 

**BIDEN** 1,038,321

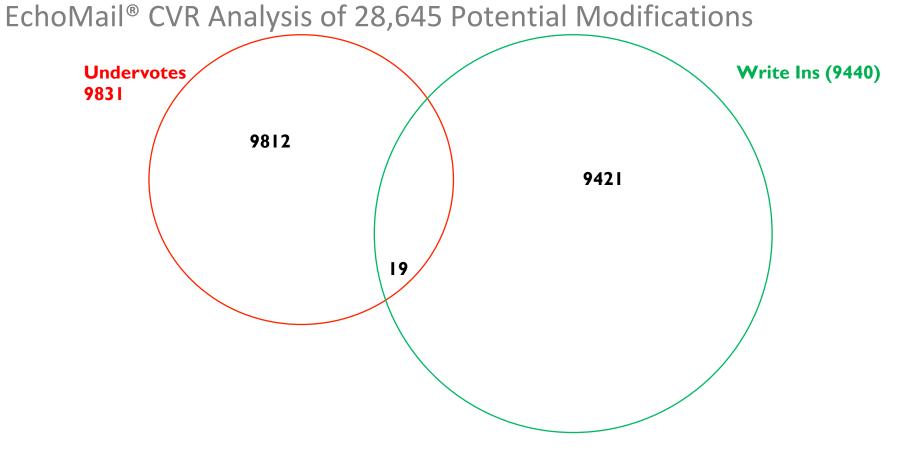




**IsVote** 

**TRUMP** 993,973

**BIDEN** 1,038,321

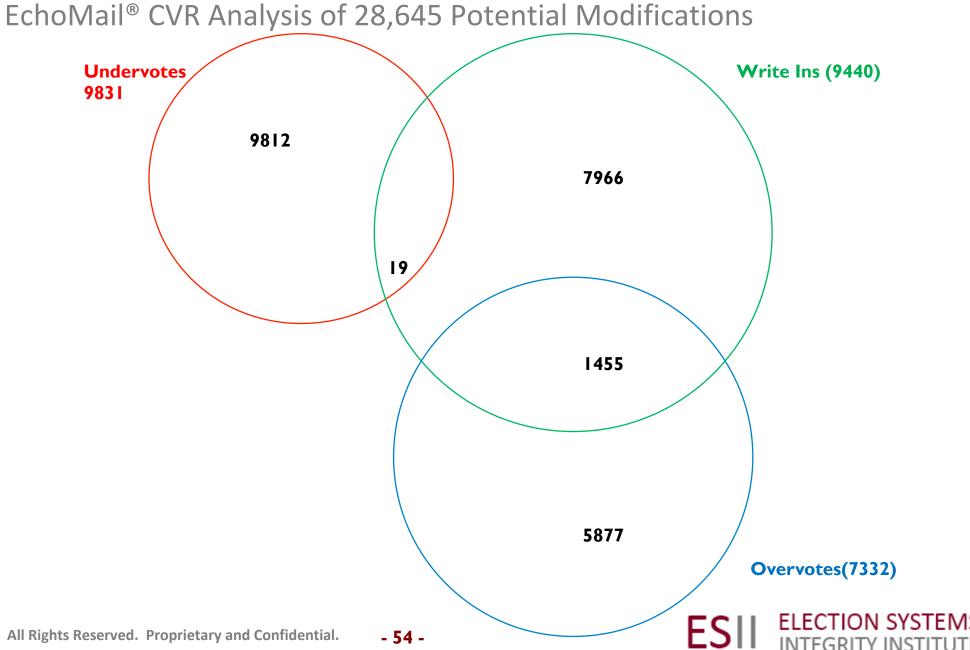


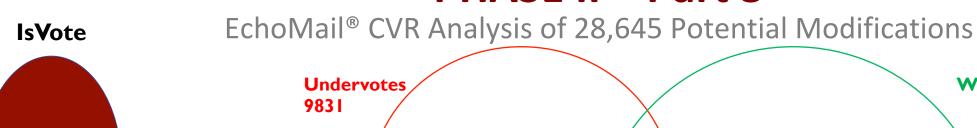




**TRUMP** 993,973

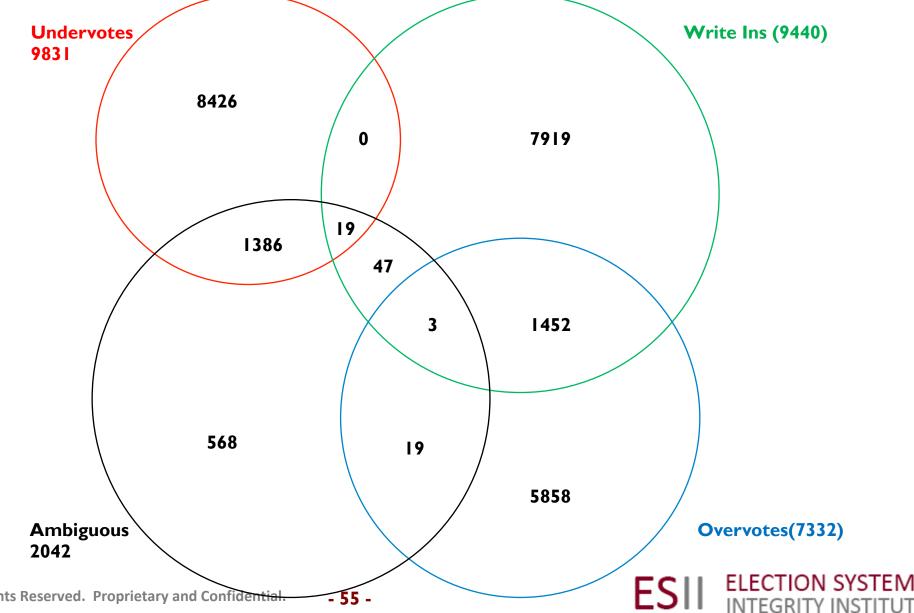
**BIDEN** 1,038,321

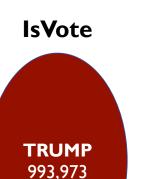




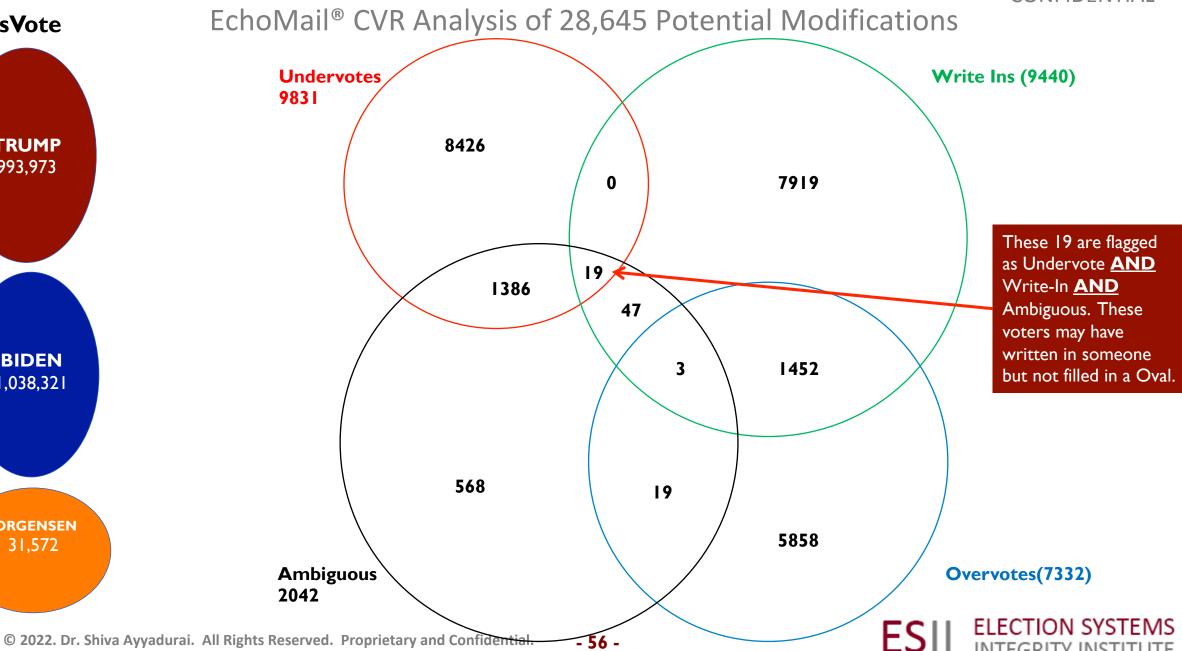
**TRUMP** 993,973

> **BIDEN** 1,038,321





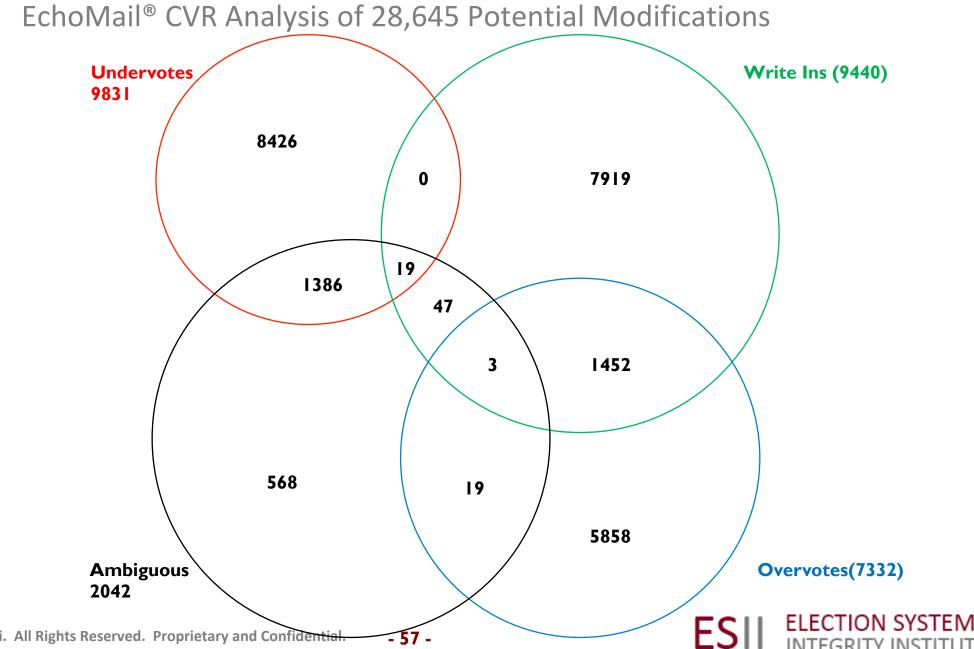
**BIDEN** 1,038,321

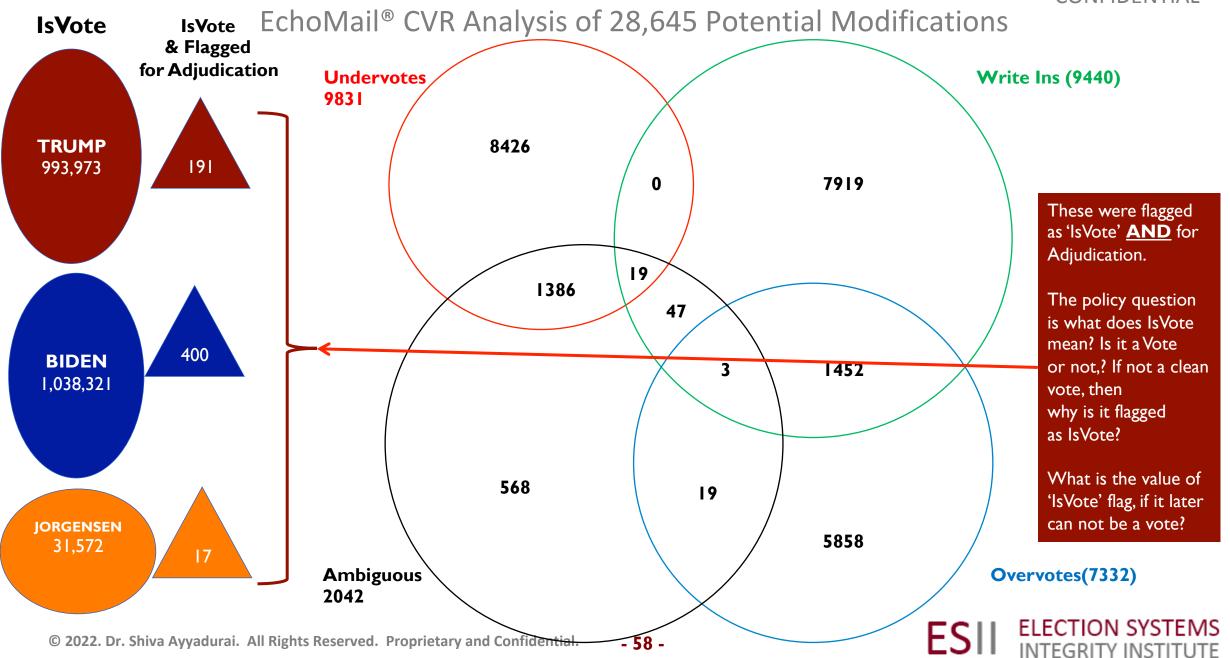


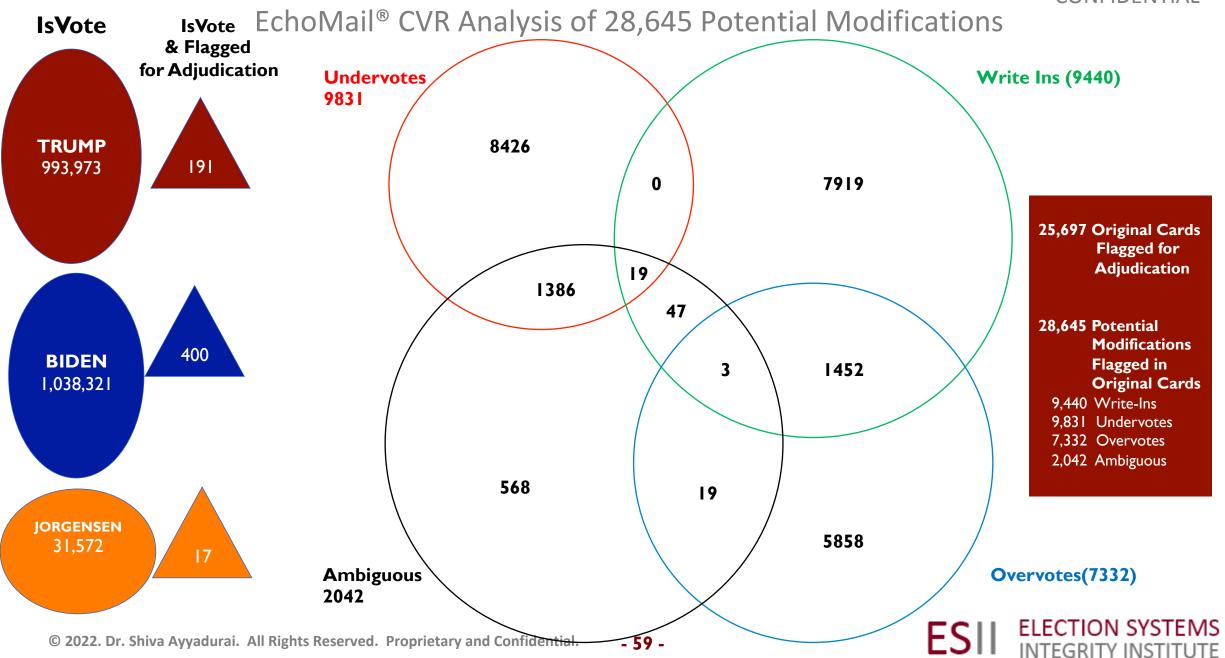


**TRUMP** 993,973

**BIDEN** 1,038,321

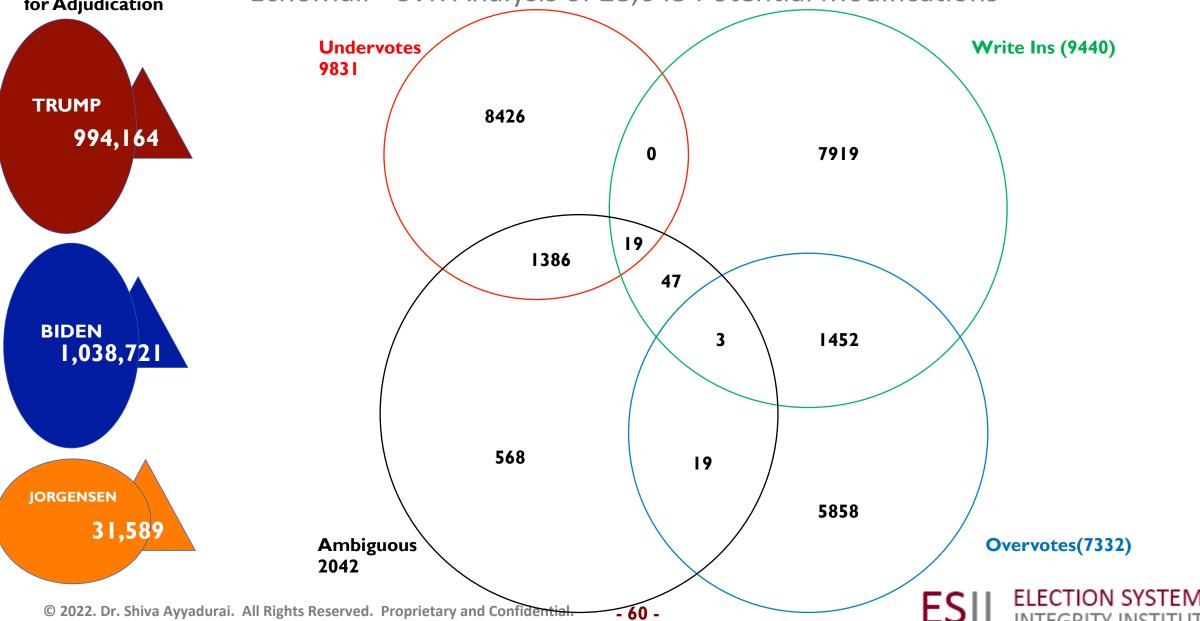






CONFIDENTIAL





EchoMail® CVR Analysis of Potential Modifications Across 25,697 Original Cards Flagged for Adjudication By the Dominion Artificial Intelligence System

Item	EchoMail® CVR Analysis
"Pure" IsVotes Assigned to Candidates by Dominion A.I.	2,063,866
Trump	993,973
Biden	1,038,321
Jorgensen	31,572
Original Cards Flagged for Adjudication	25,697
Potential Modifications Flagged in Original Cards	28,645
Write-Ins	9,440
Undervotes	9,831
Overvotes	7,332
Ambiguous	2,042

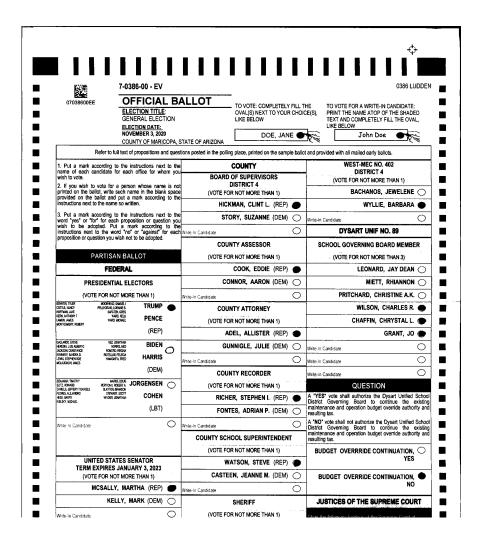
- The visual representation of EchoMail® CVR analysis provides a detailed understanding of the results of auditing the original cards <u>PRIOR</u> to adjudication.
- In this analysis, EchoMail discovered 608 original cards that were flagged as 'IsVote' for a candidate AND for Adjudication.
- An important policy question arises from this analysis: What does 'IsVote' mean? Is it a Vote or not? If not a *clean* vote, then why is it flagged as 'IsVote'?
- EchoMail prior to publishing this document did have conversation with two highly experienced election officials in Arizona and they were unable to provide answers to this question.
- EchoMail invites a conversation with County officials to have a discussion on the policy concerning the use of the 'IsVote'.



Ballot Images of Trump IsVotes Also Flagged for Adjudication



### TRUMP ISVOTE AND AMBIGUOUS #1



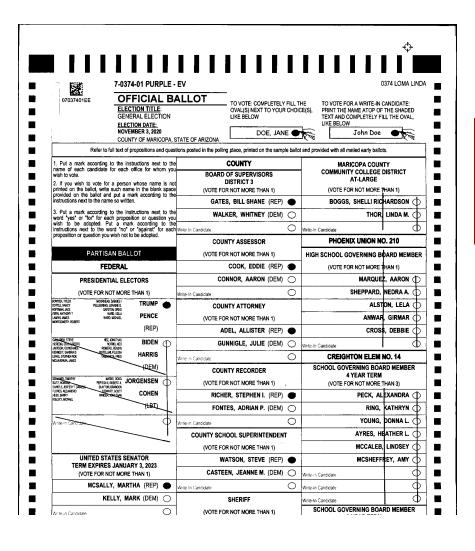
Why did the Dominion A.I. mark this as 'Is Vote' AND Ambiguous?

Should it not be JUST 'IsVote' or JUST Ambiguous?

If there is a doubt, then it should be JUST Ambiguous.

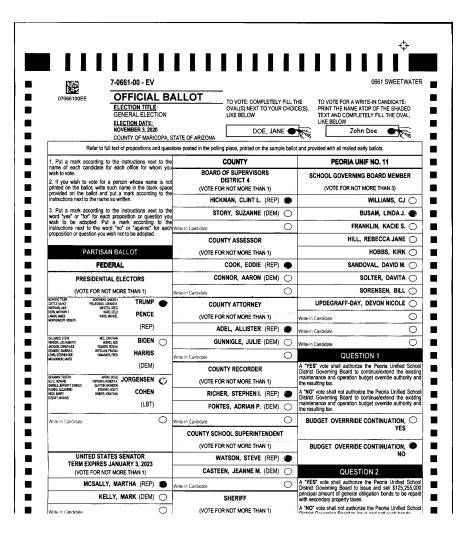


### TRUMP Is VOTE AND AMBIGUOUS #2



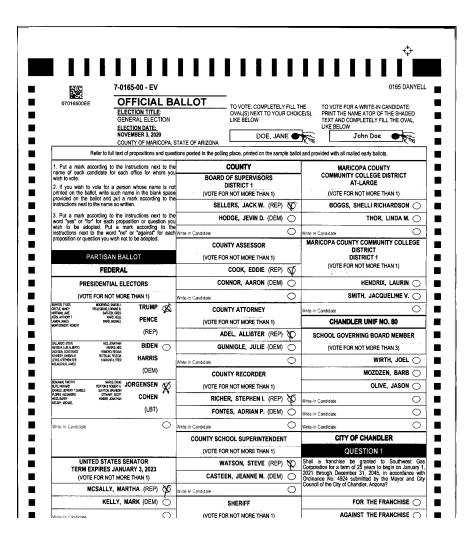
Why did the Dominion A.I. not mark this exclusively as Ambiguous?

### TRUMP ISVOTE AND AMBIGUOUS #3



Why did the Dominion A.I. not mark this exclusively as Ambiguous?

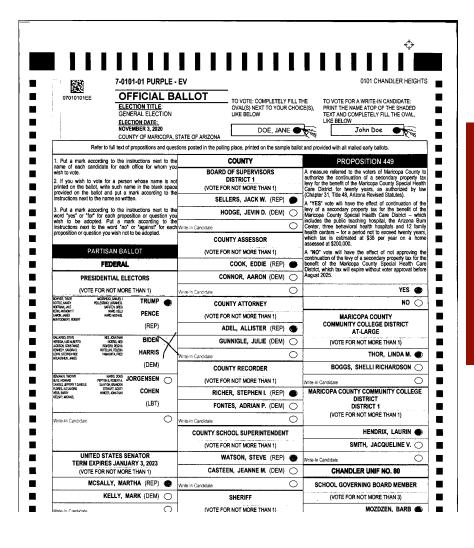
## TRUMP IsVOTE AND AMBIGUOUS #4



Why did Dominion A.I. mark this as 'IsVote' for Trump and not JUST Ambiguous?

What are the density settings on how much an Oval is filled in comparison to another Oval to determine 'IsVote'?

### TRUMP ISVOTE AND AMBIGUOUS #5



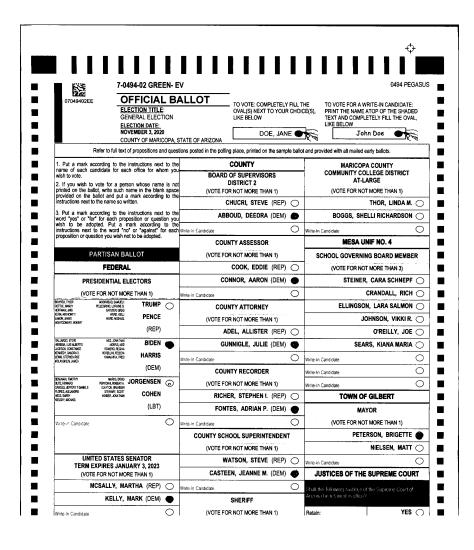
Why did Dominion A.I. mark this as 'IsVote' for Biden and not JUST Ambiguous?

What are the density settings on how much an Oval is filled in comparison to another Oval to determine 'IsVote'?

Ballot Images of Biden IsVotes Also Flagged for Adjudication



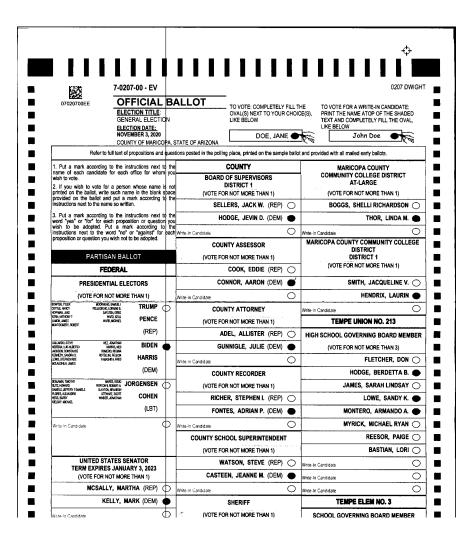
### **BIDEN ISVOTE AND AMBIGUOUS #1**



Why did Dominion A.I. mark this as 'IsVote' for Biden and not JUST Ambiguous?

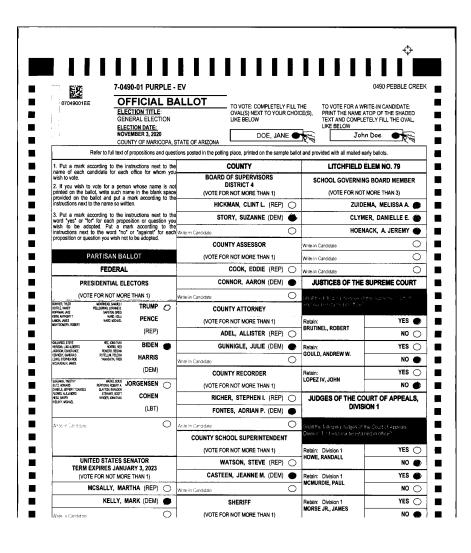
What are the density settings on how much an Oval is filled in comparison to another Oval to determine 'IsVote'?

### **BIDEN ISVOTE AND AMBIGUOUS #2**



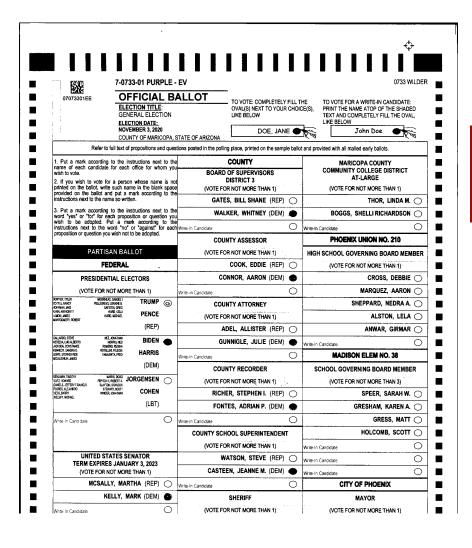
Why did Dominion A.I. mark this as 'IsVote' for Biden and not JUST Ambiguous?

### **BIDEN ISVOTE AND AMBIGUOUS #3**



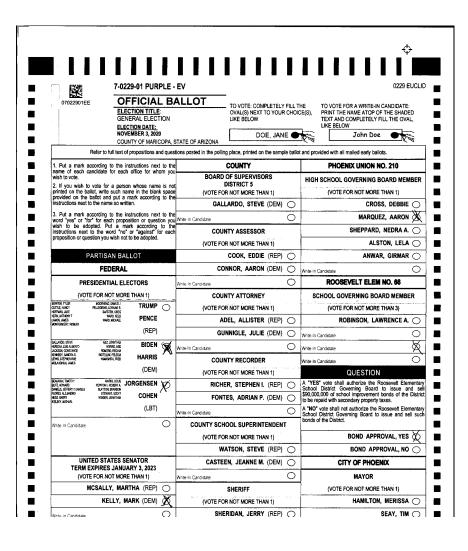
Why did Dominion A.I. mark this as 'IsVote' for Biden and not JUST Ambiguous?

#### **BIDEN ISVOTE AND AMBIGUOUS #4**



Why did Dominion A.I. mark this as 'IsVote' for Biden and not JUST Ambiguous?

#### **BIDEN ISVOTE AND AMBIGUOUS #5**



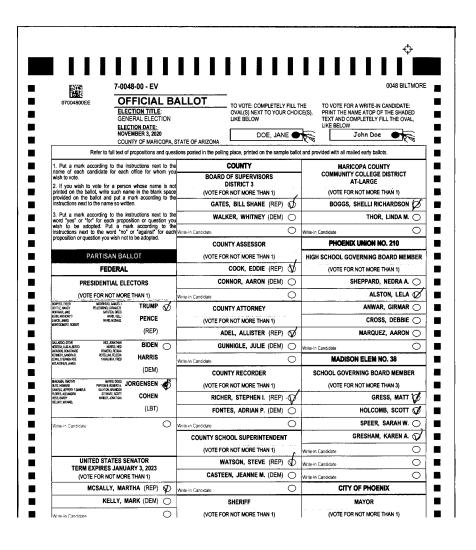
Why did Dominion A.I. mark this as 'IsVote' for Biden and not JUST Ambiguous?

What are the density settings on how much an Oval is filled in comparison to another Oval to determine 'IsVote'?

## PHASE II – Part 3 Summary

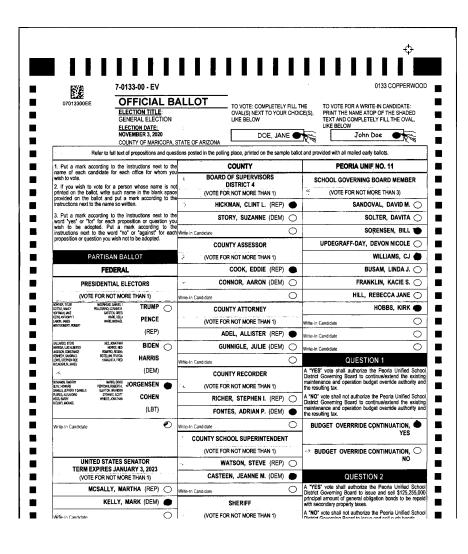
Ballot Images of Jorgensen IsVotes Also Flagged for Adjudication





Why did Dominion A.I. mark this as 'IsVote' for Jorgensen and not JUST Ambiguous?

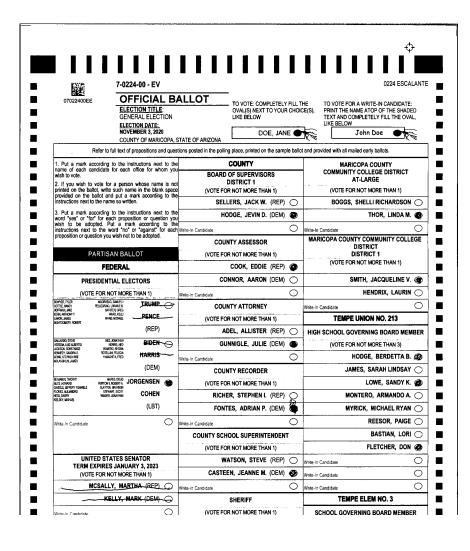
What are the density settings on how much an Oval is filled in comparison to another Oval to determine 'ls Vote'?



Why did Dominion A.I. mark this as 'IsVote' for Jorgensen and not JUST Ambiguous?

What are the density settings on how much an Oval is filled in comparison to another Oval to determine 'IsVote'?

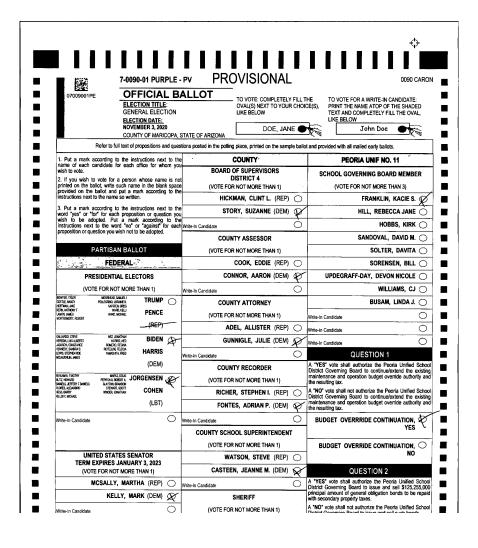
What are the conditions when it is an Overvote versus Ambiguous?



Why did Dominion A.I. mark this as 'IsVote' for Jorgensen and not JUST Ambiguous?

What are the density settings on how much an Oval is filled in comparison to another Oval to determine 'lsVote'?

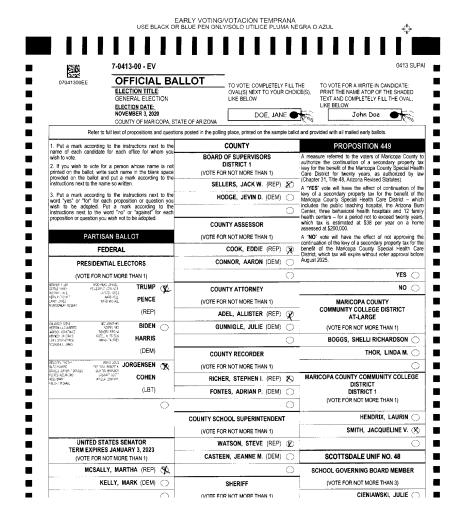
What are the conditions in when it is an Overvote versus Ambiguous?



Why did Dominion A.I. mark this as 'IsVote' for Jorgensen and not JUST Ambiguous?

What are the density settings on how much an Oval is filled in comparison to another Oval to determine 'IsVote'?

What are the conditions when it is an Overvote versus Ambiguous?



Why did Dominion A.I. mark this as 'IsVote' for Jorgensen and not JUST Ambiguous?

What are the density settings on how much an Oval is filled in comparison to another Oval to determine 'IsVote'?

What are the conditions when it is an Overvote versus Ambiguous?

# PHASE II – Part 3 Summary

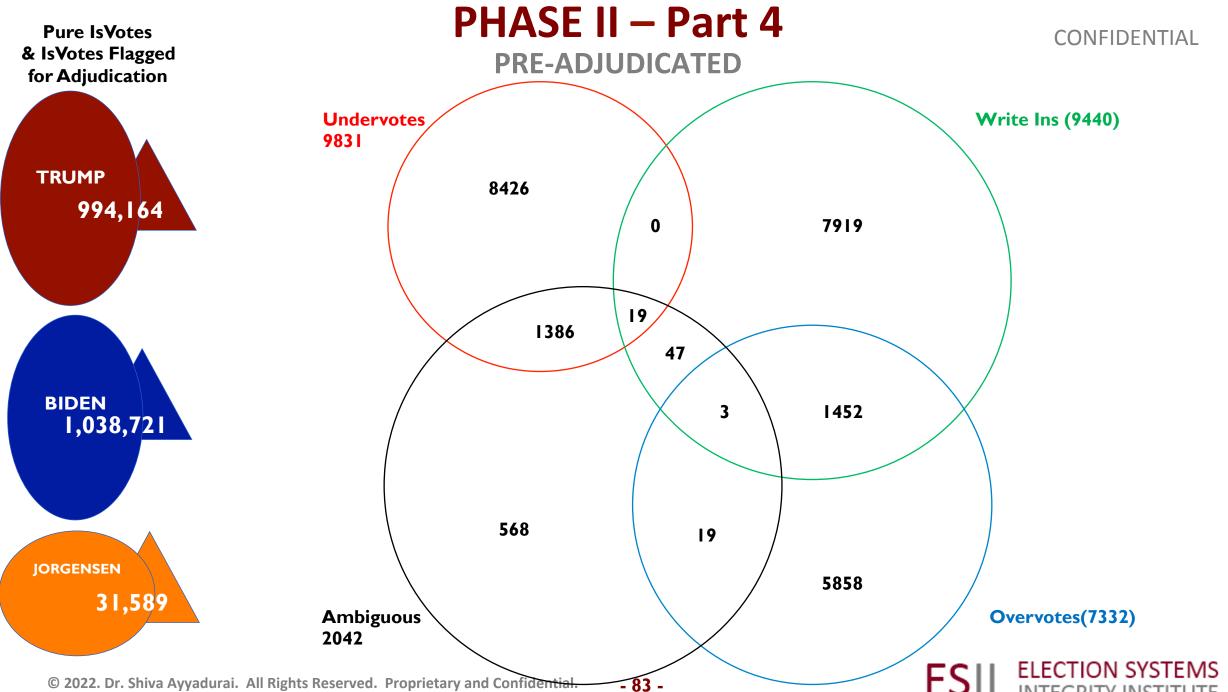
- The important observation herein is that the actual parameters that the A.I. uses in determining a vote, write-in, undervote, overvote, or ambiguous, should be fully transparent, and dictated by the legislature.
- Even if the A.I. was correct in all cases, it is not prudent to simply trust that the A.I. will be accurate without the public knowing what actual parameters the A.I. is using to determine vote allocations.
- The above were a few examples where the 'IsVote' flag was set for Trump, Biden, Jorgensen, along with another adjudication flag. Appendix B contains 608 Ballot Images divided into THREE separate directories for each candidate. The following named directories have those ballot images:
  - 1. Directory 'IsVote-Trump-Flagged-Adjudicated' containing 191 ballot images
  - 2. Directory 'IsVote-Biden-Flagged-Adjudicated' containing 400 ballot images
  - 3. Directory 'IsVote-Jorgensen-Flagged-Adjudicated' containing 17 ballot images

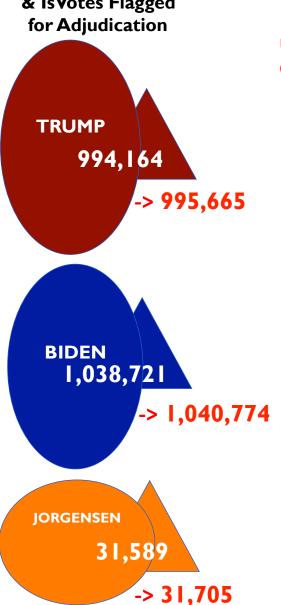


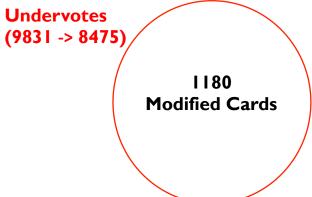
#### PHASE II - Part 4

EchoMail® CVR Analysis of Adjudication Process from Pre-Adjudication State to Post-Adjudication State

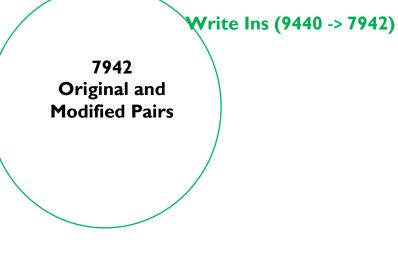














Overvotes(7332 -> 5002)

**ECHOMAIL® CVR ANALYSIS OF ADJUDICATION PROCESS** 

Write Ins (9440 -> 7942)





FROM PRE-ADJUDICATION STATE TO POST-ADJUDICATION STATE

Undervotes
(9831 -> 8475)

I I 80 Modified Cards 7942 Original and Modified Pairs

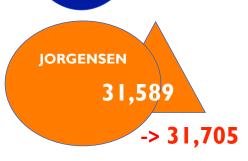
ECHOMAIL® ANALYSIS OF PRE-ADJUDICATION TO POST-ADJUDICATION STATES REVEALED THAT THE WRITE-INS AND OVERVOTES APPEARED TO HAVE BEEN ACCURATELY CALCULATED.

HOWEVER, FOR UNDERVOTES, THERE WAS AN INCONSISTENCY. ONLY 1,180 MODIFIED CARDS WERE OBSERVED IN THE POSTADJUDICATED STATE, ALTHOUGH THERE WERE 8,475 TOTAL POST-ADJUDICATED UNDERVOTES.

TO RESOLVE THIS REQUIRED A SIGNIFICANT DECIPHERING EFFORT ACROSS THESE TWO STATES.



Overvotes(7332 -> 5002)



1,038,721

-> **1,040,774** 

**BIDEN** 

-> 995,665

-> 1,040,774

**TRUMP** 

**BIDEN** 

994,164

**EchoMail® CVR Analysis of Adjudication Process** from Pre-Adjudication State to Post-Adjudication State

**Undervotes** (9831 -> 8475)

1170 **Modified Cards** With Original Cards Flagged

Write Ins (9440 -> 7942)

10 Modified Cards NO Original Cards Flagged

In this deciphering effort, EchoMail discovered that 10 modified cards had no original cards that were flagged for adjudication.

In fact, the original cards associated with these 10 modified cards were marked as 'IsVote' for either Trump or Biden, but were not flagged in the original cards for anything else in the presidential race.

5002 Original and **Modified Pairs** Overvotes(7332 -> 5002)

7942

Original and

**Modified Pairs** 

**IORGENSEN** 31,589 -> 31,705

1,038,721

Pure IsVotes & IsVotes Flagged for Adjudication



ECHOMAIL® CVR ANALYSIS OF ADJUDICATION PROCESS
FROM PRE-ADJUDICATION STATE TO POST-ADJUDICATION STATE

**Undervotes** (983 I -> 8475)/

I 170

Modified Cards

With Original Cards Flagged

10 Modified Cards

NO Original Cards Flagged

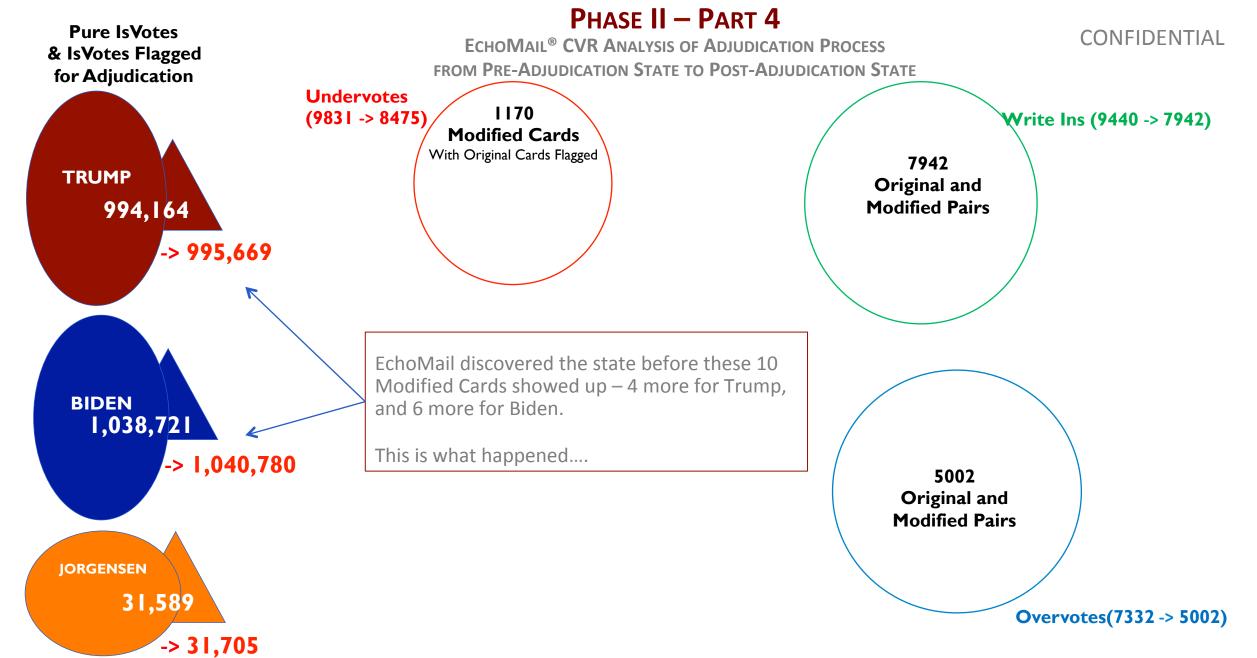
7942
Original and
Modified Pairs

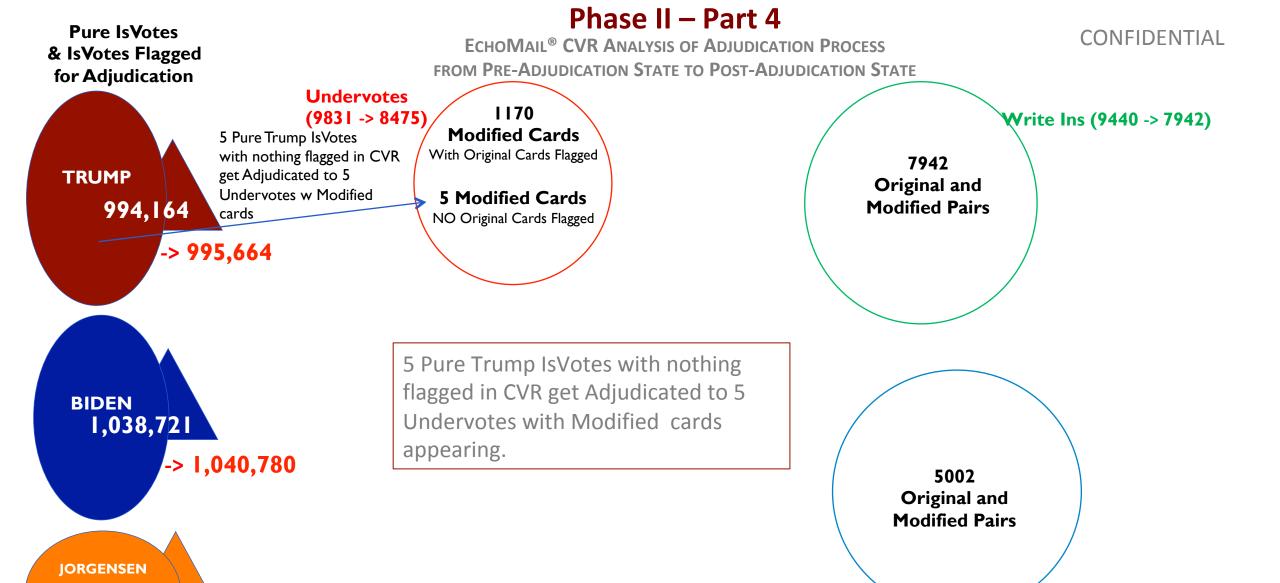
BIDEN 1,038,721 -> 1,040,774 **HOW DID THIS HAPPEN?** 



31,589 -> 31,705

ESII ELECTION SYSTEMS





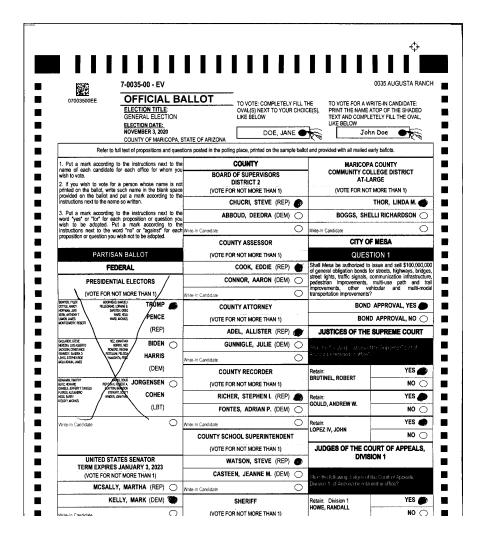
ESII ELECTION SYSTEMS

Overvotes(7332 -> 5002)

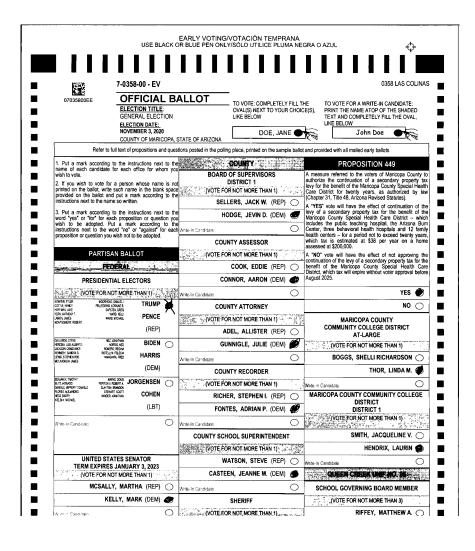
31,589

-> 31,705

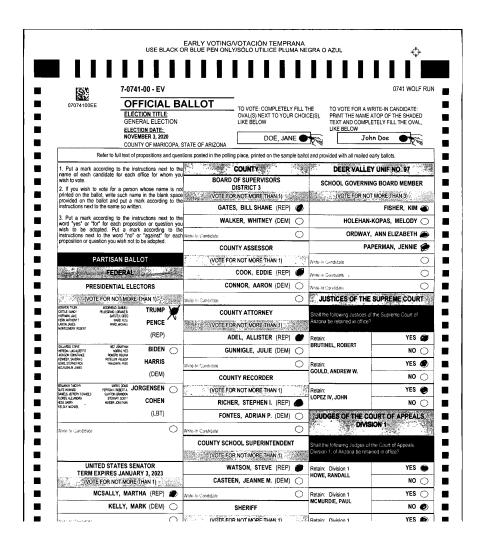
## TRUMP PURE 'ISVOTE' TO UNDERVOTE #1



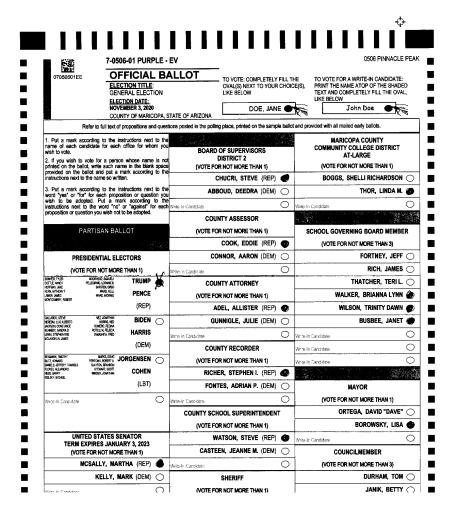
## TRUMP PURE 'ISVOTE' TO UNDERVOTE #2



## TRUMP PURE 'ISVOTE' UNDERVOTE #3

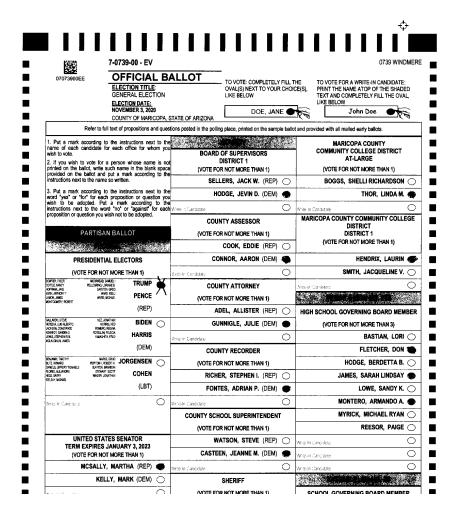


## TRUMP PURE 'ISVOTE' UNDERVOTE #4

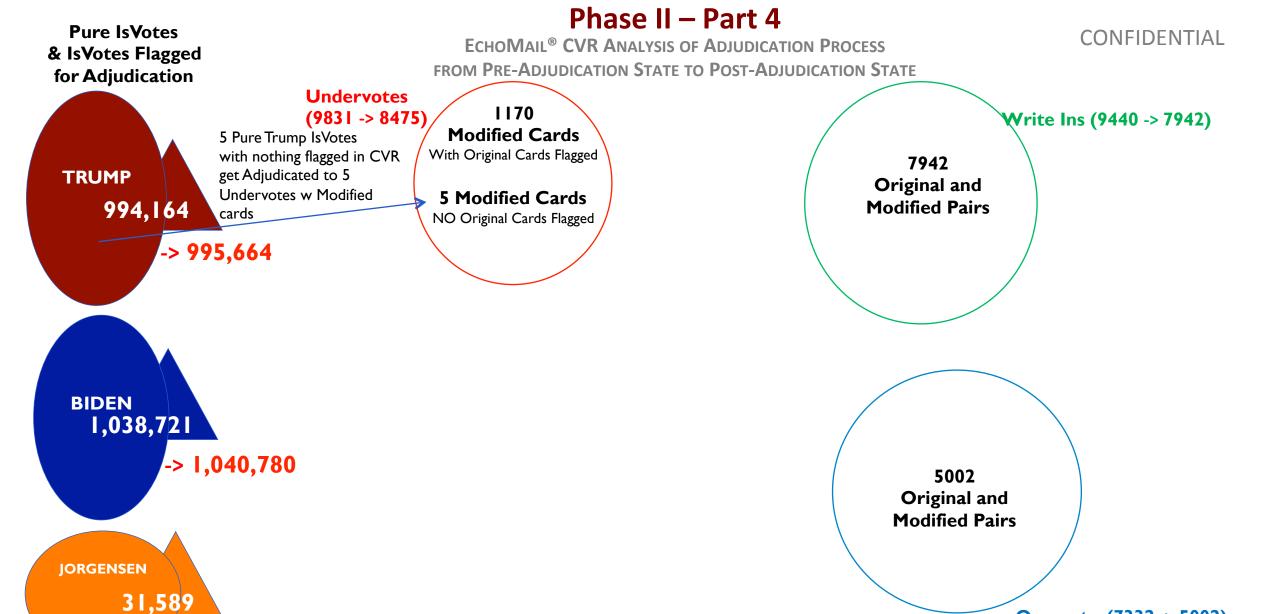




#### TRUMP PURE 'ISVOTE' UNDERVOTE #5



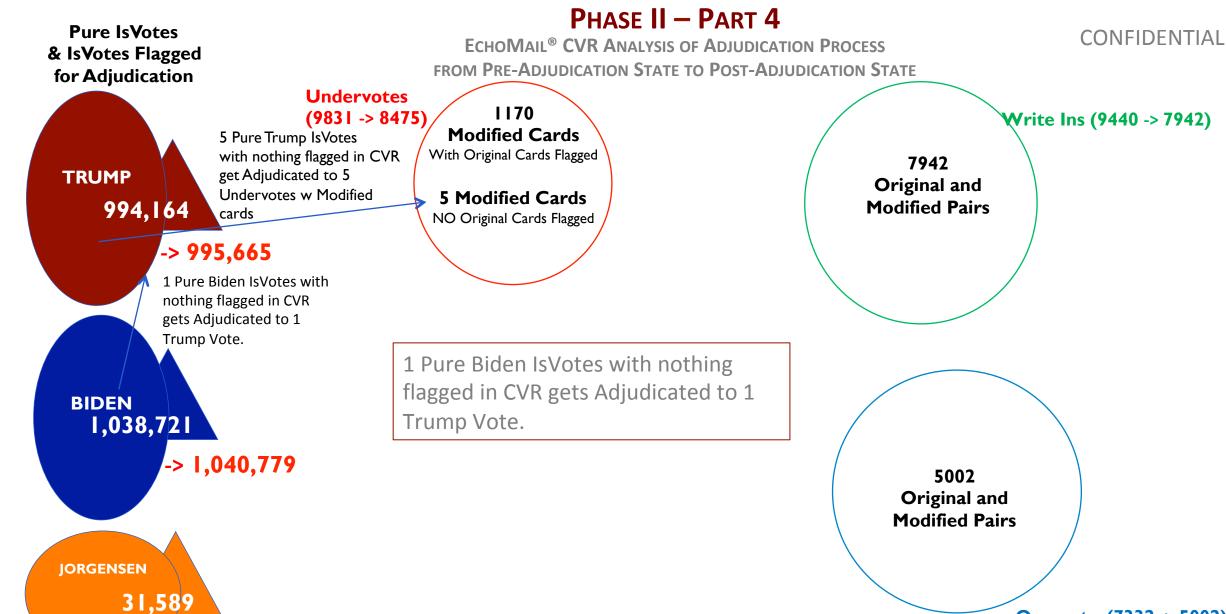






Overvotes(7332 -> 5002)

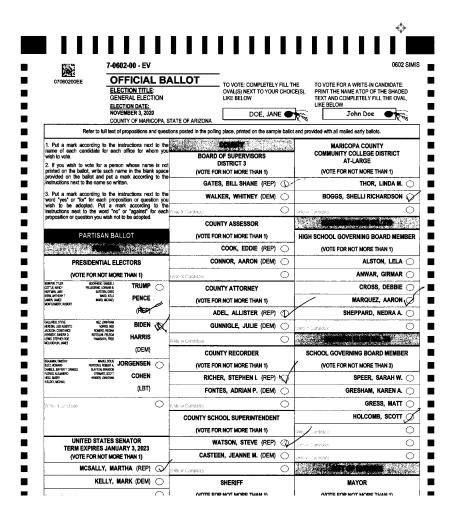
-> 31,705



Overvotes(7332 -> 5002)

-> 31,705

## BIDEN PURE 'ISVOTE' TO TRUMP #1

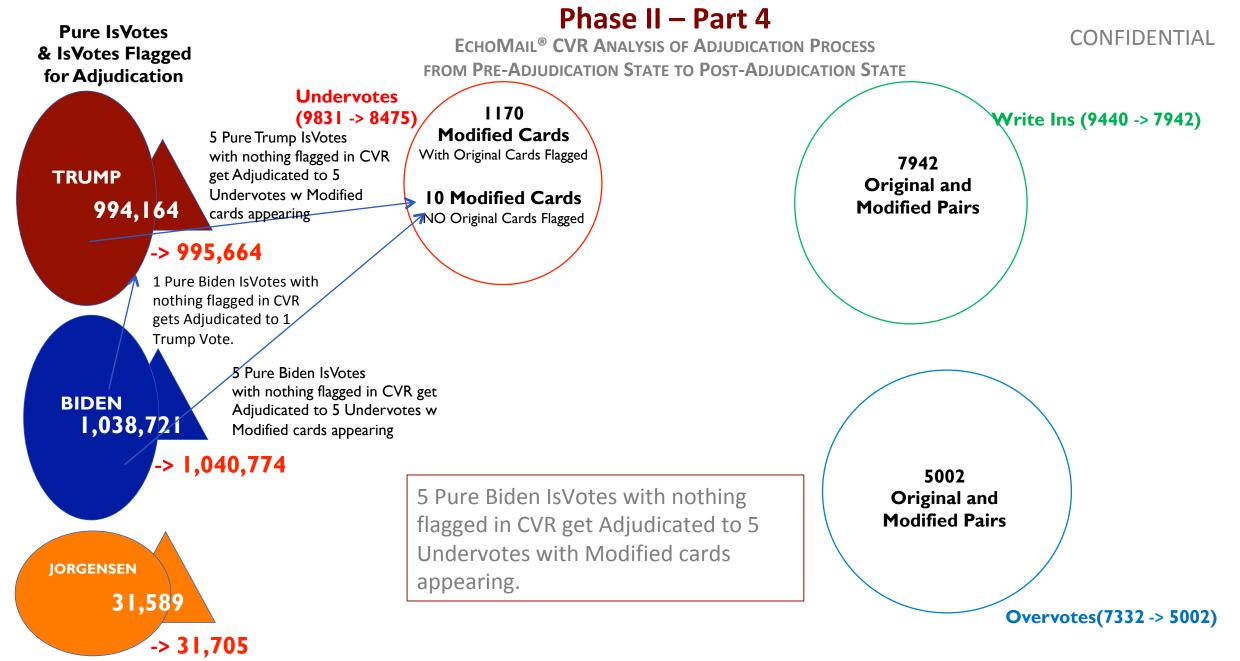


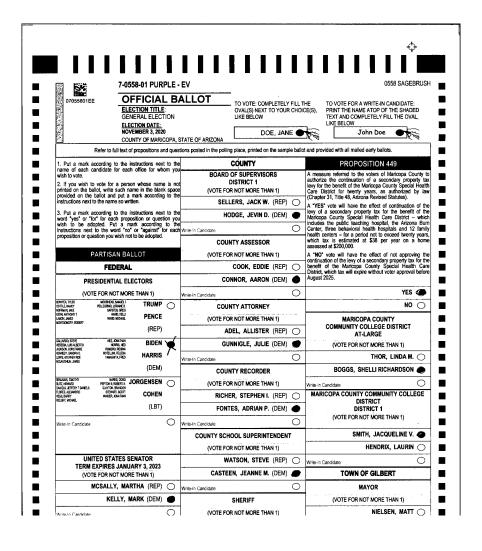
ESII ELECTION SYSTEMS

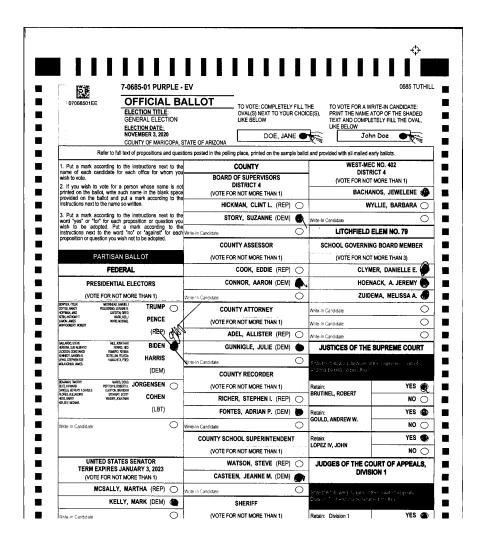
Overvotes(7332 -> 5002)

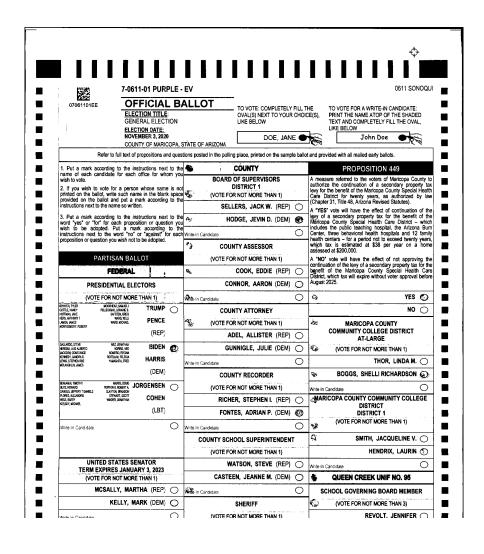
31,589

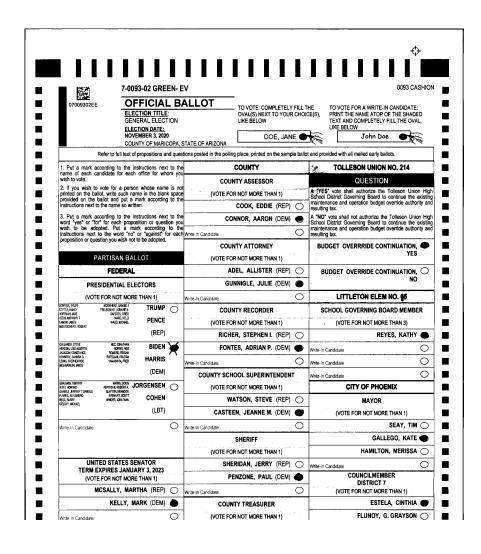
-> 31,705

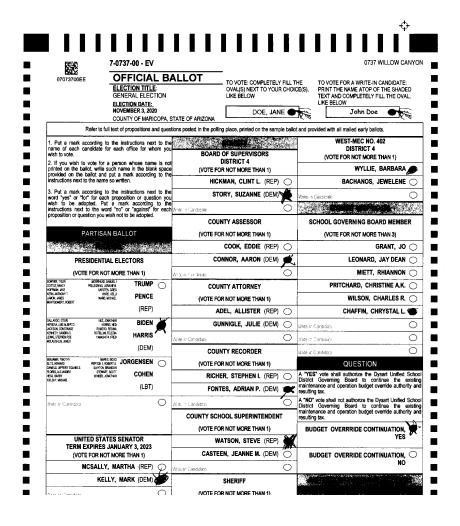




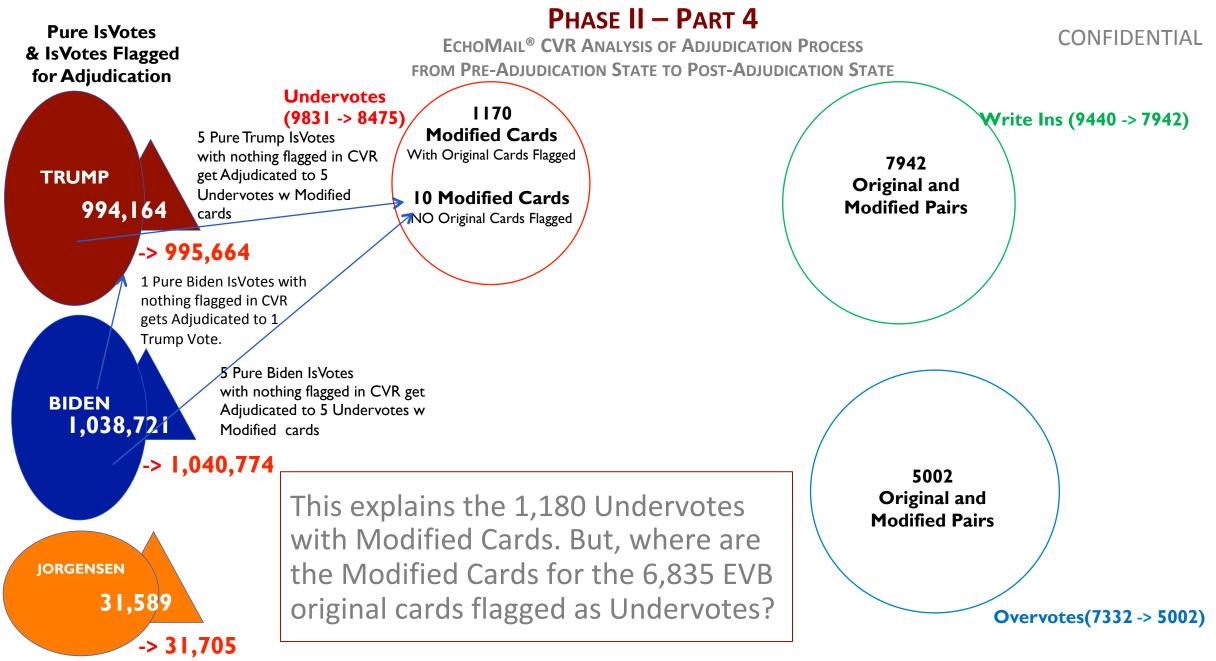


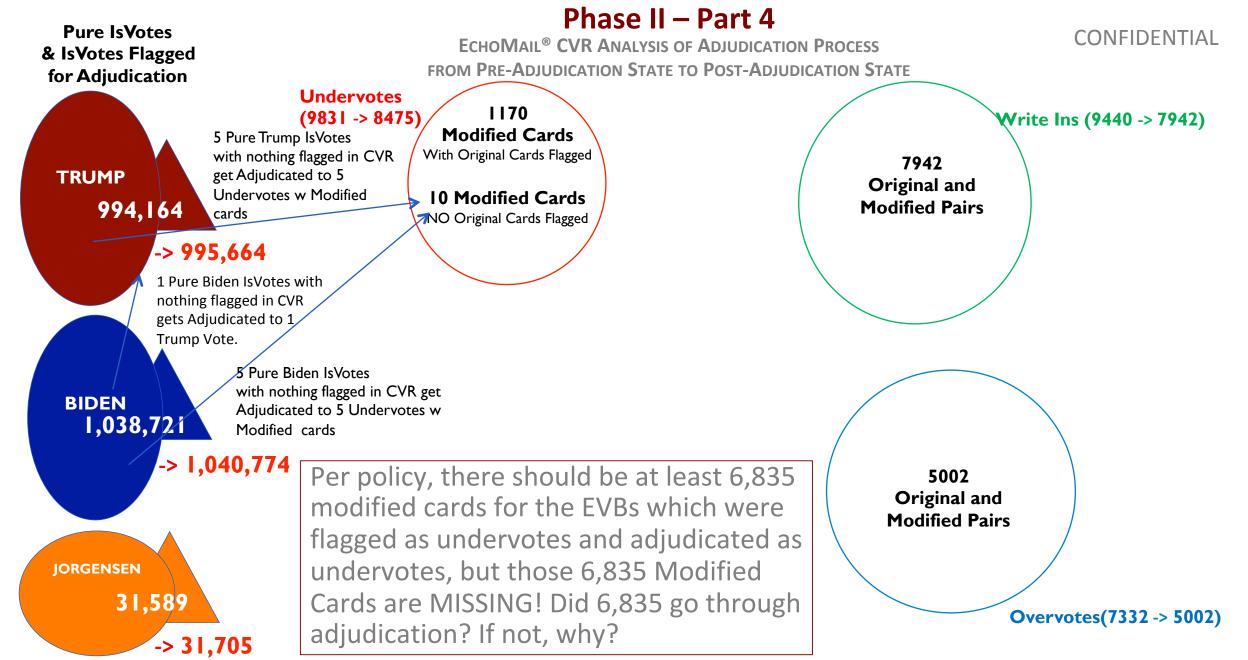


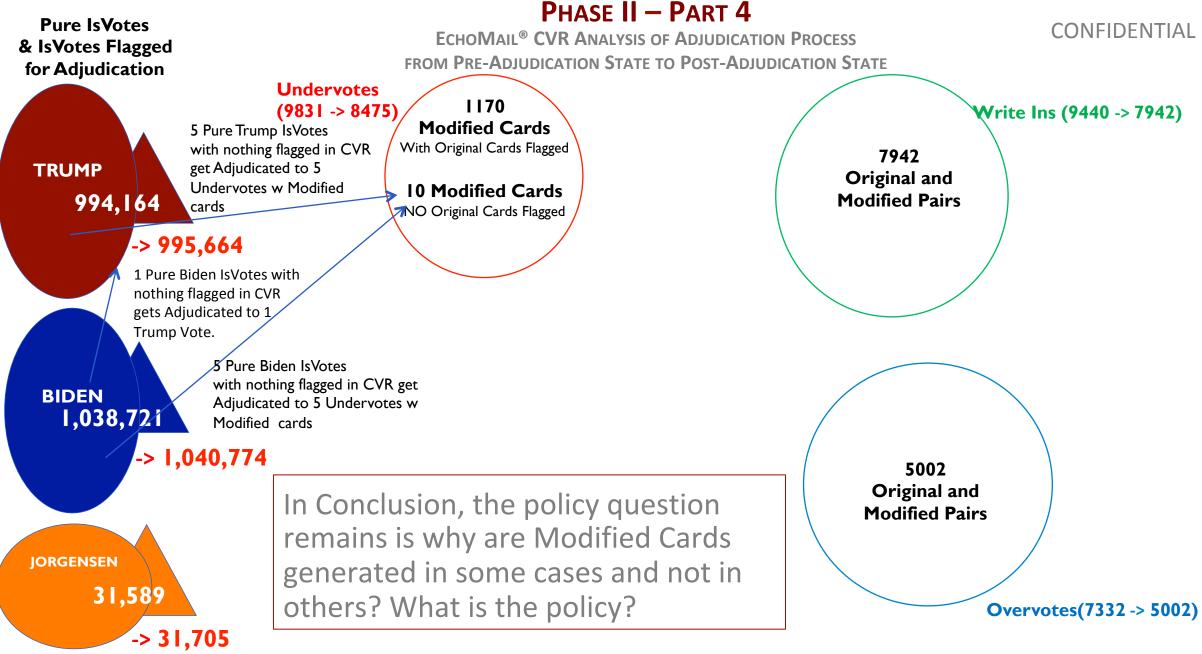












# Phase II – Part 4 Summary

- There needs to be full disclosure describing under what conditions the Dominion A.I. system decides what is a vote, write-in, undervote, overvote, ambiguous?
- Is a Modified Card generated for all EVBs whose Original Cards are flagged for adjudication? That is stated policy; however, it is not being followed. Why?
- More generally, in some cases Modified Cards are being generated as they should, and in other cases they are not, when they should.
- How can a pure 'IsVote' suddenly become adjudicated and a modified card be created without an Original Card being flagged for adjudication?



## Phase II – Part 4 Summary

- How can pure 'IsVote' move from one candidate to another when it was <u>never</u>
   flagged for adjudication. Regardless of even it was ONE VOTE (Biden -> Trump),
   how could this occur? What policy allowed for this? If this can happen, then what
   is stopping adjudications to be created arbitrarily?
- The above observation is disconcerting as it took highly specialized experts at EchoMail to discover this "leak" in the system i.e. a vote to be transferred from one candidate to another when no adjudication was flagged.



#### **PHASE III**

# EchoMail® A.I. *Initial* Ballot Image Analysis vs. Dominion A.I. Ballot Image Analysis

Item	EchoMail® A.I.	Dominion A.I.	Delta	% Delta	
Trump (pure)	973,329	993,973	(20,644)	-2.1%	
Biden (pure)	1,019,881	1,038,321	(18,440)	-1.8%	
Jorgensen (pure)	30,999	31,572	(573)	-1.8%	
Write-In (pure)	7,724	7919	(195)	-2.5%	
Overvotes ALL	9,279	7,332	1,947	26.6%	
Other (Ambiguous & Undervotes)	<u>48,351</u>	10,446	<u>37,905</u>	<u>362.9%</u>	
TOTAL	2,089,563	2,089,563	0	0%	

<sup>&</sup>quot;pure" when only one oval was selected per the A.I. algorithm



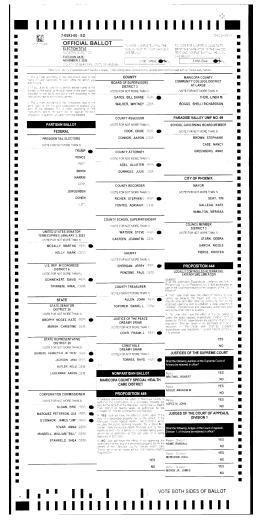
# Phase III – Part 1 Summary

- EchoMail's initial Ballot Image analysis revealed that the Ballot Images quality was not homogeneous.
- The quality of Ballot Images generated at MCTEC among its 33 tabulators were significantly better than the Ballot Images generated at the 346 inperson tabulators across multiple precincts

# Phase III – Part 1 Summary

PRIZECULA CON LOCAL PRISECULAR CON LOCAL PRISECULAR

Non-MCTEC Ballot Images (very light and Illegible)



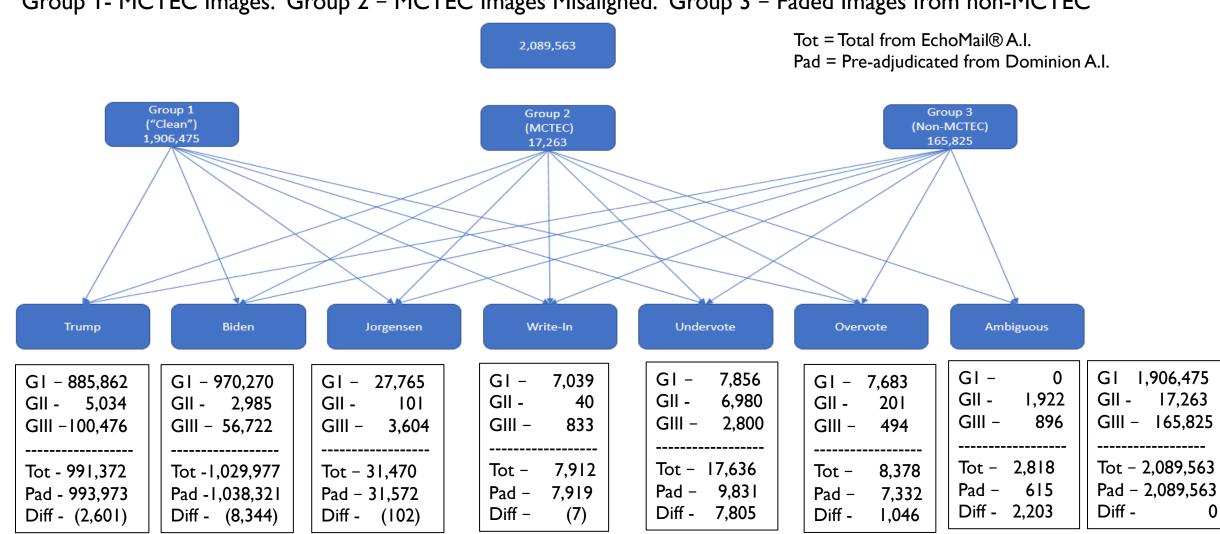
# Phase III – Part 1 Summary

- EchoMail's initial Ballot Image analysis revealed that the Ballot Images quality was not homogeneous.
- The quality of Ballot Images generated at MCTEC among its 33 tabulators were significantly better than the Ballot Images generated at the 346 inperson tabulators across multiple precincts
- EchoMail found only 19 ballot images out of 165,844 (0.02%) generated from In-person tabulators that were as clear and legible.
- EchoMail applied an enhanced Ballot Image analysis method to re-process all Ballot Images (Phase III – Part 2)



#### EchoMail® Enhanced Ballot Image Analysis Results

Group 1- MCTEC Images. Group 2 - MCTEC Images Misaligned. Group 3 - Faded Images from non-MCTEC



#### EchoMail® Enhanced Ballot Image Analysis Results

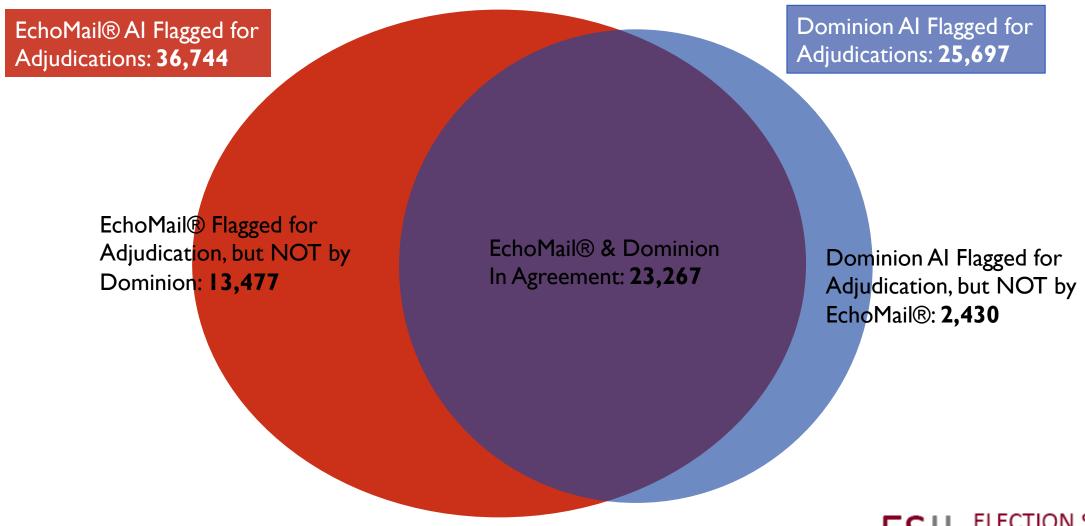
Item	EchoMail® A.I.	Dominion A.I.	Difference	% Difference
Trump (pure)	991,372	993,973	(2,601)	-0.3%
Biden (pure)	1,029,977	1,038,321	(8,344)	-0.8%
Jorgensen (pure)	31,470	31,572	(102)	-0.3%
Write-In (pure)	7,912	7919	(7)	-0.09%
Undervotes ALL	17,636	9,831	7,805	79.4%
Overvotes ALL	8,378	7332	1,046	14.3%
Ambiguous(~OV,~UV)	2818	<u>615</u>	<u>2,203</u>	<u>358.2%</u>
	2,089,563	2,089,563	0	0%



#### EchoMail® A.I. Vs. Dominion A.I. Ballot Image Analysis Differences

Item	EchoMail® A.I.	Dominion A.I.	Common	EchoMail Difference	Dominion Difference
Trump (pure)	991,372	993,973	990,011	1361	3962
Biden (pure)	1,029,977	1,038,321	1,029,316	661	9005
Jorgensen (pure)	31,470	31,572	31,423	47	149
Flagged for Adjudication	36,744	25,697	23,267	13,477	2,430
Write-In (pure)	7,912	7919	7,892	20	27
Undervotes ALL	17,636	9,831	8,427	9209	1404
Overvotes ALL	8,378	7332	6,945	1433	387
Ambiguous(~OV,~UV)	<u>2,818</u>	<u>615</u>	<u>3</u>	<u>2815</u>	<u>612</u>
	2,089,563	2,089,563	2,074,017	15,546	15,546

EchoMail® A.I. Vs. Dominion A.I. Ballot Image Difference Analysis on Adjudications



## PHASE III – Part 2 Summary

- EchoMail® A.I. Ballot Image analysis and Dominion A.I. Ballot Image analysis prior to adjudication concur on 2,074,017 ballots, and do not concur on 15,546 ballots
- To resolve the 15,546 difference, it is necessary to know what policy i.e. rules and standards Dominion A.I. used in defining a vote, write-in, undervote, overvote, and ambiguous.
- Did Dominion A.I. use the SAME Ballot Images that EchoMail received? Or, did Dominion process real-time scans, perhaps in higher or different resolution in memory on the tabulators?
- Is there a difference between the Ballot Images analyzed by Dominion versus the Ballot Images later archived and provided to EchoMail?



## PHASE III – Part 2 Summary

- Appendix C contains the 15,546 Ballot Images that differ with Dominion's A.I.:
  - 1. Directory: Trump-EchoMail-Difference containing 1,361 Ballot Images
  - 2. Directory: Trump-EchoMail-Difference containing 661 Ballot Images
  - 3. Directory: Trump-EchoMail-Difference containing 47 Ballot Images
  - 4. Directory: Flagged-for-Adjudication (4 Subdirectories) containing 13,477 Ballot Images
    - a. Sub-Directory: Write-Ins containing 20 Ballot Images
    - b. Sub-Directory: Undervotes containing 9,209 Ballot Images
    - c. Sub-Directory: Overvotes containing 1,433 Ballot Images
    - d. Sub-Directory: Ambiguous containing 2,815 Ballot Images



#### **PHASE IV**

EchoMail® A.I. vs. Maricopa CANVASS (Post-Adjudication)

Item	EchoMail® A.I.	Maricopa CANVASS	Common	EchoMail Difference	Dominion Difference
Trump (pure)	991,372	995,665	990,749	623	4,916
Biden (pure)	1,029,977	1,040,774	1,029,951	26	10,823
Jorgensen (pure)	31,470	31,705	31,462	8	243
Auto/Post-Adjudicated	36,744	21,419	20,964	15,780	455
Write-In (pure)	7,912	7,942	7,889	23	53
Undervotes ALL	17,636	8475	8,364	9,372	111
Overvotes ALL	8,378	5,002	4,711	3,667	291
Ambiguous(~OV,~UV)	2,818	<u>0</u>	<u>0</u>	<u>2,818</u>	<u>0</u>
	2,089,563	2,089,563	2,073,126	16,437	16,437

## **PHASE IV**

- Appendix D contains the 16,437 Ballot Images that differ with CANVASS:
  - 1. Directory: Canvass-Trump-EchoMail-Difference containing 623 Ballot Images
  - 2. Directory: Canvass-Trump-EchoMail-Difference containing 26 Ballot Images
  - 3. Directory: Canvass-Trump-EchoMail-Difference containing 8 Ballot Images
  - 4. Directory: Canvass-Flagged-for-Adjudication (4 Subdirectories) containing 15,780 Ballot Images
    - a. Sub-Directory: Write-Ins containing 23 Ballot Images
    - b. Sub-Directory: Undervotes containing 9,372 Ballot Images
    - c. Sub-Directory: Overvotes containing 3,667 Ballot Images
    - d. Sub-Directory: Ambiguous containing 2,818 Ballot Images





- Why was analysis of Ballot Images & CVR not performed as first step in the Maricopa Audit? Millions of tax payer dollars and time could have been saved, and such effort could have been directed to real issues e.g. chain of custody, signature verification to advance election systems integrity
  - EchoMail® A.I. Ballot Image analysis identified 15,546 and 16,437 ballots that did not concur with Dominion A.I.'s pre-adjudicated tabulation and post-adjudicated tabulation, respectively. The Audit should have focused on these paper ballots versus reviewing all 2,089,563 ballots.
- Why are 6,835 Modified Cards missing. Per policy, for every Early Voting Ballot (EVB) where an Original Card in the Presidential Race was flagged for adjudication, there should be a Modified Card.



- When is a vote a vote given the inconsistent use of 'IsVote' flag by the Dominion A.I. system? Even experienced election officials cannot explain the inconsistencies?
- Why are any ballots even one being adjudicated for the Presidential Race when the Original Card was never flagged for adjudication?
- One important question that remains is are the Ballot Images for analysis during election by Dominion A.I. different than the Ballot Images archived and provided to EchoMail A.I. for analysis.

• The legislature, not a private corporation, <u>must define the actual</u> <u>parameters</u> that the A.I. should adhere to in determining a vote, write-in, undervote, overvote, or ambiguous.



## **FUTURE RESEARCH**



### **FUTURE RESEARCH**

- Had EchoMail® Ballot Images and CVR analysis, as herein, been done first, that
  would have provided more time, effort and resources to put into the real and
  substantive issues such as Chain of Custody and Signature Verification
- EchoMail as a follow up to this work and its previous research EVB Envelope
   Signature detection analysis is completing a EVB Envelope Signature
   Verification analysis to determine how many EVB Envelopes had non-matching
   signatures that did not go through the "curing" process





# EchoMail® Audit of Ballot Images & Cast Vote Record (CVR) from 2020 U.S. Presidential Race in Maricopa County, AZ

If A.I. Driven Electronic Voting Systems Continue To Be Used, Legislatures (Not Private Corporations) Must Define the Parameters Used By Such A.I. In Vote Tabulation

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Uncorrupted Ballot Images Received:

EchoMail® Ballot Image Analysis Completed:

Draft Report Completed:

Report Posted to Public:

December 7, 2021 January 7, 2022

January 22, 2022

February 16, 2022

#### **Delivered to:**

#### **Honorable Senator Karen Fann**

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Arizona State Senate
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