



## Technology Assisted Voting

NSW State Election  
26 March 2011

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## Background – Other Jurisdictions

- History in Australia
  - The Australian Electoral Commission in 2007 used a remote electronic voting system for ADF, then in 2008 used an in polling place system.
  - Victorian Electoral Commission had provided electronic voting at 2006 and 2010 elections principally for disabled electors
  - ACT uses in polling place system for all polling places which allowed some 44,000 people to vote in 2008
  - Tasmanian Electoral Commission trialled one voting kiosk in 2007 election.

## Background – Other Jurisdictions (cont...)

- Overseas
  - Estonia has conducted the largest remote online parliamentary election in 2011 where 140,846 voted using the internet out of 913, 346 electors
  - Brazil uses voting machines in large number of polling places
  - India used over 1M voting machines in 2004
  - Switzerland used a remote electronic voting system
  - Other countries – Britain, Ireland, Canada, New Zealand, US

## Why Technology Assisted Voting

- Interest groups representing electors with a disability or a vision impairment requested accessible and private voting options
- Judicial decision to provide braille ballot papers existed
- In March 2010 the NSW Government requested a feasibility report into electronic voting for NSW State General Election 2011
- Report tabled in NSW Parliament September 2010
- Parliament endorsed the report and appropriated funds for implementation
- iVote legislation passed on 2 December 2010 with an amendment to include electors outside NSW on polling day



## The Project

- Cost – \$3.6M
- Team
  - NSW Electoral Commission - me
  - Core Voting System Supplier – Everyone Counts (on/off shore)
  - System Integration – Logica – about 6 (on site)
  - Testing - Birlasoft – 1 onsite and 1 off shore
  - Experts – 4 other specialists
  - Call Centre staff and management
- Timeline
  - Report start March 2010
  - Team ramp-up September 2010
  - Wrap-up end of March 2011

## Technology Assisted Voting basics

- What is iVote?
  - Voting by phone using as standard handset and DTMF tones
  - Voting over the internet using a standard web browser
- Who can use iVote?
  - Electors who are blind or who have low vision
  - Physically incapacitated or illiterate electors who could not vote without assistance
  - Disabled (within the meaning of the *Disability Discrimination Act 1992*)
  - Rural voters (live more than 20km from a polling place)
  - Electors outside NSW on Election Day
- Electoral Commissioner approves procedures – registration, secrecy of ballot, security of systems, scrutiny of ballot papers printed from the virtual ballot box

## Technology Assisted Voting basics (cont...)

- Registering for iVote
  - Person must be on NSW electoral roll when writ issued in order to register
  - Elector can apply to register by phone to call centre or self service web browser over internet
  - Elector provides a 6 digit PIN at the time of registration
  - NSWEC provides an 8 digit iVote number when registration is accepted
  - iVote number is delivered by post plus if requested SMS and email and to disabled by telephone
  - Registration commenced on 17 February and finished on 23 March 2011 (2 days before election day)

## Technology Assisted Voting basics (cont...)

- Candidate details
  - Captured during nominations process
  - Published on NSWEC website after close of nominations as both text and sound files
  - Candidates have 2 days to listen to sound files and advise NSWEC of any mispronunciations
  - Male and female voice to distinguish between voting instructions and candidate/party names
  - Details loaded to IVR and web systems 2 days after close of nominations



## Technology Assisted Voting basics (cont...)

- Using iVote
  - Voting to take place between 8am Monday 14<sup>th</sup> and Friday 6pm 25<sup>th</sup> March 2011 (the same as pre-poll period)
  - Elector must have PIN and iVote number to vote
  - iVote by Phone follows the Telephone Voting Standard from Electoral Council of Australia
  - The Legislative Assembly ballot is presented first, followed by the Legislative Council ballot
  - A voter receipt is provided for votes cast and accepted by phone or internet
  - Receipt can be checked from 28<sup>th</sup> March by entering iVote number on phone or web to hear/see the same receipt

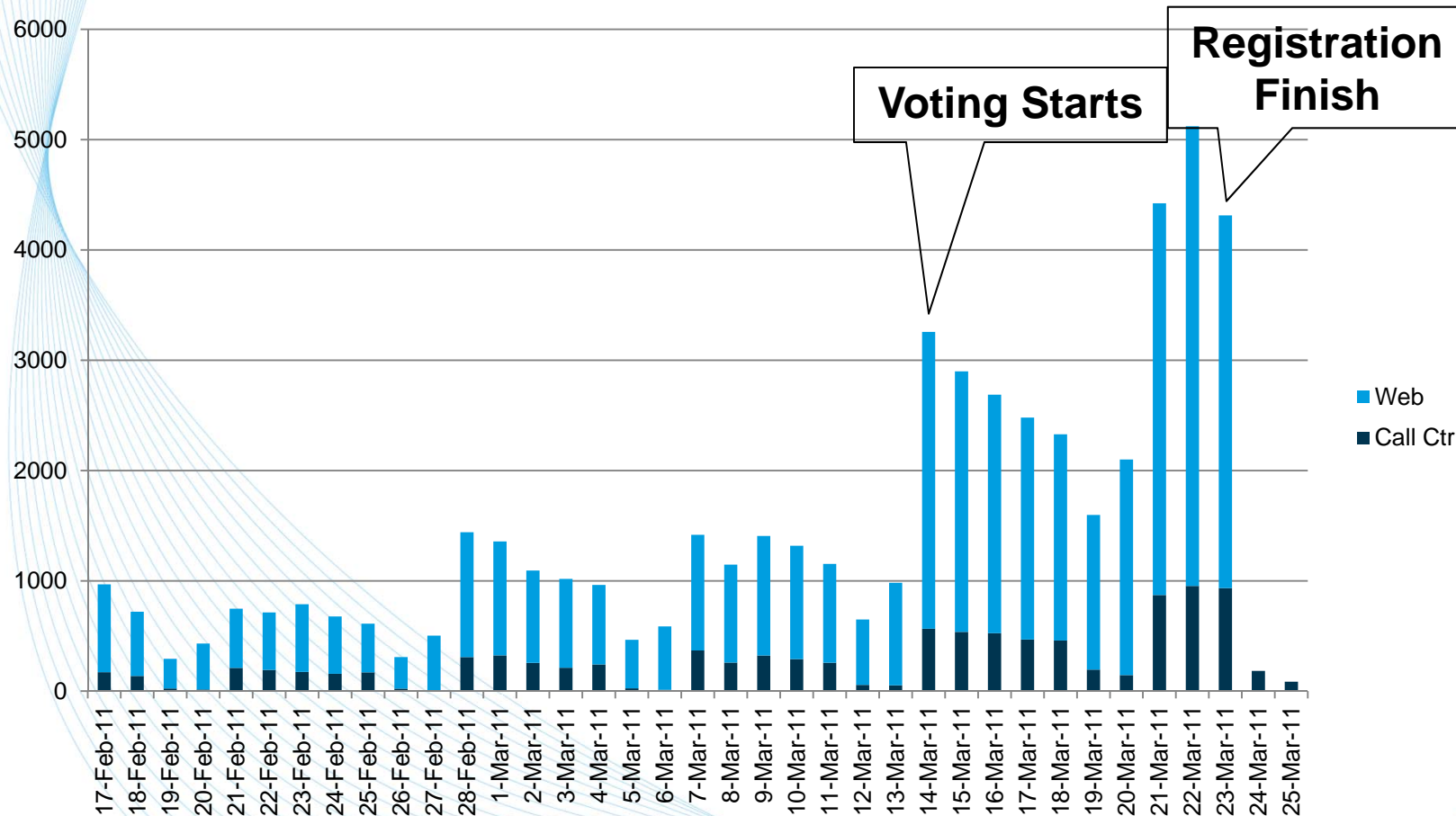
## Getting the iVote message out

- Promotions directed to target groups including:
  - Blindness and disability support groups
  - Direct mail to remote electors
  - Radio advertising on 2PRH
  - Call-out campaign by Vision Australia
- Two weeks of print advertising across NSW
- Internet advertising targeting people outside NSW
- Facebook, Twitter and YouTube promotions
- iVote information included in some general advertising
- iVote posters in RO offices
- Information of NSWEC web sites

# Registrations

Application Ground	Applications			Unique Electors
	Call Centre	Web Browser	Total	
People outside NSW on polling day	7,375	40,074	47,449	47,038
People who are 20km from a Polling Place	419	1,415	1,834	1,830
People with Disabilities	350	1,123	1,473	1,457
People who are blind or have low vision or are illiterate	376	413	789	778
<b>Total</b>	<b>8,520</b>	<b>43,025</b>	<b>51,545</b>	<b>51,103</b>

# Registrations by Day



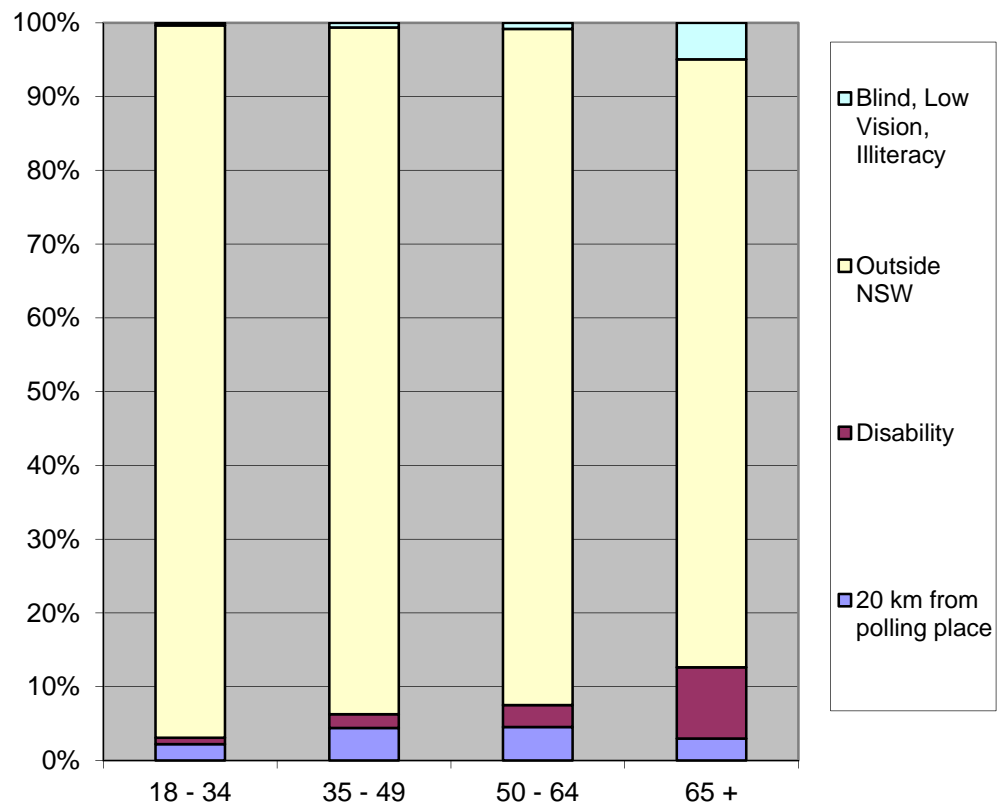


# Voted

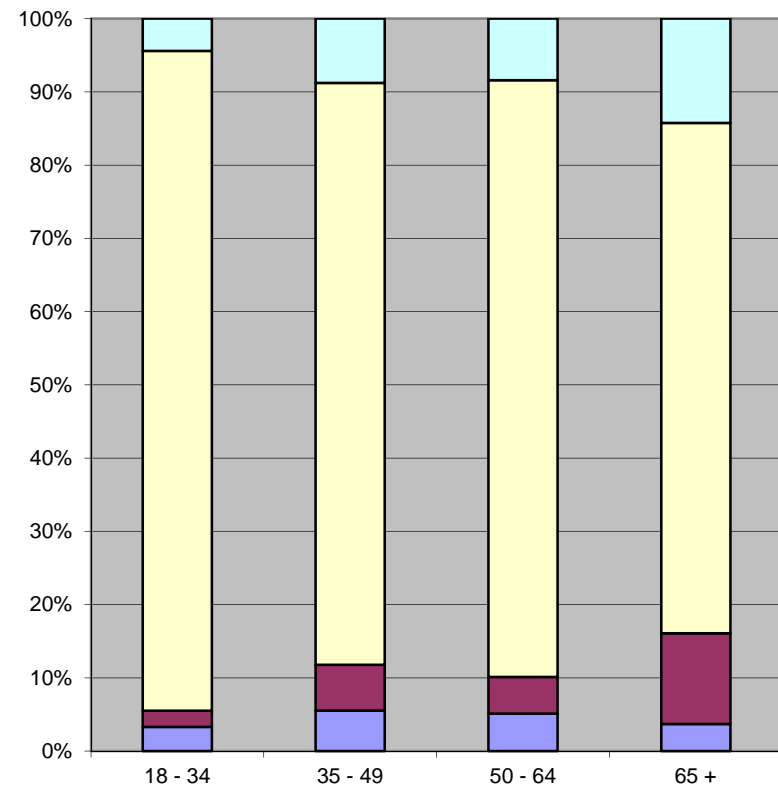
Application Ground	Phone	Web Browser	Total
People outside NSW on polling day	1,780	41,477	43,257
People who are 20km from a Polling Place	101	1,542	1,643
People with Disabilities	160	1,136	1,296
People who are blind or have low vision or are illiterate	218	450	668
<b>Totals</b>	<b>2,259</b>	<b>44,605</b>	<b>46,864</b>

# Voters by Age and Grounds

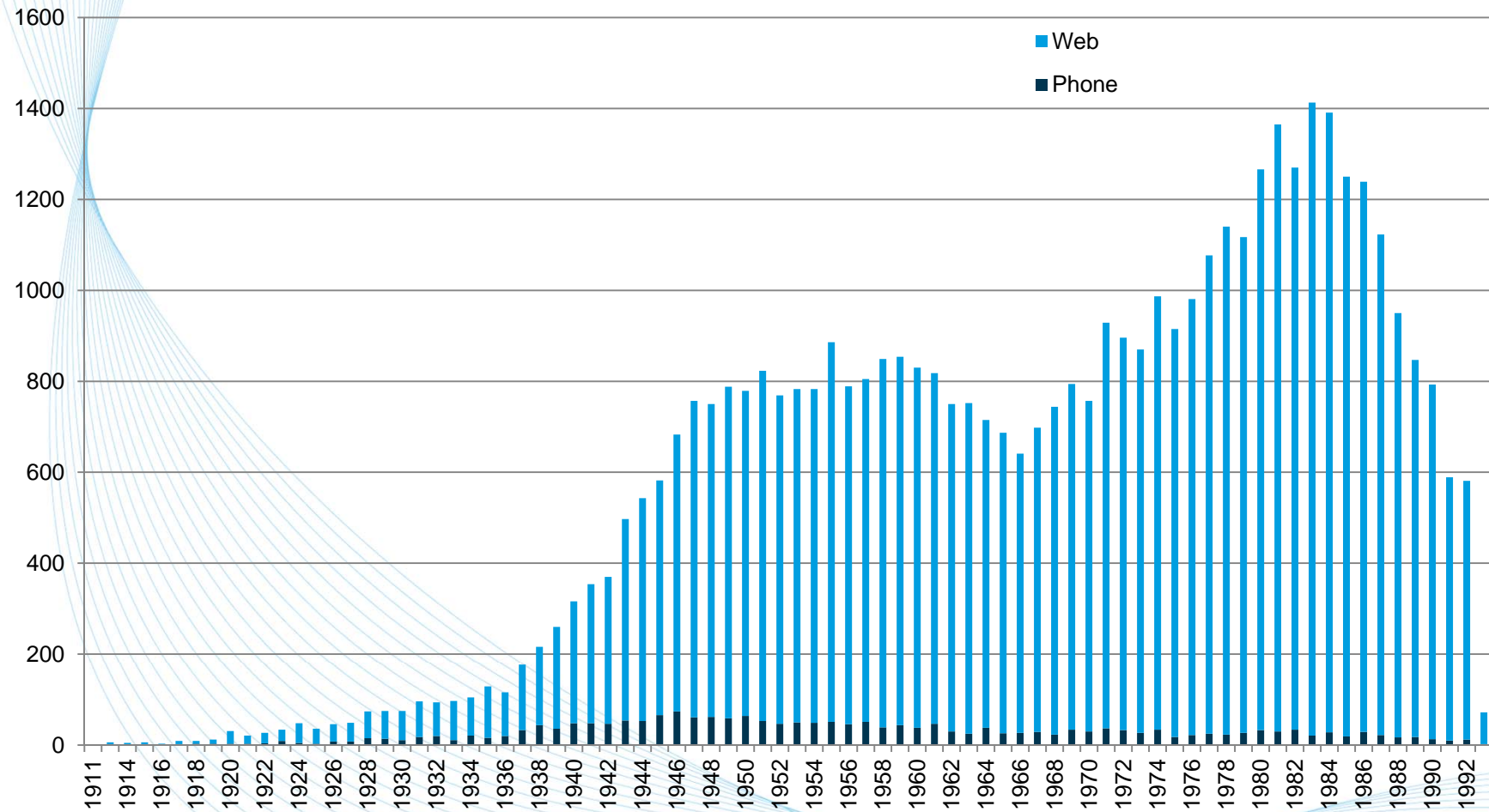
## Web Voting



## Phone Voting

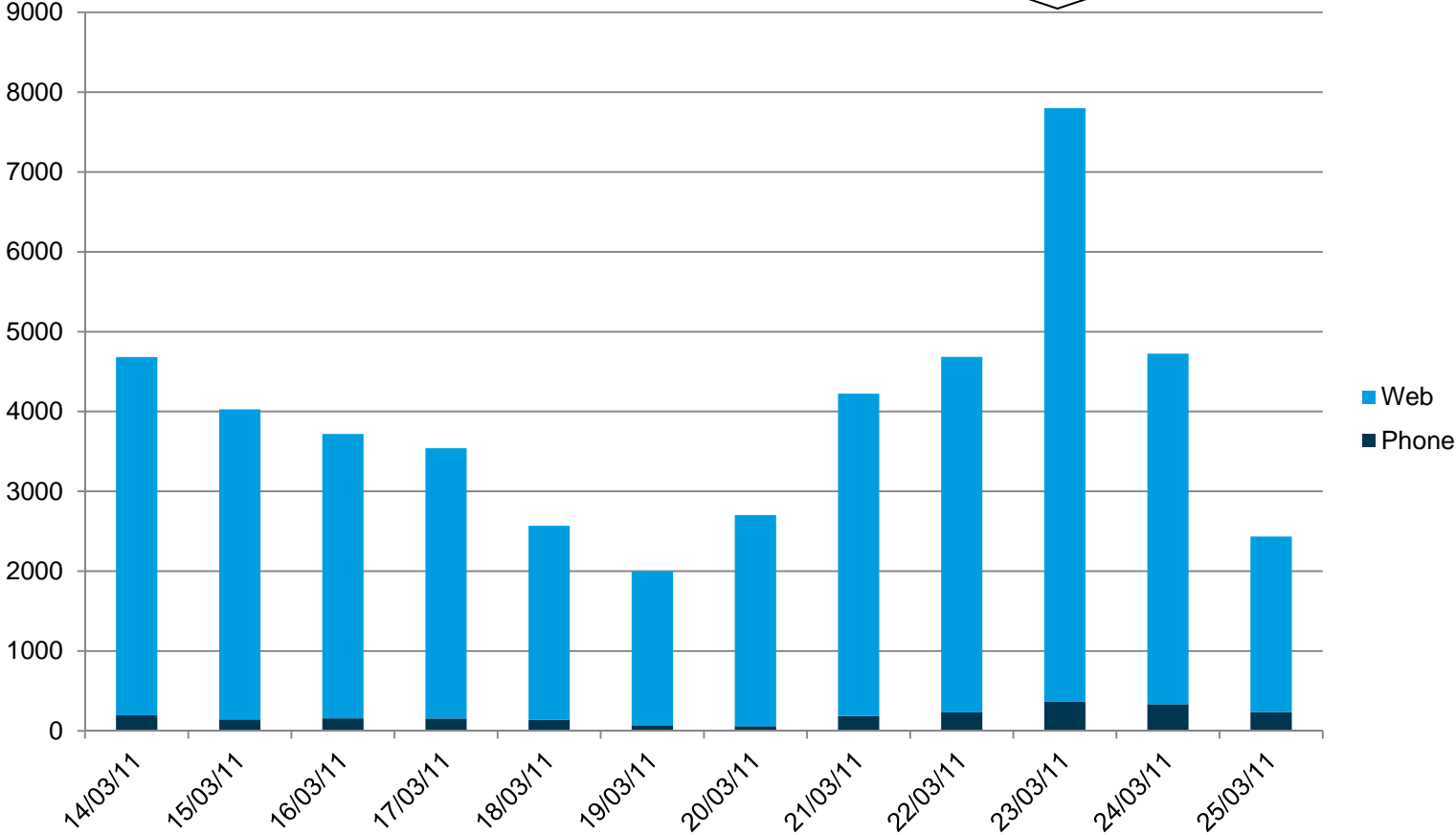


# Voters Year of Birth



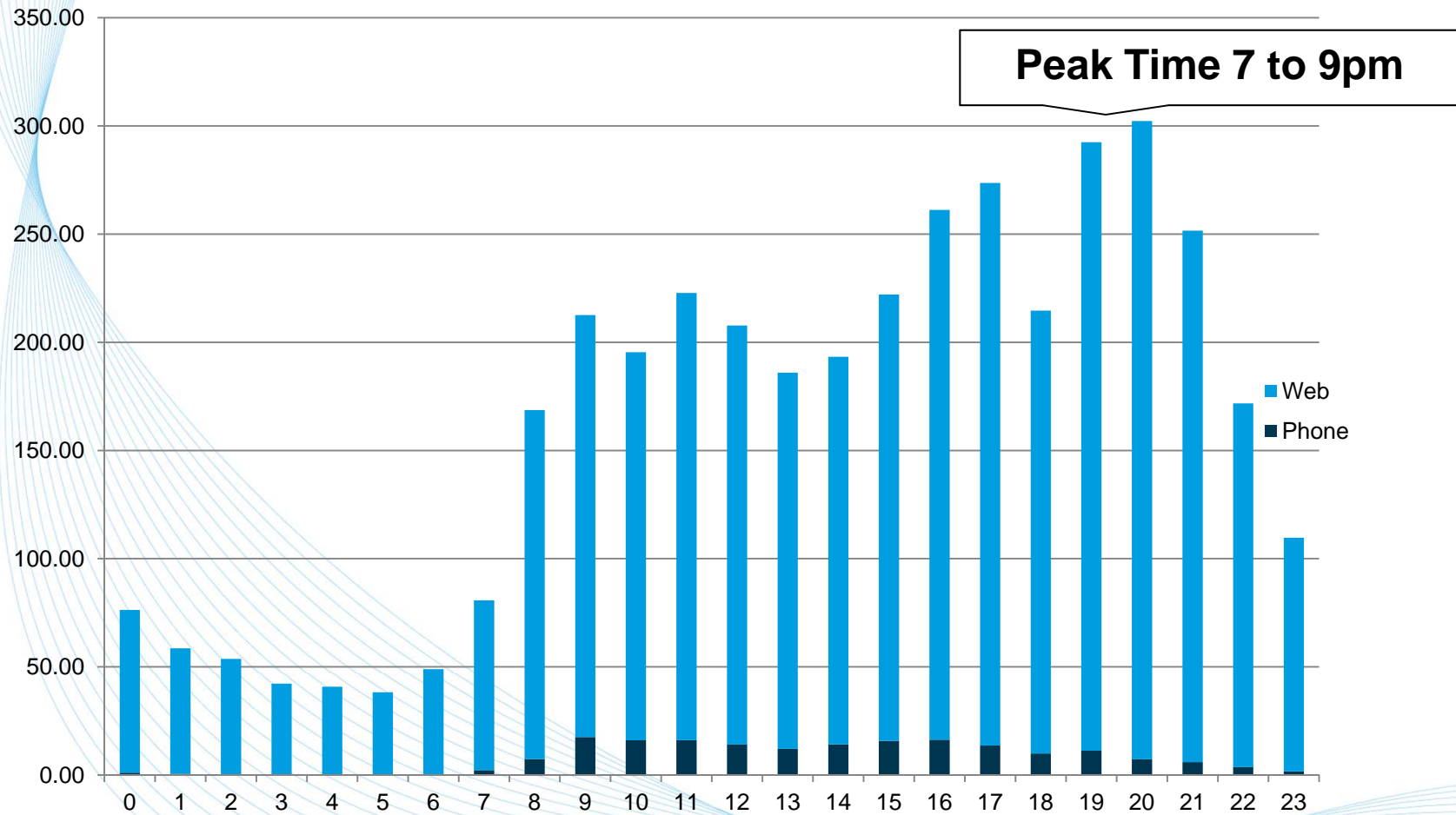
# Votes taken by day

**Close of  
Registration**





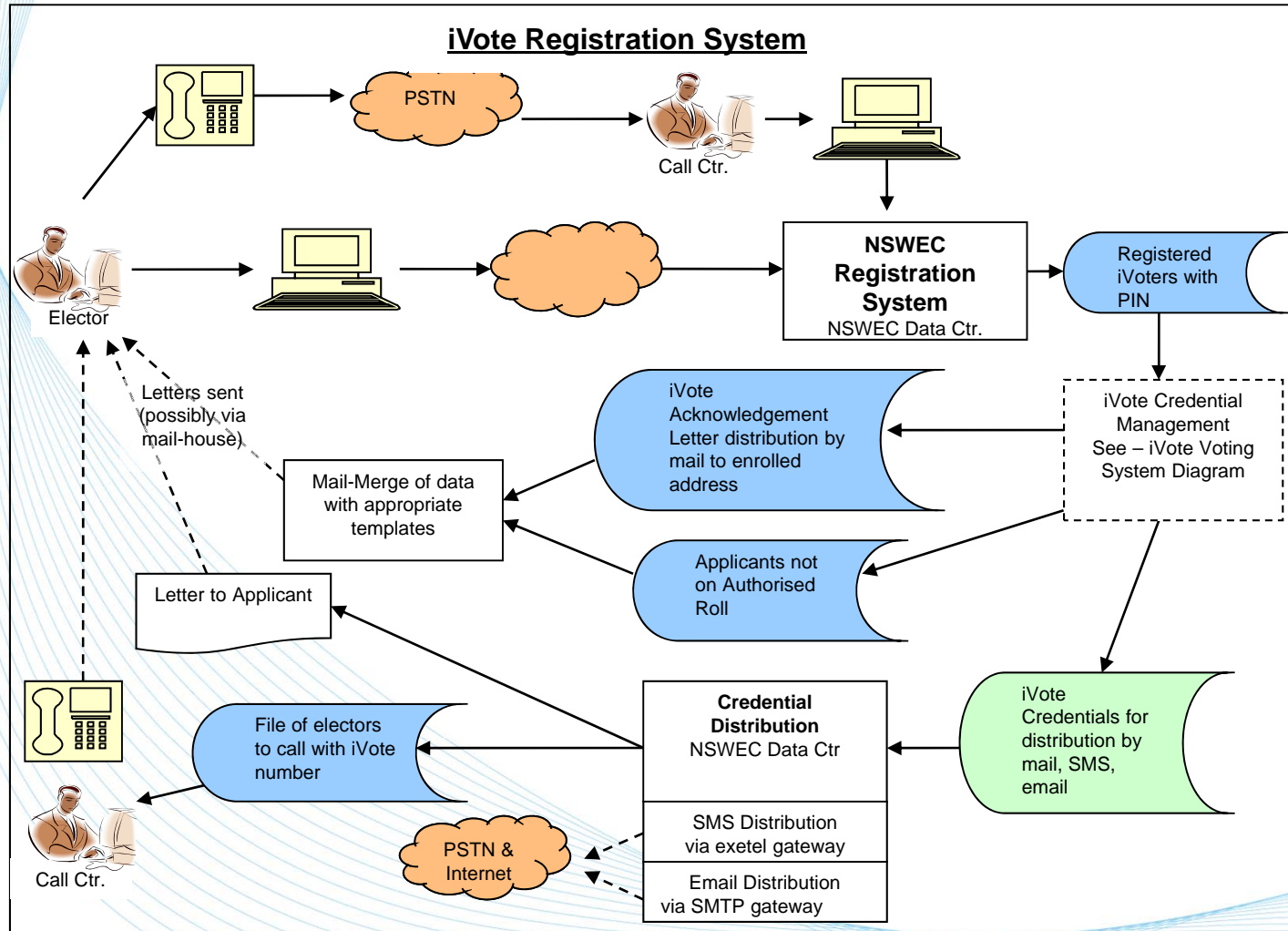
# Average Votes per hour during a day



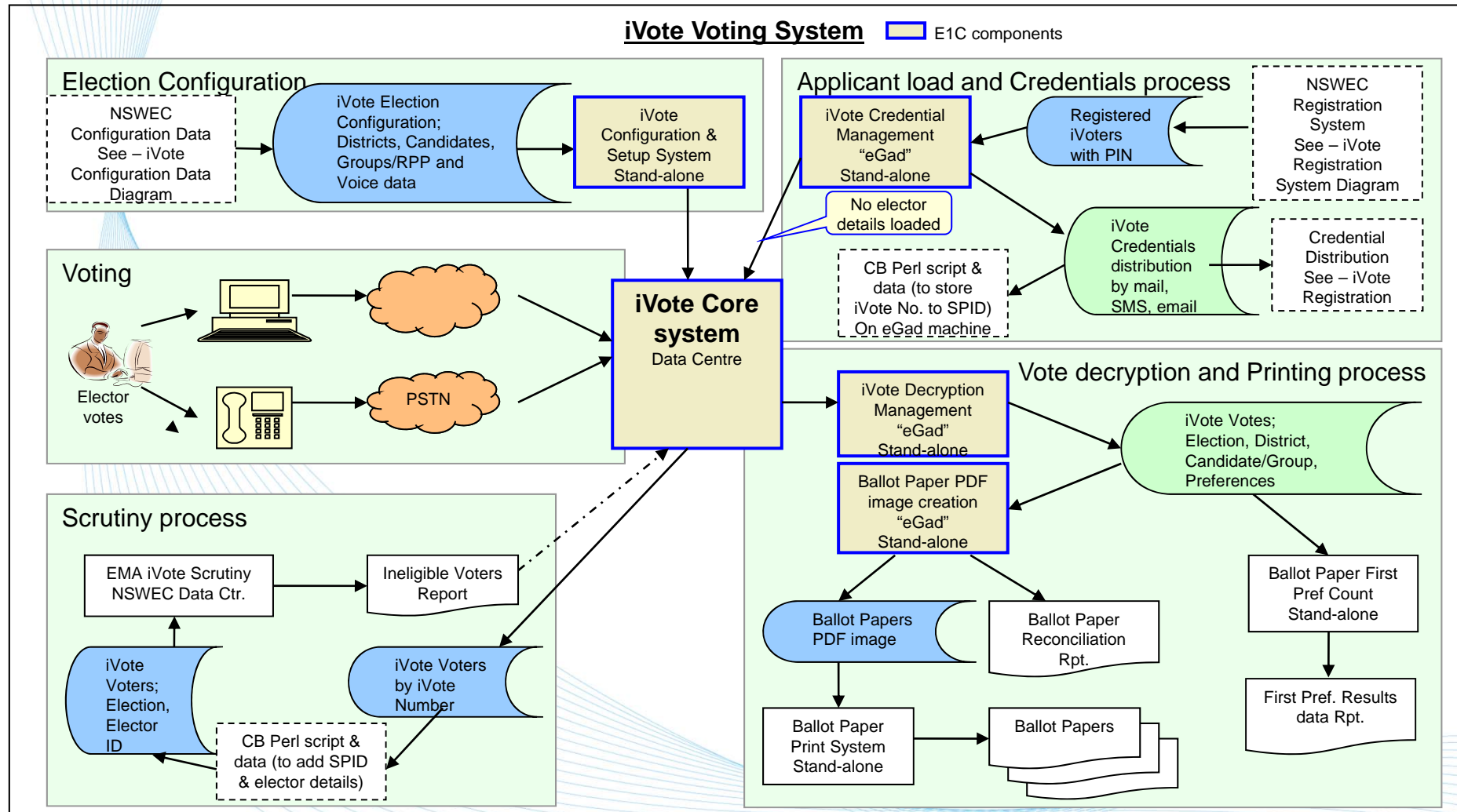
## Election Day Processing

- Re-organise the space to set-up 8 printers
- Printing voter preferences
  - Scrutiny (has a vote already been accepted?)
  - Unlocking the system by quorum (3 of 5) of Electoral Board
  - Decryption of votes and printing ballot papers  
(all on special A4 paper with LA printed 3 per sheet and then cut)
  - Despatching to Returning Officers
  - Scrutineers

# Registration Process

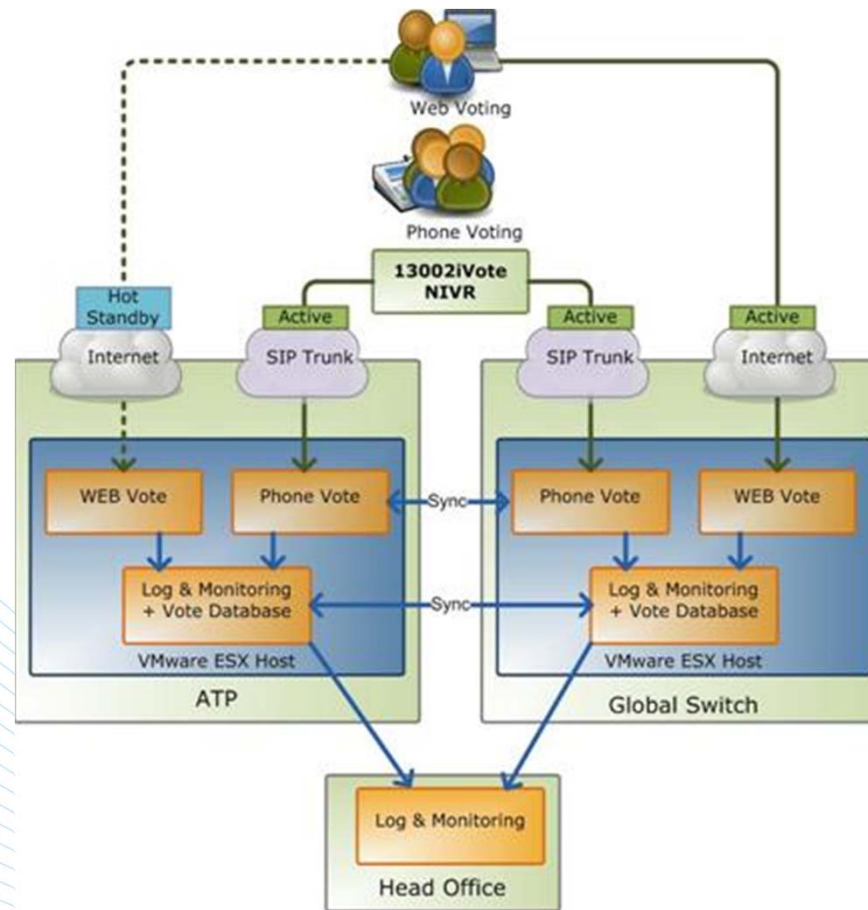


# Voting Process





# Data Centre



## Security of Remote Electronic Voting

- iVote Integrity
  - Independent development of a test standard
  - Extensive testing including; intrusion testing and usability testing
  - Independent audit reports before and after the election
- Offence for hacking/tampering
  - The legislation for technology assisted voting introduced offences with a maximum penalty of \$11,000 and 3 years

## Security Approach

- Registration and Voting
  - Every registrant had a letter sent to their enrolled address verifying they registered for iVote. They were asked to contact NSWEC if they had not registered for iVote to identify if any impersonations occurred (no complaints were received)
  - Over 99% of registrants who tried to vote using iVote voted successfully i.e. about 250 voters who tried to vote failed.
  - Elector sent iVote Number which entitled them to vote once.
  - If elector was not able to vote with their iVote Number or forgot their PIN, the elector could re-register and be issued new iVote Number, the old vote was deleted. This meant anyone stealing credentials had their vote removed.

## Security Approach (cont...)

- Vote Security
  - To vote you need credentials (Two Factor security)
    - PIN Number provided by voter not known to election officials – 6 digit
    - iVote Number provided by NSWEC – 8 digit
  - No voter details held on core voting system
    - Only a hash of the PIN and iVote Number held on voting server to be used for authentication of entered values by user
    - Hashing done using large “salt” to make more difficult to break encryption using brute force approach
  - Only allowed to vote once. Able to “delete” encrypted votes of electors who have voted or should not have voted
  - Issued receipt upon completion of successful vote which the elector can use to check their vote has been correctly processed after election closed



## Security Approach (cont...)

- System Security
  - Computer system locked at commencement of election and only Electoral Commissioner and iVote Manager have “keys”
  - Passwords to electronic ballot box held by 5 trusted people. Quorum of 3 needed to open or close ballot box
  - Electronic ballot box closed (encrypted) at beginning of election such that the contents of votes put into the box are not visible to anyone. Votes in electronic ballot box are like postal votes inside an envelope
  - Electronic ballot box opening (decrypt) when election closed separating the vote from the voter and allowing vote to be printed
  - Opening and closing of box witnessed by scrutineers



## Scrutiny

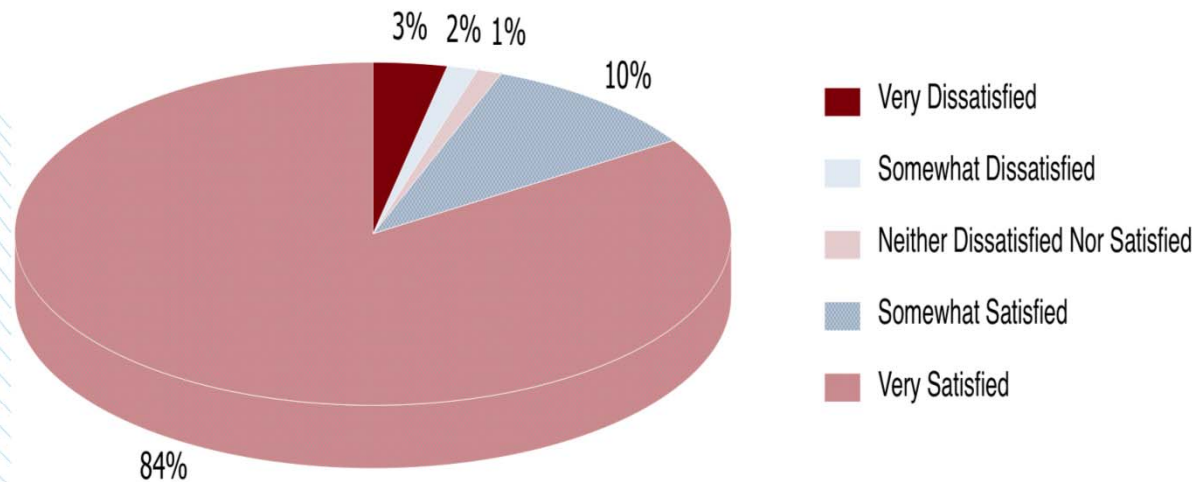
- Paper System
  - Candidates/Parties nominate persons to observe vote counting processes on election night operations in polling place and post election night in Returning Officer offices
- iVote System
  - System scrutinised by independent software auditors for security and integrity of key software and encryption processes
  - System tested by independent testing company
  - Voting system audited against iVote Standard by PWC
  - Encryption and decryption process witnessed by scrutineers
  - Ballot Printing and reconciliation process witnessed by scrutineers and reconciled to expected votes from decryption and log file data
  - Counting of ballots done using standard counting and scrutiny

## The vast majority of comments are positive

- Twitter:
  - “Kudos to Electoral Commission NSW for iVote system.”
  - “Just voted online in the NSW State Elections. Impressed I can now vote online. Not so impressed at the candidates.”
  - “Still overseas and voted today for NSW election using iVote online. Surprisingly efficient and easy.”
- iVote feedback via email, survey monkey and voicemail:
  - “To let you know the iVote online voting is brilliant. Hopefully we won't need to be overseas to use it next time. Thanks to all involved in providing the service”
  - “It's NO WONDER people don't vote,who was the brainless moron who developed you ivote website?They should go back to MacDonalds although I doubt they could hold down a job there(they require a modicum of intelligence)”

# Satisfaction

- Post Election Survey
  - 94% satisfied
  - Main suggested improvement to extend usage



## Incidents

- Operator Error
  - 1026 Electors receiving seven-digit PINS
  - 842 Reminder to vote being sent to people who had already voted
- Infrastructure Failure
  - 37 minute failure between iVote data centres – no lost votes
  - 9 minute outage of live iVote system – no cause identified
- Programming Error
  - iVote by Web allowing letter “N” onto 43 ballots due to java script error
- Voting problems
  - About 175 voters appeared to experience problems voting



## Lessons Learnt

- Governance drives every aspect of the project
- Not really a technology project
- In house team with supplier technology support
- More time – 6 months is not enough for implementation
- Test, Test, Test – Useability, Functional, Stress, boundary
- Test Harness – need to simulate election in final production environment under worst conditions
- Supply must lead demand or suffer the consequence
- The little things count (it is amazing what you think is obvious and the rest of the world does not see).



# Questions?

More information  
[www.elections.nsw.gov.au](http://www.elections.nsw.gov.au)