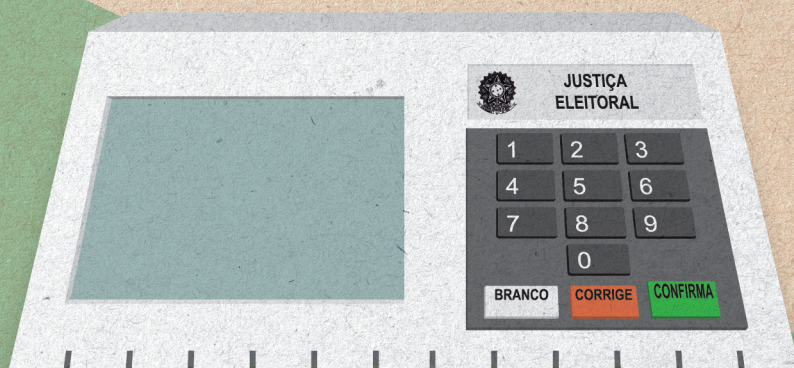


# BRAZILIAN ELECTRONIC VOTING MACHINE

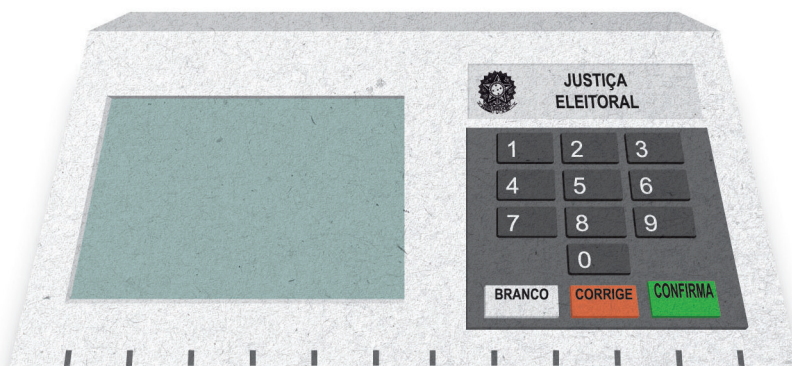


# 20 YEARS IN FAVOR OF DEMOCRACY

Brasília – 2016



# BRAZILIAN ELECTRONIC VOTING MACHINE



# 20 YEARS IN FAVOR OF DEMOCRACY

Brasília – 2016

© 2016 Superior Electoral Court

All rights reserved. This document, or parts thereof, must not be reproduced in any form without the prior written permission of copyright owners.

Office of Information Management  
SAFS, Quadra 7, Lotes 1/2, 1º andar  
70070-600 – Brasília/DF  
Telephone: +55 (61) 3030-9225

**Secretary-General of the Presidency**

Luciano Felício Fuck

**Director-General**

Maurício Caldas de Melo

**Information Management Officer**

Janeth Aparecida Dias de Melo

**Coordinator of Publishing and Publications**

Renata Leite Motta Paes Medeiros

**Publishing**

Subdivision of Publishing and Graphic Design (Seprov/Cedip/SGI)

**Cover and graphic design**

Clinton Anderson and Daniel Gomes

**Editorial services – copyediting**

Subdivision of Proofreading and Copyediting Services (Seprev/Cedip/SGI)

**Proofreading and copyediting**

Manuela Costa, Patrícia Jacob and Vanda Tourinho

**Translation**

Simonny Valéria Soares  
International Advisory/TSE

**Printing and print finishing**

Subdivision of Graphic Services (Segraf/Cedip/SGI)

Cataloging in Publication Data (CIP)  
(Superior Electoral Court – Library Prof. Alysson Darowish Mitraud)

---

Brazil. Superior Electoral Court.

Brazilian electronic voting machine : 20 years in favor of democracy. – Brasília :  
Superior Electoral Court, 2016.

41 p. ; 24 cm.

Original: Urna eletrônica : 20 anos a favor da democracia.

1. E-voting machine – History – Brazil. 2. E-voting – Brazil. I. Voter's card number.

CDD 324.650 981  
CDU 342.843.5(81)

---

## **SUPERIOR ELECTORAL COURT**

### **President**

Justice Gilmar Mendes

### **Vice-President**

Justice Luiz Fux

### **Court Justices**

Justice Rosa Weber

Justice Maria Thereza de Assis Moura

Justice Herman Benjamin

Justice Henrique Neves da Silva

Justice Luciana Lóssio

### **Federal Electoral Prosecutor**

Rodrigo Janot Monteiro de Barros



INTRODUCTION	7
BALLOT BOXES BEFORE THE DIGITAL AGE	9
THE BIRTH OF E-VOTING MACHINES	11
CHARACTERISTICS OF THE BRAZILIAN EVM MODEL	14
THE STRENGTHS OF THE BRAZILIAN EVM MODEL	16
VOTING SECURITY	18
DIGITAL EVM DEFENDERS	20
PHYSICAL EVM DEFENDERS	22
PUBLIC SECURITY TESTS	25
AUDITABILITY OF ELECTIONS	27
CONFIGURATION OF E-VOTING MACHINES	29
COMPONENTS OF E-VOTING MACHINES	31
ACCESSIBILITY OF E-VOTING MACHINES	34
EVM LOGISTICS DURING ELECTIONS	36
DISPOSAL OF E-VOTING MACHINES	38
CONCLUSION	40

The Brazilian electronic voting machines (EVMs)<sup>1</sup> complete its 20th anniversary in 2016. These devices were used for the first time in 1996 and have been object of many different technological improvements ever since with the aim of ensuring that Brazilians exercised their voting rights. The Brazilian EVM model is an icon of the country's democracy and constitutes the most relevant undertaking of the Superior Electoral Court (TSE).

Aesthetically simple if compared to other key voting machine models, the design of the Brazilian EVM resulted from the dedication of highly talented professionals from the Electoral Justice and other government agencies, including the National Institute of Spatial Research (INPE), the Brazilian Army, the Brazilian Air Force (Department of Aerospace Science and Technology – DCTA) , the Brazilian Navy, and the Center of Telecommunications Research and Development (CPqD), being all such entities deeply committed to implementing state-of-the-art IT security mechanisms and standards.

Although the media has criticized Brazilian EVMs in many occasions – often by plain lack of awareness of their security components -, it is one of the safest voting devices being used to this date. Along with the computerization of the Electoral Justice, EVMs have helped eliminate different types of fraud and human errors that affected the previous electoral process, including duplicate voting and exchange of voter's cards during the counting of votes.

The Electoral Justice dedicates tireless efforts to make sure that EVMs are delivered in any location in the Brazilian territory. The purpose is to ensure that every citizen is granted the opportunity to exercise their voting rights.

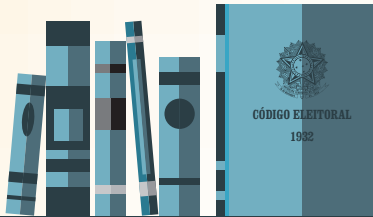
The TSE acknowledges the paramount importance of this project, which was already provided for in the Electoral Code of 1932, and has prepared this information booklet to disseminate the history behind the launching and use of EVMs in Brazilian elections: the necessary development and configuration stages in addition to information on machine parts and security features that make these devices the safest, most effective and best privacy-oriented option for Brazilian voters.

---

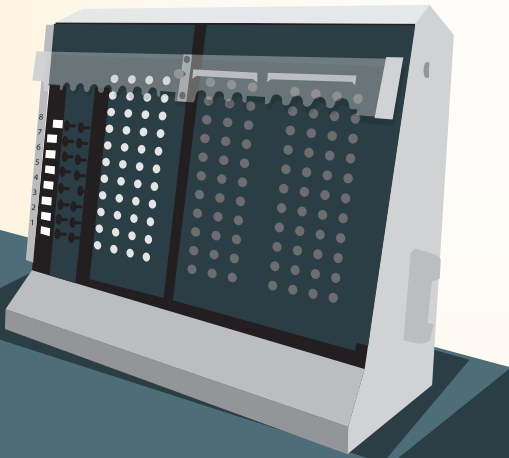
<sup>1</sup> Translator's Note; The acronym "EVM", that is, "Electronic Voting Machine" often refers to a Direct-Recording Electronic (DRE) Voting Machine. A DRE Voting Machine records votes by means of a ballot display provided with mechanical or electro-optical components that can be activated by the voter (typically buttons or a touchscreen). It processes data by means of a computer program and records voting data and ballot images in memory components. The terms "EVM" and "DRE voting machine" can be used interchangeably, being the latter the most common type of EVM.

# BALLOT BOXES

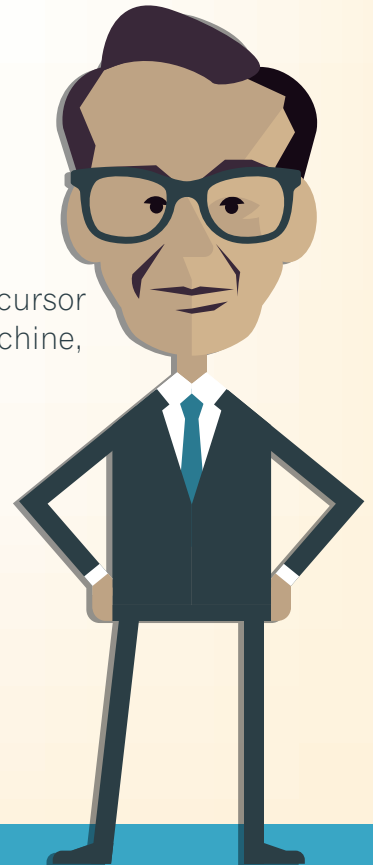
## BEFORE THE **DIGITAL AGE**



The Electoral Code of 1932  
already provided for the  
“use of voting machines”.



Sócrates Ricardo  
Puntel, a Brazilian  
national, invented  
the mechanical  
ballot box, the precursor  
to the e-voting machine,  
in the 1960s.





## BALLOT BOXES BEFORE THE DIGITAL AGE

Throughout the Brazilian electoral history, many different objects were used for ballot-storage purposes. Initially, votes would be whispered in election clerk's ears who would then write these votes down and count them, writing the names of the elected candidates in small pieces of paper that would be later stored in hollow wax balls (also known as *pelouros*). These artifacts would be kept in wooden arks until the day in which the entire community was given access to the results.

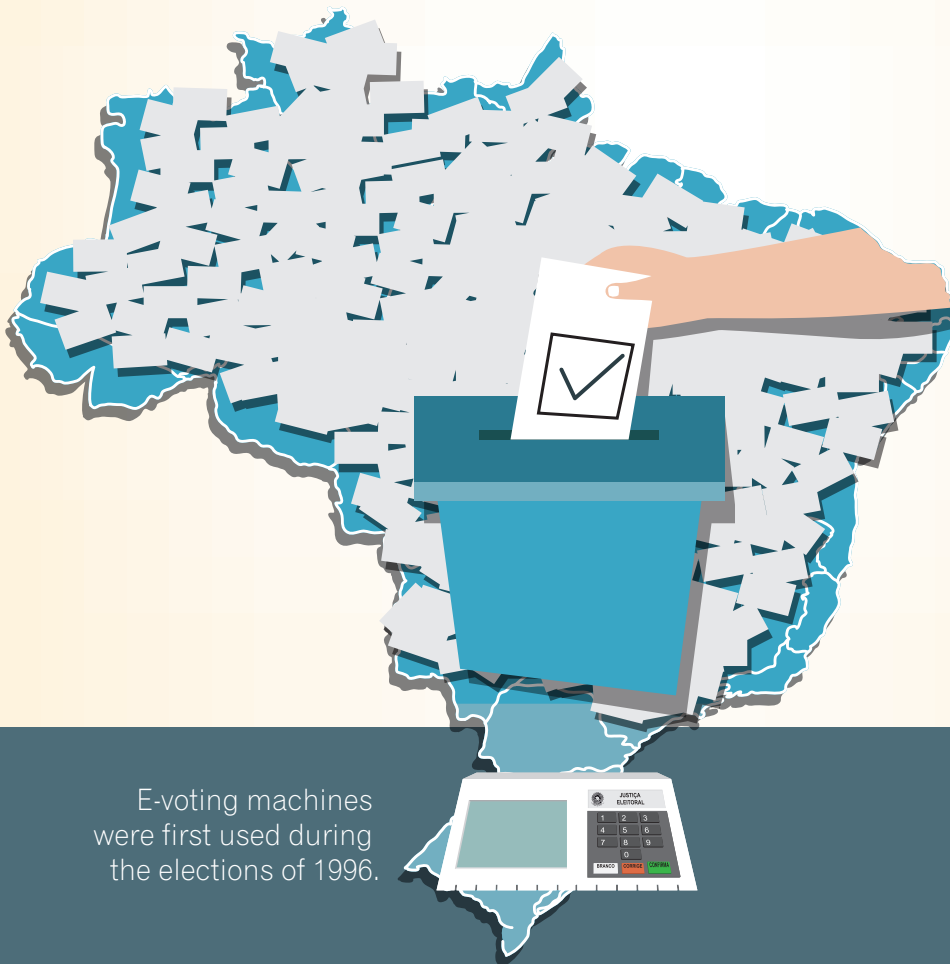
There was no official ballot paper during Empire Brazil and in the first years of the Republic. Voters were given the right to insert in wooden ballot boxes any piece of paper in which it was possible to read the name of the candidate. The legislation in place would even establish that voters could declare their vote out loud at the sight of everyone.

In 1932, after the establishment of the Electoral Justice, impenetrable voting booths and official envelopes served as means to protect voting secrecy. The manufacture of ballot papers remained under the responsibility of running candidates. These ballots, however, should be inserted in the opaque envelopes that were supplied by the Electoral Justice.

As of 1955, official ballot papers were designed and distributed to voters. In addition to curbing fraudulent practices, they mitigated the influence of economic power in elections as candidates were no longer required to cover the costs related to the manufacturing of ballot papers.

A provision set forth in the Electoral Code of 1932, however, had not been implemented to that time: "the use of voting machines". Many inventors attempted to design those devices, but it was Sócrates Puntel that came up with the mechanical ballot box in the 1960s. Nevertheless, all released machine models failed to meet a few critical requirements: accessibility, robustness, easy transportation to remote regions, protection of voting secrecy, and reliable vote-counting procedures. The definitive solution was found in 1995.

# THE BIRTH OF E-VOTING MACHINES



E-voting machines  
were first used during  
the elections of 1996.

32%

of voters  
actually used  
EVMs to vote.

## THE BIRTH OF E-VOTING MACHINES

E-voting machines have radically changed elections in Brazil. Scribbled ballot papers, canvas ballot bags, and the amount of time consumed during vote-counting procedures were replaced by computers that were already ordinarily used worldwide.

The computerization of the Electoral Justice in Brazil started in 1985, with the unified automated registry of approximately 70 million voters through the national electronic relisting program.

Before the unified registry, each Regional Electoral Court (TRE) carried out the registration of local voters in an independent manner. That has opened doors for the fraudulent adulteration of voter information. Voters registered in more than one state and deceased persons whose electoral records remained active constitute examples of fraudulent practices of that time. Such practices were curbed with the implementation of the aforementioned relisting program, which featured a national registration number for each voter.

The relisting program accelerated a number of modernization initiatives, including the following:

- The installation of a data center specific for the Superior Electoral Court, the 27 regional electoral courts and the 2,854 polling places distributed across the national territory.

- The implementation of a data transmission network, connecting all the networks of the Electoral Justice.

The computerized counting of votes was established in 1994, after the national relisting of voters. Thus, after the elections scheduled for that year were held, although votes were manually counted, partial results were entered in computer programs that tallied the total.



The efforts to develop e-voting procedures started the following year. A committee formed by jurists and IT experts presented an e-voting machine prototype.

IT, Electronics and Communication experts from the Electoral Justice, the Brazilian Armed Forces, the Brazilian Ministry of Science and Technology, and the Brazilian Ministry of Communications collaborated on the preparation of a technical project for the development of EVMs, including equipment and software.

Initially, the new e-voting device was named Electronic Vote Collector (CEV). Upon the creation of that piece of equipment, the objective was to identify automation alternatives for voting procedures, and to establish the measures that needed to be adopted to ensure its implementation in more than 50 Brazilian municipalities as of the elections of 1996.

To ensure that vote-casting was a voter-friendly experience, a few critical technical requirements had to met, including the following:

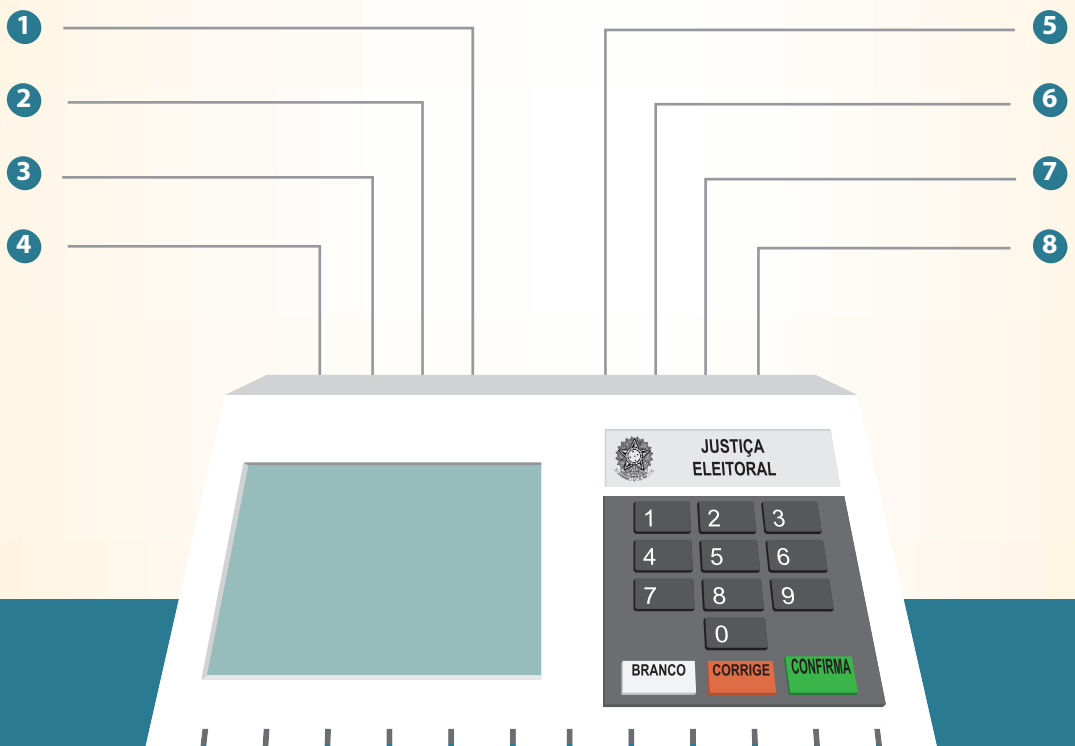
- Votes should refer to the electoral number of candidates/parties;
- EVMs should feature a numerical keyboard similar to those used on telephones.

In 1996, the project was finally completed, and Brazil experienced electronic voting for the first time. E-voting machines were set up in 57 cities, covering the entire state of Rio de Janeiro, capital cities of other states, and municipalities with more than 200 thousand voters. One third of a total of almost 100 million voters used EVMs to cast their vote in the municipal elections of that year.

In the elections of 1998, two-thirds of all Brazilian voters cast their vote electronically. In 2000, the e-voting project was fully implemented, covering the entire Brazilian territory.

Until 2006, the software used to operate e-voting machines was based on VirtuOS and Windows CE platforms. The TSE IT expert team embraced the responsibility of developing the machine system after Brazil's gun ban referendum in 2005. In 2008, the ecosystem of EVMs migrated to a Linux platform and began being entirely designed by the Superior Electoral Court.

# CHARACTERISTICS OF THE BRAZILIAN EVM MODEL



The development of the Brazilian EVM model, an icon of Brazilian elections, was based on eight major guidelines that were key to product success.

## CHARACTERISTICS OF THE BRAZILIAN EVM MODEL

The major guidelines established prior to the development of the Brazilian EVM model included:

- A universal solution: the recording of votes should be based on the electoral number of candidates or parties.
- Compliance to the legislation in place: development of EVMs that could be later updated so that occasional changes in the existing electoral legislation did not require machine modification.
- User-friendly interface: voting equipment should be easy to operate, and should display the picture of chosen candidates on the screen prior to vote confirmation.
- Cost-effective: the e-voting project should be cost-effective, especially when considering the high number of polling stations.
- Long lifespan: it should be possible to use the same EVMs in many different elections, reducing vote costs.
- Security: vote casting and counting should not be subject to any type of fraudulent practice.
- Simple logistics: EVMs should be small, powerful, lightweight, and easy to carry and store.
- Autonomy: it should be possible to operate battery-powered EVMs in locations with no electrical power supply.



# THE STRENGTHS OF THE BRAZILIAN EVM MODEL

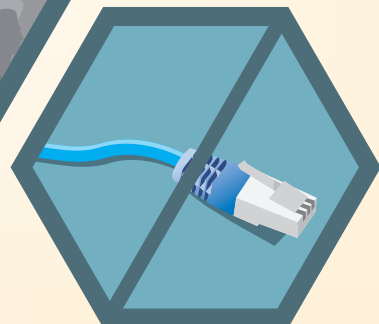


Election results are publicly disclosed before midnight on Election Day.



Impossibility of voter's identification

EVMs are not connected to the Internet nor to any network device.



## THE STRENGTHS OF THE BRAZILIAN EVM MODEL

The country takes pride in its e-voting machines. They are part of a computerized electoral process exclusively developed to meet the needs of the Brazilian society. Thus, thanks to the implementation of this automated process, Brazilians get to know who won the elections before midnight on Election Day. More than just meeting valuable time-saving standards, EVMs also constitute cost-effective solutions to save power and resources, which were abundantly spent in the past during vote-counting periods that could last for days.

Furthermore, the great advantage of EVM is that its many different security mechanisms prevent equipment adulteration and protect voting secrecy. The impossibility to identify voters combined with the fact that EVMs are not connected to the Internet nor to any network device constitute, inter alia, features that build on the reliability of these devices so as to prevent equipment violation during the many phases of the voting process.

Brazilian EVMs were developed to tally votes in a safe and confidential way, featuring the best possible cost-effective benefits so as to meet the country's needs and characteristics.

# VOTING SECURITY

Thanks to the maturity acquired over the past **20 years of e-voting**, it is accurate to state that the Brazilian computerized electoral process constitutes a full, safe and advanced electoral solution.

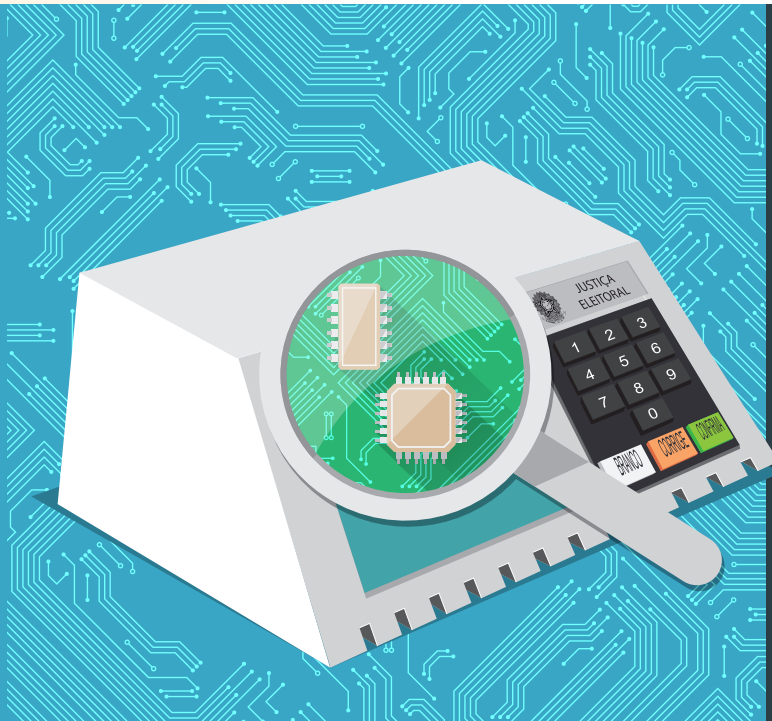


Breaking one single pencil is an easy job. But try to break more than a dozen all at once, and you will see that it demands amazing strength. The same applies to the security of e-voting machines: they comprise more than 90 electoral security systems. Such architecture of numerous linked barriers makes election fraud highly improbable, especially if considering the brief amount of time that it takes to transmit voting data.

The protection offered by these barriers, which are both physical (specific security components) and digital (software developed to prevent fraud from taking place), is confirmed in Public Security Tests, when experts try to hack the security of EVMs in controlled environments. These tests are being organized since 2009 with the aim of improving the entire voting system.

Despite their ordinary design, which remains almost unchanged as of the date they were launched, EVMs encompass complex systems that are improved and updated every time a new version is released. In addition to that, they feature an exclusive cryptographic hardware that only runs the official software developed by the TSE, including the operational system.

# DIGITAL **EVM** DEFENDERS



The cryptographic hardware of each EVM provides these devices with individual identities, ensuring the authenticity and origin of machine-generated data.

Whenever elections are held, Brazilian EVMs are loaded with software and data that, combined with their specific operational system (Uenux), form the *equipment ecosystem*, that is, a number of software developed by TSE experts to be exclusively used by the Electoral Justice, which run together to ensure the full operation of these machines.

All computer systems used in vote casting, counting and tallying procedures are sealed and digitally signed during the Ceremony of Digital Signing and Sealing of Systems, a public event that is required by law, which counts on the participation of political parties and coalitions, members of the Prosecution Service, the Brazilian Bar Association, and persons authorized to attend the ceremony. A hash code is generated during the event, and it works as the identity (a summary) of each sealed app. The adulteration of one single character in the source code would result in an incompatibility with the original hash code.

The list of hash codes is handed over to the authorities that attend the event and is then published in the TSE web portal. Thus, it is possible to check, at anytime and anywhere in Brazil, if the app that is running in a given EVM is the same that was generated during the public ceremony.

The cryptographic hardware of each EVM constitutes another important barrier that provides these devices with individual identities. That feature ensures the authenticity and origin of machine-generated data. It also ensures that EVMs will only run official systems that are signed by the Electoral Justice. Furthermore, EVMs are programmed to run – and receive votes – only while elections are being held.

# PHYSICAL **EVM** DEFENDERS

E-voting machines also count on a number of devices and practices aimed at preventing their physical violation.





E-voting machines also count on a number of devices and practices aimed at preventing their physical violation:

- The TSE has total control over the e-voting machine project. The company responsible for manufacturing physical components and for the assembly of the machines cannot operate them without prior authorization of the Court.

- Known by their robustness, EVMs are designed to stand different weather, storage and transport conditions.

- After being configured for Election Day, a security seal especially designed and manufactured by the Brazilian Mint is tagged on all EVMs, preventing any violation attempt.

- Similar to flight data recorders, EVMs have secure logs. These logs constitute a security-relevant record of events that can be later analyzed with the purpose of identifying the causes of occasional problems that might have taken place during the vote.

- Before voters start casting their votes, EVMs print the *zerésima*, a report that proves that these machines have zero votes at that point.

- After the election, each EVM prints five copies of the machine bulletin (BU), which features the total amount of e-votes cast for each candidate or party. One of these copies is posted at the precinct for the public. At that moment, the results of that EVM are officially made public. Additional copies may be handed out to inspecting officers appointed by any interested political party.

- EVMs are not connected to any wired or wireless data network. That prevents Internet-based and long-distance attacks.

The new biometric voting system applied to the elections constitutes another way of ensuring the integrity of the electoral process. It recognizes, checks and identifies previously registered voters.

Fingerprint scanning and reading add to safer identification of voters. Voters are clear to vote only after fingerprint recognition, which rules out any possibility of voter identification fraud.

Regarding the elections of 2016, the total of Brazilian voters is expected to be around 140 million voters. Out of the aforementioned total, a share of 27.33% is eligible to make use of the biometric voting system, which corresponds to almost 40 million voters. The biometric relisting of Brazilian voters started in 2008 and remains open.

# PUBLIC SECURITY TESTS

In controlled environments, Electoral Courts invite stakeholders and third parties to attempt to hack their security mechanisms.



## PUBLIC SECURITY TEST

Public Security Tests (TPS) is an unparalleled world event created from the initiative of the Superior Electoral Court (TSE) with the aim of strengthening the reliability, transparency, and security of vote casting and counting as well as continuously improving the Brazilian electoral process.

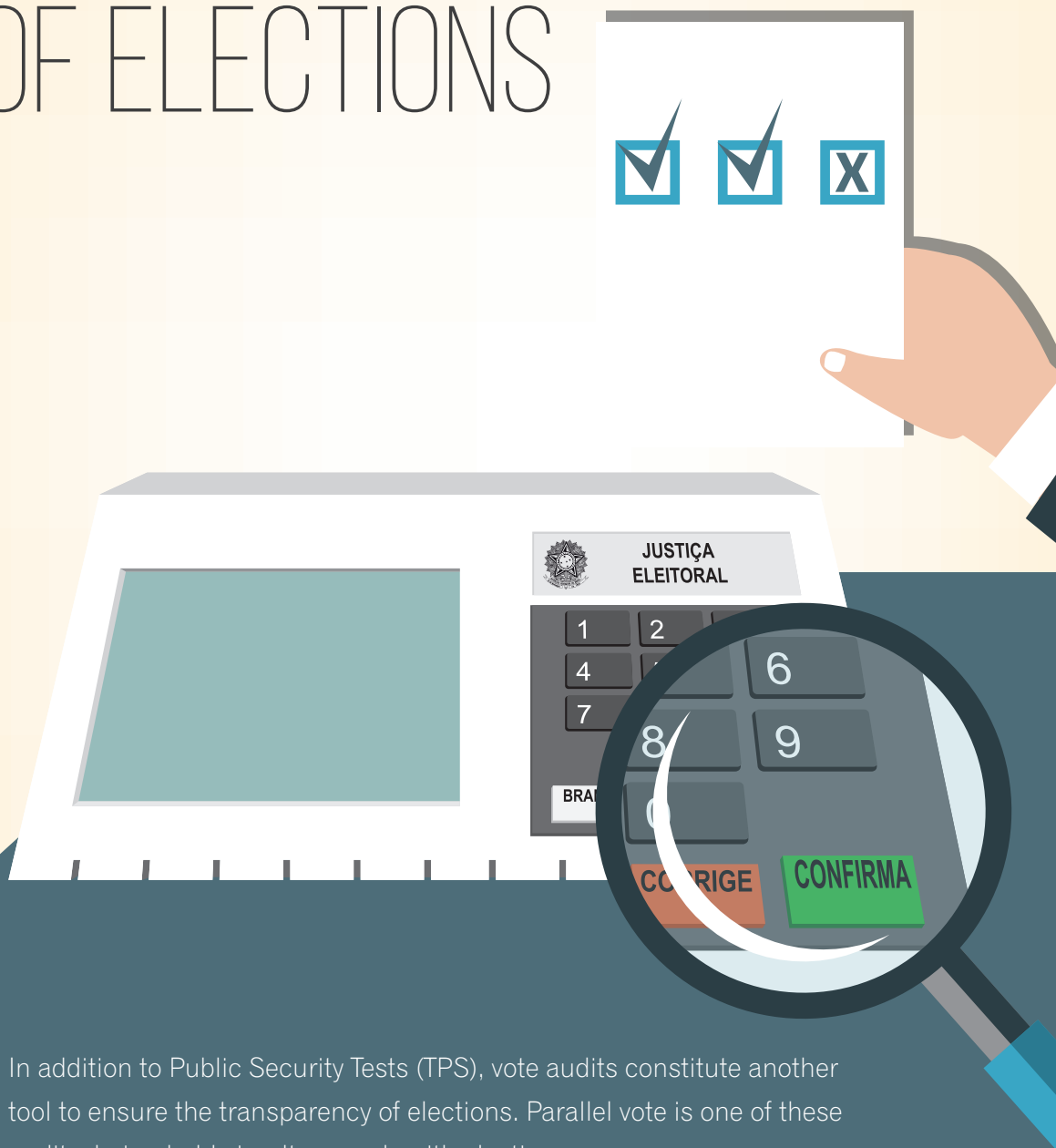
Based on institutional transparency, one of the pillars of the TSE and the entire Electoral Justice, the testing event brings together Technology and Information Security experts from many different organizations, academic institutions, and prestigious government agencies. During public tests, the participants are invited to attempt to hack EVMs and their internal and external components with the purpose of identifying system vulnerabilities related to the potential adulteration of results and breach of voting secrecy.

Electoral systems submitted to Public Security Tests include those used for generating data storage media, for voting, vote-counting, transmission and receipt of files. These systems, which include EVM hardware and loaded software, are sealed during a public ceremony.

As of 2016 onwards, the ceremony referred to above, which used to be an optional event, became mandatory as established in TSE Resolution No. 23,444/2015. In 2009, during the first edition of the TPS, it was possible to identify improvement opportunities in the keyboards of voter's terminals. After the second edition of the TPS, in 2012, the technical team performed improvements in the mechanism used to shuffle digital votes. In 2016, event participants pointed to the need to improve items like the audio system for visually impaired persons, and the check code that is used as contingency measure. None of the identified vulnerabilities, however, posed an actual threat to the integrity of elections.

The fact that Public Security Tests are mandatory constitutes one more reason trust the effectiveness of Brazilian EVMs, as these devices are subject to continuous improvements so as to ensure that citizens exercise the right to vote in a safe, transparent and efficient environment.

# AUDITABILITY OF ELECTIONS



In addition to Public Security Tests (TPS), vote audits constitute another tool to ensure the transparency of elections. Parallel vote is one of these audits, being held simultaneously with elections.

## AUDITABILITY OF ELECTIONS

EVMs used in parallel vote are selected on the eve of Election Day in draws organized by the TRE of each state. After the draw, the selected devices are collected at their places of origin and taken on the same day to the regional courts head office, where they are then stored and monitored.

Parallel vote follows actual voting hours. Surveillance cameras are set up to track the event, attended by accredited auditors and inspecting officers appointed by political parties and coalitions who clear the vote after checking the digital signature and summary of electoral systems. Prior to casting their votes in EVMs, event participants disclose their vote to inspecting officers and record their voting choice in an independent vote-counting terminal. After that, the voting choices disclosed by event participants are compared with the results recorded in the machine bulletin (*Boletim de Urna – BU*)<sup>1</sup>, which is printed by all the devices where votes were cast. These procedures take place during a public ceremony.

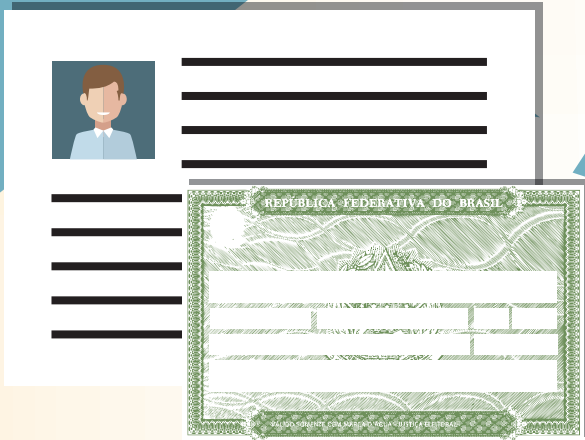
It is possible to challenge any machine result forwarded to the TSE in case it differs from the result printed in the original BU. Additionally, the digital record of the vote (RDV) also made possible the re-counting of votes in an automated way. Political parties and coalitions may request copies of RDVs and BUs of their interest with the purpose of checking the official tallying of votes with that recorded in their own vote-counting software.

All these mechanisms attest to the transparency and integrity of the electoral process in Brazil.

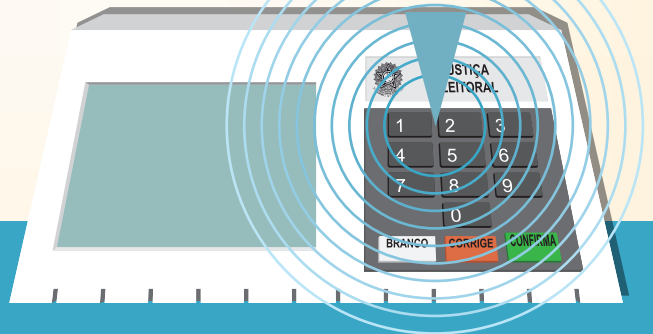
---

<sup>1</sup> Report that summarizes the tallying of votes cast in each e-voting machine after the closing of voting hours. It is affixed on the wall of the corresponding polling station to publicize the results of each e-voting device.

# CONFIGURATION OF E-VOTING MACHINES



During the preparatory stage, EVMs are loaded with election data and systems that have been previously sealed.





## CONFIGURATION OF E-VOTING MACHINES

After the Public Ceremony of Digital Signing and Sealing of Systems takes place, voting software are cleared to be distributed to all TREs, where they should be set up and serve as a means to import election data. Then, the data storage media used to set up and load EVMs with election data is generated during public ceremonies held at regional electoral courts or polling places.

E-voting machines run two types of data storage media: flashcards and another data storage format that is exclusively used by the Electoral Justice, which is known as “result memory”, featuring a USB connector and operating as some sort of flash drive.

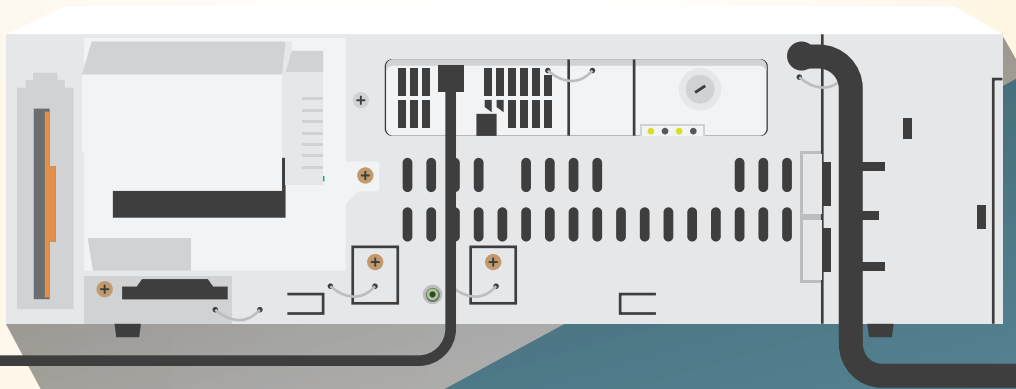
The completion of the first stage of configuration of EVMs placed at polling stations, of EVMs used to justify the absence of voters, and of EVMs used as reserve for contingencies occurs after the installation of the operational system, e-voting machine software, libraries and election data. The second and last stage is completed after the running of a number of tests with the purpose to confirm the smooth and correct functioning of the voting equipment.

Charge memory cards (flash charging cards) are used in the first stage of configuration of EVMs. During the last stage, these machines will be set up to simultaneously run voting memory cards (flash voting cards) and result memory cards.

Next, EVMs are stored in locations determined by the TRE, being taken to polling places on the eve of Election Day.

All the devices and practices detailed above point to the maturity acquired over the past 20 years of e-voting. It is accurate to state that the Brazilian computerized electoral process constitutes a full, safe and advanced electoral solution.

# COMPONENTS OF **E-VOTING MACHINES**

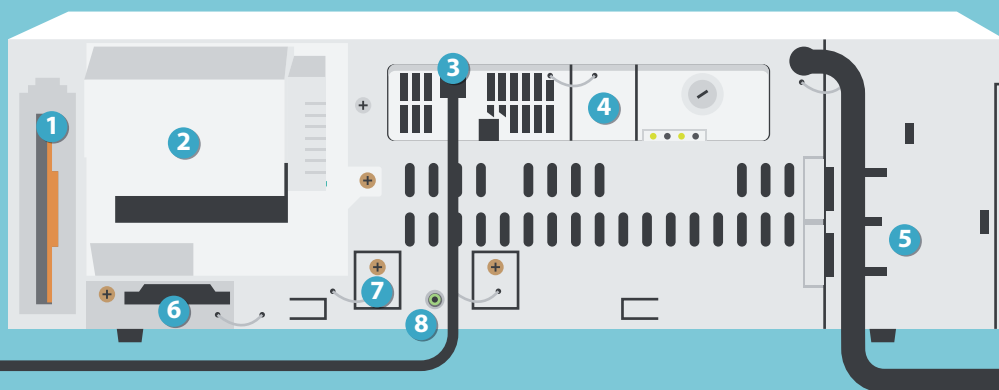


EVMs are election-oriented microcomputers. Their components provide for the accessibility, swiftness and security of the vote.

## COMPONENTS OF E-VOTING MACHINES

It is common knowledge that an e-voting machine is a microcomputer especially developed to store votes cast when a referendum is held or on Election Day. It seems opportune, however, to learn more about the components designed to make EVMs the perfect solution for vote tallying. Below, a list of EVM components and a brief description of their functions.

## THE TECHNOLOGY BEHIND BRAZILIAN E-VOTING MACHINES



### E-voting machine

#### 1 Result memory card

EVMs recorded e-votes in floppy disks until 2008. The current EVM model has a memory component that is like a flash drive, which is called result memory card. It is bigger than ordinary USB flash drives and fits easily in machine ports, which makes it harder for poll workers to accidentally damage it when connecting the device to the EVM.

#### 2 Thermal printers

Regardless of their small size, EVMs come with a built-in thermal printer. These printers are similar to thermal credit card receipt printers, and are also used to print machine bulletins, which features the total vote. These printers require special paper that is designed so that all printed data lasts up to five years.

#### 3 Power cables

Power cables (external power supply and battery), that keep EVMs plugged into power outlets.

#### 4 Internal battery

In the event of shortage of power supply at a given polling place, EVMs backup internal battery power will run for up to 13 hours.

#### 5 External battery

In case EVMs backup internal battery power ends before expected after having been activated because of lack of power supply at a given polling station, the external battery comes in handy as a third power supply alternative, featuring a battery life similar to the one of internal batteries.

#### 6 Flash memory similar to the one of digital cameras

In addition to the result memory card, EVMs record data in a flash memory card, similar to the one used in digital cameras. This data storage device operates as a backup copy of EVMs recorded data in case the other memory is occasionally damaged.

#### 7 USB

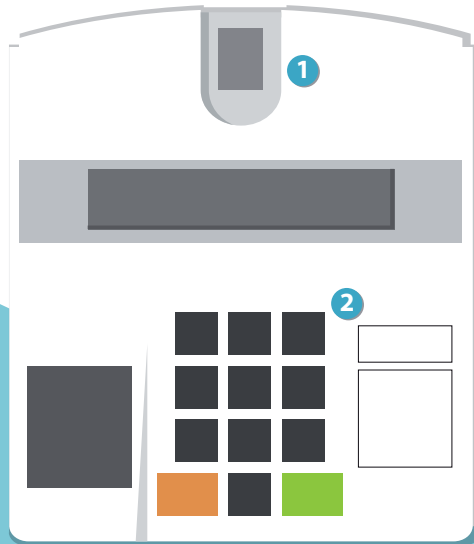
It is possible to record EVMs voting data in USB flash drives (EVMs come with two USB ports). This data storage alternative operates as a backup copy of EVMs recorded data.

#### 8 Audio output to visually impaired voters

EVMs come with an audio output (compatible with the majority of ordinary earphones) to assist visually impaired voters. After plugging the earphones at the corresponding port, voters get to hear the numbers they typed when e-voting.

## Poll worker's terminal

A poll worker's terminal commands an EVM. Poll workers use it to type each voter's registration number (voter's card number), and confirm voter's identity and vote. After the vote is complete, the poll worker types a password in this terminal, triggering the printing of voting bulletins in the corresponding EVM.



### 1 Fingerprint authentication

The biometric reader scans the optical image of voter's fingerprints to confirm their identity.

### 2 Numeric keyboard

Designed as a telephone keypad, featuring 0-9 keyboard keys along with "Confirm" and "Correct" buttons, a LED display and lights that indicate EVM status (Free, Wait, and Internal Battery).

Source: Rafael Fernandes de Barros Costa Azevedo, Head of the Logistics at the IT Department of the TSE.

# ACCESSIBILITY OF E-VOTING MACHINES

In addition to being a safe voting device, the Brazilian EVM model features mechanisms that ensure that the right to vote is accessible to everyone.



## ACCESSIBILITY OF E-VOTING MACHINES

In conformity with the provisions set forth in the Convention on the Rights of Persons with Disabilities, adopted by the United Nations, Brazilian EVMs feature mechanisms that ensure that the right to vote is accessible to everyone.

In addition to making use of the braille system and marking key number five in the keyboard, which allows users to locate the other keys, EVMs are loaded with software that enable the use of earphones in special polling stations, provided by the Electoral Courts, so that visually impaired voters can secretly hear the number of the candidate of their preference before casting their vote.

Add to that the measures adopted by the Electoral Justice to support voters with hearing impairments or reduced mobility so that these citizens can be assisted at Electoral Registration Offices and polling stations, such as the training of poll workers to use the Brazilian Sign Language and the adaptation of voting and electoral service spaces.

Thanks to these measures, voters with disabilities get to fully exercise their right to vote.

# EVM LOGISTICS DURING ELECTIONS

The TSE is tasked with the acquisition, supply of components, relocation and replacement of EVMs on nationwide level so as to ensure the standardization and the security of elections.





The TSE is tasked with the acquisition, supply of components, relocation and replacement of EVMs on nationwide level so as to ensure the standardization and the security of elections.

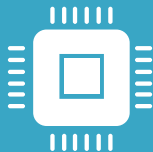
TSE inspectors check and audit EVMs when they are still being manufactured. In case one single EVM fails to meet inspectors' standards, the entire batch is returned to the production line.

After EVMs are individually packed and their delivery destination is defined, these machines are tagged with the identification of the city to which they will be transported to. Next, they are recorded as property of the Regional Court in whose jurisdiction they are set up, being under the responsibility of said Court from that moment onwards.

EVMs are distributed shortly before Election Day. The Electoral Justice counts on the support of Brazilian Navy and Brazilian Air Force to reach remote locations. Additionally, transport companies are also hired to ensure the safe delivery of EVMs and satellite data transmission kits. Many of the EVMs are delivered via helicopters, different airplane models, boats and even canoes. Some locations are so hard to reach that it is necessary to come on foot to ensure the delivery of EVMs.

# DISPOSAL OF E-VOTING MACHINES

The recycling or reuse of EVM components may result in a number of accessories and new electronic equipment parts.



## DISPOSAL OF E-VOTING MACHINES

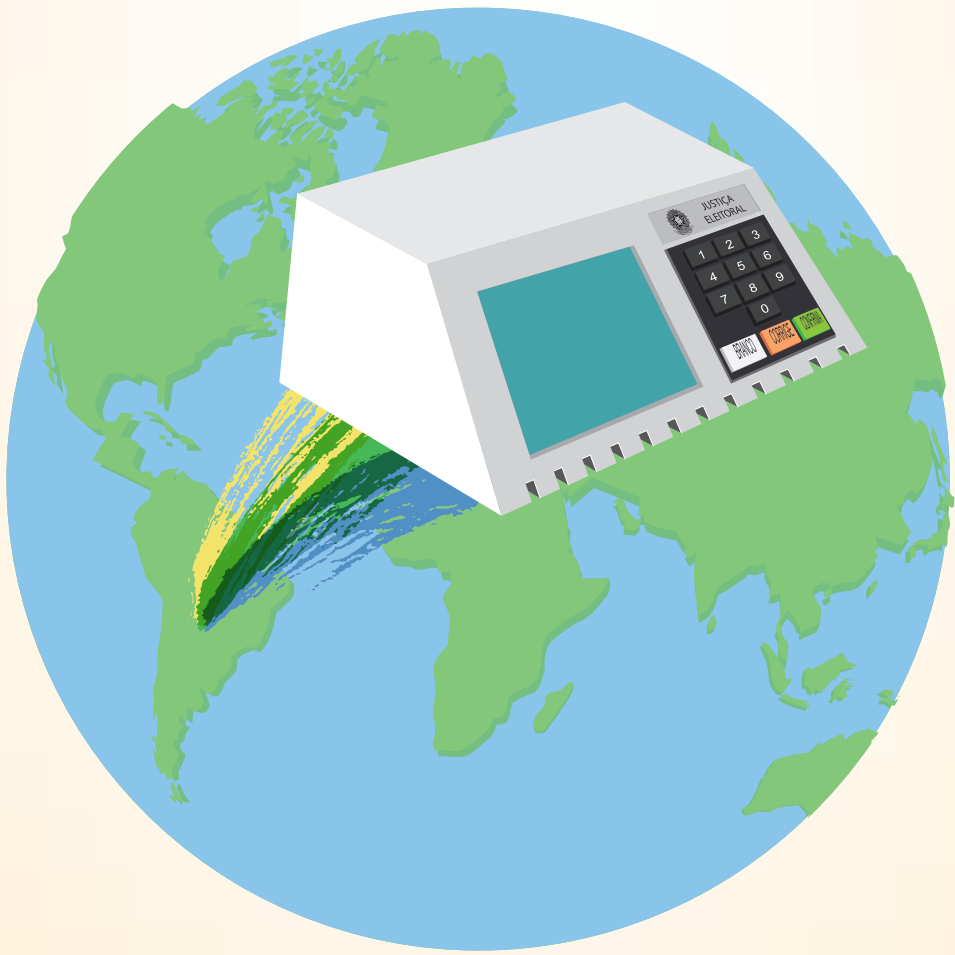
Sandal straps, beanbags, many different accessories, new electronic equipment parts and much more – every ten years, no longer serviceable EVMs may be used in the manufacturing of any of these items through the recycling or reuse of their components.

The process of recycling and disposal of EVMs is carefully implemented, which points to the concern of the Electoral Justice with the environment. The disposal of EVM parts that cannot be reused (only 1% of the EVM components) is made at accredited landfill sites, and follows a number of security measures.

EVM batteries constitute an example of this kind of concerned disposal, as waste disposal must be in conformity with the provisions set forth in Resolution No. 401/2008, issued by the National Environment Board (Conama), which is responsible for regulating the management of waste and dangerous materials.

To ensure that the disposal of EVMs is made in an eco-friendly manner, the TSE organizes public bids to hire companies to do the job. In addition to proving that EVM materials were actually recycled, successful bidders must submit a final report detailing how the management and disposal of EVMs were carried out.

# CONCLUSION



Brazil's e-voting experience is acknowledged worldwide because of its positive impact in the security and swiftness of the electoral process. The Brazilian Electoral Justice takes pride in acting as a trailblazer in the technological advances that led to the most modern elections known to this day.

However, voters' attitude and the increased awareness of the relevance of voting rights constitute the most important aspect of the successful voting experience of Brazil. In view of the above, the entire structure of the Electoral Justice remains working tirelessly and improving existing practices to help safeguard democracy in Brazil.



Printed on coated paper 150g/m<sup>2</sup> (cover) and coated paper 90g/m<sup>2</sup> (internal pages). The font used was Gothic 720BT size 10, line spacing of 18 points.





**Tribunal  
Superior  
Eleitoral**