

2019

Overseas Voting Reforms Proposal Volume 2

GLOBAL BERSIH

A Civil Society Proposal for the Election
Commission and Electoral Reform
Committee of Malaysia

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Volume 2

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Glossary

Absent voter	Includes advance and postal voters as defined in the regulations
Advance voting or early voting	A subset of absentee voting which means voting in-person at a designated polling booth earlier than Election Day
Blockchain voting	Voting using blockchain technology
Global Bersih Data Collection Survey	A survey conducted by Global Bersih in 2018 during and immediately after GE14, to document severe operational faults, identify major issues and garner voter feedback
Diplomatic bag	A diplomatic bag facilitates the delivery of diplomatically sensitive material across borders. It has a tamper-proof seal, is accompanied by a diplomatic courier and avoids delays at Customs.
Diplomatic pouch	See Diplomatic bag.
EC	Election Commission
ERC	Electoral Reform Committee
e-registration	Using electronic elements in the registration process
e-voting	See Electronic voting.
Electronic voting	The use of electronic devices or procedures to vote during an election
EVM	Electronic Voting Machine
GE13	13 th General Election
GE14	14 th General Election
GE15	15 th General Election
i-voting	See Online voting.
MFM	Malaysian foreign mission, i.e. a Malaysian embassy, high commission or consulate
NRD	National Registration Department
Online voting	Voting using an online method with or without supervision by an electoral official
OPV	Overseas postal voter
OVR Survey Report	Report on the Overseas Voting Reform Survey conducted by Global Bersih in February 2019 to get feedback from overseas Malaysians to develop a model of overseas voting that works for all stakeholders, published as Volume 3 of this proposal
PACABA	Polling Agent, Counting Agent and Barung Agent
Remote e-voting	Online voting without supervision by an electoral official
RO	Returning Officer

EXECUTIVE SUMMARY

Volume 2 contains ideas that require more vision and investment by the Election Commission (“EC”) and other stakeholders (overseas voters, Ministry of Foreign Affairs, civil society organisations, etc.). They can be tested for implementation once the more urgent reforms in Volume 1 have been implemented and the integrity of and faith in the EC have been restored. Given the current composition and more progressive direction of the EC, we believe that this will happen soon.

These ideas are: (i) having a select few Malaysian foreign missions (“MFMs”) collect overseas postal ballots before sending them to the EC by diplomatic bag; (ii) using printable postal ballots; and further in the future, (iii) implementing e-voting.

The first idea (presented in Chapter 3) to use the MFMs as collection points would save time and money for the voter because they would not have to use expensive courier services. Security would be ensured by stationing observers at the MFMs in question and using diplomatic bags. The EC can choose a select few MFMs to represent their respective regions. In this way, resources spent can be kept to a minimum while speeding up the delivery of ballots.

In Chapter 4, we explore a method in which voters may download blank ballots electronically, then print, fill in and send them by post, or deliver them in person to the ROs. To prevent duplicates, the system would issue a unique identifier code each time the identification form is printed. The greatest benefit of this method is that it saves time by removing the need for paper ballots to be posted from Malaysia to overseas voters.

Finally, we discuss e-registration and e-voting in Chapters 5-7. The biggest chapter in Volume 2 (i.e. Chapter 7) has been devoted to e-voting. We present a comprehensive review of e-voting developments from around the world. Rather than propose specific procedures, we outline international best practices and the basic democratic principles that the EC must consider before designing an e-voting system. We recommend an approach that is, we believe, suitable for the Malaysian context, including a pilot programme starting with the Malaysian Youth Parliament elections.

Chapter 1: Introduction to Volume 2

Good laws will not be effective without a national culture that resists malpractice and cheating. If a state was so corrupt that it induced a heightened state of distrust among its citizenry, as has happened in Malaysia in previous elections, then people would mistrust any number of electoral procedures. Therefore we have focused on immediate and urgent reforms that can work within the current logistical, financial and political framework in Volume 1.

However, electoral reform is a never-ending iterative process that must keep pace with emerging needs and limitations as time goes by. So here in Volume 2, we have introduced new ideas to explore. The first two of these ideas occupy a chapter each in this volume, while the final ideas – electronic registration and voting (e-registration and e-voting) – take up the subsequent three chapters.

Optimising and improving a voting system is an ongoing journey. Therefore, we hope that these options in this volume can pave the way as we move toward GE15 and beyond. Embarking on this journey requires vision, commitment and resources. However, together with civil society and all other stakeholders, we are confident that we can make this a reality.

To read about the background and objective of this proposal, as well as the approach and methodology we have employed, please refer to Volume 1.

Chapter 2: Overseas postal ballot collection at regional Malaysian foreign missions

The EC may consider collecting postal ballots at specific MFMs selected to represent their respective regions. For example, the London high commission may collect ballots from around Europe, as it takes, on average, three days for mail to travel within the continent. Only the selected MFMs in the different regions will have to be resourced, lowering the cost and manpower needed.

Voters may either drop their ballots off in person or post them to the MFM up to one week before Election Day. To be clear, voters would still have the option to mail their postal ballots back to the ROs in Malaysia. But many voters, especially students, retirees and low-wage earners, would find the costs of sending their ballots by courier back to Malaysia a hindrance to voting.

Election observers should be stationed at the MFMs to observe the unopened ballots being deposited into the diplomatic pouch¹ and resealed. The EC, through the MFMs, should reach out to the Malaysian diaspora to train a pool of volunteers to be election observers. This should be done early in the pre-election process. Global Bersih welcomes the opportunity to help the EC train and educate volunteers.

The MFM would collect the unopened ballots and dispatch them to the EC by diplomatic bag. We understand that all MFMs are able to use diplomatic bags. The MFMs would not have to sort the ballots by electorate, as that would be the EC's task upon receipt. The EC would then distribute the ballots to the ROs in time to be counted on Election Day.

We are aware of the logistical and manpower limitations associated with distributing the ballots from the EC to the ROs. In fact, diplomatic bags were used to transport ballots from the MFMs to the ROs during GE13. It was very difficult to maintain efficiency and security, but the EC should use GE13 as a case study to identify these limitations and optimise the system so that it becomes feasible.

The results detailed in the OVR Survey Report suggest that many Malaysians still have trust in the MFMs and favour this method of returning ballots if there is sufficient time to do so. By selecting only a few MFMs to collect the unopened ballots, the costs associated with manpower would be greatly reduced and would save the EC's resources.

Strengths

- The biggest advantage of this model is that the ballots are monitored and accompanied at every step of the process.
- This method provides an auditable paper trail to ensure the integrity of the vote.

¹ Diplomatic pouches (also known as diplomatic bags) facilitate the delivery of diplomatically sensitive material across borders. They are a mechanism agreed upon in the Vienna Convention on Diplomatic Relations 1961. Malaysia incorporated this convention into the Diplomatic Privileges (Vienna Convention) Act 1966 [Revised - 2004]. Article 27 allows for, "diplomatic documents or articles intended for official use," sent by diplomatic bag to be, "inviolable," and states that they, "shall not be opened or detained." The diplomatic couriers themselves, "shall enjoy personal inviolability and shall not be liable to any form of arrest or detention." In the absence of a diplomatic courier, the captain of a commercial aircraft may be entrusted with the diplomatic bag for the duration of the flight.

- The EC saves on resources by providing the necessary manpower to only the MFMs selected to represent their regions, instead of all MFMs as in GE13.
- This method saves time, mitigating the time crunch that comes from a short campaign period. We recommend a 25-day campaign period.
- By returning their completed ballots to the MFM within their region, instead of their RO in Malaysia, the OPV benefits by saving on the cost of postage.

Shortcomings

- The EC has to assign adequate resources and station observers at the MFMs. The additional expenditure will vary depending on the number of Malaysians being serviced by the particular MFM.
- This option will mean that there are a variety of methods of getting overseas ballots back to Malaysia, and there will be a need for effective voter education to avoid confusion.

Recommendations

- The campaign period should be 25 days.
- Ballots should be sent to voters by post with a central contact point for voters to track their couriers.
- Up to one week before Election Day, the voter may post their ballots or deliver them in person to their designated MFM. The voter may also deliver the ballot to the RO in person or by post (as per GE13).
- Election observers from the diaspora and civil society should be trained by the EC and stationed at the MFMs to monitor the receipt of the ballots. They should witness the sealing of the ballot bag and sign on the seal at the end of the day.
- The MFMs should send the ballots back to the EC by diplomatic bag. Voters may also choose to send ballots directly to the ROs.
- The EC should distribute the received postal ballots to the relevant ROs by Election Day. Measures must be put in place to ensure the security of the ballots at the RO offices.
- On Election Day, the ballots should be counted at the ROs.

Chapter 3: Postal ballots printed by voters

Once OPVs get used to online registration, we envisage that the next step will be for the EC to introduce printable ballots. This method is not to be confused with online voting.

The OPV may receive their ballots by email (e.g.: as a secure PDF) or print their ballot papers directly from the EC's website using a secure PIN. The online security may be similar to e-registration (discussed in Volume 1) where 2-factor or 3-factor authentication is used to access the portal. In this scenario, electronic security features act as a substitute for human oversight by PACABAs that would take place in the in-person voting process.

The OPV is prevented from electronically completing the digital ballot file. Instead, they must print the ballot first before completing it, so that there is no chance that the voter's choice on the ballot is stored online. This will enable voter secrecy.

The completed ballot paper will then be returned by post to the ROs and counted on Election Day. Since this method means that ballots will reach voters very quickly, we do not think there is a need to collect ballots at the MFMs. There will be ample time to send ballots to the ROs by post.

The findings detailed in the OVR Survey Report suggest that many Malaysians favour this method if ballot security is assured. We realise that this method involves a huge adjustment not only on the legal side but also in the thinking of all stakeholders. Below is a brief summary of how this method is used successfully in New Zealand. We have also listed the amendments that would need to be made to existing laws in order to accommodate this method. See Appendix E: Suggested amendments to the legislation for using PDF ballots.

Brief summary of the New Zealand system

The New Zealand overseas voting system lets voters log in to an online portal and download PDF voting papers by entering their full name, date of birth and enrolled address. It is unlawful for anyone to download someone else's voting papers. The voting papers contain a special declaration form and the ballot paper.

Every declaration has a unique declaration number. If a voter downloads their voting papers more than once, they will have a different declaration number each time. These are recorded against their name. Voters are able to print their voting papers more than once or download new ones in case they make a mistake on them or if they are misplaced or damaged.

Overseas voters are able to scan and upload their completed ballot papers and return them using a second system called the Upload Voting Papers Application. This application will encrypt voting papers on completion of upload. The Overseas Team will decrypt and print each voting paper in a secure location.

Overseas votes are returned to a centralised Overseas Processing Team. They are responsible for receiving voting papers (i.e. declaration form and ballot paper), matching them together using the unique declaration number and sealing them into a special double pocketed envelope – one for the declaration and the other for the ballot paper.

Each member of this team is appointed as an electoral official, who completes a secrecy declaration as part of the process. They also work in a restricted area, which is not accessible by other electoral officials.

After Election Day, the New Zealand EC processes each declaration and marks each voter on a master roll. This process allows them to identify if multiple votes have been received from the same voter. These are then investigated before the vote is included into the official count. Where the vote is found to be a dual vote, all votes received are removed from the count.

Strengths

- The biggest advantage of this method is that the time taken for the ballot papers to reach the OPVs and be returned to the ROs is kept to a minimum.
- In adopting electronic delivery of ballot papers to the OPV, it is anticipated that the EC will reduce its costs significantly in the long term.
- It prevents duplicate votes by issuing a unique declaration number every time the PDF declaration is printed.
- PACABAs will not be required for the electronic issuance of the PDF ballots as they are replaced by the 2-factor or 3-factor authentication process.

Shortcomings

- It requires OPVs to possess a basic level of technical knowledge and equipment to print a hard copy of the ballots. This may adversely affect older or less technically capable people.
- As PACABAs may not witness nor audit the issuance of the ballot papers, ballot security and integrity may be compromised unless the issued ballot papers carry a unique serial number or equivalent.
- It requires amendments to the Elections (Postal Voting) Regulations 2003. See Appendix E: Suggested amendments to the legislation for using PDF ballots.

Recommendations

- The OPV may print the declaration form and ballot directly from the EC's website using a secure PIN. Every time a declaration form is printed, a unique declaration number should be issued to prevent duplicates.
- The OPV should be prevented from downloading and/or electronically completing the digital ballot file. The OPV must print the ballot first before completing it, so that there is no chance that the voter's choice on the ballot is stored online. This enables voter secrecy.
- The completed ballot paper should then be returned by post to the ROs and counted on Election Day.
- PACABAs should witness the receipt of these ballots at the ROs.

These preceding ideas for reform are formulated to circumvent the short campaign period. Firstly, with regional MFMs collecting ballots and sending them to Malaysia by diplomatic bag, voters do not have to spend so much money on courier services and ballots will reach Malaysia in time for Election Day. We also mooted the idea of using PDF ballots to shorten the time it takes for ballots to reach voters. With this method, the MFMs are not even tasked with collecting the ballots since the voters will post the ballots directly to the ROs within a reasonable time.

We are offering these ideas to the EC because we recognise that innovation and creativity are needed to accommodate the concerns of all stakeholders. We have tried to balance the stakeholders' limitations with voters' expectations of security and transparency.

The next chapters of this volume deal with e-voting and how it could work for Malaysia. This is obviously a long-term reform and requires significant resources, commitment and voter education. It makes up a large section of this volume because we believe that it would be feasible when Malaysia progresses into a mature democracy. We have researched this family of options and included it here to start this conversation and encourage the EC to begin thinking about it in practical terms.

Please note that we have not proposed specific reforms concerning e-voting. The following chapter presents a general overview of e-registration and e-voting models from around the world.

Chapter 4: Overview of electronic registration and voting

Definitions

Electronic voting (e-voting) refers to the use of computers or computerised voting equipment to cast ballots in an election. Sometimes, this term is used more specifically to refer to voting that takes place over the Internet. Electronic systems can be used to register voters, tally ballots, and record votes.²

The working definition of e-voting was proposed by the Council of Europe: the use of an electronic device or procedure within the framework of an election which, for the voter, replaces the casting of a paper ballot. It has since been refined to include the use of an electronic device or procedure within the larger framework of an election.³

For this section we will use e-registration to refer to registration processes conducted online, e-voting to refer to voting using electronic systems and remote e-voting for voting using online methods. The latter is also called i-voting and includes blockchain voting. Blockchain voting is discussed later in this volume.

In this section, we discuss the considerations, challenges and benefits of these different e-voting methods.

The Malaysian context

We recommend that the EC explores the possibility of e-voting as a future solution for overseas Malaysians. It can only be introduced in Malaysia when voters have trust and confidence in the electoral system and the election administration. That will take time and effort on the part of all stakeholders.

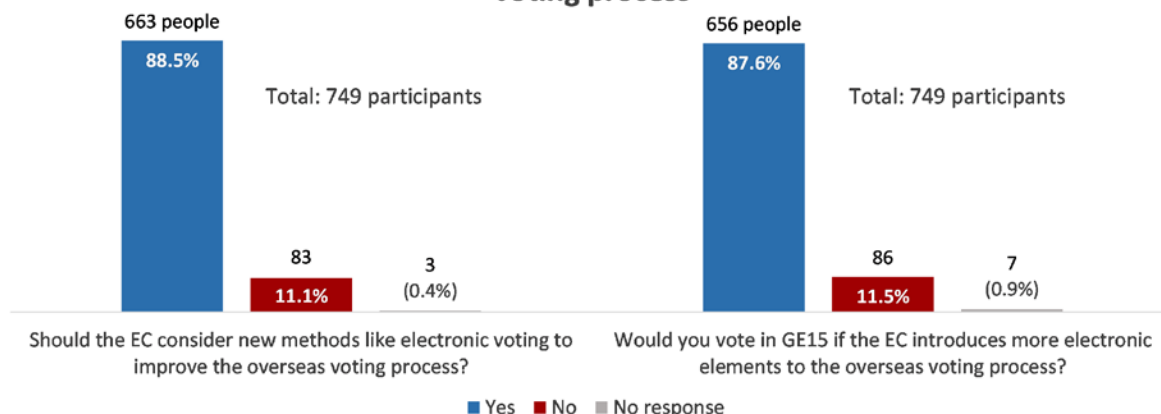
As a first step towards this, the EC may develop a secure e-registration system, as discussed in Volume 1. During GE14, overseas Malaysians could register as overseas postal voters by downloading the PDF application form, printing it, completing it in writing, scanning it to a soft copy, and submitting it to the EC via email. More than 7,300 overseas postal voters were successfully registered in this way. This shows that Malaysians are able to adapt to electronic processes, as long as they receive sufficient advice and clear communication from the EC.

The results detailed in the OVR Survey Report show that nearly 88% of participants will vote if more electronic elements are introduced in the overseas voting process. This suggests that the Malaysian diaspora is open to the idea of the EC exploring new technologies for the voting process, if not now, then in the near future.

² Raul Rojas (ed.) "Encyclopedia of Computers and Computer History" Fitzroy Dearborn, University of Michigan, 2001.

³ Council of Europe. "Recommendations on E-voting Standards". United Kingdom, November 2002.

Participants' opinions on electronic voting as a part of the overseas voting process



Source: OVR Survey Report

The results detailed in the OVR Survey Report indicate that the biggest worry among participants about e-voting is that the system might be open to manipulation. When e-voting is introduced, it is important that the right to vote freely and by secret ballot will not be compromised.

We will discuss the benefits and risks of the specific e-voting methods later in this volume. Below we have listed the general benefits of introducing e-voting elements into the existing system.

Benefits to the EC

- Speed – The online registration and voting system will be faster than any other method, enabling the EC to process applications and ballots more quickly.
- Accuracy – Faster, more reliable counting and delivery of final results with the reduction of human error
- Transparency – The system can detect errors and possible fraud.
- Cost – Long term cost-effectiveness by reducing polling staff, postal charges and printing costs
- Win back trust – The introduction of a transparent, secure and accurate system would be a great way to win the trust of the voters. We recommend starting with e-registration for OPVs first.

Benefits to the Overseas Voter

- Speed – Fastest method to receive and return the ballots, hence less stress for overseas voters
- Accessibility and inclusivity – E-voting makes it very easy for overseas voters to take part in the voting process. Voters would not be hindered from voting by employment arrangements or geographical limitations. There would likely also be a longer voting duration as e-voting is usually open for more hours than physical polling stations.
- Transparency – The online system enables the overseas voter to keep track of their application or voting status in real time.

- Cost – E-voting can achieve a significant reduction in travelling expenses or the cost of returning ballots by post. So far, many overseas Malaysians have been spending exorbitant amounts to fly home to vote or urgently courier their ballots. E-voting is a solution to stop this practice and ease the burden on voters.
- Continuity – An e-voting system will likely be uniform and thus easy for overseas voters to understand once it is normalised.
- Voter secrecy – E-voting can reduce instances of voter intimidation by allowing a voter to correct a vote before the deadline. For example, if a voter is coerced or persuaded by someone in the same household to choose a particular candidate, that voter still has a chance to change the vote before the deadline.

Considerations for e-voting

Security

Security experts must be consulted at the design stage. There must be adequate security testing before the system goes live and ongoing threat detection must be put into place.

Voter Authentication

One of the main security concerns in the e-registration process is voter identification. In the current paper-based system, applicants personally submit their forms, hence there is no problem with identification. E-registration developers must therefore come up with identification solutions, such as using the MyKad number combined with another identification factor – e.g.: date of passport, date of birth, birthplace, password or random codes.

The EC should use MyIdentity to ensure voter authenticity. MyIdentity is a current government initiative that began in 2012 that allows citizens and permanent residents to access personal information and update contact information when dealing with government agencies online. With this existing tool, it is possible to crosscheck information for verification and authentication. A 2- or 3-factor identification and authentication procedure should be developed to support the system.

Voter Privacy

E-registration can protect the security of the user's information in a number of ways. For example, the system can (i) run frequent, automated scans of registration activity to detect discrepancies, (ii) incorporate software to prevent hacking or automated attacks on the system, (iii) force an application to "time out" automatically after a certain period of inactivity and (iv) include CAPTCHA Tests.⁴ Studies consistently show that online voter registration systems effectively protect voters' private information.⁵ The system should also encrypt data flowing between online registrants and the

⁴ CAPTCHA Test stands for Completely Automated Public Turing Test. It is a computer program designed to distinguish human from machine input, by asking the user to respond to a challenge or question.

⁵ The Pew Charitable Trusts. "Online Voter Registration: Trends in Development and Implementation". May 2015. https://www.pewtrusts.org/~media/assets/2015/05/ovr_2015_brief.pdf

registration portal on the Internet. It should also restrict administrative access of the online portal to elections officials.

A slew of underlying data policies must accompany the e-voting system. There must be a data privacy policy to protect the security of the information. Additionally, a data retention policy must outline how the information will be organised and when and how the data will be disposed of when it is no longer needed. A clear and defined cookie deletion policy is also very important to ensure that no information is being harvested without proper consent from the user. These policies are needed to ensure that the system is transparent and that, crucially, users are comfortable sharing their information online.

Costs

According to a joint UNDP, Norwegian, Swedish, and Moldovan feasibility study on online voting published in 2016,⁶ the cost of introducing the system is dependent on factors including:

- the voting protocol selected
- the hardware required
- software licences and custom development costs
- the complexity of the solution
- voter authentication methods
- personnel training

Many online voter registration implementers claim online voter registration systems save money because they need to print fewer registration forms and dedicate less administrative time to manually processing registration forms and updates. For example, Maricopa County, Arizona estimated that it takes approximately 83 cents to process a paper registration form, but only 3 cents to process an online one. Further, counties in Washington State are saving between 50 cents and two dollars on each online registration.^{7, 8}

In Malaysia, e-voting should not be initially offered as the sole voting channel but only as an alternative voting channel and this will mean additional cost. The government (with the assistance of relevant CSOs and other expert advice) should perform long-term cost and benefit analyses, as it is known that in the long term, e-voting reduces overall costs to operate and manage the election or referendum process.

Major costs in the introduction of e-voting will be in these segments:

- Architecture and design of the system
- Identity authentication and verification (involves online registration and voting)
- Testing the system for weaknesses (including professional hackers)
- Network flood/(D)DOS ((distributed) denial of services attack) defences
- Technical support (e.g.: call centres, live chat support, etc.)
- Technical training for staff
- Voter education
- Emergency response team

⁶ Feasibility study on Internet voting for the Central Electoral Commission of the Republic of Moldova, United Nations Development Programme, June 2016.

⁷ https://www.pewtrusts.org/~media/assets/2015/05/ovr_2015_brief.pdf

⁸ <https://webrootsdemocracy.files.wordpress.com/2017/11/cost-of-voting-webroots-democracy>

Legislation

The existing legislation needs to be amended to accommodate the introduction of e-voting processes in Malaysia. Once the best e-voting method is identified, the EC's legal department should identify the relevant legislative changes that need to be made. The EC should also communicate with the Attorney-General's Chambers to check for changes that need to be made through other channels. Here are some relevant statutes that need to be changed:

- P.U.(A) 293/2002 Elections (Registration of Electors) Regulations 2002, Part II- Form of Electoral Roll- Regulation 10(2). In relation to the principal electoral roll, the law states that the EC shall update the electoral roll every three months. This should be changed to allow for ongoing automatic updates to take place.
- P.U.(A) 293/2002 Elections (Registration of Electors) Regulations 2002, Part II- Form of Electoral Roll- Regulation 12(1&2) states that applicants have to be physically present to register onto the electoral roll. The requirement to be physically present should be deleted.
- Article 119(4) of the Federal Constitution of Malaysia deals with voters applying to change address details. The legislation should be amended to accommodate automatic changes of address with the electronic system.

Best practices

The EC should connect with countries that have tried and tested e-voting, and tap into their experience. The United Kingdom's online registration system is a good example to look into because many pilot projects were carried out before developing the system. Meanwhile, India's online registration shows how such a system can play a big role in maintaining the largest democracy in the world. Please refer to "Countries that discontinued or successfully implemented online voting" on pages **Error! Bookmark not defined**.0-21.

We also hope the EC will continue to engage with international bodies that have researched e-voting, such as the International Institute for Democracy and Electoral Assistance (International IDEA), the International Foundation for Electoral Systems (IFES) and the Kofi Annan Foundation.

Advocacy and education

Voter education plays a big role in introducing e-voting because any new process will need time to get used to. The digitisation of democracy is often met with scepticism so it is important that all stakeholders understand not only the limitations of this system but also the benefits. The EC should create education programs to convince voters about the effectiveness of e-voting methods. If the EC takes ownership of the e-voting process and oversees it, while making the process as transparent as possible, this will help voters understand and trust the system.

Chapter 5: E-registration process

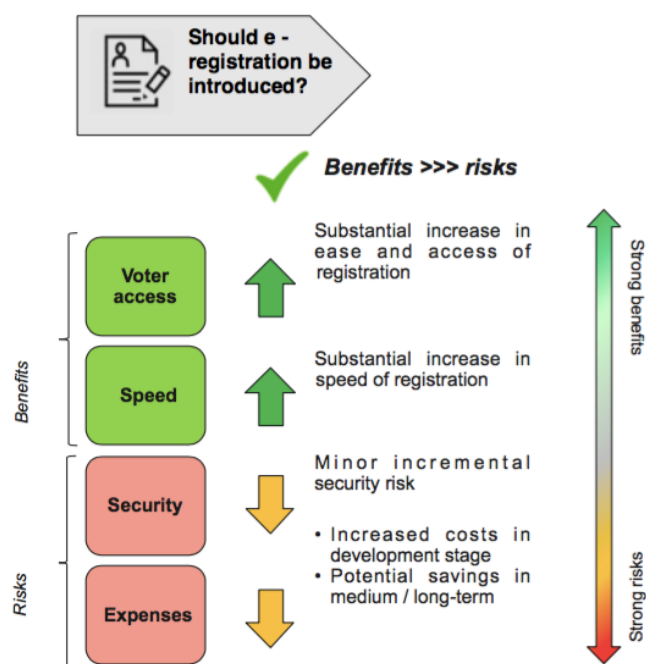
Automatic registration for first time voters and an e-registration process for OPVs will pave the way towards e-voting (as discussed in Volume 1).

The EC can carry out automatic voter registration using existing government online networks. The National Registration Department (“NRD”) already supplies the EC with the requisite information on Malaysian citizens. This process can be expedited by using the Agency Link-Up System (“ALIS”) that connects all government agencies. Using MyKad (national identification card) numbers for reference, agencies such as the EC, Immigration Department, NRD and the Police can play a major role in updating voter eligibility for local elections and voting from overseas.

Once the EC has set up a running system for online registration, it can be optimised to cover all the different elements of the registration process – from first time voter registration to changes of address. All this can be done on the same platform. Once online registration has been carried out successfully, the EC would have earned voters’ trust in implementing electronic elements. From there, we can look further into e-voting.

As with all policy decisions, all steps introducing any electronic elements should be evaluated very carefully. Again, we should remind ourselves that a strategy of evolutionary rather than revolutionary change is needed with a focus on ‘security before speed’.

The introduction of e-registration and e-voting must be analysed via a “risk-reward” or “cost-benefit” framework. Only if the rewards/benefits from e-voting far outweigh the risks/costs should e-voting be adopted. As we are aware of the risks/costs involved in the introduction of e-registration and e-voting, we also have dwelt on the benefits of these processes, as there is a need to analyse both sides in practice before moving further.



The benefits of e-registration outweigh the risks.

Source: Global Bersih

Additionally, there is a need to be aware of the time required to design, test and implement any new development towards e-registration. The timeline sketched in the “Pilot Project” sub-section below provides a rough estimate of the time needed to implement an eventual e-registration system.

Pilot Project

We recommend that the EC runs a pilot project for e-registration to assess its risks and benefits empirically. It should focus on overcoming the main risks of security and authentication. It is also an excellent way to determine and quantify the benefits of an electronic process. It should be sustainable and manageable on a large scale. Our nearest neighbour, Singapore, ran an online e-registration pilot in 2017.⁹

An e-registration pilot project can be a great approach to help all stakeholders understand the system and be a part of it, since e-voting is sometimes looked upon with distrust. Due to a lack of understanding and the media sensationalising its downsides, the benefits of e-registration may not be easily conveyed to stakeholders. However, a well carried out pilot project speaks volumes and can play a significant role in enabling the EC to win the trust of the voting public.

As discussed in Volume 1, we recommend that the registration process for first-time voters should be automatic with no onus on the voter to apply to be on the electoral roll. This is so that more people become involved in the democratic process by default. People will not need to be mobilised to register, saving the EC money and time. We also recommend that the registration processes for first-time and overseas voters are carried out continuously rather than periodically.

The pilot project should be carried out to test these elements of the system’s software and hardware:

- **Security testing** – This is the most important test section because this is one of the main concerns about an e-registration system.
- **Acceptance testing** – How well the new system is accepted by all the involved parties
- **Performance testing** – The new system must be able to perform its role in solving problems and fulfilling its requirements.
- **Usability testing** – This is important because no matter how secure or modern a system is, no one will use it if it is too complicated.
- **Stress testing** – This is needed to test if the new system can withstand unforeseen circumstances.

Every level of the pilot project should try to test all or some of these elements and sufficient time should be given to test them.

The Malaysian Context

Legal framework

A pilot project requires a legal basis to run. If it is being conducted in a non-binding context, the legal changes required would be small. However, if the pilot project is run with official, binding voting results, it probably requires larger changes to existing legislation.

⁹ <https://www.straitstimes.com/singapore/elections-dept-to-pilot-electronic-voter-registration>

In any case, it would be useful to start preparing for potential changes to the electoral system as early as possible, without fundamentally altering the foundations of our democracy, as the latter will be a complicated process.

To introduce e-registration, new legislation needs to be drafted. This new legislation could take three different forms:

- a temporary law permitting e-registration experiments;
- a change in the existing electoral law; and
- a temporary law for e-registration combined with changes to the existing electoral law.

It would make sense for the legislative changes permitting e-voting experimentation to have a specific time limit and to be geared towards one or more specific elections. For example, if an e-registration pilot is to be conducted for the upcoming Sarawak state elections in 2021, temporary changes to the legislation would be needed to allow for this. The advantage of using a temporary law is that the existing electoral legislation does not have to be modified, which would probably take more time, thus slowing down the process.

The entire electoral law would have to be reviewed to examine where and how the different parts of e-registration could be integrated into it. One legislative option would be to prepare preliminary temporary legislation for the Sarawak election and, while conducting the experiments, begin preparing the amendments to the existing legislation. The advantage of this combined approach is that no time is lost once the decision to introduce e-registration has been made.

The drafters of such legislation must ensure that the statutory language is technically neutral because technology advances at such a rapid pace.

The EC should formulate codes of conduct for all those involved, including the technical designers, testers, software architects and other technical staff who would not be directly involved in running the pilot project.

Budgeting

The central budgetary expense for e-registration would be the investment in the system itself. We recommend using open-source, non-proprietary software so that the EC is not tied to any particular vendor. The EC will have control of the system, which should increase trust in the system as there would be no outside intervention.

The budget for the pilot project should also include not only hardware and software, but also allow for storage testing, communication, evaluation, research, auditing training and most importantly, voter education.

Participants

There is a need for a management body to handle the pilot project. It should include a different task force to actually run the project. The team should be headed by the EC and should consist of:

- a communications task force, to be headed by the Akademi Pilihanraya, to educate all stakeholders about the process. The task force should include representatives from the Ministry of Communications and Multimedia, and MFMs.

- security specialists including representatives of the Cybercrime Police Department, Malaysian Communications and Multimedia and Cybersecurity Malaysia Malware Research Centre.
- technical specialists who are responsible for conducting the experiment and the implementation of the system including EC's IT Department, CERT-Malaysian Computer Response Team, Malaysia Blockchain Association, Police IT Department, Ministry of Science, Technology and Innovation and MIMOS (National Applied R&D Centre).
- trainers to train electoral staff and civil society. Akademi Pilihanraya can work with MFMs and Global Bersih to come up with training materials and sessions.
- legal experts and policymakers
- a devil's advocate who should be able to provide views different from those of the rest of the team, and who should be able to propose various constructive solutions. Hacking competitions (hackathons) may be held to try to detect and rectify the maximum number of faults in the system
- a 'people's panel' to give advice and feedback, comprising members of political parties, academics, representatives of local, regional and national authorities, and representatives of civil society
- international technical experts, who should be involved in the pilot project so we can learn worldwide best practices

Our proposal for a pilot project is outlined in Appendix C: Potential pilot projects for e-registration and e-voting.

Chapter 6: E-voting process

We are still a long way from introducing a comprehensive electronic voting system for Malaysia. Given that it takes a long time to develop, implement and maintain an online voting process, we believe that we should already start exploring online voting as a possible method, starting with overseas Malaysians, and then one day, all Malaysians.

Below we have listed the main methods of voting today and the benefits and limitations of each method from a Malaysian perspective. For e-voting, we have compared the two most common methods: electronic voting machines (“EVMs”) and online voting.

From the table below, we can see that each method has its own benefits and disadvantages. Nevertheless, the electronic voting methods fare quite well compared to the other methods. And just like any other voting method, online voting can be implemented successfully if proper design, implementation and maintenance is carried out.

Comparing strengths and shortcomings of four voting methods

ADVANTAGES/BENEFITS

	Paper-based Polling Station Voting	Postal Voting	Electronic Voting Machine	Online (Internet) Voting
Easy Accessibility	Low	Medium	Low	High
Transparency in Voting	High	Low	Low	Medium
Ease of Usability	Medium	Medium	Medium	Medium

DISADVANTAGES/RISKS

	Paper-based Polling Station Voting	Postal Voting	Electronic Voting Machine	Online (Internet) Voting
Casting an Invalid Vote	High	High	Low	Low
Counting Errors	High	High	Low	Low
Manipulation and Tampering	Low	Medium	Medium/High	Medium/High
Loss of Votes	High	High	Low	Low
Loss of Voter Anonymity	Low	High	Low/Medium	Low/Medium
Public Control Over the Process	Medium	Medium	Low	Medium

	Paper-based Polling Station Voting	Postal Voting	Electronic Voting Machine	Online (Internet) Voting
Counting Process	Slow	Slow	Instant	Instant
Costly (may need more information for comparison)	Yes (but need cost figure for comparison)	Yes (if couriers are used and many choose postal voting)	Yes	Yes, but more cost-effective in the long term

Comparison of different e-voting methods

E-voting is commonly separated into two main methods:

- **Controlled voting environments where e-voting is physically supervised by the EC or their representatives.** Voters can cast their ballots from any polling station using standalone electronic voting machines (“EVMs”) and the tallying process will be both fast and precise. More importantly, election officials can feasibly manage the security risks of such systems since they control both the voting platform and the physical environment.

A variation of the above method is kiosk voting, where EVMs are located away from traditional polling places, in convenient locations such as post offices and shopping malls. The voting platforms are still under the control of election officials. The physical environment can be modified and monitored as needed (for example, by election officials, volunteers or cameras) to address security and privacy concerns and prevent coercion or other forms of intervention.

- **Uncontrolled voting environments (also called online voting, remote e-voting or i-voting)** where the voter submits their votes electronically to the election authorities, from any location. Online voting can mean many things. It can be as simple as allowing voters to download ballots by email. Alternatively, it can be more comprehensive and involve voters marking their ballots electronically, encrypting data and tabulating election results automatically. People may vote online through common connectable household devices. The EC may choose whether to use online voting piecemeal or incorporate it into the entire electoral process.

In controlled voting environments using kiosks and EVMs, e-voting only marginally benefits voters because it does not greatly increase voter participation. By contrast, uncontrolled voting environments (remote e-voting) increase voter access but come with increased security risks. Countries like Ireland and the Netherlands that have piloted or implemented e-voting in controlled environments have discontinued it due to its many risks versus minimal benefits. Many of these countries reported voter dissatisfaction with EVMs, leading to a decline in trust in the wider electoral system. Moreover, the cost per ballot cast in these countries was often higher than paper voting systems due to upfront costs, and maintenance and storage costs of the EVMs. It does not seem to be a cost-effective method when the machines are used only once every five years.

Uncontrolled voting environments similarly incur a high expenditure in the development phase. However, it significantly reduces costs in the medium- and long-term. In any case, both controlled and uncontrolled voting environments come with significant security risks.

Comparison of e-voting in controlled environments and uncontrolled environments

	Controlled Environment	Uncontrolled Environment
Voter accessibility	No increase	Increase
Ballot counting speed	Increase	Increase
Vulnerability to security risk	High risk	High risk
Initial costs	High increase	Moderate increase
Long-term cost/expense	High	Potential cost-savings
Controlled Environment = electronic equipment at polling station (e.g.: kiosks) Uncontrolled Environment = e-voting outside polling station (e.g.: via the Internet, or via SMS) * Green = benefit; Red = risk / cost. The darker the shade of each colour, the greater the benefit or risk. * There is also the possibility of ‘unknown security risks’ as new elements that endanger e-voting may surface in the future.		

Therefore, we recommend that the EC tests e-voting in uncontrolled voting environments. This finding is consistent with global experiences including those of Elections Ontario in Canada. Many countries have explored remote e-voting or online voting. Below is a list of the countries that have tried online voting and decided to discontinue or further implement it. We can again take the best practices from these countries to design a system that works for Malaysia.

Summary of e-voting implementation in other countries as detailed in the table below:

- 6 countries/regions are still using or planning to implement e-voting.
- 1 country discontinued it due to an actual hacking incident.
- 3 countries/regions discontinued it due to fear of hacking.
- 3 countries/regions discontinued it for other reasons.
- 1 country studied but did not implement e-voting.

Countries that have reviewed, successfully implemented, and/or discontinued online voting

Country	Scope of elections	E-voting outcome	Discontinued	Recent Issues
Australia (NSW)	NSW State government elections for remote voters and voters with disabilities	Since March 2011		Software issues where the “confirm” or “next” buttons did not work for users
Canada (Halifax, Peterborough and Markham)	Local government elections and local government polls	Limited number of precincts		The software limited the number of users that were able to access the system at any given time.
Estonia	Local government and parliamentary elections as well as	Successful nationwide; used in six elections since 2005		None

Country	Scope of elections	E-voting outcome	Discontinued	Recent Issues
	European Parliament elections			
Finland			A review in 2016-17 concluded that the risks outweighed the benefits.	None
France	Limited to expatriate voters	Successful in the election of representatives to the Assembly of French Citizens Abroad from 2012	Discontinued (March 2018) due to general fear of possible hacking, after USA hacking scandal	None
Netherlands	Water board councils and national parliament		Discontinued due to general fear of possible hacking, after USA hacking scandal	None
Norway	Local government and parliamentary elections	Successful trials in 2011 and 2013; a view to implement nationwide by 2017	Discontinued because it did not increase voter turnout	None – this has since been cancelled
Portugal	For overseas citizens to vote in parliamentary elections		Discontinued due to high costs	None
South Korea		In place since 2013; used by 5.64 million people		None
Switzerland (Geneva)	Municipal, cantonal and federal referenda and elections for university councils and libraries	In place in some cantons; other cantons developing online voting based on the Geneva model		None
United Kingdom	Local government elections	Successful pilot	Discontinued due to high costs and lack of evidence of benefits	None
USA (Washington DC)	Local government elections; limited to military and overseas voters		Discontinued due to hacking	Hacking
USA (West Virginia)	Presidential, federal, state and county elections; trial limited to military and overseas voters	Successful; a review of the system was carried out after the Washington DC experience; blockchain testing is to go ahead		None

Blockchain voting

One of the latest developments in the field of remote voting is blockchain technology. It is based on mathematics and creates a chain of information that is embedded within its data. This means that every transaction within a blockchain is traceable. The implication for elections is that a voter's choice may not be tampered with. The voter's identity and their choice of candidate are stored in two different repositories of data, meaning the voter's identity is not traceable to the vote option. In these ways, it is said that blockchain is the most secure e-voting method available.

Blockchain voting is similar to the analogue voting that we are used to. The same concepts and processes apply. In order to cast a digital vote, a citizen would need to register and prove their eligibility in a given jurisdiction. We could then record that identity and verification on the blockchain associated with that user's key.

The voter casts a vote using a voting token that is deposited into the user's account. This token would also likely have a time limit in which it could be used to vote, after which it would 'burn' (deactivate) itself via a smart contract or become useless.

The voter sends the voting token (the ballot) to a specific "address" (a unique identification number). Voters would know which address aligns with which candidate or referendum option. Sending a token to that address would represent a vote.

Technically, that sounds simple enough. The vote gets registered on the blockchain where it is immutable, verifiable and transparent. We can easily count the votes to declare a winner to the election. In addition, we can build user-friendly interfaces that automate and hide the process of sending a token to a specific address. Instead, voters would see a simple online interface for them to select a candidate or proposal and click submit.

Many countries all around the world are testing blockchain in their voting system and some of them have had very good experiences. See the table below for some examples. Nevertheless, blockchain voting is not a 'magic solution' for online voting as it has its own set of limitations, which will be discussed in the next section.

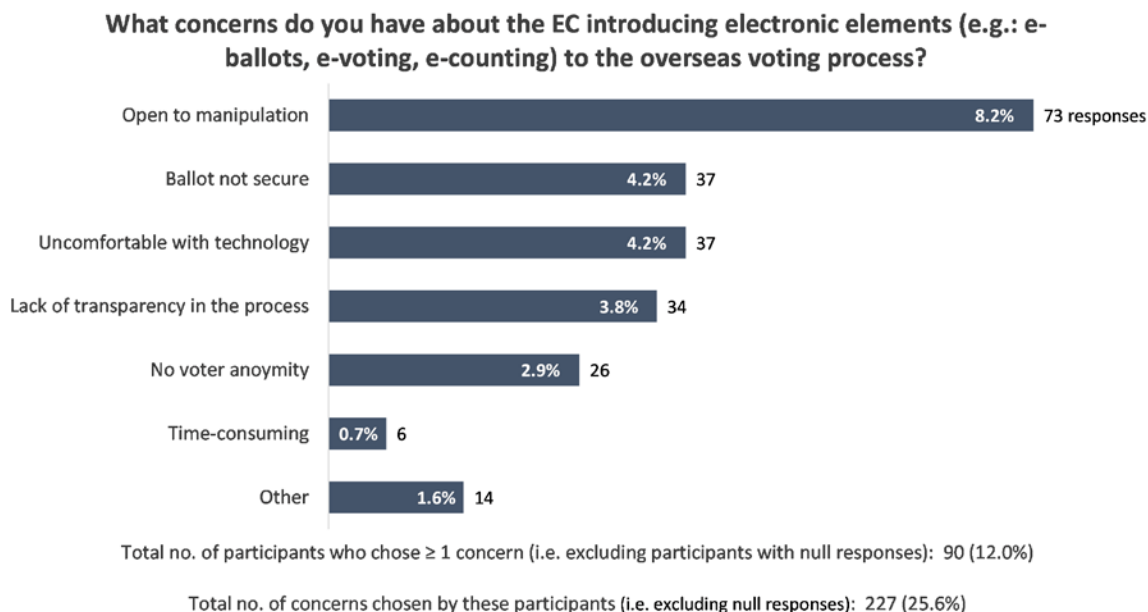
Countries that have had good experiences with blockchain voting

City/Country	Blockchain status
Zug (Switzerland)	Trials have been run and about 80% of the respondents welcome the blockchain voting system as the best way forward towards facilitating a faster and easier voting experience.
South Korea	Blockchain voting was successfully introduced to the existing online system in Dec 2018 in order to increase security and transparency.
Tsukuba (Japan)	Tsukuba city launched a blockchain voting system specifically for projects regarding social contribution.
West Virginia (USA)	West Virginia also has a blockchain voting system but only for overseas troops. West Virginia released the blockchain voting app for the first time in two of its 50 counties. Two audits later, the app was ready to be deployed in 24 counties.

City/Country	Blockchain status
Estonia	Estonia holds the record for one of the most successful countries in Europe to use an online voting system. Thanks to its voting system Estonia has built an unprecedented level of trust and transparency in its digital systems among its people.

Challenges of introducing e-voting in Malaysia

Just like any other voting processes, e-voting has its own challenges and limitations. As it is a relatively new method, there will be many concerns from all stakeholders. The results detailed in the OVR Survey Report suggest that Malaysians' main concerns will likely revolve around the security of the system.



Source: OVR Survey Report

Here are some of the limitations that we might face in implementing remote online voting in Malaysia:

1. Unambiguous identification
2. Integrity of the e-voting servers
3. Unique and universal voting
4. Protection of voting secrecy/privacy
5. External forces
6. Hackers attack on: voting devices, vote transactions and central server platform
7. Traceability and recounting
8. Confidence in the system

We further discuss possible ways to overcome these challenges in Appendix D: Challenges in e-voting and possible solutions.

Summary of e-voting

In theory, e-voting (especially remote online voting) seems to solve many of the limitations that overseas Malaysians faced during GE13 and GE14. It is fast, transparent and reduces human error. However, even this method has its limitations, and these cannot be taken lightly as e-voting is potentially susceptible to problems that could undermine the basic principles of a democratic election system (e.g.: fraud and hacking).

- The first step for the EC would be to gather as much information as possible by engaging all stakeholders to measure the acceptability of this method.
- Then the EC should perform a cost- and risk-benefit analysis of the introduction of e-voting.
- Focusing on ensuring the successful implementation of an online e-registration system (e.g.: providing a good user interface, wide and easy accessibility, a robust system at high usage volume, etc.) will build trust and pave the way for an eventual e-voting system.

To provide a possible model for such a system, we have included Appendix B: How e-voting can work in Malaysia, based on the Swiss e-voting system.

Recommendations

- Implement online registration as a first step.
- Perform a risk-benefit assessment of e-registration and e-voting.
- Carry out a pilot project for e-registration, and later, for e-voting.
- Tap into other countries' experience and emulate their best practices, then adapt them to fit local requirements and needs.
- Engage all stakeholders in designing the system.
- Engage international expertise and consult locally in designing and implementing the system.

CONCLUDING REMARKS

Democracy relies on good faith to thrive. Electoral systems require people to have a certain level of trust in the EC for them to participate in and accept the legitimacy of elections. We have not yet achieved this level of maturity.

The reforms proposed in Volume 1 are more practical for implementation in the near future, whereas the reforms recommended in this volume look further into the future, are more progressive and will take longer to evaluate and implement. Nevertheless, we intend to continue laying the groundwork for these reforms in our effort to improve and optimise the overseas voting system by looking ahead to GE15 and beyond.

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ACKNOWLEDGEMENTS

It took a global village to author this three-volume proposal, from data crunchers to legal analysts working together across different time zones. Global Bersih would like to express our gratitude to the following individuals:



Survey analysis and reporting

Satya Venugopal
Hema Preya Selvanathan
Hwa Shi-Hsia
Pamela Wong
Sharmala Rajoo
Cindy Woon Ping Sim
Adrian Fui Kiew Yong
Khangzhen Leow
Wan Leng See
Dayana Bulchand

Absentee voting research and reporting

Lydia Chai
Iqbal Abdullah
Christine Chan
Shelvy Tjing
Vivien Voon
Cindy Woon Ping Sim
Soon Yee Yap
Adrian Fui Kiew Yong

Legal research and analysis

Ernest Chew
Christine Chan
Joanne Long
Vivien Voon

Electronic voting research and reporting

Sharmala S. Hinrichsen
Joanne Lee
Su Lin
Andrew Loh
Joshua Ng
Yau Mei Leng
Doreen Seah
Pamela Wong
Cindy Woon Ping Sim
Nirmala Devi Windgaetter

Expert review

Daphne D’Herve
Andrew Yong

Project coordination

Lydia Chai
Bala Chelliah
Sharmala Rajoo
Nirmala Devi Windgaetter
Pamela Wong

Global Bersih is an international movement of overseas Malaysians, created to support Malaysian civil society’s work and strengthen Malaysia’s maturing democracy, using peaceful and legal means of action. Its Geneva base enables a stronger international platform to advocate for change, taking advantage of the dynamic international human rights movement in the city.

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Suggested citation

Overseas Voting Reforms Proposal Volume 2: A Civil Society Proposal for the Election Commission and Electoral Reforms Committee of Malaysia. Global Bersih, 2019.

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Appendix A: Full list of recommendations (Volume 2)

Overseas Postal Ballot Collection at Regional Malaysian Foreign Missions

- Ballots are sent to voters by post with a central contact point for voters to track their couriers.
- Up to one week before Election Day, the voter may send their ballot or deliver it in person to the designated MFM. The voter may also deliver the ballot to the RO in person or by post (as per GE13).
- Election observers from civil society are trained by the EC and stationed at the MFMs to monitor the receipt of ballots. They witness the sealing of the ballot bag and sign on the seal at the end of the day.
- The MFMs send the ballots back to the EC by diplomatic bag to be distributed to the ROs.

Postal Ballots Printed by Voters

- The OPV prints the ballot paper directly from the EC's website using a secure PIN.
- The OPV is prevented from downloading and or electronically completing the digitised ballot paper.
- The OPV must print the ballot first before completing it, so that there is no chance that the voter's choice on the ballot is stored online. This enables voter secrecy.
- The completed ballot paper will then be returned by post to the ROs and counted on Election Day.
- PACABAs will witness the receipt of these ballots at the ROs.

Online Voting

- Implement online registration as a first step.
- Perform a risk-benefit assessment on e-registration and e-voting.
- Carry out a pilot project for e-registration, and later, for e-voting.
- Tap into other countries' experiences, emulate their best practices and adjust to fit local requirements and needs.
- Engage all stakeholders in designing the system.
- Engage international expertise and consult locally in designing and implementing the system.

Appendix B: How e-voting can work in Malaysia, based on the Swiss e-voting system

The EC currently already has an updated electoral roll and prepares the basic infrastructure for the election. In the online overseas voting context, the electoral roll should be updated more quickly with the latest information, especially the addresses where the voting cards will be sent to. The Semakan Daftar Pemilih should be updated in a timelier manner with the latest information and should be made available for voters to check and correct any discrepancies.

An Election Task Force should be placed in charge of the initialisation and encryption of the electronic ballot box. This task force should comprise six representatives from the EC, a notary, an IT security officer from the police, the internet voting network administrator ("**Network Administrator**"), the administrator of the internet voting system ("**System Administrator**") and the PACABAs. Should one of them be missing, the required codes cannot be initialised and the digital ballot box cannot be opened (decrypted).

The participants should meet in a room fitted with a dedicated and secure network connection to the electronic ballot box. The Network Administrator would then connect the PC to the internet voting specific network.

Using a 4-eyes identification process with 2-factor-authentication, the System Administrator should start a connection to the internet voting system on the administration PC. The System Administrator should then launch the generation of a pair of asymmetric vote encryption keys (composed of a public vote encryption key and a private vote decryption key), as well as a symmetric key to check the integrity of the ballot box.

The Election Task Force members would be divided into two groups of three people. Each group should generate a password. The combination of the two passwords would lock the ballot box encryption key or – for the decryption – enable this key to be unlocked.

The ballot box will be illegible during the voting session by virtue of the use of an asymmetric key. Only the public encryption key should be available to the system while the private decryption key should be stored in a secure place, protected by passwords.

The public encryption key would be used by the system to encrypt the votes into the ballot box. The ballot box cannot be tampered with without the system detecting it, thanks to a harness of integrity checks (relying on a cryptographic integrity chain) on the votes that would raise an alert in case of a discrepancy.

The vote servers should be installed in some maximum security area. Physical access to the servers should be strictly controlled, and access via the network should be limited to the entry of a single special optical cable, which is the only link between the local network and the web. Several firewalls should be installed to provide protection against intrusion from the web. Also, different probes should be installed to detect specific events in order to protect the system against denial of service or mass attacks.

Once the codes have been created, the voting cards are to be printed by the EC. The voting card is a very important element of the online voting system. It is the passport to vote online. The voting card will contain a voting card number (the initialisation code), registration code (received when

successfully registered as an overseas online voter), name, address, deadline for voting, website address for online voting, confirmation code and verification code.

There are arguments over the use of the voting card, as many consider it a backward component in an online voting procedure, since it involves the physical activity of printing and sending out the cards. Some countries like Estonia do not have voting cards in their e-voting process, as their citizens' national identity card number is used as the first initialisation code. Nevertheless, the voting cards are important at least in the early phases of the introduction of online voting as they will ease voters slowly into this voting method.

Voters are to use the information on the voting card to vote online before the given deadline. Once voting is closed, all attempts to vote online must be rejected and all the codes on the voting card would become obsolete.

The electronic ballot box should be opened after the deadline to generate the results. The Election Task Force will meet again in the presence of PACABAs and political candidate representatives. They are required to give the password that enables the registered votes to be doubly decrypted. In addition, the electronic ballot box's content is mixed before being read to prevent any date- or order-matching that could lead to linking voters' names to their votes. This is done through a cryptographic shuffle.

Then the system should generate two different files, one containing the image of each ballot paper registered per voting site (submitted in order to generate the overall results), and the other taken from the electoral roll, permitting statistical turnout analyses (transmitted to the EC and the Statistics Department for the official record). The file containing all the ballots is to be processed by a results management system. In this way, the system would calculate the results.

The above processes and any communication after the very start of the process should be documented on a Bulletin Board. Thanks to the mandatory access to the system using 4-eyes identification and full tracing of all administrative actions, a single insider attack on the ballot box will be impossible without detection, while ballot decryption and counting will be impossible without the presence and participation of the Election Authority acting as representative of the citizenry.

Appendix C: Potential pilot projects for e-registration and e-voting

We should remind ourselves that an evolutionary, rather than revolutionary strategy is needed with a focus on 'security before speed'. An excellent place to start is to test the first phase of e-registration in the Malaysian Youth Parliament elections. The Youth Parliament of Malaysia is a youth council and a simulation of the proceedings of the Parliament of Malaysia for youth aged 18 to 25 years. The Youth Parliament gives young people an insight into and raises their awareness of the workings of Parliament in particular and the government more broadly. Three sessions are held each year (consisting of three days for each session), each involving 133 elected members.

Under the current system, any Malaysian citizen aged 15 to 25 is eligible to register as a voter on the official website of the Youth Parliament. The quick and simple online registration requires that the applicant give valid personal information. And any registered youth voter aged 18 to 25 is eligible to become a nominator and even a candidate.

After the campaign week, the registered voters have a right to vote online for their respective states through the official website.

There is a limit to the number of Youth Parliament Members allocated for every state. The allocation is made based on each state's youth population size, using the scale: 1 Member to every 100,000 youths in the state. Polling is open for two weeks and the results are announced two days after polling is closed. The election uses plurality-at-large voting, a non-proportional voting system which allows for the election of several representatives simultaneously for a single state.

In the 2014 Youth Parliament election, 171,094 citizens aged 15 to 25 from all across Malaysia registered to vote. Thus, these elections offer the EC (in co-operation with Parliament) great non-binding controlled test cases to trial any e-registration system it develops. Moreover, the Youth Parliament elections will also provide a great platform to pilot-test e-voting in the future.

The registration procedure for these elections should stay the same; only the registration system would be changed to trial e-registration. The system can thus be tested for user interface, technical solutions, voter confidence, etc.

The next step would be to test the e-registration system on overseas voters in a mock registration exercise. The EC could test the system in a specific geographic area overseas. A mock registration exercise of this kind offers yet another non-binding, controlled environment of sorts to identify any problems that might occur and fix them before the system is implemented in a "real" e-registration scenario.

For example, the EC could run its pilot project to register Malaysians in Singapore as overseas voters. Under current regulations, Malaysians living in Singapore are not eligible to register as overseas postal voters using Borang 1B. This means they have to travel back to Malaysia to vote. Global Bersih has been – and still is – proposing that all overseas Malaysians, including those residing in Singapore, should be included in the overseas voting process. Therefore Malaysians in Singapore would be a good test group with whom to trial the new e-registration system. That most of them would never have been registered as overseas voters before makes it easier to test the system and control for confounding variables.

The EC should run a campaign in tandem with the mock absent voter registration exercise for Malaysians in Singapore. The campaign should start with information dissemination to encourage overseas voters to understand and take part in the exercise. The EC should work together with the

Malaysian high commission in Singapore to accomplish this. We also need to engage Malaysian clubs and social groups in Singapore to encourage the diaspora to participate. This exercise would once again be a good platform with which to test user interface, technical solutions, voter acceptance, etc.

The final test could be to introduce the e-registration system for overseas voters during the Sarawak state election in 2021. This step would be a crucially important one.

The next Sarawak state election will take place before 7 September 2021. The last state election was held on 7 May 2016 after a 12-day campaign period. There are 82 seats in the Sarawak State Legislative Assembly. In the last election, there were 106 overseas postal voters, an extremely low number compared to the total of 1,138,650 citizens registered to vote in constituencies in Sarawak. This is likely due to a lack of information and poor efforts to raise awareness about the overseas voting process. This should also be taken into account when conducting the pilot project.

Parallel to the existing registration system, the new e-registration system can be trialled on overseas voters, so the EC should work with all related stakeholders locally and internationally to run the pilot project.

Appendix D: Challenges in e-voting and possible solutions

One of the major concerns with e-voting is security. Online elections are especially vulnerable to cyber threats because anyone on the Internet can attack the elections remotely. A successful attack may never be detected, resulting in the wrong candidates being elected, with no evidence, even forensic evidence, that anything was amiss. Many computer security problems must be addressed before we can safely conduct elections online. Some argue that blockchain has the solution to these limitations. The use of blockchain **does not** automatically eliminate most of the limitations discussed here. Therefore, the EC has to openly discuss all the risks and benefits in consultation with cybersecurity experts before trialling any form of e-voting.

Challenges	Possible solutions
<p><u>Unambiguous Identification</u> The voters in an election must be clearly identified and authorised, and this is a limitation in e-voting, especially in remote online voting.</p>	<ul style="list-style-type: none"> • Individual code to gain access to the system • Indication of date of birth, place of birth and other personal identifiers for the purposes of validation and fraud-prevention • Use of digital signature • Further personal data could be required.
<p><u>Authenticity of e-voting servers</u> Citizens must have the guarantee that their votes are sent to official servers.</p>	<ul style="list-style-type: none"> • The server certificate should be reviewable by citizens. • Authenticity could also be demonstrated by an answer code or symbol (image) that can be verified, e.g.: on a polling card sent to the voter by post.
<p><u>Unique and universal voting</u> Each citizen is allowed to cast only one vote. The casting of two or more votes must be prevented.</p>	<ul style="list-style-type: none"> • As soon as an electronic vote is cast, the voter could be marked in the electronic electoral register. • Unambiguous features like the creation of one-time verification/authentication codes in combination with the individual voter's identity should be incorporated into the system.
<p><u>Protection of voting secrecy/privacy</u> The intentions of the citizens must remain secret and must not be seen by any third party.</p>	<ul style="list-style-type: none"> • Separate and divided storing of personal data and votes • Random mixing of votes in the electronic ballot box, so that it is impossible to figure out how someone has voted by comparing the sequence of casting votes and timestamps in the electronic electoral register.

Challenges	Possible solutions
<p><u>External Threats – Both natural and man-made</u> E.g.: thunderstorms, earthquakes, terrorist attacks, etc.</p>	<ul style="list-style-type: none"> • Several back-up servers in different locations • Servers housed in highly secure rooms (with access control, fire protection, an emergency power supply, etc.)
<p><u>Hacker attacks to:</u></p> <p>a) Voting devices (private computers, hand phones, etc.): possible interception and modification of votes, e.g.: by viruses; voting via personal devices is known to have the weakest security of all the e-voting systems</p> <p>b) Vote transaction from voter to server: possible interception and modification of votes (e.g.: man-in-the-middle attack, domain name server (DNS) hacking, etc.)</p> <p>c) Central server platform (heart of the e-voting system): e.g.: denial-of-service attack</p>	<p>a) Firewall protection</p> <ul style="list-style-type: none"> • Virus scans <p>b) Vote encryption</p> <ul style="list-style-type: none"> • Verification by the voter: The vote is transmitted as an image, not as text information. • In the transaction dialogue, all packages should be check-sum-tested (hash code) to prove their integrity. <p>c) Several redundant servers</p> <ul style="list-style-type: none"> • Collaboration with major providers.
<p><u>Traceability and Recounting</u> Electronic votes must be recounted if there is a need.</p>	<ul style="list-style-type: none"> • Voters get a receipt when their vote has been cast. • Audit trail journal of the counting of the electronic votes signed by the public servants and controllers in charge • Separate storage of logging system
<p><u>Confidence</u> The system and its components must be trustworthy. External experts must be able to review all relevant source code.</p>	<ul style="list-style-type: none"> • Training of all related stakeholders • Use of trustable operating system (open source is used in many countries) • Disclosure of proprietary applications

Appendix E: Suggested amendments to the legislation for using PDF ballots

We have drafted amendments to “P.U.(A) 185/2003 Elections (Postal Voting) Regulations 2003 Incorporating latest amendment - P.U.(A) 10 /2013” to incorporate some of the reforms included in this proposal. The amended regulations with additions and deletions displayed are attached as a separate document.