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The (un)making of electoral transparency through technology: The 2017 Kenyan presidential election controversy

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Abstract

Marked by the killing of a senior ICT professional working for the Electoral Commission and the invalidation of the presidential election by the Supreme Court, the 2017 Kenyan elections make for a good case through which to study how digital technologies shape contemporary electoral practice. This article examines the practice of electoral transparency through technology and argues that it can be conceived as a socio-technical device based both on distancing people from knowledge of the electoral infrastructure and on staging a simplified discourse on public access to the electoral infrastructure. Drawing on interviews with key actors in election technology implementation and ethnographic observations of public events around it, the article argues that digital technology has had three sets of implications for elections. First, it has shaped the electoral infrastructure and the nature of the final result (now a paper and digital hybrid). Second, it has shaped the distribution of knowledge among electoral professionals, giving a central role to ICT actors, objects, and knowledge in the definition of electoral transparency. Third, the centrality of ICTs in elections and the order of knowledge they bring are highly controversial and criticized by other electoral actors who demand for material proof for understanding the inner workings of elections.

Keywords

transparency, election technologies, voting technologies, digital identity and security industry, Kenya

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A week before the general elections in Kenya on 8 August 2017, Chris Msando, the Information and Communications Technology (ICT) Director of the Independent Electoral and Boundaries Commission (IEBC)[1] was found dead under suspicious circumstances that remain unclear (Okumu & Michira, 2017). The shadow cast over the elections by the murder of this ICT expert revealed the importance of digital technologies in this election, where they are used for voter registration and identification, and for broadcasting and publishing results.

Playing on the Kenyan public's problematic relationship with successive Electoral Commissions (Erlich & Kerr, 2016), the opposition coalition, the National Super Alliance (NASA), led by its presidential candidate Raila Odinga, publicly interpreted Msando's death as a sign of attempted rigging by Uhuru Kenyatta's incumbent Jubilee party. Rumours spread about the motives for his murder, related to his authorization to access servers that processed election results. Accusations of electoral fraud abounded, suggesting collaboration between the ruling party, the IEBC and Safran Morpho, the French digital company that provided the technology.

The opposition disputed the election results, which gave 54% of the vote to the incumbent Uhuru Kenyatta (Daily Nation, 2017a), and petitioned the Supreme Court based on allegations of hacking. Tasked with adjudicating electoral disputes, on 1 September 2017, the Court nullified the presidential election.[2] This decision led to the organization of new elections on October 26, which Uhuru Kenyatta (re)won with 98% of the vote. Raila Odinga boycotted these new elections, and therefore the turnout dropped radically from nearly 80% in the August to 38% in the October elections.

Digital technologies are parts of elections all over the world, and have effects on the outcomes and legitimacy of those elections. Taking the 2017 Kenyan presidential controversy as a case study, the article explores the making of 'electoral transparency through technology', and its rapid unmaking in the aftermath of the 2017 elections. Especially during the time frame of the controversy, one can observe the construction of electoral transparency in terms of social practice: actions that aim to produce trust in elections by mobilizing digital technologies, around which hard power relations are played out. Drawing on interviews with key actors in technology implementation and ethnographic observations of public events around it, this article shows how the technology provider is at the center of a device for circulating electoral knowledge based on both the concealment and spectacularization of the digital electoral infrastructure.

As the following analysis shows, digital technology has had three sets of implications for Kenyan elections, some of which can be generalized to other contexts. First, it has changed the electoral infrastructure, down to the very nature of the final result (now embodied as a hybrid of paper and digital files). Through the Results Transmission System (RTS), constructed as a solution to the 2007 post-election violence, transparency was to be created around the management of results, especially between the vote and final publication. However, the RTS was controversial: The materiality of the digital was presented as a source of transparency or conversely as a source of opacity, depending on the moment, shaping a technology that leaves room for power struggles in defining the meaning of how technology should implement transparency.

Second, digital technology transformed the relationships and knowledge hierarchies among election professionals (candidates, election institutions, election observers,

judiciary, technology experts and vendors). The role of ICT (objects, experts, knowledge) is now central in defining election transparency, while the roles of more traditional actors have been diminished. The 2017 controversy shed light on this new order, showing how the system was in the hands of computer scientists, particularly foreign vendors, at the center of the production of a election transparency device.

Third, the way technology affected elections (infrastructure and hierarchies of knowledge) was strongly contested by other actors, particularly the judiciary, which did not let the authority of ICTs over the definition of electoral practice remain unquestioned. Several actors opened a bitter debate around the definition of technology as an agent of transparency or conversely opacity, and struggled to establish their own knowledge as best suited to validate or invalidate the transparency of the process. In this debate, particularly visible during the Supreme Court proceedings, the concept of technology as an agent of transparency was strongly contested, and material evidence, as opposed to the immateriality of the digital, was reestablished as an authoritative principle for establishing electoral truth. While ICT experts initially defined the criteria for electoral transparency, the legal debate, building on the hybrid system, reversed the balance of power by (tentatively) imposing its own legal and material criteria for transparency (see Kanyinga & Odote, 2019).

The article is based on data collected during fieldwork in Nairobi around the 2017 presidential elections. Data collection was conducted primarily between June 2016 and December 2017. The data consisted of interviews and informal discussion with key actors in the implementation and administration of technology (in the Election Commission, Safran Morpho, and independent consultants), and ethnographic observations of situations where the technology was deployed on the field, at election offices, or/and where its inner workings were presented in front of selected audiences.[3] The article is also based on data from official documents (legal acts, decisions, reports), handbooks, newspaper articles and 'counter documents' produced by the opposition when contesting the electoral results (graphs, tweets, social media publications). We use these materials to provide a description of the voting process, to reconstruct the history of the digitization of Kenyan elections, and to trace the circulation of knowledge and knowledge claims about elections and digital technology as a political battleground.

Making electoral transparency through technology

Kenyan elections have always been times of contest and conflict, evidencing as well as fostering deep social divisions, and producing unexpected crises (see Cheeseman et al., 2020). Kenyan elections are known to have been relatively competitive under the one-party rule (Barkan & Okumu, 1978) and to have brought a change in power in 2002 (Oyugi et al., 2003). At the same time, they are high stakes political moments and have been sparking violence since 1992 (Throup & Hornsby, 1992), with a climax in 2007-2008 that remains in everyone's mind (Lafargue, 2008). This violent event, enmeshed in ethnic conflicts over national political power, serves as an ideal setting for a narrative of the history of technology as a solution to deep crises: an actor of a modernity that evokes national unity against the violence of local power (Poggiali, 2017). However, the relationship between elections, peacemaking, and technology remains poorly explicated, both by local actors and in the literature.

Since the 1990s, 'electoral transparency' has been a mantra of democratization programmes and a cornerstone of acceptable elections (Norris & Nai, 2017). Radically simplifying, the concept promotes the need to implement public awareness of the inner workings of institutions and electoral processes to improve democratic governance, combat corruption and inefficiency, and produce popular trust. Almost simultaneously, under the drive of multilateral actors and the private sector, the digital has increasingly emerged as a model to support development and good governance in the Global South (Al Dahdah & Quet, 2020; Yard, 2010). It is in this context that the election technology market, a subsection of the digital identity and security market, has developed. It has gained momentum especially in the period following the September 11, 2001 attacks, which redefined global identification policies in biometric terms. In less than a decade, from about 2005 to the present, biometric voter identification, digital result transmission systems, voting machines, etc. have become an integral part of election jargon in Africa.[4] These technologies propose to solve, in one moment, two historical problems associated with the African state: The lack of a foundational civil status registry and disputes over the legitimacy of elections. African heads of state welcome these innovations with wide interest, sometimes promoting domestic development by framing their government as an actor of modernity and as the avant-garde.[5]

In Kenya, 'electoral transparency' became a constitutional principle in 2010 (Republic of Kenya, 2010, Article 81) and was to be achieved through the development of 'a policy on the progressive use of technology' (Republic of Kenya, 2016, Article 17). The principle establishes the link between election transparency and technology, but lacks specificity on how exactly technology should become an actor in that relation. Even if procurement alone results in a growth of popular confidence in the Election Commission,[6] election technology varies greatly from election to election. Thus, the definition of the meaning of 'electoral transparency through technology' remains tied to its circumstantial practice at the time of procurement of relevant devices and their organization in the field. This practice is carried out by the multinational company that sells the technology to the country (Safran Morpho in 2017) and the Election Commission (IEBC), particularly its ICT Department. The relation between the company and the commission is expressed in terms of partnership[7] because it consists of a long process that can last from one election to the next. So to understand how technology can bring election transparency, one has to go to the field and explore how, at a specific time, a specific group of people implemented this practical notion and how the rest of the electoral society received it. Every technological election is a potential ground for analyzing the meaning of 'electoral transparency through technology'; that is a social practice, implemented through technical devices, along with strategies on how to built public trust over the election process using digital technologies.

To inform governments that use technology in elections, scholars stress the amount of work needed to build transparent technology. They emphasize the importance of public participation in technology acquisition, evaluation, and design (Bowman, 2010; Champion et al., 2018), the need for open software that allows for inspection of system flaws, and the gradual creation of a local community of computer scientists based on knowledge sharing and the accumulation of experience (Camp et al., 2005). In contrast, Carson's critical analysis (2001) shows how voting machines function precisely by

creating an effect of transparency with respect to their social contributions. Their legitimacy is built by making themselves invisible:

> Their role is to act as transmission mechanisms, ways of maintaining uninterrupted and unmodulated lines of sight and communication from the citizenry to the state, or from the state to the citizenry. Indeed, their communicative and regulative functions depend precisely on their ability to produce the sense that they add nothing to the process, that they marshal technology and expertise in the service of impersonal and objective fact. (Carson, 2001, p. 426)

The state of 'electoral transparency through technology' during the 2017 Kenyan presidential election was complicated to grasp because one could observe both of these notions of transparency, one based on communication and the other on rendering the election infrastructure invisible. Transparency through public participation in the infrastructure and transparency through invisibilization of infrastructure are not two elements in dichotomy, though, but must coexist. Digital and electoral transparency is a result of interactions with the digital infrastructure.

In Kenya, technology tends to be developed in a manner diametrically opposed to what is often considered best practice (e.g. Bowman, 2010; Camp et al., 2005; Champion et al., 2018). Government contracts are often conferred through direct agreements between the administration and the private company (see Office of the Auditor General, 2014, p. 197; Republic of Kenya, 2019, pp. 23-24), users' opinions are not sought, and there is no intention to foster a local community of technology experts to openly assess the quality and safety of the technology. Moreover, during the elections we observed, the Election Commission was completely in the hands of the vendor. The latter, for its part, is committed to making no missteps so as not to be dragged into local politics. It does not give interviews to journalists and researchers,[8] and it stays in the country for the time it needs (a few weeks) and then returns to where it came from. Moreover, in 2017, there were no arrangements for knowledge or technology transfer to the Commission.[9]

In contrast to these practices of concealment, we could see that a strategy was in place to produce transparency around the technology. First, over the period from 2010 to 2017 a Results Transmission System (RTS) was built with the aim of publicly displaying the accumulation of results from election offices to the central database. In addition, public access was provided to the legal documents attesting to the final result. This system aimed to create an effect of transparency between the act of voting and the final results through digital interfaces and access. Second, and especially during the pre-election period, the IEBC and the vendor organized several communication, awareness, and technology training exercises. During these exercises, interaction between 'the people' and the machine was promoted, the inner workings of the technology were shown to selected audiences, and election agents were trained in its use. These transparency exercises, disseminated to all levels of society, advanced a discourse of citizens exposure to the election infrastructure.

Digital technology causes transparency paradoxes. From our fieldwork, a narrow and regulated distribution of electoral knowledge emerged, centralized in the hands of the technology vendor and other ICT experts. The technology was developed in such a way as to make itself invisible (Carson, 2001) and block in-depth research into its

inner workings. At the same time, there was an ongoing narrative of citizen exposure to the voting infrastructure, a technical and communication practice that selected parts of it to show as simple, popular, and understandable. As discussed in more detail below, 'electoral transparency through technology' is a socio-technical device designed by actors who construct boundaries and access through partial strategies and choices about the audience to be exposed, the procedure to be disclosed, and the technologies through which to do so, while concealing the actual debate about transparency (Strathern, 2000). This transparency device led to a problematic circulation of knowledge between Safran Morpho and the Election Commission, but also to the rest of the electoral society. The explosion of computer jargon in society at large during the controversy is evidence of popular willingness to take part in and discuss the internal processes of elections. Hacks, algorithms, databases, technical systems, etc. were on everyone's lips, from Kibera to the Supreme Court. The controversy served as a measure of how the Kenyan society embraced the 2017 electoral transparency device.

Election technologies in Africa: An STS agenda

Stewart (2011, p. 372) argues that 'voting technologies have been an orphan in political science since the creation of the profession', and the same can be argued with respect to science and technology studies (STS). One exception is the 2000 U.S. election, when the confrontation between George W. Bush and Al Gore sparked a dispute over the role of voting machines in the Florida results. This event is the focus of a *Social Studies of Science* special issue that emphasizes the need to study elections and democracy through the lens of knowledge production (Lynch, 2001). The articles show the extent to which counting rules and representation devices played a central role in the election outcome and highlight the centrality of knowledge practices in the production of the political legitimacy of democracies (e.g. Miller, 2001).

From other research sites, Kelty (2008) and Dalsgaard and Gad (2018) stress the need to consider the mutual effects of the materiality of elections and the theoretical debate on democracy. In sub-Saharan Africa, the debate on electon materiality is more alive than ever for historical reasons related to electoral discontent but also because of the proliferation of digital technologies.

Perrot et al. (2016) point out how a fine-grained analysis of the materiality of voting challenges the disciplinary, socialization, and social appropriation aspects of elections. This work echoes the tradition of the French sociological history of politics (Garrigou, 2002) and the anthropology of democracy (Coles, 2004), and also connects to the strand of research on the African biometric state (Awenengo Dalberto et al., 2018; Breckenridge, 2014).

Since 2015, voting technologies have become an urgent scientific and political issue especially in South Africa, Ghana, Nigeria, Ivory Coast and Kenya (Boateng & Akaba, 2015; Nwokeafor, 2017). Scholars have wondered whether or not they promote 'democratization' (Piccolino, 2016) and whether or not they are tools to prevent highly contested elections from degenerating into violence (Gelb & Diofasi, 2016). Others have studied their effects on voter participation and behavior, voter (mis)understanding, and perceptions of the overall legitimacy of elections (Adams & Asante, 2019; Debrah et al., 2019;

Iwuoha, 2018; Nwangwu et al., 2018). Some have argued that voting technologies curb fraud (Agbu, 2016) while others assert that manipulation of computational results has become the new frontier for winning elections (Amoah, 2020). Other authors have emphasized the fetishization of technology as a tool for democratization and development (Cheeseman et al., 2018; Nyabola, 2018), the problematic data mining of African citizens during elections (Investigative Journalism for Europe, 2018; Makulilo, 2017), how voting technologies are yet another form of liberal intervention in Southern countries (Jacobsen, 2020) and how they frame democracy in narrow and purely procedural terms (Debos, 2021).

In Kenya, digital technologies in elections have been of interest to social scientists since the 2007 elections. The issues have included: how internet tools were able to map and identify hot spots of violence during the 2007-2008 post-election violence; how new communication technology hindered and fostered both hate and peace speech during the 2013 elections (Bowman & Bowman, 2016); and how these elections were contested over the first use of technology (Barkan, 2013; Bowman & Githaiga, 2015).

Odote and Kanyinga (2021) have recently studied election technology itself as a site for political controversy. Echoing a current opinion in the field (Debrah et al., 2019), they maintain that 'the manner in which technology is procured … is not only technical but also political' (Odote & Kanyinga, 2021, p. 1):

> When election technology is well-managed and -implemented, it can reinforce trust in elections and boost voters' confidence in the electoral process. … However, technology is subject to human behaviour and may be manipulated by politicians and election officials to promote the self-interest of powerful individuals and their political parties (Odote & Kanyinga, 2021, p. 4).

Technology is described as an actor in transparency, which can play a role in building trust but only if it is kept separate from, and thus left undisturbed by, 'human behavior'. What follows, in contrast and in keeping with the STS tradition (Langdon, 1980), pursues an understanding of electoral technologies and technologists as social beings, practicing elections and political agendas like other actors. We next present the Kenya election digital infrastructure as we have reconstructed it through interviews, documents, and direct observations during public demonstrations of technologies and on polling days.

The new election infrastructure

The 2016 Kenyan Electoral Law states that the Electoral Commission should use an 'integrated electronic electoral system' (Republic of Kenya, 2016, Article 2), which has been named the Kenyan Integrated Election Management System (KIEMS).

The term KIEMS refers to a device that includes three different technologies, each of which is dedicated to a particular function: Biometric Voter Registration (BVR) to collect voter data and produce an accurate voter register without double and fake identities; Electronic Voter Identification (EVID) to prevent identity usurpation and double voting at the polling station through digital identification of the voter's fingerprints; and the Result Transmission System (RTS) to secure transmission and avoid manipulation of

ballot boxes and tallying sheets on their way to the counting centres. The RTS function was to create a system for publishing and displaying results that was transparent and indisputable: Election results from the country's 40,883 polling stations were to be transmitted digitally from the field to central databases for accumulation (290 constituency counting centers and the national counting center at Bomas of Kenya). While being transmitted, the results were to be livestreamed directly on a giant screen in Bomas of Kenya, on the IEBC online portal (the two public interfaces of the RTS), from where they were taken by the other media and rebroadcast on radio and television. The RTS was designed to produce transparency in the counting – between the votes cast and those projected live as if there were no intermediaries – and above all to gradually prepare the losers for the results and thus prevent an emotional popular reaction that could result in violence (Republic of Kenya, 2016, Article 2).

The 'integrated system' concept was a solution to what had been viewed as a failure of the 2013 electoral technology, where each of the three systems was provided by a different vendor: the BVR by Safran Morpho, the EVID by Face Technology, the RTS and the website interface to access results developed in-house by the Electoral Commission, Google Kenya, the International Foundation for Electoral Systems (IFES), and Japak GIS.[10] The number of actors involved in 2013 has been named as the cause of the system failure due to interoperability issues among different technological components.[11] As a consequence, in 2017, the three technologies were integrated into a single machine, the high-tech tablet provided by one company, Safran Morpho (Figure 1), already involved in the provision of the BVR in 2013.[12]

Important here is that the KIEMS was embedded in an electoral system that mixed paper-based voting and counting procedures with digital ones, down to the very nature of the final result. This hybrid election technology was planned to function as follows:

> *Voter registration and identification*. A few months before Election Day, the Commission opened polling places for citizens to register as voters. Registration was carried out using the BVR, a technology that allowed polling agents to take traditional voter data (name, gender, age, date of birth) and biometric data in the form of a fingerprint scan. The digital voter file was then processed and uploaded to the national voter registry. The latter was then divided and assigned to every polling station in the country, and each portion of the registry was uploaded to a tablet assigned to a particular polling station and printed on a paper voter register.[13] On the day of the poll, the election agent had to verify the identity of voters before allowing them access to the voting booth. This was done using the EVID, a technology to verify if voters are 'who they claim to be'[14] by scanning their fingerprints. The technology compared the fingerprints with the other records in the database (the voter registry). In the 2017 election, a paper register complemented the digital register in case the tablet failed to work. In this case, the polling agent was able to give the voter access to the booth by comparing his or her ID document, face, and ID claims with the records on the paper register.
>
> *The vote* was carried out manually: Voters collected the six different coloured ballot papers for the six electoral positions, ticked their preferred candidates with a pen and cast their votes in the six corresponding plastic ballot boxes.

Figure 1. The Kenyan Integrated Election Management System (KIEMS) at the polling station.

Result counting, transmission, and publication. At the end of polling day, the Presiding Officer (PO) in charge of a polling station closed the booth and proceeded to the counting of ballots and votes. This was done by the PO manually and aloud, observed closely by the other polling agents and party representatives. Once the votes had been counted, the PO completed and signed a paper form (Form 34A) with other agents. The PO activated the tablet and entered the RTS application, the last, and most heavily contested, component of the whole system. As we said, the aim of this technology was to transmit results from the polling station to the tallying centres in a secure and incontestable manner,[15] and so the results were transmitted in two different formats: a *text* format and a *scanned paper* format. The *text* format consisted in keying the number of votes each presidential candidate received, as in a text message. The *scanned paper* format was a scan of the previously completed paper Form 34A made using the tablet's camera. The legal basis for the legitimacy of the electoral results was the *scanned paper form*, a nice mix of a digital and paper artefact. The PO was responsible for transmitting the results in *text* format with the attached Form 34A scan to the Constituency and National Tallying Centres. The scan was mandatory, and the RTS application was designed so that the 'submit results' button was visible only after the *scanned paper* copy of the Form 34A was attached (Kura Yangu Sauti Yangu, 2017). At the National Tallying Centre located in Bomas of Kenya, the IEBC and Safran Morpho were ready to receive the results in both formats. A giant screen projected the images of the eight presidential candidates and, next to their image, the number of votes received, fed in real time by the numbers that flowed directly from the *text* results sent by the POs (Figure 2).

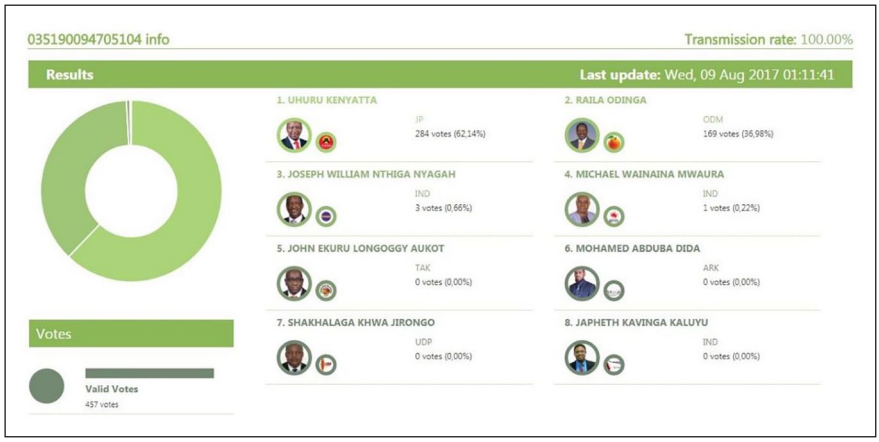

Figure 2. The public interface of the Results Transmission and Display System (RTS).

These numbers appeared live on the Bomas of Kenya giant screen and on the Electoral Commission's online portal. Aside from this visual system, voters could access all the polling stations via the same online portal and download the original *paper scanned* Form 34A 'so that numbers could be checked against the scanned images of the forms as the results came in' (Kura Yangu Sauti Yangu, 2017, pp. 1-2).

In Kenya's 2017 election technology, paper procedures did not just accompany digital ones, but were embedded in them. The *scanned version of the paper form* became the main document for certifying the final election results, combining the innovation of the digital in bringing speed and numerical quantification to the paper document that provided the material trail of numbers. Digital and paper certified each other, in a truly specific and circumstantial understanding of electoral transparency through technology. What follows is a historical overview of how this hybrid technology was built around competing visions and volatile conceptions of the digital as a source of transparency or, conversely, opacity.

Before the 2017 election: The irresistible rise of the technological utopia

The introduction of electoral technology in Kenya is the political component of a wider modernizing project for a self-described 'digital country' (Poggiali, 2017).[16] It is also the most recent component of the never-ending discussions on electoral techniques common to African countries: Ever-changing electoral laws, voting materials and systems are temporary responses to a continuing sense of discontent over electoral management (Perrot et al., 2016).

The standard narrative on the introduction of digital technologies in Kenyan elections claims that it was the curative measure after the 2007-2008 post-election violence.[17] During these elections, the opposition contested incumbent President Mwai Kibaki's victory, and accusations of electoral fraud escalated into an unprecedented crisis in which

more than 1,100 Kenyans died and 500,000 were displaced (Lafargue, 2008). However, the genealogy of voting technologies is longer and dates back before 2007.[18] The Electoral Commission considered a system of printers for RTS in 2002, and since that time its ICT Directorate has been experimenting internally with new ways to modernize elections. This relocates technology development within a history of experimentation by professionals who are removed from the direct political context.

The 2007 electoral crisis represented a major push towards technology, however. After the crisis, an Independent Review Commission (IREC) was set up to diagnose the failure of the electoral system and propose solutions. They argued that what raised 'concerns about the accuracy of the final results' was 'the lack of transparency in the processing and tallying' (Independent Review Commission, 2008, pp. 70-71):

> Against the advice of experienced external advisors, [the Commission] rejected the announcement of 'partial' results that would have kept data flowing from the constituency. Instead, they … adopted a system of announcing results based on a faxed or phoned-in data, which was inherently prone to misinterpretation by the uninformed, and then failed to explain the system adequately, not only to political party, observers, and other member of the public, but even to its own staff members. (Independent Review Commission, 2008, pp. 70-71)

The 2017 technology design responded to the 'lack of transparency' noted by the IREC which therefore suggests implementing an:

> [i]ntegrated and secure tallying and data transmission system, which will allow computerised data entry and tallying at constituencies, secure simultaneous transmission (of individual polling station level data too) to the national tallying centre, and the integration of this results-handling system in a progressive election result announcement system. (Independent Review Commission, 2008, p. 138)

Since then, and against the opinion of many experts who argue for less high-tech election technologies,[19] the introduction of more and more technology has become the consistent response to repeated electoral failures and a key feature in the evolution of the Kenyan electoral system (Barkan, 2013).

The IREC's recommendations were implemented by the Kenyan firm Next Technology Limited in the country's first RTS.[20] It was implemented 'on a pilot basis in the run-up to the 2010 referendum' for the new Constitution (Republic of Kenya, 2017b, p. 230; also Office of the Auditor General, 2014, p. 186). A year later, election technology appeared (briefly) in the Electoral Act ('The Commission may use such technology as it considers appropriate in the electoral process' (Republic of Kenya, 2011a, Article 44), and in the Independent Electoral and Boundaries Act: 'The Commissions is responsible for … the use of appropriate technology and approaches in the performance of its functions' (Republic of Kenya, 2011b, Article 4). Yet, no law offered any specific guidelines on the type of technology or regulated its use in the 2013 elections, leaving the practice of developing transparency in the hands of technicians and private providers.

On election day in 2013, several problems arose that prevented the proper use of Biometric Identification and Result Transmission. One of the three servers provided by the vendor for Transmission had to be converted for Identification, because the other

vendor did not provide its own server.[21] The transfer of a server slowed down the entry of votes, which started a couple of hours too late, as news of the failure had already circulated in media outlets and social networks. The 2013 elections are remembered for these failures and dramatic delays in material procurement (Bowman & Githaiga, 2015). However, the main narrative blamed 'human behaviour' (politicians tempering with the technology or the Commission not being tech savvy enough to implement it properly), and consequently a variety of actors proposed better and more sophisticated technology, technology providers being first among them.

The global market for biometric technologies has been growing rapidly (Marketsandmarkets, 2020) especially since the second decade of the 2000s. A growing number of companies, mainly multinational and European, see large new markets in African countries for selling digital identity solutions (biometric passports and identity cards, Automated Fingerprint Identification software, scanners, integrated systems and dozens of other products). As one independent consultant told us, the size of a domestic market can range, depending on the country's population, from $20 million to $500 million (Kenya's government in 2017 spent $20 million x 2 contracts).[22] This huge financial dimension coexists with a strong ethical dimension related to the development of African countries. Governments are framed as clients to whom vendors provide digital solutions to historical issues related to the (mal)functioning of the state. Platforms such as ID4Africa (a World Bank project) brilliantly illustrate this connection between market and development. ID4A connects governments and vendors who want to showcase their ever-changing products suitable for African administrations in the field (small, mobile, temperature- and dust-proof devices designed for contexts with limited infrastructure). For these companies, as in the case of pollsters, elections provide a platform to establish themselves as market leaders and key partners to governments to sell the rest of the products they need.

However, the market is as risky as it is lucrative.[23] The competition among companies is fierce and frequently controversial, going as far as court cases in which companies challenge the legality of contracts won by others (International Foundation for Electoral Systems, 2017). In Kenya, the history of the procurement of electoral technology shares features with procurement in general and the involvement of multinational firms on the continent: competition between mainly Western companies and obscure procurement processes (see Office of the Auditor General, 2014, p. 197; Republic of Kenya, 2019, pp. 23-24). The history of controversy over security and identity information systems dates back to the infamous Anglo Leasing scandal, which revealed a wide network of corruption among politicians and civil servants over a tender for national passports (Bachelard, 2010). This history provided a framework for the opposition to target the reputational vulnerabilities of Safran Morpho, but it did not prevent the government from entering into contracts with the company.

Although private providers do an important job of framing the growing use of technology in Kenya (and Africa) they are not the only ones. 'Democracy experts' and multilateral institutions were also instrumental in the drive towards an increasingly sophisticated system for the 2017 elections. Although sometimes cautious *vis-à-vis* technology (Barkan, 2013), international experts financially assisted the 2017 Kenyan election and polling agents training: UNDP set up a fund of 24 million dollars, and the

International Foundation for Electoral Systems trained polling agents directly in the use of electoral materials.[24]

Last but not least, politicians from both the government and the opposition argued in favor of a more digitally focused electoral system. Together with the government, the opposition voted in favour of the amendments to the 2016 and 2017 law for the acquisition of the 'integrated electronic electoral system' proposed by inter-party committees. But, just as in 2013, procurement and logistical issues slowed down technology implementation and, harbouring a deep distrust of the IEBC, the opposition has systematically questioned its legitimacy and efficiency in organizing technology. Election technology thus became a political battleground between the government, the IEBC, and the opposition. Because the procedures were new and not specific, the IEBC and the opposition fought over a few of them in court (Kanyinga & Odote, 2019). The National Super Alliance (NASA) and a few Kenyan NGOs advocated for a digital-only election, in contrast with the Commission's willingness to introduce a 'complementary mechanism' to Biometric Identification: a paper electoral register to back up the technology in the event of failure (Republic of Kenya, 2017e). The paper register has been described by opponents as the IEBC's and the government's blatant willingness to pursue election fraud and bankrupt the technology (described as an image of election neutrality and transparency). The opposition lost the case, and the paper register back-up was eventually established. However, the opposition and its allies were successful in making their case for vote counts carried out within constituencies to be final, with no recounts to be permitted at the National Tallying Centre (Republic of Kenya, 2017a).

The push for digitization is strong and heterogeneous, but debates continue at the local political level about the digital as a source of transparency or opacity. Immediately after the 2017 vote, these debates radicalized around the RTS. The opposition (and others) labeled the system as an actor of opacity, the proof of which was the absence of paper records to support digital results.

Polling day

The election process went smoothly on 8 August 2017: At the polling stations, the KIEMS tablets functioned without any major errors. After the closing of the poll at 5 p.m., the digital *text* results immediately began to stream on to the IEBC online portal and on the big screen at the Bomas of Kenya, showing an advantage of Uhuru Kenyatta. That is when the controversy about the manipulation of the digital technology and its opacity was launched by the opposition, using the hybrid system to prove its statements.

At 2 a.m. on 9 August, NASA issued a press release entitled 'Declaration of illegal results' condemning the live results streaming (NASA Coalition, 2017a). The communiqué described them as unlawful because they were 'just keyed in results … not supported by Form 34A as required by the law' (NASA Coalition, 2017a). A few hours later, NASA stated that the IEBC servers had been hacked using the login details of Chris Msando, the ICT IEBC Director who had been found dead several days earlier. They added that an algorithm had been programmed into the servers to 'fabricate results' (NASA Coalition, 2017b) because the gap between the two top candidates' was too consistent to be real. The official winner would then be a 'computer-generated leader' (Republic of Kenya,

2017b, §16). They then published a 50-page document with trails of logs that had presumably been retrieved from the IEBC servers, claiming that there was evidence of illegal attempts to enter the servers and modify the data (Odinga, 2017a). Also, NGOs questioned how the stream of *text* results could have appeared on the IEBC website only seven minutes after the closing polling stations, and they noted some 'serious discrepancies' between the typed digital results and the few paper forms that were eventually received (Kura Yangu Sauti Yangu, 2017, p. 4).

In response to the predicted unreliability of the government's technological system, the opposition asserted that it had set up an alternative tallying centre and was able to provide Kenyan citizens with parallel counting. The veracity of these claims was never established, but the day after polling, opposition leaders gave the media a different final vote count, which placed Raila Odinga ahead (Odinga, 2017b). On 11 August, amidst this rising tension, the IEBC chairman declared Uhuru Kenyatta the winner. The opposition and some civil society activists contested the official announcement, as a quarter of the forms required to state the results were not available on the IEBC online portal. NASA called for street protests, which were quickly repressed by the police (Amnesty International and Human Rights Watch, 2017), and eventually decided to submit a petition to the Supreme Court. Uhuru Kenyatta, his supporters, the IEBC and Safran Morpho argued that the system was neutral and that the stream of live results transmitted on the IEBC screens represented the will of the Kenyan people: 'Kenyans made their choice through their ballot paper; they had no role in technicalities', said the Deputy President in an interview.[25] However, these technicalities were at the centre of the ensuing debate between experts and among the wider public.

The new knowledge distribution

The RTS was supposed to show a transparent process of transmission, counting and publication that reflected 'uninterrupted and unmoderated lines of sight and communication from the citizenry to the state, [and] from the state to the citizenry' (Carson, 2001, p. 426). On the contrary, the opposition, by putting the RTS in the spotlight, showed its social construction, partiality and imperfection. Above all, it revealed a problematic device of electoral knowledge circulation. During the controversy, the distribution of electoral knowledge became a public and problematic issue, but even more so the role of the French company Safran Morpho. Its employees, both French and Kenyan, seemed to have more knowledge and control over the elections than the Electoral Commission itself. For some interviewees, this knowledge monopoly was demonstrated on the day of the 'Dry Run of the Results Transmission System and Result Display' held on August 2, a couple of days before the election (KTN News, 2017).

The simulation of the Result Transmission System was a trial for IEBC 'to make sure things work', but also to stage it in front of a chosen audience consisting of diplomats, party representatives, registered international and local election observers, and the wider public through the broadcast on national television by means of journalists to whom a privileged position in front of the speakers' stage was dedicated.[26] The simulation had been planned for the 31 July, the same day Chris Msando's body was found by the police. Because of this terrifying coincidence, the event was moved up a few days. In the absence

of Msando, Safran Morpho's Kenyan employees carried out the exercise while the French staff were helping behind the scenes. The live tallying produced some extra votes for Kenyatta that were not recorded by the media[27] but, more importantly, as we were told in a whisper just after the test by a member of the KIEMS IT Advisory Committee, it was obvious that after Msando's death, the 'Electoral Commission's technicians were not able to run the technology'.[28] The group of people who surrounded the Committee member nodded in agreement. The IEBC's limited understanding of the technology was also evident in our observations during a training session for returning and presiding officers.[29] The knowledge provided by training manuals and experts was not meant to explain the technology to its users, but to tell them how to operate it (Independent Electoral and Boundaries Commission, 2017, p. 22). Pointed out as being responsible for the invalidation of the election, IEBC agents were retrained before the second election, but many of the officers were still not conversant with the tablets, were fearful of their responsibilities, and wanted to hand them over to the ICT experts.[30]

The topic of technology training and education was the focus of several public events, similar to the Dry Run described above, organized by the IEBC and Safran Morpho in the pre-election period. For example, the 'Biometric Voter Verification exercise' was a month-long event (May–June 2017) during which the KIEMS were distributed at the polling stations across the country to enable voters to verify the accuracy of their personal information ahead of the upcoming Election Day. IEBC pollying agents (two to five of them) were based at the polling stations for a month using, taking home, and recharging the batteries of the tablets. Voters, from their side, made their way up to their polling stations, and familiarized themselves with the procedure. Voters had to place their finger in the tablet scanner to see their registration information appear in the screen. As IEBC staff told us, the exercise was to 'get people to interact with the technology' and allow them to 'experience the KIEMS'.[31]

On June 9, a technology demonstration was held at the Safari Club Hotel, an upscale hotel on University Road, next to IEBC's headquarters: the 'KIEMS end-to-end test executive plan'. The event was opened by IEBC's CEO, who introduced some of Safran Morpho's executives, emphasizing their role in accompanying the commission for the smooth running of the elections. The presentation consisted of the detailed unfolding of the entire technical system, from voter registration to identification on voting day, through the filling out of Form 34A, its scanning and transmission, to the collection of results. The presentation was made in front of a selected audience (the 'election stakeholders', mainly NGOs) of about eighty people who were offered a rich lunch, notebooks and pens, water, and asked what their wish was for the upcoming elections. Most of them responded with composure – repeating the mantra of good election administration – transparent, free and fair elections.[32]

These exercises were presented to us as events designed to enable everyone to understand how the technology works and in that way to democratize it; they were to demonstrate the technology to people, to let them interact with it, and to build their confidence in it. The confidence was to be built by showing different aspects of the technology to different audiences (voters, election officials, 'stakeholders', VIPs). For each audience, what was showcased was presented as a simple and understandable technology. In the post-election period, however, this communication strategy appeared extremely limited

compared with the demand – advanced first by the opposition in the public sphere and then before the court – for deep information on the inner workings of technical processes. The central role of the technology provider in giving or not giving access to information and spreading knowledge about the election infrastructure appeared in all of the opposition's evidence.

Safran Morpho agents offered explanations for not disclosing detailed information about the system. First, the company was not planning to transfer technology and know-how to the IEBC. Second, given the legal culture in Kenya, disclosing details of the deployment process would have led to permanent court actions, making the technology impossible to implement. And third, as we shall see, the company pointed to IEBC's shortcomings as what prevented the company from disclosing its technology arrangements when summoned by the Supreme Court.[33] Hence, they maintained, information about technology that circulated within the IEBC and the public sphere was carefully chosen and limited to basic knowledge and communication exercises.[34] Public demonstrations of the technology were ongoing, but seemed simplistic when compared to the computer science expertise that began to be discussed in the public media. Critics charged that the IEBC and the company were implementing a transparency device based on public demonstrations that created an impression of the openness, transparency, and understandability of technology, when in fact the actual digital practice was opaque, and the technology was hard for the wider public to understand.

The opposition certainly did not miss the opportunity to argue that the elections went against the constitutional principle according to which 'free and fair elections [are] transparent; and administered in an impartial, neutral, efficient, accurate and accountable manner' (Republic of Kenya, 2010, Article 81). The murder of Msando was mobilized, including suggestions that his hand was cut off to use his fingerprints to access the system and that he was tortured to disclose his passwords.[35] After the election, the opposition claimed to have far more accurate technological knowledge than that which the Election Commission had revealed and proposed an alternative truth. It released pictures of its modern parallel counting centre and, on 9 August, Raila Odinga left the floor to a young ICT expert 'to explain' to his public what had happened in the hacked servers (NTV Kenya, 2017). Claiming that 'the truth [was] contained in the servers', NASA politicians published data logs on social networks (NASA Coalition, 2017c). Accused of having 'rubber-stamped' the results far too soon (Epstein, 2017), international observers argued that they did not have enough expertise to access crucial technological data and had released their comments based on what they were able to monitor directly.[36] Even the most digital-savvy local observers from the Electoral Observation Group (ELOG), who were collecting and counting votes alongside the Commission, had no mandate to monitor the IEBC's results transmission technology. Their sample confirmed the official results but was dismissed by the opposition and certain electoral experts as partisan and irrelevant.

The introduction of technology, in sum, changed the power relations among election professionals. ICT practitioners were in 2017 the primary actors performing electoral transparency, the ones who chose which facts to reveal and which to conceal about the electoral infrastructure (West & Sanders, 2003) and thus the only ones able to unveil the electoral truth they had fabricated. The judiciary, however, did not let the authority of ICT professionals over the definition of electoral practice remain unquestioned.

After the election: The judicial unmaking of election transparency through technology

On 1 September, the presidential election was nullified by a majority decision of the Supreme Court. While it did not give a definitive opinion on the true results – they were not accessible even if they existed somewhere – it noted that 'elections are not events but processes' (Republic of Kenya, 2017d, §224), and pointed out that in conflict with the constitutional principle of transparency, the 'system went opaquely awry' (Republic of Kenya, 2017d, §301). The ruling also stated clearly that only material evidence, and not digital alone, would be sufficiently convincing, which the respondents (IEBC and Uhuru Kenyatta) were not willing or able to provide despite the court's orders (Republic of Kenya, 2017d, §278). The Supreme Court played on the 'hybrid script' to rehabilitate the manual and material evidence to the detriment of the digital one.

The main arguments in the opposition's petition was that the RTS violated the Constitution, as text results were streamed live on a public portal and TV without being either verified or backed up by the required paper or scanned Forms 34A (Republic of Kenya, 2017d, §264-266). They stated that 'this was deliberate and calculated to create a false narrative and national psyche in preparation for stealing the election in favour of the 3rd respondent [U. Kenyatta]' (Republic of Kenya, 2017b, §21.2.7). After fighting against the manual electoral register as a back-up, the opposition built its legal arguments around the sole authenticity of paperwork, both paper and scanned versions. The Court upheld this argument by requesting material evidence for the 'live results' stream. In its 'scrutiny exercise', the Court made eighteen orders, the majority of which related to the physical dimension of technology: They asked the IEBC to give the petitioners access to its servers, the GPS locations of each KIEMS tablet used during polling day, the logs showing access to the servers and to the actual tablets, and certified photocopies of original paper 34A forms (Republic of Kenya, 2017c).

Some of these orders, such as full access to the servers, were not complied with by the IEBC[37]. The Commission and Safran Morpho hid behind each other, providing justifications regarding their inability to provide access. In interviews we conducted with two Safran Morpho agents, they justified this lack of compliance by citing the appointed experts' limited skills and the lack of sufficient time to give proper access to the servers.[38] 'Security concerns' were the IEBC's main reason for refusing to grant servers access. The Court ruled that this opacity validated the opposition's argument:

> Our order of scrutiny was a golden opportunity for IEBC to place before Court evidence to debunk the petitioner's said claims. If IEBC had nothing to hide, even before the Order was made, it would have itself readily provided access to ICT logs and servers to disprove the petitioners' claims. But what did IEBC do with it? It contumaciously disobeyed the Order in the critical areas …. It leaves us with no option but to accept the petitioners' claims that either IEBC ICT system was infiltrated and compromised, and the data therein interfered with, or IEBC's officials themselves interfered with the data or simply refused to accept that it had bungled the whole transmission and were unable to verify the data (Republic of Kenya, 2017d, §279).

The other motive for the nullification of the election was the absence of scanned and paper Forms 34A at the National Tallying Centre when the electoral results were declared.

Citing the law and the recent Maina Kiai case (Republic of Kenya, 2017a), the Supreme Court advanced the argument that the 34A forms – either originals or scanned copies – were the only documents that certified the will of the people, only the forms and not the 'typed digital results were the legal documents and figures on which to assert the results' (Republic of Kenya, 2017d, §264-265). These forms provided evidence of human activity at the lowest level – the polling station – and were material evidence of a transparent process (Republic of Kenya, 2017d).

In the same 'material turn', mathematical and statistical 'proof', provided by both the opposition and citizens, was widely circulated in the media and in wider society where servers and hacking became the main bar talk. Meanwhile in court, lawyers on both sides awkwardly displayed their newly acquired digital skills to convince the court. A video of an eminent lawyer, Paul Muite, in court comparing firewalls to 'mtego wa panya' ('rat traps' in Kiswahili) was shared on social media, attracting ironic comments from digital users (Daily Nation, 2017b). In contrast, NASA attorney Otiende Amollo confidently presented the famous algorithm which, once entered in the servers, would fabricate presidential results from scratch. Alongside the material evidence, human actors were blamed for being responsible for this chaos. The opposition and civil society organisations called for the prosecution or dismissal of high-ranking officials at the IEBC who selected some scapegoats and fired about 40 of the constituency return officers for the new elections.[39] NASA released pictures of Safran Morpho agents, allegedly blaming them for interfering in the elections. By this point, none of the electoral stakeholders believed in a technology separate from 'human behaviour'.

Faced with the opacity of transparency through technology, and the impossibility of understanding what had happened after the closing of the polling stations on 8 August, the Court demanded material evidence and, not having received it, invalidated the presidential election. If ICT actors were playing a central role in the election, the balance of power between electoral professionals was temporary mitigated by the judiciary asserting its authority to determine the transparency of the process, returning the digital ephemeral to an understandable (at least to them) paper-based materiality: Whoever was able to present material evidence won the right to utter the electoral truth.

However, the balance of power was unstable. After the ruling, Safran Morpho – which had merged with Oberthur Technologies (OT) in May 2017 to become OT-Morpho (Asmag.com, 2017) and changed its name to IDEMIA in September 2017 − won a second €20 million bid to organize the October elections by partially adapting, with the IEBC, to court injunctions. The IEBC inaugurated a new technology training tour: three days during which management staff and election experts retrained polling station managers and presiding officers who had been blamed for the 'technological failure' of the first election. The company, in the face of harsh criticism, sought to increase its transparency practices by commissioning three technology audits, communicating more (issuing three press releases and deciding to speak officially with us) and opening a 'monitoring room' at the National Counting Center. Here the results were projected and announced in front of party representatives, diplomats, registered observers and journalists to build confidence in the second election.[40] They were pursuing the same strategy as before, however, in their staging of transparent and simple technology. Moreover, they refused to organize the live broadcast of digital text results to avoid confusion between digital numbers and paper results, thus eliminating the system's only intimate public interface.

Conclusion

The introduction of digital technologies – or rather their construction as a solution to electoral conflicts in Kenya – has had three sets of consequences for elections. First, it has transformed the electoral infrastructure to the very redefinition of the legal evidence that determines the result (now a mix of paper and digital). This hybrid result stems from the tension between the push toward progressive digitization, brought about by various groups of actors, and the changing views of local politicians about the materiality of the digital as a source of transparency or, conversely, opacity. Second, technology has transformed the relationships and knowledge hierarchies among election professionals. The most important part of the electoral system was centered in the hand of ICT experts, playing a central role in the redistribution of knowledge on the election. Third, the centrality of technologies in the electoral exercise – and especially the hierarchy of knowledge they entail – is contested by traditional electoral institutions. While ICTs play an increasing role in the design of electoral concepts, publics – despite the supposedly blind trust in the digital – continue to demand, especially at critical moments, material evidence to support their understanding of the inner workings of the technology and thus the search for electoral truth.

This article shows the value of considering 'electoral transparency through technology' as a set of social practices, from design and administration to controversial popular receptions. The complex circulation of electoral knowledge can only be observed from the field, looking simultaneously at multiple sites of knowledge production and circulation. It also shows the interest in conceiving of the technicians, managers, administrators, and technologies from a growing private sector, which plays an increasingly important role in designing the basic terms of democratic elections, as well-rounded (electoral) actors. Finally, it shows the importance of following the election controversy as an epistemological tool to unveil and understand hierarchies of knowledges between experts over public processes that otherwise would be invisible (Carson, 2001). The struggles between the Parliament, The Public Procurement Administrative Review Board, the High Court, and the IEBC over technology procurement and implementation for the August 2022 general elections reaffirmed the highly disputed dimension of election infrastructure and the role it plays in shaping a transparent and trusted democratic process (Odhiambo, 2021a, 2021b). This article has been written before 9th of august 2022 general elections. We hope, in the future, to see greater precision, especially from the IEBC and technology providers, about the ways in which they intend to build electoral transparency.

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Notes

1. In most Sub-Saharan African countries, elections are managed by independent, often controversial, bodies called Electoral Commissions (Gazibo, 2019).
2. Six elections were taking place on the same day, but we only discuss the presidential election here.
3. These data reflect a Nairobi-centred perspective focused on the centralized administration of technology as the place where the strategy of trust in elections is built. We hope to see further research on the administration of technology in less centralized places.
4. In 2014 alone, 31 of the 50 African countries were adopting one or more digital election technologies, all based on biometric identification (International IDEA, 2014).
5. For similar accounts on Rwanda and Ethiopia, see: Bowman (2015) and Gagliardone (2014).
6. After the technology procurement the public trust in the IEBC rose to almost 70% from 33% during the previous election. Interview with an IEBC County Returning Officer, Bridge workshop, Nairobi, 24 April 2017.
7. The IEBC CEO frames it in these terms during a public demonstration of technology. Notes on the observation of the 'KIEMS end-to-end testing executive plan', Safari Club Hotel, Nairobi, 9 June 2017.
8. We still managed to interact informally and continuously, from June 2016 to October 2017, including after the cancellation of the August elections, when the company was in the limelight, top managers were willing to give us proper interviews.
9. Interview with a Safran Morpho sales manager, Alliance Française, Nairobi, 29 May 2017; Interview with a Safran Morpho vice-president, Bomas of Kenya, Nairobi, 27 October 2017.
10. Interview with an IEBC County Returning Officer, Bridge workshop, Nairobi, 24 April 2017; Interview with the 2017 ICT IEBC Director, Alexandre coffeeshop, Nairobi, 12 May 2017; Interview with a former ICT IEBC Director, Nairobi, Java café, 29 June 2017.
11. Interview with a former ICT IEBC Director, Nairobi, 29 June 2017; Informal discussion with an IFES advisor on election technologies, E-vote conference, Bregenz, 24 October 2017.
12. For this technical choice, the Electoral Commission was unsuccessfully sued for single sourcing.
13. This script is taken from ethnographic observations of the Biometric voter verification exercise (Sarangombe, Nairobi, May-June 2017); the 'KIEMS end-to-end testing executive plan' (Safari Club Hotel, Nairobi, 9 June 2017); the 'Dry Run of the Result Transmission System and Result Display' (Bomas of Kenya, Nairobi, 2 August 2017); the polling days (Kibera, Nairobi, 8 August, and 26 October 2017) and from interview with the 2017 ICT IEBC Director, Alexandre coffeshop, Nairobi, 12 May 2017; Interview with a polling station Presiding Officer, Sarangombe, Nairobi, 15 May 2017.

14. A commonly used sentenced by biometrics actors to define the function of the technology. Interview with a former ICT IEBC Director, Nairobi, 29 June 2017.
15. Interview with an IEBC County Returning Officer. Bridge workshop, Nairobi, 24 April 2017.
16. Kenya's Information and Communication sector accounts for 6% of the growth in GDP (Kenya National Bureau of Statistics, 2017*)*.
17. Interview with an IEBC County Returning Officier, Bridge workshop, Nairobi, 24 April 2017; Interview with an IEBC Commissioner, Bridge workshop, Nairobi, 24 April 2017.
18. Interview with a former ICT IEBC Director, Java café, Nairobi, 29 June 2017.
19. Interview with an independent consultant on election technologie, Zoom, 11 May 2020; Interview with a UNDP Policy Advisor, Zoom, 10 July 2020.
20. In the same period the Canadian firm CODE Incorporated was developing the first Biometric Voter Registration referendum (Office of the Auditor General, 2014:90). However, here we focus on the RTS.
21. Interviews with a former ICT IEBC Director, Java café, Nairobi, 29 June 2017; Informal discussion with an IFES advisor on election technologies, E-vote conference, Bregenz, 24 October 2017.
22. Interviews with an independent consultant on digital identity, Zoom, 13 June 2020.
23. Interview with a Safran Morpho sales manager, Alliance Française, Nairobi, 29 May 2017.
24. See the UNDP Kenya Support to Electoral Processes in Kenya (SEPK). Available at: https://www.ke.undp.org/content/kenya/en/home/operations/projects/democratic_governance/electoralreforms.html (Accessed 18 February 2021); Notes of the observations at the IEBC training session for County electoral managers and returning officers (Safari Park Hotel, Nairobi, 6 October 2017).
25. Authors' personal notes of a public speech broadcasted by NTV in August 2017.
26. Interview with an IEBC County Returning Officer, Bridge workshop, Nairobi, 24 April 2017.
27. Notes of the observations of the 'Dry Run of the Result Transmission System and Result Display' (Bomas of Kenya, Nairobi, 2 August 2017).
28. Notes of the observations of the 'Dry Run of the Result Transmission System and Result Display' (Bomas of Kenya, Nairobi, 2 August 2017); Informal discussion with a member of the KIEMS IT Advisory Committee, Bomas of Kenya, Nairobi, 2 August 2017.
29. Notes of the observations at the IEBC training session for County electoral managers and returning officers, Safari Park Hotel, Nairobi, 6 October 2017.
30. Notes of the observations at the IEBC training session for County electoral managers and returning officers, Safari Park Hotel, Nairobi, 6 October 2017.
31. Notes of the observations of the Biometric voter verification exercise (Sarangombe, Nairobi, May-June 2017); Interview with an IEBC County Returning Officier, Bridge workshop, Nairobi, 24 April 2017; Interview with an IEBC Commissioner, Bridge workshop, Nairobi, 24 April 2017.
32. Notes of the observations of the 'KIEMS End-to-end testing executive plan' (Safari Club Hotel, Nairobi, 9 June 2017).
33. Interview with a Safran Morpho sales manager, Alliance Française, Nairobi, 29 May 2017; Interview with a Safran Morpho vice-president, Bomas of Kenya, Nairobi, 27 October 2017; Informal discussion with a Safran Morpho employee, Java Coffeeshop, Nairobi, 29 May 2017.
34. For a similar claim, see European Union Electoral Observation Mission (2018, p. 22) and for an example of basic technology communication, see the speech by the late Chris Msando, published posthumously: Africa Uncensored (2017).
35. The rumours that Msando's arm had been amputated have been refuted, but the post-mortem still showed that he had been strangled and tortured (Daily Nation, 2017c).

36. Scholars have emphasized this point: see specially Cheeseman et al. (2018) and Amoah (2020).
37. In its full judgment, the Court lists the items that were not granted, which included information on firewalls, 'certified copies of the certificates of penetration tests', the 'specific GPRS location of each KIEMS kit', 'logs', etc. (Republic of Kenya, 2017d, §278).
38. Interview with a Safran Morpho sales manager, Le Grenier à Pain, Nairobi, 13 September 2017; and Interview with a Safran Morpho vice-president, Bomas of Kenya, Nairobi, 27 October 2017.
39. Notes of the observations at the IEBC training session for County electoral managers and returning officers, Safari Park Hotel, Nairobi, 6 October 2017.
40. Interview with a Safran Morpho vice-president, Bomas of Kenya, Nairobi, 27 October; Notes of the observations of the monitoring room at the National Tallying Centre, Nairobi, 27 October 2017.

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