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Revolutionary Secrets

Technology's Role in the South African Anti-Apartheid Movement

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In the late 1980s, Operation Vula brought exiled African National Congress (ANC) leaders and military capacity into South Africa despite legal and military obstacles. According to participants, a purpose-built encrypted communication system was critical to this success, but what was the significance of the technology? Was it simply a catalyst for change within the ANC leadership, or did the system crucially alter the political situation? This case study highlights the importance of four key factors affecting the interaction between new information and communication technologies (ICTs) and social movements. The factors are (a) ongoing technological innovation, (b) user practices, (c) technical competence, and (d) organizational routines. Scholarship that fails to consider these factors risks oversimplifying the process of sociotechnical change, hampering our ability to understand the relationship between ICTs and contentious political activity.

Keywords: *computers; information and communication technology; activism; social movements; ANC; South Africa*

In the late 1980s, the African National Congress (ANC) embarked on an operation to bring exiled ANC leaders and military capacity into South Africa despite legal and military obstacles. Operation Vulindlela, more commonly known as Operation Vula, successfully established an underground network of operatives within the country who were in regular contact with one another, with ANC leadership located in neighboring Zambia and with supporters around the world.

According to ANC activists, a purpose-built, encrypted communication system was critical to this success (Jenkin, 1995; Press, 1995). They assert that the capabilities afforded by the system inexorably changed the South African political landscape. On this view, the new technology ushered in an era of unprecedented information exchange within the ANC, undermining the apartheid regimes' policy of repression. The limited scholarship on Vula has largely embraced these claims (Henderson, 1997; Motumi, 1994; Williams, 2000). Discussion of the conditions surrounding activists' use of the technology is almost entirely largely absent. Careful examination of the historical evidence, however, suggests that four contextual factors—evolving technologies, individual practices, user skills, and organizational routines—profoundly shaped the influence of the communication system.

Our purpose in undertaking this case study is twofold. Our primary objective is to highlight the importance of the factors we have identified when studying the consequences of technology for social movements. Though discussions of each of these factors can be found in the existing social movement literature, we believe that more thorough consideration would be fruitful. A secondary goal is to present a thorough and accessible account of an important early example of activist computer use.

In the next section, we provide a brief history of Operation Vula, locating it within the broader conflict between the ANC and the South African apartheid regime. Next, we more carefully define the four factors listed above and review gaps in contemporary social movement literature with regard to each. The section that follows provides a detailed description of the Vula communication system, demonstrating the utility of the four factors. We conclude with a brief discussion of the significance of our findings.

Background: Operation Vula

The ANC was officially banned in 1960 as part of the apartheid government's crackdown on Black political opposition. Some of the organization's leaders, including Nelson Mandela, were captured and sentenced to prison in 1964. The remaining ANC leaders went into exile in Zambia and other countries, where they could operate overtly, but intensive police surveillance severely curtailed the ANC's anti-apartheid campaign inside South Africa.

The ANC eventually adopted not only political but also paramilitary tactics. The government responded to its raids and bombings with brutal police repression and transborder military attacks on the ANC leadership in exile. From the mid-1980s, many South African townships (Black residential areas) were in a de facto state of civil war. International opposition to apartheid reached its height during this period, with economic embargoes and foreign disinvestment in addition to political condemnation. Anti-apartheid activists outside the country, especially in the United Kingdom and the Netherlands, built strong alliances with the ANC to keep the apartheid issue visible and increase pressure on the White minority government.

In 1986, buoyed by international support and signs that the apartheid government was beginning to crumble, the ANC and its military wing, Umkhonto we Sizwe (MK), began to plan a final push: Operation Vula (Henderson, 1997). Between 1988 and 1991, Vula brought exiled ANC leaders and military capacity inside South Africa to support a major, potentially armed movement against apartheid. The absence of internal leadership had been a longstanding obstacle to effective mobilization by the ANC, and though the Vula network did not provide control over all aspects of political and military work, it allowed the ANC to establish strategic control from within the country for the first time (Barrell, 1990, p. 55).

Negotiations were ultimately effective and Vula's military capacity was never tested, but the operation was successful by other measures. At least a dozen operatives infiltrated the country and kept regular contact with the ANC leadership outside the country. ANC activists also smuggled in a large number of weapons, which members of the underground

stored in 14 safe houses located around the country (Mandela, 1991; Motumi, 1994; Tutu, 1998; Williams, 2000).

Significance of the Vula Communication System

Members of the movement report that the development of the encrypted communication system was key to Operation Vula's success. The system, built by activists using commercially available computer equipment and the international telephone system, linked operatives within the country with ANC leaders and supporters in Lusaka, London, Amsterdam, and other locations around the world. The system grew to accommodate unanticipated levels of use and was an integral part of the operation until early 1991, when the ANC decided that it was no longer needed.[1]

According to ANC participants, the Vula communication system was used to coordinate meetings and actions, to debate strategy, to report operational outcomes, to share military and political intelligence, and much more. The ultimate effect was that operatives within South Africa had immediate access to powerful allies, while the South African government's capacity to repress ANC communication was significantly reduced.

How should we understand the role of Vula's encrypted communication system in the operation's success? Did it simply catalyze a social process of reorganizing and reinvigorating ANC leadership? If so, would this have happened anyway, by other means? Or did the communication system actively and crucially change the political situation? Without it, might the apartheid government have hung on for longer or managed—as it intended—to discredit the ANC and retain a privileged political role for Whites in the post-apartheid dispensation? Counterfactual questions such as these cannot, of course, be answered with any certainty. But pondering them helps us see just how important the relationship between information technology and social movements can be.

Existing discussions of Vula would lead us to conclude that its encrypted communication system played a pivotal role, fundamental to the movement's success. Indeed, the system's chief designer, Tim Jenkin, has promoted this view in a long account of its origin and effects. But this kind of account always risks sliding into determinism. We need to move beyond the simple statement that communication technology influenced political capacity to answer the deeper questions of how, when, and why.

In a memoir, Vula's technical wizard, Tim Jenkin (1995), expressed his view of the communication system's significance in no uncertain terms. Before the encrypted system,

> poor communications had determined the shape of our struggle. It was because our fighters and cadres [inside South Africa] could not communicate with their leaders [outside the country] and between themselves that the underground never developed and "People's War" never became a reality.

Jenkin goes on to depict the encryption system as a primary causal factor in the ANC's ultimate success.

> Within a couple of weeks of setting up the computerised communication link with South Africa, the value of good communications began to show. For the first time in the history of

> the underground struggle you had a group of operatives inside South Africa in dynamic contact with the leadership outside. What this meant was that there could be true dialogue between the soldiers and the generals. . . . In short, there could be true political leadership instead of one-sided military orders. (Jenkin, 1995)

Assessing Vula's significance, Henderson (1997) reaches a similar conclusion:

> The underground operation's ultimate viability was dependent upon a number of . . . factors. To begin with, it had to acquire a previously unavailable means of secure real-time communications between the ANC/MK leadership in Lusaka and the Vula commanders within South Africa. (p. 441)

The view that a secure communications system was a necessary, if not a sufficient, condition for Vula's success prevails throughout available accounts.[2]

This perspective is typical of the literature on intelligence and military affairs, where technological-determinist arguments are common. This work tends to credit the success or failure of a particular campaign to its supporting technologies (e.g., Fast, 1997; Ham & Atkinson, 2002; Nichiporuk & Builder, 1997). Treating Vula as a military operation, Henderson (1997) considers the communication system to be a key military capacity, foregrounding it as he would any other military infrastructure.

Social movement literature offers an alternate perspective for understanding the significance of the Vula communication system. Scholarship in this area has demonstrated that new technologies can reduce a state's capacity for repression and open up access to elite allies. For example, the Mexican Zapatistas used the high-speed global communication capacities afforded by the Internet to coordinate with elite allies internationally and to exploit differences between their own government and that of the United States (Schulz, 1998). Scholars also suggest that the Internet can be used to avoid surveillance and to circumvent state regulation (Denning, 2001; Kidd, 2003; Scott & Street, 2000). Changes such as these alter activists' political opportunities, enhancing their ability to organize, mobilize, and influence elites (see McAdam, 1996).

Though this perspective offers a clearer articulation of the mechanisms by which new technologies are linked to social movement outcomes, these accounts still take on a determinist hue. The analyses tend to frame sociotechnical change in terms of static capabilities used in predictable ways. In other words, changed political opportunity structures result directly from capacities inherent in new information and communication technologies (ICTs). In effect, these capacities are the new opportunities, simply there to be exploited. This view of technological change buys into the rhetoric of revolution that often accompanies new ICTs.

In this article, we use the Vula case to highlight four key factors affecting the how, when, and why of interaction between new ICTs and social movements. These factors are (a) ongoing technological innovation, (b) user practices, (c) technical competence, and (d) organizational routines. Consideration of these factors is not without precedent—they are well established within the sociology of technology, and they are represented in the literature on social movements—but there is room for more careful exploration. Before turning to the Vula case, we describe these factors in more detail, and we provide several examples of

social movement research in which they have been ignored. In some cases, we can also identify specific mischaracterizations of sociotechnical change that result from their exclusion.

Dynamic Technologies and Complex Practices

Consider, first, rapid incremental innovation. ICTs, especially microcomputer and digital communication technologies, have evolved very quickly during the past 30 years. Each successive generation of these technologies has brought new capacities or combined existing ones in novel ways. Not infrequently, apparently small, incremental changes have shifted balances dramatically. Personal computers, for example, were widely regarded as hobbyist toys by computer industry leaders of the mid-1970s—and they were, at first (Campbell-Kelly & Aspray, 1996). Within a few years, however, steady improvements in processor power, memory capacity, and operating systems made them serious tools.

Current social movement scholarship rarely explores the significance of this kind of incremental change. Though there are many case studies describing how new technologies are being employed in the social movement sector, these studies too often omit discussion of technical change. Studies of the web provide a prominent example. There are detailed accounts of the ways in which activists are embracing the web (A. Edwards, 2004; Kidd, 2003; Rosenkrands, 2004; Vegh, 2003), careful analyses of the consequences of this use (Galusky, 2003; Gurak & Logie, 2003; le Grignou & Patou, 2004; Wright, 2004), thoughtful maps of social networks evident in site links (Garrido & Halavais, 2003; Van Aelst & Walgrave, 2004), and more. Yet none of these analyses addresses the influence of the rapid technical transformations that have characterized the web during the past decade. Our claim is not that these treatments are worthless—to the contrary, they make many important contributions—but rather that they present an incomplete picture. If we want to understand the influence of technology in a social movement context, we cannot bracket technological change.

Ignoring technical change is particularly problematic when scholars base predictions on the capabilities afforded by a few salient technologies. For example, Ayres's (1999) discussion of the Internet's role in the antiglobalization movement focuses on the rapid circulation of incomplete or inaccurate information via e-mail lists and static-content web sites. As a consequence, he depicts the Internet as a mechanism facilitating the rapid circulation of unverifiable claims. Based on this characterization, he suggests that new technology may "indeed herald a return to old-fashioned collective behavior—the riots, panics and sporadic protests of old" (p. 141). His analysis, however, is limited by a characterization grounded in fixed capacities. Only months after the work was published, antiglobalization activists adopted new Internet technologies providing capabilities complementing the swift communication that was the centerpiece of Ayres's work. Web-based collaborative publishing and real-time consumer video production tools were used by activists during the Seattle protests in 1999 to create a credible alternate news outlet offering detailed, verifiable coverage of protest activities (Smith, 2000). In light of these changes, Ayres's claims appear to have been overly dire. If we seek to understand how new technologies influence social movement outcomes, we must be careful to recognize their evolving nature.

A second factor, related but not identical, is the major role of user practices in technical change. Dozens of studies in the history of technology underline the fact that extremely

important shifts can be initiated not only by highly skilled designers, developers, and corporations but also by less-skilled users of technology (Bijker & Law, 1992; Fischer, 1992; Landauer, 1999). Technical capabilities and limits shape, but do not determine, how a technology is used. For this reason, social movement scholars must attend to the specific ways in which activists put technologies into practice.

There are many examples of predictions that assume a specific use. These predictions can be thought-provoking, but unless the assumed use is explicitly discussed, they are likely to be overly broad. Numerous scholars share Ayres's (1999) concern that the Internet will lead people to accept, use, and disseminate information without attending to its accuracy (Fisher, 1998; Garner, 1999; Sunstein, 2001; Zook, 1996). Yet there is evidence that for some the Internet provides a means of verifying claims and arriving at informed political opinions (DiMaggio & Sato, 2003; Elin, 2003). Such use has the opposite effect, increasing the accuracy of the political information that circulates online. As this example illustrates, blanket assertions about the consequences of a particular capability can be misleading when they emphasize what can be done at the expense of considering what individuals will choose to do.

Third, scholarship on social movements rarely discusses activists' technical competence. Yet individuals' skills strongly influence which technologies they use and how they use them (Orlikowski, 2000). If an individual does not know how to use a new technology or does not realize that it exists, whatever capacities it affords are out of reach. New skills, particularly complex ones unrelated to existing capabilities, come at a cost in time and effort.

Many scholars highlight the importance of new capabilities without addressing the skills necessary to utilize them. For example, though Scott and Street (2000) describe Internet-enabled "secrecy" as one of four key technologies, they do not consider how activists' decisions to use (or ignore) encryption technologies—a primary instrument for achieving secrecy—may be affected by the complexity of the skills required to operate them. Encryption software is complicated and exchanging encrypted messages requires skilled action on the part of both sender and receiver. If done incorrectly, the security and readability of the message are jeopardized. Similarly, several scholars have described the ways in which activists can exploit networked computer system security vulnerabilities to advance a political agenda, without mentioning the esoteric skills required to engage in such tactics (e.g., Denning, 2001; Vegh, 2003; Wray, 1999). Mundane skills, such as searching the web, participating in electronic mailing lists, or publishing web sites, are even more likely to be taken for granted (e.g., Bennett, 2003; A. Edwards, 2004; Elin, 2003; Nip, 2004). To develop a detailed model of how social movements are affected by new ICTs, we must first understand exactly how and why activists acquire complex technical skills—or, alternatively, how and why technically skilled individuals or communities become activists (e.g., Earl & Schussman, 2003).

Fourth, the social movement literature focuses on specific applications of ICT-enabled capacities without assessing the integration of technology into activist practices more broadly. The application of information technologies within organizations is significantly constrained by routines (Eason, 1997; Kling & Scacchi, 1982). Routines preserve organizational capabilities at a level beyond individuals, but this comes at a cost in flexibility and speed of adaptation. Well-established routines are partially or wholly invisible to those who work within them (Bowker & Star, 1999; Star & Ruhleder, 1996). This inertia makes all

kinds of change more difficult, but for the reasons mentioned above, technological change can be especially problematic if it requires users to learn completely new skills and interact with unfamiliar devices. As a result, attempts to revolutionize organizational routines through new technology often end in abject failure (P. N. Edwards, 1995; Zuboff, 1988).

Activists' ability to successfully employ an innovative technology depends fundamentally on the broader set of organizational routines shaping movement activity. Yet predictions of technology-induced organizational change still sometimes ignore the significance of routine. Scholars have observed that activist use of new technologies can dramatically alter communication flows (Myers, 1994, 2000), can yield new kinds of coalitions (Brainard & Siplon, 2000; Vegh, 2003), and can introduce new mechanisms for coordinating action (Scott & Street, 2000). These are compelling possibilities, but they are not inevitable. Whether and how organizations embrace these new capabilities depends to a large extent on the preexisting organizational context.

We think these four factors, which have an important influence on the relationship between ICTs and social movements, are still too often overlooked. This historical case study of the development and use of Vula communication system provides additional evidence of the importance of these considerations**.** Data for this analysis are primarily the personal accounts of Tim Jenkin and Ron Press, the activists who built and operated the system (Jenkin, 1995; Press, 1995) and a more recent interview with Jenkin (personal communication, T. Jenkin, October 10, 2003). We supplement these accounts with information about Operation Vula gleaned from the Truth and Reconciliation Report (Tutu, 1998) and from works describing Vula's military aspects (Henderson, 1997; Motumi, 1994; Williams, 2000).

Rapid Incremental Innovation

The Vula communication system was based on rapidly changing microcomputer technology. For many years, ANC activists had exchanged messages using simple manual encryption techniques such as one-time "pads." These techniques, however, posed a number of logistical challenges. To use a one-time pad, both parties need the message itself and a copy of the pad, a list of random numbers allowing the user to encode and decode the message. The coding process requires that every character in the message be individually transformed. As a result, encoding or decoding even a relatively short message can be time-consuming. In the early 1980s, Jenkin and Press were living and working in London as part of the ANC underground.[3] As microcomputers began to appear on the consumer market, the activists realized that they might offer an affordable way to automate some of this tedious, error-prone process.

During the years that the system was in development, from 1984 to 1988, Press and Jenkin worked with three different computer platforms. They conducted their first encryption experiments using an Oric 1. Costing less than £100 at the time of its release in 1983, this primitive system proved that the concept could work. Encouraged by their success, they invested in a more expensive machine, the Commodore 64, which offered more memory, better graphics, increased reliability, and a wider range of peripherals. It was on this platform that activists first integrated menu-based operation, making the system much easier to use. They also experimented with transmitting messages via telephone, though without much success.

ANC leaders' interest in the project grew as it evolved. In 1987, Jenkin and Press were asked to migrate the system to the most common personal computer of that era, the IBM PC. This more powerful platform allowed activists to create increasingly sophisticated programs. Another benefit was the availability of a light laptop, well suited to South African operatives' need for mobility and secrecy. This was the platform that the ANC first deployed in the field.

Evolving digital communication technologies also proved crucial to the project. Jenkin's and Press's first effort to exchange messages using the telephone network failed because their modems could not communicate successfully over the noise and echoes of the international lines. This led them to build their own communication device by connecting the computers to a machine that could create and recognize the dual-tone multifrequency (DTMF) tones used for touch-tone dialing.

Unlike a conventional modem, which would only generate audio signals when connected to another modem over a telephone line, the DTMF-based system operated asynchronously, producing sounds without waiting for a response from a remote device. To transmit the message, a sender would record the audio on tape and then play the recording back into a telephone handset. At the other end, the recipient would record the incoming message and then play it back for the receiving computer to decode. As a result, the sender's computer and the telephone did not have to be in the same location. This was a significant benefit because it meant that operatives could use any telephone, including a pay phone, to transmit their messages. Though the DTMF-based technology, like the modems it was intended to replace, ultimately failed when tested on international lines, it still served a valuable purpose by suggesting a solution to another crucial problem. Improvements in modem technology, and the serendipitous discovery of an acoustic coupler modem which, like the DTMF device, produced sound without being linked to another computer over the telephone network, provided the last piece of the solution to the network's communication problems.

Even innovation in the South African communication infrastructure proved relevant. For instance, on his first use of the system, an underground operative discovered that message pickup did not work from coin-operated payphones because the coin drop sounds were too disruptive. Card-operated pay phones—just then becoming available through a pilot program—provided a solution to this problem.

This story suggests that the capabilities of the Vula communication system, on which the ability to circumvent government repression depended, were strongly influenced by rapid incremental innovation in the microcomputer industry. Predictions based on the technologies available in 1984, when system development began, would have been profoundly misguided. Social movement analyses that treat technology as though it were static, ignoring the steady stream of innovations large and small, cannot accurately capture their influence on the political environment.

User Practices

Individual practices profoundly influenced how the Vula communication system was used. The evolution of the messages transmitted across the network provides one example. Activists originally deployed the system primarily for meeting coordination, logistics,

progress reports, and project proposals. However, as they gained experience, they began also to encrypt and store organizational records (e.g., meeting minutes) and to exchange personal messages with family members outside the country.

Another notable change in user practices had to do with the interactions between operatives in South Africa and ANC leaders in Lusaka. Early messages tended to be informational, providing updates or announcing decisions, but a more interactive style soon became the norm. Leaders of the South African underground would discuss their ideas with their counterparts in Lusaka, challenging suggestions with which they disagreed, and would provide feedback and criticism of projects that had failed. In Jenkin's words,

> No longer did you have a situation where blind commands were issued which the soldiers obediently had to carry out. The leaders were now properly informed of the situation inside the country and any suggestions they made could be corrected by those "in the field." (Jenkin, 1995)

Activists' use of the system also profoundly influenced its security. For evading state surveillance, the capacity to engage in and maintain a record of encrypted communications was invaluable, but successful evasion depended at least as much on users' willingness to follow strict protocols as on its technical capabilities. When South African police discovered a Vula communication center in July 1990, state agents managed to access a large volume of Vula communications dating back to the start of the operation. This security breach occurred because operatives in South Africa failed to follow protocols. Though the exact mechanism by which the police acquired decrypted records is unknown, Jenkin believes that the operative was carrying both the data and the disk containing the key when he was picked up by police forces—a clear violation of the guidelines regarding the safekeeping of encryption keys (Jenkin 1995). Although they cannot be sure, Jenkin and Maharaj believe that some of the files were actually being stored unencrypted—possibly even as printouts—at the communication center (P. N. Edwards, 2003; Henderson, 1997, p. 436; Jenkin, 1995).

We will probably never know exactly why the system failed. South African security police destroyed most of their records—along with an accounting for police behavior under apartheid—from that era around 1992, when it became clear that a democratic government would soon arrive. It is likely that the captured operative (or the entire ANC cell) failed to understand the protocol or failed to see exactly how severe the consequences would be if it were compromised. Perhaps that person, or the cell, assessed the importance of the encryption system differently than its designers.

Thus, individual practices had a profound influence on the Vula communication system's practical capacities. None of these practices was determined by technical factors. Instead, they emerged from constant interaction among individuals, the organizational structures and routines, and the technology itself.

Technical Competence

Activists' technical competence also shaped the development and use of the Vula communication system. Limited familiarity with computer technology slowed system development and delayed the ANC leadership's decision to adopt it. Press and Jenkin demonstrated

a dogged conviction that computers would aid their cause, despite the many obstacles they encountered, but upper-level ANC leadership was more hesitant. According to Press (1995), "It was the general wisdom in Lusaka that it is impossible to send computer stuff from Lusaka to London or anywhere else." It is easy to imagine decision makers' skepticism regarding a private communications network kluged together atop the existing telephone infrastructure and requiring exotic electronics. Such doubt was only reinforced by failed demonstrations of commercially provided e-mail services; the pronounced echo on international telephone lines confused standard modems. If corporate e-mail could not provide reliable service, it must have been hard to imagine that a few novice computer users could do better.

The technical innovations described above certainly contributed to an increased acceptance of this technology. However, Press suggests that the popular success of the IBM PC, especially word processing, increased the ANC leadership's interest in the project. Once they began to see computers as useful tools for ordinary people and to understand how the technology could be used to store and manipulate text, their appreciation for Vula's potential grew.

The design of the system was heavily influenced by the activists' skills and knowledge. Jenkin and Press were computer neophytes. To build Vula they had to learn about computer programming, encryption, digital communication, and much more. Though their skills grew immensely during the course of the project, gaps in their understanding remained. As a result, the communication system design was based on an incomplete understanding of a fraction of the available technologies.

Consider the development of their encryption mechanism. In the mid-1980s, when Jenkin and Press began to contemplate using computers, computer-based encryption was already a well-established field with a robust research literature, national standards, and commercial products. For example, by 1977 the United States had established a national Data Encryption Standard ("Data Encryption Standard Fact Sheet," 1996), and products based on this standard were commercially available ("IBMs Cryptographic Products," 1978).

The two activists, however, remained largely unaware of this. Though they did foray briefly into the field, this contact was not particularly fruitful. For example, several months after Vula was put into operation, Press visited a library seeking a solution to an encryption problem. He found one, but the experience left him with the impression that "cryptology was an arcane science for bored mathematicians, not for underground activists" (Jenkin, 1995). In the end, Press and Jenkin made almost no use of the readily available, but relatively esoteric, computer encryption techniques. Instead, they simply automated the manual encryption process already in use by the ANC underground. Thus, their limited technical skills ultimately influenced both the nature and the quality of the system.

Routine and Practice

The choice to automate an existing system, rather than build a completely new, potentially better one, was also influenced by the fourth factor we have mentioned: the need to exploit, and to harmonize with, existing organizational routines. For example, the slow connection linking Vula computers was just one of several factors influencing the speed of communication between exiled ANC leadership and underground operatives inside South Africa. ANC

leaders rarely used the communication system directly. Instead, they would receive updates from a system operator, decide on an appropriate response, and then pass this information back to the operator. The decision-making process often moved very slowly. Jenkin reports that once activists realized how quickly the new communications system could convey a message, they grew impatient and pressured ANC leaders to respond more rapidly. As the new routine (using the communication system) became established, it created pressure to change an older one (making decisions within a secret guerilla organization).

The ANC's resistance to the new technology, described in the technical competence section above, is a second example of the importance of organizational routine. Despite the apparently drastic shortcomings of the existing communication process, it took several years for advocates of the computerized encryption system to win support from the ANC leadership.

Conclusion

Analysis of the interaction between social movements and new ICTs too often appears on two levels illustrated by the Vula case. One is the Press/Jenkin level, which describes all the technology and skill-acquisition details of the implementation process. The other is the Mandela/Henderson level, which treats the system as a black box, as infrastructure that just worked. In this article, we have introduced an intermediate level of analysis, which simultaneously examines how the ANC technical committee developed and implemented the system and how the larger organization adopted, shaped, and was shaped by it.

In crafting our analysis, we emphasize the human and organizational components of the Vula communication system. Rapid incremental innovation, user practices, technical competence, and organizational routines all profoundly affected the ways in which the system influenced the political environment in which ANC activists operated. It is not possible to understand how the system developed or how it affected activists' political opportunities without examining these factors.

Failure to address these phenomena produces important problems in the analysis of Operation Vula that apply equally to other cases of social movements adopting or adapting new ICTs. First, existing accounts sometimes deploy a "before-and-after" frame, seeing computerization as a plus-minus, either-or factor. This misses the influence of incremental changes on the capabilities a technology affords, on how these capabilities are used, and on whether new technologies are used at all. As we have shown here, technical developments that ultimately fail can be important influences. Second, analyses that focus exclusively on technology often fail to acknowledge that new technologies sometimes meet resistance because the expectation is that everyone will immediately recognize technical capacities as an obvious opportunity. Third, these analyses too frequently assume that activist use of technology depends on what the technology "can do"—as if that were independent of what individuals know about it and which skills they already possess. This is simply incorrect.

Though we have argued that the role of new ICTs is highly contingent, we do not believe that prediction is impossible. To make claims about the implications of new technology for the political opportunities available to activists, scholars must place these claims in the context of the social factors on which the outcomes depend. It is insufficient to assert that new

technologies dramatically reduce constraints on activist communication, thereby enhancing social movement organizations' ability to mobilize supporters, challenge elite authority, and more effectively realize their goals. These arguments must be grounded in an understanding of the technology's current and evolving capabilities and of the activists' practices, competences, and routines. Attention to these attributes is important whether the analysis is at the level of activist, organization, or field.

Notes

1. By that time, President F. W. de Klerk had lifted the ban on the African National Congress (ANC) and negotiations had begun toward a new South African constitution, incorporating principles of racial equality.

2. However, a book-length account of Operation Vula by one of its Dutch operatives, Conny Braam (2004), mentions the encryption system but is entirely silent on whether or how it affected the mission's success.

3. Jenkin (2003), a White South African, was an underground ANC operative in Cape Town until his arrest in 1978. Imprisoned in Pretoria, he escaped in 1979 and made his way to London.

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