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*History and the Technopolitics of Identity: The Case of Apartheid South Africa**

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This article explores the history of nuclear systems and computers in apartheid South Africa, considering these systems – and apartheid more generally – as forms of 'technopolitics', hybrids of technical systems and political practices that produced new forms of power and agency. Both systems were exceptionally important to the apartheid state, not only as tools but also as symbols. Equally significant, both came to serve as focal points for Western governments and international anti-apartheid activists, who fought to limit South Africa's access to these systems. We argue that nuclear systems enacted the technopolitics of national identity, while computers expressed a technopolitics of social identity.

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Contests over global order after the Second World War rapidly embroiled South Africa in the rhetorics and realities of Cold War geopolitics. These proceeded according to two central dualisms: 'the West' versus the 'Eastern bloc', and 'developed' versus 'underdeveloped'.[1] Each had a key technological dimension. The East/West binary pitted two sociopolitical systems against each other in a totalising struggle for hearts and minds. From the arms race to the Nixon–Khrushchev kitchen debate, each side routinely displayed technological sophistication, abundance, and power as a principal index of virtue. The developed/underdeveloped dualism, meanwhile, posited a race in which poor countries rushed toward modernity by following 'the' infrastructural, technoscientific, and medical path charted by wealthy industrialised nations.

Apartheid ideology explicitly articulated South Africa's position with respect to these technopolitical dualisms. Afrikaner personal histories and collective imaginaries had long articulated national identity as simultaneously Western and African.[2] Apartheid leaders portrayed South Africa as a 'Western', developed nation, qualifying as such through political heritage, ethnic ancestry, corporate connections, technological development, and industrial infrastructure – not to mention white rule and fervent anti-communism. At the same time,

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1 On 'development' and decolonisation in Cold War context, see (among many others): F. Cooper and R.M. Packard (eds), *International Development and the Social Sciences: Essays on the History and Politics of Knowledge* (Berkeley, University of California Press, 1997); A. Escobar, *Encountering Development: The Making and Unmaking of the Third World* (Princeton, Princeton University Press, 1995); O.A. Westad, *The Global Cold War: Third World Interventions and the Making of Our Times* (Cambridge, Cambridge University Press, 2005); G. Hecht and P.N. Edwards, *The Technopolitics of Cold War: Towards a Transregional Perspective* (Washington, DC, American Historical Association, 2008). On South Africa specifically, see G. Hecht, 'Negotiating Global Nuclearities: Apartheid, Decolonization, and the Cold War in the Making of the IAEA', in J. Krige and K. Barth (eds), *Global Power Knowledge: Science, Technology, and International Affairs*, *Osiris*, 21, 1 (July 2006), pp. 25–48.

2 H. Giliomee, *The Afrikaners: Biography of a People* (Cape Town, Tafelberg, 2003); T.D. Moodie, *The Rise of Afrikanerdom: Power, Apartheid, and the Afrikaner Civil Religion* (Berkeley, University of California Press, 1975).

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Afrikaner nationalism insisted on its own African-ness: Afrikaners had cut the tie to Europe, pioneered the land, suffered mightily at the hands of British imperialism, and made South Africa their God-given homeland. All this gave them what Saul Dubow calls an 'acquired indigeneity'.[3] The National Party's 1948 electoral victory seemed a reward for centuries of struggle, and offered a unique opportunity to forge the most 'advanced' African nation in history.

This essay explores how technological projects figured in the practices, symbolisms, and political narratives marshalled by apartheid apologists and anti-apartheid activists. We argue that the entanglement of technology with narratives of national and social identity had concrete political dimensions and material outcomes. Like other nations during the Cold War, the apartheid South African state used technopolitical strategies[4] – the embedding of policy choices in engineering projects and infrastructure development – to simultaneously conceal and legitimate its agendas. Large-scale technological projects expanded the apartheid state's apparatus and displayed its power. As Dubow has argued, apartheid leaders used them to articulate a nationalist modernism that appealed to universal principles while maintaining a distinctive South African identity.[5]

Leaders perhaps expected that the state's privileged access to expertise and resources would automatically head off challenges from below, but the anti-apartheid movement discovered technopolitical strategies of its own. These involved contesting claims about the distinctively South African character of technologies and expertise, and revealing the repressive politics hidden in apartheid technological systems. In the 1970s, both anti-apartheid activists and Western governments began to view South Africa's dependence on foreign technology and knowledge as a key point of weakness. Based on this analysis, they targeted two major technologies: nuclear systems and computers. Both were exceptionally important to the apartheid state, not only as tools but also as symbols. By building its 'own' nuclear systems, the state sought to enact a 'western' national identity and demonstrate technological self-sufficiency. Anti-apartheid activists challenged such claims by demonstrating the dependence of South Africa's nuclear capabilities on international knowledge networks. Similarly, the apartheid state aimed to manage its race-based identity registration – the hated passbooks and their related fingerprint databases – with computer technology, thereby muting the system's oppressive character beneath a quest for bureaucratic efficiency through automation. Activists reacted by making the underlying technology itself an issue, connecting computers to military systems and political persecution by the police. Those arguments led to international embargoes focused on nuclear systems and computers, but they also created a template for viewing the role of technology in South African politics that resonates powerfully into the present.

The Technopolitics of National Identity

Apartheid elites imagined the Western-ness of their nation in dialectic with its African-ness. The specificities of nature and geography made their nation African; its Western-ness manifested itself in the industrialised ways they coped with that nature and geography.[6]

3 S. Dubow, *A Commonwealth of Knowledge: Science, Sensibility and White South Africa 1820–2000* (Oxford, Oxford University Press, 2006), p. 14.

4 G. Hecht, *The Radiance of France: Nuclear Power and National Identity after World War II* (Cambridge, MA, MIT Press, 1998).

5 Dubow, *A Commonwealth of Knowledge*. See also N.L. Clark, *Manufacturing Apartheid: State Corporations in South Africa* (New Haven, Yale University Press, 1994); R. Christie, *Electricity, Industry and Class in South Africa* (Albany, State University of New York Press, 1984); and D. Posel, 'A Mania for Measurement: Statistics and Statecraft in the Transition to Apartheid', in S. Dubow (ed.), *Science and Society in Southern Africa* (Manchester, Manchester University Press, 2000), pp. 116–42.

6 These dialectics had a long history, as Dubow, *A Commonwealth of Knowledge*, shows.

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Purple prose from the 1979 official history of the South African Atomic Energy Board gives a sense of the ongoing performance and significance of this dialectic for industrial and scientific elites:

> In terms of human social advancement, much of the vast African continent is poor; the civilisation of today has not even reached the more remote areas and a subsistence existence is still the lot of millions of its inhabitants. But beneath the dripping jungles and the searing desert sands, in the hills and mountains and the far-reaching grassland and scrubland lie rich mineral deposits which are the envy of many nations — oil, coal, gold, uranium, diamonds, copper, chrome, cobalt and a myriad of other base, precious, and exotic minerals... [T]he Republic of South Africa, with its advanced technology, is far ahead of the rest of the Continent in cataloguing and exploiting its mineral resources ... Although coal is believed to have been used by the Zulus several centuries ago when they exploited outcrops of it to replace charcoal for smelting iron ore, the mining of minerals really dates only from the last century; small-scale coal recovery started in the early 1800s, copper in the mid-century, diamonds nearly twenty years later and then, in 1886 came the opening up of the Witwatersrand gold fields.[7]

In and of itself, Africa was thus a place without technology or civilisation, defined by these absences and the ecologies that produced them. Zulus' use of coal was a matter of conjecture, not 'really' a part of the continent's history.

Such logic underpinned apartheid policies of social control as well. 'Developed' whites would separate, control, and educate blacks – not just those living in South Africa, but also migrant 'tropical Natives' – lifting them out of 'underdevelopment' in an orderly fashion that nevertheless maintained their distinctive African-ness. The 'special responsibility' to negotiate development and underdevelopment simultaneously made South Africa exceptional and justified the increasingly complex apparatus of apartheid.

Leaders of 'the West' had their own, often technological, reasons to include South Africa within the fold. During the early Cold War, the nuclear-obsessed US and UK had identified South Africa as their most reliable – and desirable – ally on the continent, with the world's largest known uranium reserves buried in gold-mine shafts and tailings piles.[8] South Africa's southern hemisphere location made it an exceptionally valuable site for US satellite tracking stations, and a well-placed refuelling stop for aircraft carriers roaming the Indian Ocean. More generally, Cold War strategists viewed the country's enormous mineral resources as Western assets requiring protection from Soviet incursion.

But technological systems bound South Africa to 'the West' in ways that reached beyond economics and geostrategy. From the rhetorics of nationalism to the mechanisms of racial separation, technological development pervaded the identity claims made by the apartheid state. To bring these into sharper focus, let us first consider the uranium industry.

Critical to the apartheid state and its industrial elites was a nationalist, technological history that simultaneously allied South Africa with the West and maintained its exceptionalism. The uranium industry offered an ideal site for articulating this narrative. The explosive end to the Second World War had made atomic science and technology the pinnacle of modernity and the key to geopolitics. The US and the UK anxiously sought a global monopoly on uranium. In 1950, they signed a contract to buy some 10,000 tons of South African uranium over the next 14 years.[9] The agreement's terms offered excellent

7 A.R. Newby-Fraser, *Chain Reaction: Twenty Years of Nuclear Research and Development in South Africa* (Pretoria, Atomic Energy Board, 1979), p. 64.

8 Uranium was present in gold-bearing ore, but it had no significant economic value before the Second World War. Until 1952, South African ore treatment processes purified only for gold, discarding the uranium (in the ore waste) onto tailings piles.

9 The National Archives (United Kingdom) [TNA], AB (Atomic Energy Authority) 16/312-83070, Transcripts of negotiation meetings, 1950.

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prices for ore, as well as substantial loans for infrastructure development.[10] For the gold industry, the timing proved fortuitous: without the uranium contracts, many shafts might have closed.[11]

The significance of uranium reached beyond this economic bonanza. Politicians and industrialists relentlessly invoked uranium as a key marker in a teleological historical narrative about South African industrial advancement. In a 1948 speech to Parliament, General Smuts detailed the technical history of South African ore extraction, arguing that an inevitable logic governed his nation's participation in 'the biggest scientific discovery that has been made probably for hundreds of years' (namely, the splitting of the atom).[12] National Party leaders eagerly took up this narrative. The first uranium-producing plant opened in 1952, the same year as the Van Riebeeck Festival that Leslie Witz analyses so deftly.[13] In keeping with the festival's fanfare, Prime Minister D.F. Malan's keynote address at the plant's opening ceremony hailed the uranium programme as critical in elevating the nation's modernity, and proof of South Africa's determination to contribute 'to the cause of the Western Powers'.[14] The new plant's celebratory brochure proclaimed that

> the opening of the Uranium Plant at West Rand ... is for South Africa the most important metallurgical event of the century. It was as long ago as 1890 that an event of similar magnitude occurred with the introduction to the Witwatersrand of the cyanide process, which made possible the growth of the mining industry to its present immense size and influence.[15]

This metallurgical achievement could shape 'the future destinies of South Africa'.[16] To make sure that 'the West' got the message, the State Information Office distributed a pamphlet to foreign embassies in Pretoria portraying uranium as the modern apotheosis of South Africa's gold industry: 'future historical works on the Union of South Africa may well include a chapter on "Uranium, 1952" just as present-day histories refer to "Gold, 1885–86"'.[17]

Carefully selected technical details served as historical markers in narratives of metallurgical nationalism. These histories did not dwell on the mere presence or extraction of uranium ore. After all, the former was an accident of nature, and the latter was performed by black labour. Instead, they celebrated (white) metallurgical skill, which had made South African mining great in the past and would continue to do so in the future. Foreign expertise vanished: metallurgical history, rehearsed in excruciating technical detail, appeared exclusively South African. In Parliamentary speeches, engineering journals, newspaper reports, and elsewhere, such historical declamations used a surfeit of technical specifications to erase not only the politics of racialised labour, but also political tensions between English and Afrikaans speakers.

This nationalist depoliticisation of mining history also masked deep anxieties about South Africa's place in the newly nuclear world. Yes, South Africa participated in the West's

10 TNA, AB 16, boxes 370-7, 381-3. See also T. Borstelmann, *Apartheid's Reluctant Uncle: The United States and Southern Africa in the Early Cold War* (New York, Oxford University Press, 1993); M. Gowing, *Independence and Deterrence: Britain and Atomic Energy, 1945–1952* (London, Macmillan, 1974); J.E. Helmreich, *Gathering Rare Ores: The Diplomacy of Uranium Acquisition, 1943–1954* (Princeton, Princeton University Press, 1986).

11 D. Fig, *Uranium Road: Questioning South Africa's Nuclear Direction* (Johannesburg, Heinrich Böll Stiftung, 2004).

12 Union of South Africa, *House of Assembly Debates* (*HAD*), 23 August 1948, p. 734.

13 L. Witz, *Apartheid's Festival: Contesting South Africa's National Pasts* (Bloomington, Indiana University Press, 2003).

14 National Archives of South Africa (NASA), INL (Government Information Office) 1/2/41, 21/12, 'Speech by the Honourable the Prime Minister on the Occasion of the Opening of the First Uranium Production Plant in the Union of South Africa', 8 October 1952.

15 TNA, AB 16/2546, West Rand Consolidated Mines Limited, 'The Story of South Africa's First Uranium Production Plant', 1952.

16 *Ibid.*

17 NASA, INL 1/2/41, 21/12, G.J. Roux, 'Enter Uranium', September 1952.

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nuclear crusade against communism – but not on a technologically equal basis. From the outset, the US had refused to provide knowledge about atomic weapons or reactors in exchange for guaranteed uranium supplies.[18] In and of itself, that refusal did not constitute a denial of Western-ness: after all, the US had even denied atomic knowledge to the UK. Truly upsetting, however, was the American suggestion that South African ore samples be sent regularly to the Massachusetts Institute of Technology for assay.[19] South African metallurgists found the suggestion deeply insulting. Did US experts really think South Africa a mere colony, a supplier (but not a processor) of raw materials? Starting in 1947, the Government Metallurgical Laboratory directed the overwhelming majority of its scientists and resources toward work on uranium treatment and purification. By 1952, it had firmly established itself as an expert body, producing as many reports on South African uranium metallurgy as the US, the UK, and Canada combined. This achievement would continue to ring loudly in public narratives of South Africa's mineral history throughout the apartheid period.[20]

Rehearsing the glorious role of uranium in South Africa's mineral history also offered a technopolitical framework to justify, and shape, a nuclear programme. The South African Atomic Energy Board (AEB), formally constituted in 1959, differed from atomic energy commissions in other nations in two key respects: it fell under the tutelage of the Ministry of Mines (rather than its own ministry), and the bulk of its initial research funding went to research and development of ore treatment processes (as opposed to nuclear physics). Meanwhile, uranium mining and metallurgy enabled South Africa to secure a seat on the governing board of the International Atomic Energy Agency (IAEA) in 1957, at the very moment in which the apartheid state was being shunned by other international organisations. South African representatives maintained an influential position in the IAEA for nearly two decades, resisting the non-aligned movement's efforts to eject them by arguing that the IAEA's work was technical, not political.[21]

In the 1960s, the AEB began to militate for one more step in the teleological quest for mineral refinement. For uranium to be truly 'nuclear', went the argument, it needed to be enriched. Enrichment turned processed uranium ore into fissionable material – i.e. feed for nuclear reactors or atomic bombs. Only three 'Western' nations possessed enrichment plants. Could South Africa become the fourth? The AEB began enrichment research, in secret, in the 1960s.[22]

In 1970, Prime Minister B.J. Vorster – 'speaking in English for the benefit of foreign visitors and pressmen'[23] – revealed to Parliament the existence of an enrichment pilot plant. An 'obvious' step in the nation's (white, industrial) history, enrichment would allow South Africa to market uranium more profitably. 'The achievement that I am announcing today', Vorster proclaimed, 'is unequalled in the history of our country'. He went on:

> The South African process, which is unique in its concept, is presently developed to the stage where it is estimated that under South African conditions, a large scale plant can be competitive with existing plants in the West . . . .

18 Gowing, *Independence and Deterrence*; Helmreich, *Gathering Rare Ores*.

19 TNA: AB 16/306, 'Memorandum on Future Investigational Programme', 10 April 1947; AB 16/532, Cabinet Offices to Joint Services Mission, 31 January 1948, CANCAM 978).

20 See most notably J. Levin, *The Story of Mintek, 1934–1984* (Randburg, Council for Mineral Technology, 1985).

21 Hecht, 'Negotiating Global Nuclearities'.

22 NASA: EAE (Economic Adviser of the Prime Minister), 143, EA2/2/13, 'Raad op Atoomkrag', 3 vols; MEM (Private Secretary of the Prime Minister), 1/590, I21/2. Hecht thanks A. Jackson (formerly Executive General Manager of Corporate Business Development for the Atomic Energy Corporation of South Africa) for access to his unpublished memoir, A.G.M. Jackson, *Qalindaba (The Talking Begins): Personal Anecdotes of Triumphs, Disasters and Controversies*.

23 Newby-Fraser, *Chain Reaction*, p. 91.

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> South Africa does not intend to withhold the considerable advantages inherent in this development from the world community. We are therefore prepared to collaborate in the exploitation of this process with any non-communist country(ies) desiring to do so, but subject to the conclusion of an agreement safeguarding our interests. However, I must emphasise that our sole objective in the further development and application of the process would be to promote the peaceful application of nuclear energy – only then can it be to our benefit and that of mankind.[24]

Vorster's insistence on the 'unique' character of South Africa's enrichment process would quickly pervade official discourse on this topic, serving as an affirmation of national(ist) technological prowess. So would the more veiled remark that a large-scale plant would prove competitive 'under South African conditions'. This phrase encoded two things. First, the South African process was not really unique. It closely resembled German 'jet-nozzle' enrichment technology; the African National Congress (ANC) would later argue that the AEB had copied that process directly. But high energy costs made the jet-nozzle process uneconomical in Europe. Hence, the second bit of code: 'South African conditions' referred to cheap electricity, via cheap black labour. Official descriptions thus remade these 'conditions' into apolitical, technical parameters.

Ensuring the secrecy of atomic matters, leaders insisted, signalled South Africa's credibility as a responsible nuclear state (rather than an intention to build bombs). A few days after Vorster's announcement, the Minister of Mines congratulated parliamentarians on 'the insight shown … in not asking unnecessary questions'[25] about nuclear development over the years. His audience concurred. One member noted:

> What could it mean if the knowledge underlying this discovery [of a new enrichment process] became of more general knowledge throughout other countries of the world who are to-day looking with very suspicious eyes, shall I say, on South Africa? The security attached to this particular discovery to my mind transcends the need for security in any other matter at our disposal here in South Africa.[26]

Secrecy thus performed South African nuclear nationalism, both inside and outside the country.

Within the nuclear programme, secrecy had a language: Afrikaans. The AEB's top officials were Afrikaners, and though English-speakers populated all levels of the hierarchy, everyone understood that meetings about enrichment and other potentially sensitive technologies took place in Afrikaans.[27] The AEB's language board facilitated the task by developing an extensive Afrikaans vocabulary for nuclear technology.[28] Even press releases and public reports issued by other nations on their own enrichment progress were routinely stamped GEHEIM when they entered the offices of the AEB.[29] Absurd from a functional perspective, such acts worked as performances of identity. They circumscribed a community of experts, pitted them against the outside world, and placed them on a quest of critical importance to the survival of their embattled state.

Ironically enough, it would be by penetrating this most secret, most technologically sophisticated domain of South African uranium production that activists would first begin to crack the technopolitics of apartheid.

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24 NASA, MEM 1/590, I21/2 'Verklang deur Sy Edele die Eerste Minister', 20 July 1970.

25 *HAD*, 27 July 1970, p. 476.

26 *Ibid*., p. 475.

27 Starting with the very first report on uranium enrichment: NASA, EAE 143, EA2/2/13, A.J.A. Roux and W.L. Grant, 'Vorderingsverslag oor 'n Nuwe Metode vir Uraanverryking', Raad op Atoomkrag, 31 March 1966 (see also in these files minutes of early AEB meetings on enrichment). Also, G. Hecht, interviews with R. Heard, Pelindaba, 12 August 2003; S. Guy, Johannesburg. 12 July 2004; and A. Jackson, Pretoria, 6 April 2004.

28 First published in 1976 under the title *Nuclear Energy Terms*; subsequently *Nuclear Operations Dictionary: English-Afrikaans* (Pretoria, Atomic Energy Corporation of South Africa in collaboration with the National Terminology Service of the Department of National Education, 1990).

29 Most documents in NASA, EAE 143, EA2/2/13, vols 2 and 3.

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The Technopolitics of Social Identity

Grand apartheid itself was a technopolitical project: a sweeping modernist system, erected not only on technologies of surveillance and control but also on technologies of transportation that would allow vast numbers of blacks to commute to work in white areas; on building architectures (separate bathrooms, entrances, living quarters); and so on. Hendrik Verwoerd infamously described apartheid as a 'policy of good neighbourliness', 'helping' each racial and ethnic group to pursue its own ('naturally' separate) destiny. For Verwoerd and his followers, 'good neighbourliness' depended on complex technosocial engineering, to maintain separation of the races even while elaborately interlacing their daily life and work.

Following Keith Breckenridge, and presenting additional evidence collected by Edwards, we argue that the ideology and practice of grand apartheid were deeply bound to personal identity documents, which in turn were coupled to an increasingly automated data processing system. The pillars of apartheid were the compulsory documentary order, biometric identifiers (fingerprints), the baroque taxonomy of racial identity, and the elaborate system of architectural zones and geographical and temporal borders.

Breckenridge shows that Verwoerd built his conception of grand apartheid around technologies of population registration. He eliminated the existing, forgery-riddled system of identity documents, contracts, passes, and tax receipts for black South Africans. To replace it, Verwoerd ordered the construction of the Bewysburo, literally the 'bureau of proof'. Based on the proposals of Native Affairs bureaucrat A.J. Turton, the Bewysburo aimed to create a single, central register of black Africans that would record individuals' details, take their fingerprints, and issue a permanent, comprehensive 'proof book'. This was the infamous passbook, the 'Dompas' (stupid pass) to its unfortunate users. Turton convinced Verwoerd that the combination of proof books and a central registry would permit total control of the black population, allowing Native Affairs bureaucrats to allocate the black labour force efficiently while permitting police to locate or identify any individual swiftly and positively. New technologies would prevent the fraud and disarray that characterised the previous system. These included specially printed, supposedly unmodifiable passbooks. Even more important, Turton claimed, the use of fingerprints as unique identifiers would make the passbooks unforgeable.[30] By 1966, the fingerprint collection included almost 10 million sets of prints – 'as far as can be established', the bureau proudly noted, 'the second largest collection in the world'.[31]

The passbook system thus sought to stabilise a specifically racial personal identity around a document coupled to a biometrically indexed database. Other justifications came later. In 1978, the bureau portrayed black fingerprinting as a way to safeguard the nation from 'foreign Black' invaders: 'the fingerprint record is absolutely essential, because it guarantees positive identification and precludes the possibility of foreign Blacks infiltrating into the Republic from other parts of Africa'.[32] The following year, the bureau revised this explanation, aiming instead at guaranteeing positive identification within a specifically racial framework:

> The maintenance of a fingerprint record is absolutely essential because so many Blacks, unlike Whites, Coloureds and Indians, cannot be identified by name alone and, furthermore, do not reside at permanent addresses for long continuous periods, with the result that identification by means of fingerprints is the only infallible method that can be used.[33]

30 K. Breckenridge, 'Verwoerd's Bureau of Proof: Total Information in the Making of Apartheid', *History Workshop Journal*, 59 (2005), pp. 83–108.

31 Republic of South Africa (RSA), *Report of the Department of Bantu Administration and Development* [*DBAD*] *for the Period 1 January 1966 to 31 December 1966* (R.P. 24/1968), p. 20.

32 *RSA, Report of the Department of Plural Relations and Development for the Period 1 April 1977 to 31 March 1978*, p. 29.

33 RSA, *Report of the Department of Co-operation and Development for the Period 1 April 1978 to 31 March 1979*, p. 29.

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Put baldly, the Bureau was apparently arguing that it could not tell black people apart.

Yet from the beginning the 'absolutely essential' system failed to work as advertised. Instead, Breckenridge shows, it proved an 'administrative catastrophe' of epic proportions. Africans rapidly learned to forge the supposedly unforgeable passbooks. Tracking down and fingerprinting every individual in the rural areas took longer (by years) than expected, and classifying the prints proved extraordinarily difficult. Two paper registers of prints were maintained: one classified by fingerprint characteristics and gender, and another indexed by identity number. Using fingerprints as *unique* identifiers required checking every set against previously recorded prints, a complex, time-consuming task that required special expertise. The bureau in the 1950s could classify only 300,000 sets of prints per year and rapidly fell far behind in its work. As late as 1975, the bureau reported a 'critical shortage of manpower'; that year its employees logged 34,000 hours of overtime.[34]

The magnitude of the effort was vast. According to its annual reports, from the mid-1960s onward the Bureau handled between one and two million sets of prints annually in various ways, including checking hundreds of thousands of sets against the files 'to determine whether the fingerprints of the persons concerned are not already on record'.[35] The bureau counted roughly 100,000 to 200,000 'Blacks identified from search for finger-prints' yearly, and Bewysburo technicians gave evidence regarding fingerprints in one to two hundred court cases each year.

Most importantly for our argument, despite the vast labour expended on the fingerprint record, the passbook system completely failed to bring about the promised efficient and centralised control of 'native' movements. The police found the Bewysburo nearly useless in tracking wanted men and ordered its officers to stop submitting enquiries to the bureau. Nor did the system result in docile conformity to influx controls among blacks desperate for jobs and access to urban resources. Instead, the passbook proved useful chiefly as a pretext for random street-level inspections and increasingly violent harassment. As Breckenridge argues, the Dompas became little more than 'the key instrument of a brutally-enforced white supremacy . . . – a mechanism of capricious policing, mass arrest and imprisonment'.[36] What began as a modernist attempt at clean, panoptic surveillance ended as the daily routine of an unexceptional police state.

Once established, however, the technopolitical orientation of apartheid made the problem perceivable only as one of efficiency, solvable by better technology. Already by the end of the 1950s, bureaucrats sought salvation in mechanisation, including punch-card tabulating equipment. Within a few years, electronic digital computers offered a more advanced alternative to mechanical data processing. In 1966, the Bewysburo became one of the first South African government agencies to deploy electronic computers. That year it began converting 'existing records in respect of tax particulars, movement of Bantu, and the Population Register for Bantu' to computer-readable magnetic tape. Initially, it sent punch cards out to an external data service of International Computers and Tabulators S.A. Ltd. (later known simply as ICL), but in 1967 the bureau acquired its own ICL computer. It took over five years to convert the entire black population register to digital tape.[37]

Around 1970, the Department of Interior initiated a similar registration project for all other South Africans (white, coloured, etc). Known as the 'Book of Life', the registry would replace birth and marriage certificates, driving and firearms licences, and other documents,

34 RSA, *Report of the DBAD for the Period 1 April 1974 to 31 March 1975* (R.P. 14/1975), p. 6.

35 RSA, *Report of the DBAD for the Period 1 January 1969 to 31 December 1969* (R.P. 58/1971), p. 16. The same phrase appears in all the other DBAD annual reports.

36 Breckenridge, 'Verwoerd's Bureau of Proof', p. 101.

37 RSA: *Report of the DBAD for the Period 1 January 1966 to 31 December 1966* (R.P. 24/1968), p. 5; *Report of the DBAD for the Period 1 January 1969 to 31 December 1969* (R.P. 58/1971), pp. 15–17; *Report of the DBAD for the Period 1 January to 31 December 1971* (R.P. 41/73), pp. 17–19.

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with a single identity book, indexed with a unique identification number. Although it had failed to win the contract for computerising the Bewysburo's black population register, IBM did contract to build the 'Book of Life' database.

In a 2004 interview, IBM South Africa's former managing director Jack Clarke recalled that the 'Book of Life' idea originated in Sweden.[38] Indeed, the Swedish population registry system was probably the first in the world, in 1947, to index all public documents and records to a unique personal identity number. Sweden computerised its entire civil registration in the 1960s.[39] But the Swedish registry never involved a single, all-inclusive identity *book* that directly incorporated licences and certificates, as in South Africa. Nor did Swedish identity numbers include digits indicating a person's race. The rhetorical use of a European precursor to justify the population registry project did not dwell on such differences: it simply offered one more way to articulate South African membership in the Western community.

By the mid-1970s, both government and industry sources frequently cited computerisation as an index of modernity and a source of pride. The central databases of apartheid administration became a model for an even more comprehensive vision, articulated by the notorious Minister of Information Connie Mulder in 1976:

> One may ... pose the question as to whether information facilities cannot ... be coordinated in an organised fashion so that a network of sources of information for countrywide use can be established for everybody who requires information ... The computer also makes it possible for comprehensive data on each individual to be made available for a great many purposes.

In a typically veiled nod to international concerns about apartheid, Mulder went on:

> There is also a possibility that incorrect information may be misused in this way. In spite of grave concern in some countries regarding this matter, it should not necessarily cause South Africa any serious problems, since legislation and departmental regulations guarantee the protection and proper use of personal information stored by official institutions. Personal information will, at best, be made available only in statistical or anonymous form for secondary use.[40]

Mulder's subsequent fate – he was stripped of all his political offices, vilified in the press, and disbarred for misuse of public funds in the 'Muldergate' scandal of 1977–79 – bears evidence that 'legislation and departmental regulations' were readily subverted.

As the Bantustans moved toward nominal independence in the 1970s, the apartheid government 'assisted' with the construction of administrative buildings which typically included computer facilities; Bophuthatswana was apparently the first recipient, in 1973.[41] It simultaneously encouraged the new 'states' to generate their own official identity documents and computerised population registers. For their recipients, the new documents marked the revocation of their South African citizenship in terms of the Black Homeland Citizenship Act of 1970. From the apartheid government's point of view, this had the highly desirable effect of transforming internal segregation into the more legitimate regulation of movement across international borders. In the early 1960s, the US covertly encouraged Verwoerd's Bantustan strategy for precisely these reasons,[42] but by 1970 this attitude had been replaced by outright condemnation, and the major audience for these legitimation exercises was the white minority (and some blacks who stood to benefit).

38 J. Clarke, interviewed by P.N. Edwards and K. Breckenridge, Johannesburg, 20 April 2004.
39 Swedish Tax Agency, *The Swedish System for Population Registration* (2000), p. 3.
40 C.P. Mulder, 'Usage and Development of Information Activities in South Africa', *Systems: The Bulletin of the Computer Society of South Africa*, 6, 11 (1976), pp. 8–9.
41 Anonymous, 'Computer to Aid Tswana', *Systems: The Bulletin of the Computer Society of South Africa*, 4, 5 (1973), p. 30.
42 R. Massie, *Loosing the Bonds: The United States and South Africa in the Apartheid Years* (New York, Nan A. Talese/Doubleday, 1997), pp. 151–2.

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Meanwhile, the South African national identity document system continued to evolve. The Bewysburo, along with its population registry, transferred into the Department of Home Affairs in 1984, where it joined the Directorate of Population Identification. A system of remote terminals linked to the Pretoria mainframe allowed remote entry and retrieval of population registry records. In 1986, the separate population registers were merged into a single 'integrated' database. New green, bar-coded identity books replaced both the Dompas and the Book of Life. Arguments about efficiency justified this move. But in fact it worked better as a legitimation strategy, since its principal effect was massive, enduring confusion. As late as 1998, many citizens still had not re-registered under the unified system, instead retaining older documents. This created widespread bewilderment during the 1999 elections, when would-be voters had to present the green bar-coded IDs.[43]

As for the huge fingerprint collection, it remained undigitised during the apartheid era, stuffed into file drawers that filled huge rooms.[44] Around 1979, the Bewysburo and the CSIR initiated a joint project to investigate computerising the search and classification of fingerprints. Although the computerisation project greatly exercised anti-apartheid activists, it apparently never got beyond the research phase.[45] Instead of being a functional component in a modernist, mechanical control of population flows, the black population registry served mainly to generate great masses of aggregate information – statistics – whose mere existence served as a performance of apartheid's necessity and an assertion of its success. Finally, as Posel has argued, the ubiquitous identity documents contributed to how deeply 'apartheid's racial grid was ... imprinted in the subjective experience of race'.[46]

Thus, the technologies of computerised population registration and identity documentation were basic to the apartheid system of racial identities. As we have argued elsewhere, technopolitical projects do not need to fully achieve their *technical* goals in order to 'work' politically.[47] Indeed, one form of technopolitical action is to defer a problem into the future by characterising it as technical and therefore temporary, a matter for further research and development. The registries 'worked' to establish racialised personal identities as elements of governance, and to recast raw minority domination as a technical project, nominally depoliticised by its extension in the 1970s to all South Africans. The technical project in turn 'worked' to create an image of the apartheid state as a modern bureaucracy on the European model, and to legitimate the Bantustans as national governments. Like the nuclear programme, it both exploited and performed Western-African and developed-underdeveloped dualisms: the regime might invoke its exceptionalism when violating Western governance norms in order to manage 'underdeveloped' non-white populations, but simultaneously style itself a developed nation like its Cold War partners when narrowing the focus to its white population.

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43 'Results of Countrywide ID Survey', Human Sciences Research Council Media Brief, 1998, available at http://www.hsrc.ac.za/Media_Release-54.phtml, retrieved on 22 April 2010.

44 For example, RSA, *Report of the Department. of Co-operation and Development for the Period 1 April 1980 to 31 March 1981* (R.P. 87/1981), p. 16.

45 'The Automated Fingerprint Identification System (AFIS) ... is a computerised database containing the details of over 4.6 million convicted criminals. The AFIS replaces the manual system that has been in use by the police for over a century. With the manual system personnel at the Criminal Record Centre had to physically compare fingerprints found on a scene with the sets of fingerprints stored in rows and rows of cupboards. *This was an almost impossible task and will in future be done with the touch of a button*'. See 'Media Statement by the Assistant Commissioner Piet du Doit: Head of the Criminal Record Centre', 19 March 2002, available at http://www.saps.gov.za/%5Fdynamicmodules/internetsite/buildingblocks/news/news488.htm, retrieved on 22 April 2010 (emphasis added).

46 D. Posel, 'Race as Common Sense: Racial Classification in Twentieth-Century South Africa', *African Studies Review*, 44, 2 (September 2001), p. 109. See also Posel, 'A Mania for Measurement'.

47 P.N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, MA, MIT Press, 1996), especially chapter 3. See also Hecht, *The Radiance of France*.

Monster in the Basement

Shuttling between Western and African identities may have convinced whites at home, but was increasingly an ineffective strategy for international dialogue. Following the 1960 Sharpeville massacre and the subsequent banning of the ANC and PAC, a UN Security Council resolution called on South Africa to abandon apartheid. In those turbulent years of decolonisation, support for more drastic action grew rapidly. In 1962 the UN General Assembly passed a non-binding resolution requesting member states to break off diplomatic, trade, and transport relations with South Africa. Although most did not comply, some African, Asian, and Communist bloc countries did impose unilateral trade boycotts. As newly independent African nations began to flex their muscles at the UN, European and US policymakers understood that they had to support some sort of concrete action.

Technopolitical diplomacy enabled US and European governments to manage and camouflage their dealings with the apartheid state. By 1962, the general outline of the US's South Africa policy for the next three decades had been set. The US would support a weapons embargo, but of a limited nature. Export licences would be denied for military matériel whose 'normal use … is associated with police force or infantry-type operations', but would be considered for equipment 'designed for purposes of major military defense and, particularly, applicab[le] to free world military requirements vis-à-vis the Sino-Soviet bloc'.[48] Under these criteria the South African government was denied parachutes, but offered Sidewinder air-to-air missiles.[49] In 1963, the UN Security Council approved a voluntary embargo on sales of arms and ammunition to South Africa. The US's convoluted policy allowed it to claim compliance while preserving its Cold War alliance with South Africa.

These developments established a conceptual framework for international reaction to apartheid. Along with several other illegitimate regimes, South Africa became one of the West's monsters in the basement: ugly and dangerous, not welcome in the parlour, but nonetheless 'one of us' (especially in the fight against communist insurgencies). The US and Europe wagged the big stick of a total trade boycott to keep South Africa nervous, but as a matter of *realpolitik* they pursued a much more limited course, consistently rebuffing economic sanctions (claiming that they would harm the black population more than the white minority government).

The limited arms embargo, which also restricted South African access to related international professional societies and trade associations, thus inaugurated a specifically technopolitical approach to state-sponsored action against apartheid. By framing the issue in terms of support to military, police, and other 'apartheid-enforcing agencies', and by establishing *selective* export controls as the basic mechanism, in practice international action against apartheid became centrally (though not entirely) defined as a matter of which technologies, and which forms of technical expertise, South Africa should and should not be allowed to have.

These technopolitical strategies aimed to limit the effect of anti-apartheid politics on US and British grand strategy for the Cold War by restricting its domain of action. By the mid-1970s, however, the anti-apartheid movement had appropriated those same strategies to its own ends, increasingly addressing apartheid directly as a technopolitical system.

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48 US Assistant Secretary of State M. Williams to G. Houser, Director of the American Committee on Africa, 17 December 1962, in K. Mokoena (ed.), *South Africa: The Making of U.S. Policy, 1962–1989* (Washington, D.C., National Security Archive, 1991).

49 M. Williams, 'U.S. Policy Towards South Africa – Export of 746 Parachutes', 2 February 1962, in Mokoena, *South Africa*.

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Anti-Apartheid Technopolitics

By supporting the UN's voluntary military embargo, Western governments dissuaded parliamentary representatives from pursuing economic sanctions for quite some time. But they did not mollify anti-apartheid NGOs. By the mid-1960s, American church groups, civil rights organisations, and students discovered an alternative strategy: direct pressure on corporations doing business in South Africa. Shareholder resolutions urging corporations to divest themselves of South African holdings became a central tool of protest in the US.[50] Anti-apartheid NGOs continued to pursue stringent official sanctions, but their direct-pressure strategy sought to deliver a *de facto* economic boycott, *with or without* government support. Given South Africa's dependence on imports for many high-technology goods, the departure of even a few major multinationals might profoundly weaken the country's economy and (activists hoped) help bring down the government. 'Dual-use' technologies offered especially promising avenues for capitalising on the existing military embargo – particularly in the cases of nuclear systems and computers.

While activist technopolitics began as a pragmatic move to expand strategic options for the anti-apartheid movement, it rapidly became much more. As movement leaders began to articulate their arguments against corporate involvement, they probed the close articulation between apartheid and its technological infrastructure. They countered state narratives of technological nationalism and self-reliance, arguing instead that apartheid was built on *inter*national technopolitical networks.

At the heart of this argument lay questions about the nationality of expertise. Who had expertise in technologies of power and oppression? How was this expertise acquired and distributed? Was the nuclear programme, for example, truly 'South African', truly an expression of national distinction and therefore identity? The answers to these questions had important implications. Activists' growing insistence that specific technologies and transnational knowledge networks were integral to apartheid gave substance to arguments for sanctions. Ironically, meanwhile, the South African government's increasing secrecy strengthened activist claims by appearing to confirm them.

Targeting Computers

By the early 1970s, computers had emerged as a special focus for anti-apartheid activists, for four main reasons.

First, the government, including the police and military, used more computers than any other South African entity. Hence, it would be hurt most by any reduction in the supply of computers. Second, the advent of integrated circuits and microprocessors had begun to make computers key components of military systems at every level. Chiefly through commercial suppliers, the South African military had begun to build and acquire computerised weapons and command-control systems. By 1971 computer installations began to appear in combat-related deployments, such as SA Air Force mobile radar units, training simulators, and Army logistical support systems.[51]

Third, computers offered an ideal strategic target. A single American company, IBM, controlled nearly half of the South African computer market. From 1972 on, activist minority shareholders introduced disinvestment resolutions at every annual IBM stockholder meeting. In addition, computer exports could be monitored and restricted with relative ease. (Today we

50 For example, P. Greer, 'Corporate Gadflies Scoring', *Washington Post*, 6 April 6 1975, p. 93. For an extended account, see Massie, *Loosing the Bonds*.

51 R. Leonard, *Computers in South Africa: A Survey of US Companies* (New York, The Africa Fund, 1978), p. 4.

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readily forget that until the early 1980s computers were physically large, delicate, high-value products, easy to track and difficult to conceal.) In 1975, *Management* magazine surveyed the entire computer inventory of South Africa, tallying 1,119 machines and guessing the true total at about 1,500.[52] This figure included three IBM mainframes for Defence Department administration and one ICL machine for the South African Police; the number of military computers was apparently classified. Well into the 1980s, the SA Computer Society's biennial survey of SA computer users included a count of the exact number of mainframes in the country. The count never exceeded 2,000 machines.[53]

Furthermore, although its market for information technology grew at an annual rate estimated between 20 and 30 per cent from 1960 to 1980, South Africa had virtually no indigenous computer industry.[54] The country depended entirely on imports. Throughout the 1970s, IBM, UK-based ICL, and a few other American and European companies dominated the market. For this reason, a computer embargo by Western governments – or disinvestment by the major firms – could potentially choke off the entire supply. South African businessmen and government officials liked to say (playing up their developed/'Western' qualification) that the country had become so dependent on computers that it would grind to a halt without them. For example, in 1975 the managing director of Mohawk Data Sciences South Africa pleaded with the government to reduce the sales tax rate on computer equipment, pointing out that

> Our Top 100 companies utilise them besides the hundreds of medium and small organisations [that rely on] computer bureau services ... Our country's transport systems are dependent on computers and besides our Railways and Airways the other institutions such as vehicle manufacturers, licensing and registration all rely heavily on data processing. Every major municipality, in excess of 40 councils, depend on computerised processing of municipal records. Each university has one computer or more installed. Our banking and building society system would collapse without the facilities provided by computers. Our primary industries such as mining and agriculture as well as our secondary manufacturing industries all make use of computers as an essential part of their operations.[55]

A computer embargo could therefore impose a very high cost on not only the military and the police, but on the entire government and the economy as a whole.

Fourth and finally, US concern was growing over Communist-bloc acquisition of American 'dual use' high technology. In the mid-1970s the Defence Department objected publicly to Secretary of State Henry Kissinger's détente policies allowing the sale of sophisticated computers to COMECON nations. Upon taking office in 1977, the Carter administration subjected all exports of 'large' computers to State Department review, with human rights violations by police agencies among the concerns. This policy climate and the discourse surrounding it created the opportunity for anti-apartheid activists to make similar arguments regarding computers for South Africa.

In 1977, the US, Britain, and France vetoed a new round of stringent UN sanctions resolutions sponsored by African states. Instead, the 'Western Five' members of the Security

52 'Computers '75: What's Where and What's Been Added', *Management* [Johannesburg] (December 1975), pp. 59–77.

53 S. Cashmore and I. Grant (eds), *Computing S.A.: 1987 DP Handbook* (Randburg, Thomson, 1987); S. Cashmore (ed.), *Computing S.A.: 1988 DP Handbook* (Randburg, Thomson, 1988); L.-A. Freeman, *Computer Users Handbook* (Johannesburg, Systems Publishers, 1982).

54 J.F. Clarke, 'Trends in Computing in South Africa – A Review of the Sixties: A Talk Delivered to the 360 Users' Association', *South African Computer Bulletin*, 11, 2 (1970), pp. 16–17; A. Vaughan, 'Overview: Events and Consequences', in M. White and L. Sefor (eds), *South African Computer Users Handbook 1981*(Johannesburg, Systems Publishers, 1981), pp. A1–A4.

55 C. Stewart, 'Sales Tax and the Computer', *Systems: The Bulletin of the Computer Society of South Africa*, 6, 8 (August 1976), pp. 16–20.

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Council (the US, the UK, France, Canada, West Germany) substituted a resolution of their own supporting a mandatory arms embargo. The text ordered member nations to cease supplying 'arms and related *matériel* of all types, including ... weapons and ammunition, military vehicles and equipment, paramilitary police equipment, and spare parts for the aforementioned ...'. Resolution 418 also required members to 'refrain from any co-operation with South Africa in the manufacture and development of nuclear weapons'.[56] The Carter administration interpreted Resolution 418 to include mainframe and minicomputers, conducting case-by-case reviews of exports to South Africa to determine whether they might end up in the hands of 'military or police entities'.

The other 'Western' powers construed Resolution 418 more narrowly, provoking an eyeball-rolling lament from Abdul Minty: 'the United States claims to forbid the sale of computers to the South African defence and police authorities, whilst the United Kingdom refuses to restrict computer sales at all since they are deemed to fall within the category of "normal commercial trade" even though the purchase is made directly by the defence and police authorities'.[57] That two governments could reach diametrically opposite interpretations of the same policy resulted from the policy's deliberately vague language. Indeed, State Department cables to all US embassy personnel in Africa instructed them directly to 'avoid interpreting' the resolution text 'which may in practice be subject to various interpretations'.[58]

The Carter administration chose to construe computers as 'related *matériel*'. Were they? A series of pamphlet literature from such organisations as the Africa Fund (1978, 1986), the Investor Responsibility Research Centre (1979), the American Friends Service Committee (AFSC, 1982, 1984), and the Dutch Komitee Zuidelijk Afrika (1990) surveyed, and speculated about, how the South African military and police used computers. This literature presents an intriguing image of the interplay between the discourses of activists, Cold War anticommunists, and the apartheid state.

The Carter administration ban on computer sales to 'military or police entities' did not specify exactly what these were. This created openings for activists to engage in their own version of technopolitics. First, they could try to broaden the scope of these categories to include parastatals and private companies doing business with the military and police, exposing front companies set up by the South African government and secret agreements with private suppliers created to subvert the export controls. Second, they could try to strengthen the case that computers were crucial not only to the enforcement of apartheid laws in the narrow sense, but also to apartheid as a total social system.

As the twin threats of embargoes and disinvestment loomed ever larger, government secrecy and press censorship within South Africa restricted the flow of information about military and police computing. Even the number of mainframe computers used for basic administration now became secret. The once-thick annual reports of the SA Police Service and the Department of Plural Relations (formerly the Department of Bantu Administration) shrank to a few uninformative pages by the early 1980s.

The government did continue to publish some meagre information about its computers and their uses. Primarily, however, activists gleaned fragments from the trade and popular press to piece together their jigsaw-puzzle picture. Typically, press reports regarding police,

56 UN Security Council Resolution 418 of 4 November 1977.

57 A. Minty, 'South Africa's Military and Nuclear Build-Up', International NGO Conference for Action against Apartheid, Geneva, 28–31 August 1978, available at http://www.anc.org.za/ancdocs/history/aam/abdul-12.html, retrieved on 25 April 2010.

58 C. Vance, Cable for All African Diplomatic Posts, 'Security Council Action on South Africa', 5 November 1977, in K. Mokoena (ed.), *South Africa and the United States: The Declassified History* (New York, New Press, 1993), p. 78.

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military, and Bantu Administration activities were brief, usually written by journalists without any technical training who conveyed whatever sources told them in basic terms. Often they simply reported the purchase of a computer or the completion of a project.

So while activists built up an impressive armament of citations showing the acquisition of computers, rarely could they discern what state agencies actually did with these systems. For example, activists claimed that the Department of Plural Relations maintained an ICL-based 'computer network … [that] stores fingerprints and personal details on the 16 million South Africans whom the regime classifies as blacks', citing the Department's 1977 annual report. But as we have seen, while the computer files did contain a name index to the paper-based fingerprint files, they did not 'store' the fingerprints (nor could they have done so in 1977). Activists argued that along with the Interior Department's computerised population registry, these 'data systems make up apartheid's automated memory bank, giving the minority regime a degree of control that is unrivalled throughout Africa'.[59] But exactly how this control worked, and how the computerised records facilitated it, remained unspecified – because the available sources did not spell this out.

Similarly, activists noted a 'Law Enforcement System' among software packages advertised by IBM in the 1980 *SA Computer Users Handbook*. Although they had no proof that any South African police department actually used the software, nor even any idea what the package actually did, AFSC activists mentioned this advertisement at a 1981 United Nations seminar on the arms embargo in order to confront IBM. The company denied that the software was in fact for sale in South Africa, claiming rather lamely that it 'had no idea' how the notice had come to appear. This story made its way into the US press and ultimately led to a Commerce Department investigation.

The AFSC pamphlet *Automating Apartheid* rendered this episode as: 'evidence suggests that [IBM's] subsidiary in South Africa has been supplying the apartheid police'.[60] IBM sources, then and now, flatly denied this claim,[61] but there is a better reason why it is improbable. By that time, ICL (not IBM) had become the principal supplier of computers to the SA police. In that era, operating systems and software for mainframe computers were manufacturer-specific. It would have been exceedingly difficult, if not impossible, for the police to use an IBM software package on ICL machines.

Automating Apartheid's chapter on 'Bantu Administration' activity likewise opens with a passage imagining preparations for a hypothetical police raid. An operator queries 'the computer': 'give me the names and addresses of all blacks on Victoria Street. Include pass numbers and fingerprints'. In response, 'the computer flashes the requested data onto a screen … At the same time, the information is electronically transmitted to the police … Imported computer technology makes this type of operation simple in SA'.[62] Easy, instantaneous database searches like this may be done today – but could they have happened like this in 1981? And were they actually happening in South Africa?

In 2004, Edwards conducted some two dozen oral history interviews with current and former South African government and computer industry executives and employees, of all races. These interviews suggest – though they are far from sufficient to prove – that the answer to both of these questions is 'no'. By all accounts, computerisation of the population registers primarily facilitated input of new records and correction of existing ones; it did little, if anything, to assist enforcement actions.

59 American Friends Service Committee (AFSC), *Automating Apartheid: U.S. Computer Exports to South Africa and the Arms Embargo* (Philadelphia, American Friends Service Committee, 1982), p. 14.
60 *Ibid*., p. 32.
61 J. Clarke, interview; M. Harris, interviewed by P.N. Edwards, Johannesburg, 9 June 2004.
62 AFSC, *Automating Apartheid*, p. 13.

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Activists exaggerated police computer *capabilities*, but not their *goals*. As we have seen, surveillance and control via the population registers had always been envisioned as the central social technology of apartheid. According to a semi-official history of the SAP, in 1975 the agency began work on a database that included 'all people wanted by the police', a name index of 'all fingerprints, except those of black women', and '[I]nformation on the *modus operandi* of criminals and the crimes they had committed'.[63] Yet the great early success of police computerisation lay not in pass-law enforcement, but in the recovery of stolen vehicles, via a growing database of descriptions and licence and engine numbers. In 1978, a network of 55 data terminals throughout the country was connected to the police department's ICL computer in Pretoria.[64] Even with sketchy evidence, it seems clear that this network was hardly a street-level enforcement tool of the sort imagined by activists. Access to the fingerprint index may have increased the efficiency of identifying suspects in custody and preparing court cases, but it certainly did not permit instantaneous collection or reporting of fingerprints from Pretoria's paper files, as in the *Automating Apartheid* scenario.

The police and the Department of Plural Affairs did maintain large computerised databases, and these did include political information. However, these were probably never the chief means by which police acquired information about black activists. Using detention, torture, assassination and other kinds of intimidation, the police created a large network of human informants. The 'turning' of captured black activists became so common that some were formed into special 'askari' units, which even carried out assassinations of their former comrades. Computerised databases may have helped in preparing lists of people to track or arrest, as activists suggested, but it seems unlikely that they played a vital role.

We may never know the full story on this. The SAP destroyed most of their records – including their computer files on individuals – around 1992, when it became clear that democracy was coming and, along with it, an accounting for the history of repression.[65] A few possibly relevant records do survive. Assisted by the South African History Archive (SAHA), Edwards filed for release of these documents under the Promotion of Access to Information Act in 2004. Some of his requests met with no response; the rest returned no documents of any significance. The potentially most revealing source may never come to light. In 1998, the Truth and Reconciliation Commission located 11 police data tapes at SAPS headquarters, but the tapes subsequently disappeared. SAHA inquired about their whereabouts with the SAPS in 2006. The police returned an affidavit stating that they could not be located, but that the SAPS had provided the National Archives with paper printouts. So far, attempts to locate these printouts have failed.[66] During 2003–4, Edwards also attempted to gain access to pre-1990 police records. Most telephone calls and emails were never returned. The one police administrator who did respond laughed heartily when presented with Edwards's request. After bringing himself under control, he simply said, 'You're never going to get that'.

Whatever the truth may be, activist technopolitics surrounding computers undeniably had a profound effect not only on international anti-apartheid policy, but also on computer firms operating in South Africa. For example, in 1978 some 2,000 ICL workers in the UK went on strike to protest ICL sales to the SAP. Continuous minority shareholder protests, and the wider movement's uptake of the idea of computers as a pillar of apartheid, had important effects on IBM. The company had long employed blacks in data entry positions, but from the late 1970s it began actively to recruit and train blacks, especially as systems engineers.

63 M. de W. Dippenaar, *The History of the South African Police, 1913–1988* (Silverton, Promedia Publications, 1988), p. 482.
64 *Ibid*., pp. 482, 551.
65 D. Tutu, *Truth and Reconciliation Commission of South Africa Report* (Cape Town, The TRC, 1998), Vol. 1, pp. 217 ff.
66 V. Harris and K. Allan, South African History Archive, personal communication, 15 August 2006.

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The company apparently maintained a general policy of non-racialism, including promotion and pay. It refused to enforce apartheid regulations requiring segregated bathrooms and work facilities. By the mid-1980s the company employed black executives and began moving them into contact positions, such as sales, where they routinely encountered white customers on equal terms.[67] IBM began to assist black employees in buying housing in historically white areas, at a point when this was still technically illegal. The company also engaged in large, widely trumpeted social responsibility programmes, especially a video-based educational program aimed at black schoolchildren. Such efforts were certainly *in part* self-serving attempts to stave off sanctions and mollify shareholders, but the degree to which they played a progressive role should not be too readily discounted. In fact many black and coloured executives leading today's South African IT industry – including IBM SA – received their first computer training as IBM recruits in the early 1980s.

In 1983, the Reagan administration loosened export restrictions somewhat by identifying five specific 'apartheid-enforcing agencies' to which computers could not be sold. This left a wide field for sanctions-busting practices, since computer orders could now legitimately be placed through any agency not on the 'apartheid-enforcing' list, but in 1986 the Comprehensive Anti-Apartheid Act tightened restrictions again. In October of that year, IBM announced that it would sell its South African subsidiary to local employees. According to Jack Clarke, then managing director of IBM SA, the decision came because top-level IBM management decided it could no longer afford to spend increasing amounts of time and energy defending its presence in South Africa to Congress and the public.[68] Most other American companies soon departed as well. The anti-apartheid movement's technopolitical strategy had worked.

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Nuclear Frankenstein

Uranium – and nuclear systems more generally – formed another attractive target for the anti-apartheid movement. The early 1970s marked a resurgence and expansion of European and American anti-nuclear activism which involved mainstream scientists and also fostered the development of lay expertise around science and technology policy issues. The anti-apartheid movement formed alliances with anti-nuclear activists, who gave it access to resources and expertise to challenge claims about the uniquely national character of South African uranium production and about the separation between technology and politics.

In 1975, members of the ANC's cell in West Germany broke into the South African embassy in Bonn. They stole nine files, which among other things documented the secret visit of a West German general to the Atomic Energy Board's headquarters at Pelindaba, as well as negotiations between STEAG (a West German uranium enrichment corporation) and UCOR (the Uranium Enrichment Corporation of South Africa) to build a uranium enrichment factory. The ANC used these documents to argue that (1) South Africa and West Germany were secretly co-operating to build a large-scale uranium enrichment plant based on jet-nozzle technology developed in Germany, and (2) this enriched uranium was destined for a South African atomic bomb, and maybe also for a clandestine German bomb. It published these accusations in a pamphlet entitled *The Nuclear Conspiracy* and distributed 3,000 copies, to every embassy and ministry in Bonn, members of Parliament, and all the major German newspapers.[69]

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67 J. Clarke, interview; M. Harris, interview; H. Ratshefola, interviewed by P.N. Edwards, Johannesburg, 18 May 2004; Z. Malele, interviewed by P.N. Edwards, Johannesburg, 17 May 2004; S. van Graan, telephone interview with P.N. Edwards, 18 May 2004.

68 J. Clarke, interview.

69 African National Congress, *The Nuclear Conspiracy: FRG Collaborates to Strengthen Apartheid* (Bonn, PDW-Verlag, 1975).

The ANC built its case on over 200 pages of circumstantial evidence, which demonstrated technical similarities between South African and West German enrichment technologies, documented exchanges between specialists and companies in the two countries, and uncovered the Nazi past of the German military officer involved. ANC analysts argued that the jet-nozzle system – technologically quite distinct from other enrichment techniques – had proved unfeasible in Germany because it required too much energy. In South Africa, however, energy was inexpensive, thanks to cheap labour and *de facto* subsidies from the mining industry. There jet nozzle technology could feasibly produce large quantities of highly enriched uranium. Feasible, but still not commercially viable: the ANC deemed claims that the enrichment programme would produce a higher-value uranium product for the international reactor market economically implausible.

Besides, why the secrecy? The very name of AEB headquarters – Pelindaba, the place of no talking – surely gave it all away. Even more suspiciously, the AEB had transgressed apartheid's division of labour by excluding blacks from Pelindaba altogether, even from the cleaning crew and other menial labour. Only the presence of atomic bombs could justify having whites clean toilets.[70]

In any case, activists argued, the provenance of South African nuclear expertise mattered politically. Nationalist narratives of nuclearity did not hold up. The jet-nozzle design was too unusual to have been simultaneously but independently developed in two different places. Getting jet-nozzle technology from Germany, activists maintained, simply represented the latest of many scientific exchanges and technology transfers with the West.[71]

Stressing the *inter*national dimensions of South Africa's nuclear developments served two purposes: it highlighted the West's role in the maintenance of the South African state, and it subverted the state's nationalist narratives. On both counts, the ANC succeeded in putting its targets on the defensive. STEAG countered that it never aimed to transfer the technology to South Africa, and that the basic principles of its jet-nozzle process were in the public domain. But the story continued to gain journalistic momentum. In 1976, STEAG withdrew from its contract with UCOR, citing financial reasons. South African experts, meanwhile, maintained that they had developed jet-nozzle technology independently, and that commercial secrecy, not military intentions, prohibited revelation of technical details. Besides, they claimed, their process differed from the German one. AEB Director A. Roux insisted that 'all we have attained, we attained by ourselves'.[72] The ANC had even misinterpreted the significance of the word 'Pelindaba'. The AEB's official history – published shortly after the STEAG debacle in 1979 – offered this version instead:

> Enquiries brought to light the fact that during the 1920s plans had been drawn up to establish a township there to be called Pelindaba, a project that never came to fruition. 'I wonder,' mused Dr Roux, 'whether the name has a meaning.' And meaning it did have – a conjunction of two indigenous African words, 'Pelile' meaning 'finished' and 'Indaba,' 'a council.' Put together they imply the end of the discussion. 'That's it,' was the Director's reaction, 'we have talked enough; now we get on with the job.'[73]

Would ANC activism alone have succeeded in obtaining official international action against South Africa's nuclear activities? Initially, the circumstantial nature of the ANC's evidence enabled the US government to dismiss its assertion that the apartheid state was building atomic bombs. But in August 1977, a Soviet spy satellite photographed a potential

70 Z. Cervenka and B. Rogers, *The Nuclear Axis: Secret Collaboration Between West Germany and South Africa* (London, Julian Friedmann Books, 1978), p. 107.

71 *Ibid.*; D. Smith, *South Africa's Nuclear Capability* (London, World Campaign Against Military and Nuclear Collaboration with South Africa, 1980).

72 Quoted in Cervenka and Rogers, *The Nuclear Axis*, p. 77.

73 Newby-Fraser, *Chain Reaction*, p. 50.

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nuclear weapons testing ground in the Kalahari desert. That got everyone's attention, especially after a US satellite confirmed the sighting. A month later, international revulsion toward apartheid heightened with the murder of Steve Biko. Following this confluence of events, the Group of 77 finally obtained the votes needed to oust South Africa from its seat on the IAEA Board of Governors.

These developments encouraged activists to continue investigating the technopolitics of South African nuclear development. In 1978, anti-apartheid activists and scholars published *The Nuclear Axis: Secret Collaboration Between West Germany and South Africa*. The book analysed every dimension of South African nuclear development, from uranium contracts with the US, to the training of South African experts in American and European universities, to the Kalahari test site. It argued that transnational networks underwrote South African technology and expertise – and therefore underwrote apartheid.

The conjuncture between the prospect of a South African bomb and the increasing intensity of apartheid repression captured international attention. In 1979, a broad network of activist organisations formed common cause under the umbrella of the World Campaign against Military and Nuclear Collaboration with South Africa, launched with a high-profile seminar at the UN, and an impressive masthead.[74] Its director, Abdul Minty, led off the hearings with a phrase that would resonate for years to come: South Africa was the 'nuclear Frankenstein' of the West, and only through sanctions could the West redeem itself and control its monster.[75] Computers and nuclear technologies came together in this campaign, as activists continued to stress that apartheid was embedded deep in the nation's infrastructures thanks to US co-operation. The voice-over in Peter Davis's 1980 documentary, *South Africa: The Nuclear File*, explained:

> Although the [Valindaba enrichment] plant comes under no safeguards, the United States government in 1974 nevertheless granted a license to an American company … to export computers essential for running the South African plant. It is not known why the US didn't insist on safeguards as a condition of sale, since the South Africans probably would not have been able to buy the computers elsewhere.[76]

African-American political scientist Ron Walters elaborated further:

> The problem … begins with … technological cooperation. To that extent, South Africa has been shopping around for sophisticated laser technology, and other electronic means of not only adding to its ability to enrich uranium, but also developing processing and reprocessing capability … At the end of it … you probably will have the production of nuclear weapons.[77]

To make the case, this documentary and other activist investigations engaged in fine-grained technopolitical detective work into purchasing contracts, spy satellite trajectories, the movement of scientific experts, and so on. The case remained circumstantial, but the sheer quantity of evidence made it increasingly compelling. Activists thus broadened what apartheid meant to an international audience – and what could be done to stop it. Links with anti-nuclear activists proved equally important in challenges to South African colonialism in Namibia (where the world's largest uranium mine began operations in 1976), but that is a story for another time.

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74 The 'founding patrons' included Julius Nyerere, Seretse Khama, Agostinho Neto, Kenneth Kaunda, and Olusegun Obasanjo; 'sponsors' included Olof Palme and Coretta Scott King.

75 *Nuclear Collaboration with South Africa: Report of United Nations Seminar, London, 24–25 February 1979* (London, World Campaign Against Military and Nuclear Collaboration with South Africa, 1979); Smith, *South Africa's Nuclear Capability*, p. 7.

76 P. Davis (dir.), *South Africa: The Nuclear File* (Hurleyville, NY, Villon Films, 1980).

77 *Ibid*.

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Conclusion

How South Africans imagined and deployed relationships between technology and politics mattered tremendously. Apartheid elites used technological narratives to erase political histories and downplay or displace political tensions. Depoliticised technical histories, in turn, served to shape and legitimate techno(political) futures: uranium enrichment was more legitimate as the next step in a teleological mineral history than as the first step in nuclear weapons development. Such constructions paid dividends abroad as well. At least for a while, they allowed Western nations to support the idea that the IAEA was an inappropriate forum for objections to apartheid, and to concur that uranium enrichment represented a capitalist (rather than military) effort to better valorise natural resources.

Often, the material functionality of technological systems was not their most important feature. Biometric identification and automated population management never even approached the modernist panopticism envisioned by Turton and Verwoerd. Yet the *fantasy* of technical control – a fantasy built into vast administrative systems, computers, fingerprint collections, and daily routines of technical activity – became crucial to apartheid ideology, even as increasingly violent police harassment became its sordid reality. The Bantustan governments participated in this fantasy, with their own computerised population registers serving to displace the (political) denaturalisation of millions of black South Africans into a (technical) matter of recordkeeping.

For the apartheid state, technopolitics consisted of displacing political agendas into technical acts and fantasies. For anti-apartheid activists, technopolitics involved revealing those displacements, and challenging the historical narratives that accompanied them. Activists disputed nationalist narratives of technological triumphs by revealing the international networks that bolstered the South African state, and demonstrating apartheid's reliance on foreign technology. For them, *no* practice of the apartheid state could ever be merely technical. Translating this understanding of apartheid-as-technopolitics into action, in turn, required altering accepted international constructions of the relationship between technology and politics. The limited military embargo became a hole in the dike of great-power resistance to stronger sanctions. The anti-apartheid movement dug away at the edges of this hole, gradually expanding it until the trickle became a flood. The movement conducted increasingly sophisticated investigations, in the end producing a substantial alternative body of knowledge about the South African state's technopolitical strategies. It thus broadened the understanding of apartheid's fundamental basis, not only by revealing its totalising impulses and practices within South Africa, but also by implicating foreign states and international networks in those practices.

An interesting irony is that, in retrospect, many of the technopolitical scenarios painted by activists have proven ill-founded or overblown, taking state fantasies at face value and building on them to produce even worse ones. With incomplete information, and sometimes lacking sufficient technical expertise to correctly evaluate the information they did possess, activists accorded considerably more capability to the apartheid government than it actually possessed. But these fantasies acquired their own power, substantially influencing international opinion and working their way into government, UN, and corporate policies. And not all their speculations *were* fantasies. The apartheid state did in fact build atomic bombs.

Activist technopolitics were, of course, only one element of the overall international movement against apartheid, which engaged many forms of action. Nonetheless, there is no doubt that they contributed substantially to apartheid's demise. Nor is the narrative they produced of merely academic historical interest. In 2002, the Khulumani Support Group sued 23 multinational banks and corporations in US courts on behalf of individual victims

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of South African apartheid. Now combined with other, similar litigation into a single mega-suit, the action charges computer companies IBM and Fujitsu (which bought ICL) with providing equipment used by the police and 'Bantu Boards' to administer repressive apartheid laws. It names Deutsche Bank for loaning billions to the South African government, its parastatals, and private companies involved in uranium or gold mining; several multinational mining and energy companies are also named defendants. These companies, the victims' lawsuit claims, 'played a central role in helping to design and implement apartheid policies' and so 'must be held accountable'. It argues that by providing the apartheid government with technical and financial means, defendant firms and banks knowingly participated in crimes against humanity. A federal appeals court judge narrowed the suits' basis, excluding claims that IBM and Fujitsu participated directly in torture and killings. The judge did, however, allow claims that the companies 'aided and abetted' apartheid by supplying computers and software for population registry systems to go forward.[78]

These lawsuits illustrate the power of our argument in two ways. First, they contend that corporations' provision of technological means and infrastructure to the apartheid regime constituted a fundamentally political act. The multinationals are not accused of felonies; instead, they are charged with providing technological supports. The victims' lawsuits see certain technologies as so critical that the regime either could not have functioned without them, or would have crumbled sooner had the multinationals not continued to supply them. Second, the evidentiary basis for virtually all the claims lies in activists' research from the 1970s and 1980s – cited repeatedly, and sometimes exclusively, in the lawsuits' footnotes. Technopolitical histories, and their tellings, remain central to struggles over what it means to be (a) South African.

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78 See documents available at http://www.khulumani.net/khulumani/documents/category/5-us-lawsuit.html, retrieved on 4 May 2010.