From Bletchley Park to the NSA: scientific management and "surveillance society" in the Cold War and beyond

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This paper takes a high level view of the dynamics of the Cold War and their influence on management and governance. It addresses the pre-Cold War origins of key components of the information infrastructure underpinning the networked organisation of manufacture and service delivery. These embody practices that can be traced back to the impetus given by the prosecution of WWII by the allies to scientific management, and the transfer of these efforts to the Cold War continuation of conflict.

The Cold War effort supported by both scientific management and experience gained in the management of wartime production. These in turn required and reinforced an intelligence led understanding of both production and control which became embedded in post war organisations. The end of the “bi-polar Discipline (Ohmae, 1990) of the Cold War has led to a one-sided hegemonic view of this model. This is finally being challenged by the very capabilities built in to its core. As we move into a post Cold War environment the panopticon created by the surveillance and control approach to management and governance is finally under challenge by a reverse panopticon facilitated by the internet and webspace. This is evident in the continuing tension over rival formulations of information and knowledge management as either a technical task of information retrieval and knowledge extraction delivering explicit understanding in the tradition of Taylor, or as a softer form of support for collective communities of practice premised on tacit knowing. The re-formulation of Cold War polarities into a War on Terrorism has intensified this process.

Bletchley Park – a case of institutional forgetting?

Shortly before the fiftieth anniversary of the end of WWII a museum of computing was opened at the former site of the Government Code and Cypher School (GCCS) at Bletchley Park, fifty miles north of London. The exhibits reflected the impact of pre-war, wartime and post-war developments in cryptography and computing.

The significance of the site had been revealed to the general public by the publication of F.W. Winterbotham's 'The Ultra Secret' in 1974. In the following decades a number of documentary and fictional accounts of the work undertaken by GCCS appeared and provided the basis for a revisionist account of World War II. These accounts contradicted many assumptions implicit in the established view of a British victory based around Churchillian "Blood toil sweat & tears" plus the judicious use of operations research techniques. Instead it was revealed that at key points in the war allied commanders had access to German high command orders before their intended recipients, via the use of captured or purloined Enigma coding machines and the computational analysis of intercepted signals traffic.

Because of Cold War concerns for secrecy, the wartime creation of the Colossus electronic computer used to calculate settings on the German Enigma encryption machines was only revealed fully in 1975. Alan Turing, one of its key developers was cast as the central heroic and eccentric genius. In the best British tradition, fictionalised accounts of the work of Turing and his colleagues emphasised a small group of boffins in a remote country house and the documentary accounts of survivors of the key groups at Bletchley Park tell of inspirational breakthroughs by individuals and small teams. The Taylorist organisation for the volume production of information from a vast range of intercepted messages contradicts the carefully cultivated image of lonely genius and individual inspiration. The creation of massive databases of signals traffic and the development of increasingly sophisticated traffic analysis techniques, not the discovery of the content of individual messages, led to many of the significant results produced. Much of the site is still covered by temporary and permanent buildings occupied by the 8,000 workers, many female, who made use of state-of-the-art data processing technologies technology in the form of Hollerith tabulators and card indexes.

Turing's fame had already been established by his early specification for a generalised computational machine (Turing 1936/7) and as the "father" of artificial intelligence through his formulation of a test to determine whether a machine was exhibiting intelligence. In this respect Turing has been most widely influential in

creating the popular (and misconceived) idea that computers are already capable of many of the objectives he set for them in the thirties and forties. Given that Turing's famous test for machine intelligence (Turing 1950) initially speculated on the ability to distinguish between male and female respondents via teletype communication, and only then discussed a human versus machine distinction, the gender blindness of most accounts of Bletchley Park is intriguing. For example, it was a low ranking Wren who alerted the Admiralty to an imminent sortie by the battle-cruiser Scharnhorst on the basis of signals traffic analysis on Xmas eve 1942, allowing its destruction. Runte and Mills (2003) describe the broader consequences of the suppression of this gender aspect of the war-time systems of material and knowledge production.

The deployment of computer-based information systems in commercial organisations diffused a particular model of strategic and operational management. Individuals who passed through Bletchley Park played a leading role in the post-war development of electronic computing, both at Manchester University in Britain and in the MIT Whirlwind project in the U.S. The sharing of intelligence and knowledge between the U.K. and the U.S. meant that with the destruction of the British records, the reconstruction of the Colossus computer, the star exhibit of the Bletchley Park museum, was expedited by archival information only available from U.S. Sources (Sale, 1998).

By the time the gaps had been filled in the wartime narrative, however, the history of electronic computing had been constructed around the range of successor projects to the secret British efforts. Despite the close relationship to the U.S. nuclear weapons programme (see York 1976 for a discussion of von Neuman's motivation in separating programme instructions from data), these had long been in the public realm.

Technocratic Continuities: Taylor, Ford and McNamara

The narrative underpinning the Cold War period and climaxing with Robert MacNamara's incumbency as U.S. Secretary of State was one of rational analysis of quantified data, which placed scientific management at the centre of national survival. As Klein (2003) points out, this framework was embodied in the accepted understanding of technology management. However, the foundations for the "military-industrial complex" identified by US President Dwight Eisenhower in his farewell address were laid in the period leading up to World War II. Rearmament, mobilisation and the associated managerial methods formed the basis of those used in the Cold War. The strategic distribution of production during the war laid the basis

for post-war policies of "complementarity", (Little & Grieco 2003) and the same logic of distribution of production applied to the nuclear age.

While the U.S. military industrial complex is a product of the impact of World War II and the Cold War on science and technology policy, it also reflects a pre-war technocratic sensibility. This had been given a formal expression in the political flux immediately before the implementation of the Roosevelt administration's "New Deal" programme. A Technocrat Movement rose to short-lived national prominence in the United States on a political programme of technical rationality. The Movement aimed to place engineers in charge of all facets of society, claiming that the economy would prosper in the hands of engineers. Developing Veblen's (1904) conception of the role of technical workers, the Technocrat Movement adopted energy consumption as a single unifying metric through which the rational management of economy and society could be achieved. Ultimately, according to Akin (1977), the movement withered precisely because its narrow technicism precluded the formulation of a programme of political action. The political agenda lost momentum in the face of the success of the New Deal, but the Second World War gave an added impetus to the underlying view that problems, however complex were amenable to quantitative analysis, provided it was sufficiently sophisticated.

The continuity of technocracy pre and post World War II needs to be emphasised. Belief in the power of technical rationality to deal with almost any economic or social problem has proved enduring. It received reinforcement through the comparative success of the New Deal policies in the U.S. and the successful application of new management techniques during the Second World War. The rapid advances in military and other technologies ensured a continuing acceptance of such views in the post-war period. One former Technocrat Society member, the engineer Richard Buckminster Fuller, promoted the original principles up to the end of the nineteen sixties. The career of Robert MacNamara, as narrated by Halberstam (1971), offers a paradigm of this post-war flowering of technocratic consciousness. MacNamara’s career in the automotive industry, government and the World Bank reflects the movement of these sensibilities from industry to governance and development.

The justification for the technocratic mind set can be seen in “Operation Paperclip”, the clandestine transfer of knowledge and technology from Nazi Germany to the U.S.A. at the onset of the Cold War. The first person account provided by Amtman (1988) shows the critical impact of this design input to U.S. front-line aerospace technology over the following decades. However, the absorptive capacity which allowed the U.S. beneficiaries to exploit this German research demonstrated

that superior organisation of production was as central to allied superiority as the quality of individual designs. Coupled with intelligence superiority, this had proved decisive, a lesson carried forward to the new confrontation.

Following the onset of the Cold War, the defeated combatants of World War II faced futures almost as diverse as the former allies. The reconstruction of these nations was rapidly reframed as the strengthening of bulwarks against communism. Italy was incorporated into the western alliance as a member of NATO, with a divided Germany providing a front line state for each bloc.

It could be argued that Cold War strategy elevated technocracy above democracy. Johnson (1983) illustrates the continuity of personnel between the post-War Ministry of International Trade and Industry (MITI) and the pre-war technocrats of the administration of Manchukuo, Japanese occupied Manchuria. U.S. influenced constitutions were imposed on Japan and Germany, but the former Japanese colonies of Taiwan and South Korea benefited primarily from the attention of US advice in technical development and productive capacity with democratic development coming only late in the Cold War period.

U.S. aid during the occupation of Japan led to the export of Deming's statistical approach to quality control. When the Japanese added this to Taylorism and Fordism the resulting Toyota-ism became the benchmark for manufacturers[1].

The NSA and Cold War Surveillance: "Computers by the Acre"

In the U.K. Churchill had ordered the physical destruction of key equipment and files at Bletchley Park on the cessation of hostilities in 1945, effectively concealing the wartime contribution of code breaking. However, the Government Communications Headquarters (GCHQ) was established in 1946 as the post-war successor of the Government Code and Cipher School. In the U.S. the Signals Intelligence Service, based in Arlington Hall, Virginia, and comparable in its origins to GCCS re-emerged in 1952 as the National Security Agency (NSA).

Bamford (1983) provides a history of the NSA which characterises its Cold War resource levels as computer capacity measured by the acre. According to its website,

[1] Japan, as a relatively demilitarised buffer against a newly Communist China, was free to put its intelligence ingenuity into commercial organisations such as the Nomura Institute. Bill Abernathy remarked that his own options on graduation as an engineer were between spy satellites and washing machines. Japanese graduates had no such tempting alternative to consumer durables indeed, the co-founders of Sony ere displaced from the Imperial Navy guided missile programme. Hayes and Abernathy (1980) argue the consequences of this situation for competitive performance of U.S. industry.

the NSA is currently the second largest user of electrical power in Maryland with an annual bill in excess of $21 million.

A range of significant innovations in computational capability followed from the capacity required by both code breakers and the developers of nuclear weapons. York's narrative of the post-Manhattan project technologies and politics (York, 1976) was noted earlier. During and after the Cold War the NSA led significant initiatives in the development of computing. It promoted joint development with IBM of second generation general computers with features such as the high speed tape drives, prominent in every sixties movie featuring computers. They also sponsored the first Cray supercomputers and in 1990 established a Special Processing laboratory for in-house fabrication of highly specialised micro-electronic devices.

Innovations such as finite element analysis in engineering calculation and the related practice of constructing production aircraft without physical prototypes (Sabbagh, 1995) as well as the mathematical modelling which allows "in-silico" pharmaceutical development make use of massive computational power first developed either for code breaking or for the mathematical simulation of nuclear explosions.

This continuing role of the signals intelligence community at the cutting-edge of computing developments in the post war period has ensured that the information economy is inseparable from the surveillance state. In some ways the end of the Cold War simply continued the blurring of distinctions between military and civil categories of security and surveillance. The Enigma machine, the focus of the attentions of Bletchley Park was itself originally a commercial product touted at pre-war trade shows and used by German state railways for commercial communications, as well a by the Wehrmacht.

In the U.K. the post war reactivation of GCHQ, was closely followed by civilian scientific and commercial applications of electronic computers. The Lyons Electronic Office effectively created the key concepts of management information systems at a stroke. However the low profile of Bletchley Park allowed an alternative narrative to be constructed. As recently as December 2000, John King of the University of Michigan (2000) provided a key note address to the International Conference for Information Systems in Brisbane 2000 which traced the post-war history of commercial computing with no mention of the critical LEO innovations.

The established narrative, is however, a cold War one, leading from the SAGE real-time system developed for aircraft interception, to the critical innovation of the

SABER real-time airline reservation system. This was as much the key to affordable mass air travel as the wide bodied jet and, disintermediated through the internet, remains the core technology of budget airlines.

The Cold War ARPANET origins of the Internet are well known, as are the survivability and web characteristics which were in part a response to the physical vulnerability of the SAGE system. The computer centres of this system were located at Strategic Air Command (SAC) bomber-bases, prime targets for any enemy nuclear strike. Allegedly this was for staffing reasons, since under General Curtis LeMay: SAC had secured the best quality officers' facilities, in the U.S. military and SAGE relied on the attentions of highly skilled and highly sought after technical personnel.

At end of the Cold War the NSA's mission statement (publicly available at http://www.nsa.gov/about_nsa/mission.html) distinguished between external foreign signals intelligence and “classified and unclassified national security systems” In the post 9/11 environment, the civil dimension is represented by a separate Information Systems Security Organization (ISSO). (http://www.nsa.gov/isso/bao/index.htm|). The NSA promoted their own “Clipper” encryption chip as the answer to commercial security problems on the information superhighway[2].

Joint development and commercial programs provide a direct link between military and diplomatic concerns and the world of commerce. Despite measuring its computing resources in acreage, the NSA outsources data processing to commercial organisations such as TRW, also a major credit data agency, as illustrated in the eighties film “The Falcon and the Snowman” (see also Bamford, 1983).. Yet another link between military and commercial projects is through technique. The continued refinement of signals traffic analysis has led to the emergence of what Roger Clarke (1989) terms “dataveillance”. Both governments and private organisations like TRW are able to assemble revealing pictures of organisations and individuals through the correlation of individually trivial data. Clarke campaigned against the introduction of an “Australia Card” in the 1980s. Again, in the post- 9/11 environment fresh demands for the introduction of electronic identity cards for citizens are being made in the U.K. and elsewhere.

[2] In one respect the NSA are returning technologies distantly descended from a German commercial patent to the world of business. In this context it is not surprising that there are claims that the U.S. signals intelligence community has from time to time acted in support of U.S. commercial interests through the interception of foreign business communications. (European Parliament, 2001)

At the workplace level, equivalent electronic surveillance was described in a Japanese electronics factory, where data derived from production equipment was used to discipline work teams (Sewell and Wilkinson,1992). Such coercive practices are now an accepted part of the call-centre economy. Constant monitoring of workers, consumers and customers represents the panopticon dream of rational decision making.

Winning Wars, hot and cold

In the post 9/11 environment, the urgency of Cold War data analysis has returned. Surveillance and intelligence are once again seen as the thin line separating us from oblivion. It is therefore worth considering debates which arouse around the effectiveness of the contribution of code braking to the conduct of World War II.

The narratives derived from wartime experience provide momentum to this process and Bletchley Park has been re-incorporated in the UK's national narrative and is now itself the subject of revisionist arguments. Clive Ponting, (1995) in a review of a fictionalised account of work at Bletchley Park, cautions against the trend towards the glamourisation of intelligence. He argues that the Soviets had no access to Enigma, yet engaged 90% of German army for much of war, that a crucial black-out in North Atlantic data due to the addition of a fourth rotor to the naval Enigma machine in 1942 robbed the allies of access to data during the key period of the Battle of the Atlantic, which they still won. For him the key to victory was material superiority plus the immense causalities inflicted on and meted out by the Soviet Union. In contrast, Winterbotham argues that the main problem was the level of secrecy itself, arguing that U.S. General Mark Clark did not share his ultra information with subordinates, and pursued his own agenda to become “liberator of Rome” rather than taking the opportunity to defeat German forces elsewhere.

Undoubtedly Air Marshal Dowding’s access to the Luftwaffe’s’ daily orders for the Battle of Britain ahead of the German squadron commanders ensured that Russia was not facing Germany alone. Ponting’s view is also Eurocentric. The advances made in cryptography at Bletchley Park were applied in the Pacific, with a British Special Liaison Unit being located in Brisbane to work with U.S., and Australian code-breakers. The separate U.S. ability to break the main Japanese naval code JN-25 allowed them to engineer the key victory at Midway. As late as 1976, however, the Hollywood version of the battle attributed the location of the Japanese task force to U.S. Admiral Nimitz’s intuition.

The U.S. National Security Agency claims that the Pacific war was shortened by one year through the defeat of Japanese military codes. The revisionist account which followed the publication of Winterbotham's Ultra story legitimated the massive post-war infrastructure developed by the GCHQ, successor to GCCS in the U.K. and the National Security Agency (NSA) in the United States.

War Dividends

The modern information and communication technologies derived from the Second World War innovations are essential to the level of control required over back offices and subsidiary plants located across national boundaries. They are at the therefore central to developments in the global economy which have replaced the spatial hierarchy involving resources, manufacturers and consumers by a complex layering of labour and resource markets.

Inspired by the new organisational relationships made possible by the merging of computer and communication technologies (ICTs), observers such as Negroponte (1995) and Mitchell (1995) argue for the transformative potential of new forms of networked organisation and "virtual" workplaces.

The strategies of transnational corporations resemble the placing of stepping stones as much as the construction of production chains (Little & Grieco, 2003). Inward investors can pick their distributed points of presence from a beauty parade of aspiring recipients, seeking the most favourable infrastructures and government support, regardless of jurisdiction (Lipietz, 1987).

The growing separation between intellectual capital and physical production has consequences for both core and peripheral economies. Lipietz (1992) argues that the ability to separate production from consumption in these systems signals the end of the "Fordist compromise" which underpinned the Keynsian social-democratic paradigm. Harvey (1990) points out that Ford significantly increased wages when he introduced his five-dollar, eight-hour day in 1914 in conjunction with his moving production line. He saw the workers as an integral part of a production and consumption process. Production workers remote from the destination market no longer need to be paid sufficiently well to consume the products of their own labour. The result of these changes is a complex layering of labour markets, both internal and external to the developed economies driving the globalisation process. Harvey regards this post-Fordist situation as a regime of flexible accumulation which is tightly organised through its geographical dispersal and flexible responses to labour

markets, and which is even more reliant on the creation of scientific and technical knowledge.

New locational strategies allowed white collar work from the US mainland to be relocated off-shore to the Caribbean as far back as the 1980s, and "front office" tasks in prestigious locations have been divided from "back office" tasks relegated to the more local periphery of outer suburbia. Less developed regions find themselves increasingly in competition for such lower value work, and their infrastructure is likely to be developed primarily to support it. At the same time, potential consumers with limited economic resources are less able to influence the direction of development of technologies, artifacts and services which are targeted at the most lucrative component of global markets. Across the new networked economy as a whole research and development, raw materials sources and routine manufacturing, final assembly, markets and after-market support, are increasingly co-located. The emergent global system is one of complex inter-penetration of peripheries and cores and these terms now refer to competence in the underpinning information and communication infrastructure, rather than physical location.

These innovative forms appear to alter the relationship between organisational size and performance. The contemporary notion of the “network organisation” and decreasing Internet costs appear to present an opportunity for smaller players to access resources from and to compete within global networks. However, using the reduction on transaction costs delivered by ICTs, larger firms can restructure to enter niche markets yet still draw on their wider resource base. Castells (1996) describes a form of “network enterprise” which is composed of components of larger corporations, collaborating in specific spatial and temporal circumstances, while the main companies are still pursuing global strategies of direct competition. Castells is describing a mechanism by which larger corporations can achieve some of the agility of smaller competitors. While additional accessibility and flexibility is also available to smaller players, larger firms can restructure into networks which can enter niche markets yet still draw on their wider resource base, presenting a formidable challenge to smaller and medium scale players. Monolithic large scale planning is being replaced by opportunistic niche infiltration.

Reversing the Panopticon surveillance by the surveilled

The technologies which have enabled military and managerial surveillance of distributed resources also, paradoxically, enable the communities so scrutinised to develop their own distributed strategies and patterns of relationships with external parties.

While the post-Cold war period has seen the accelerated formation of global relationships, complexity is being added by the re-assertion of older identities and allegiances against the background of erosion of state sovereignty through international dispensations from the WTO and an expanding European Union (Delamaide, 1994; Dicken 2003). As a consequence, the interaction between intervention and location has also strengthened.

The key technologies of the Internet and World Wide Web do offer opportunities for voices and visions voices from geographically disparate locations to enter the world of global communication.

Castells has described “informational politics in action” (Castells 1997 p.333). He is concerned that one aspect of globalisation, the reliance on simplified mass communication, inevitably reduces the complexity of political discourse. However, in the same volume he describes very different and complex forms of electronically mediated communication by dissident minorities: Zapatista rebels in Mexico and Militia groups in the U.S.A. In both cases movements premised on the championing of the local and specific and a rejection of the global economy are achieving a presence and a voice in a global arena through the appropriation of the technologies of globalisation. The laptop in the rainforest has become the latest info-cliché, but the Mexican Federal Government itself provides links to independent and critical coverage of events via its own web-site, shifting political discourse into cyberspace and in front of a limitless audience (Little, Holmes & Grieco 2000). Unions have taken the same route in response to increasing restriction son traditional physical actions (Hogan & Greene, 2002).

Diasporic communities have been quick to seize the potential of these enabling technologies. These can build a dynamic between traditional cultural practices, modern communication forms to provide an enrichment of global symbolic life. There is a symbiosis between the use of the Internet for e-commerce purposes and the maintenance of living and differentiated cultures, a pattern which is already evident in Canada, Africa and Indonesia (Little, Holmes & Grieco, 2000). Miller and Slater (2000) explore the question of local improvisations in the West Indies through the

case of the Trinidadian diaspora. They describe how Trinidadians undertake a distinctive set of social activities on the global Internet.

The rise of the portal metaphor as an organiser of web access has allowed countries such as Estonia, to provide public access in its own Finno-Ugric language (Abbate, 2000). The portal is a home page which provides structured links into resources appropriate to its users. As an organising device it can reduce search time for newer users, and through interposing "front-end" translation software can overcome the language barrier of the predominantly English language web[3].

New technology can assist the civic empowerment of the individual in relation to the state and also the capability of remote locations to influence the world of global government and global commerce: there are now powerful electronic counterbalances to historical policy remoteness (Little, Holmes & Grieco, 2001).

The World Bank recognised the role of knowledge in the 1998-99 "World Development Report" (World Bank, 1998) and is currently re-branding as the Knowledge Bank. Stephen Denning, formerly Director of Knowledge Management for the Bank has presented this as a necessary dialogue between all parties concerned with development process (Denning and Grieco, 2000). A component of this realignment is the development of a web portal for Global Development Knowledge. The Bank has opened a web-based debate with non-governmental organisations which has inevitably raised the issue of power relationships. These can be seen in the framing of access pathways by the resource rich on behalf of the resource poor.

In Japan, the Internet has been widely used for political debate, for example over airport location and development in the Kansai region. The Japan Local Government Center has set up a site through which it links with local governments globally to explore solutions to new urban problems.

On-line electronic petitions systems have been established in Scotland (see Griffin, 2003) and for the UK as a whole. SMS text as well as traditional postal voting has been trialed at local government elections in an attempt to increase voter turnout.

In California the notion of "community informatics" has been used to justify the provision of access to information previously freely available, but increasingly commercialised (Pitkin 2001). Across Europe city governments are co-operating across national borders through fibre optic technologies and other forms of electronic networking in the identification of municipal problems shared and solutions sought.

[3] For a taxonomy of the portals developed by non-governmental and civil organisations, see Surman, (2002)

Similarly within the European Union locations along particular lines of transport communication have begun to co-operate electronically in the management of traffic. The models of networking already present in the real world counter the view that global communications flatten cultural terrain in favour of the dominance of modes and material practices determined by global economic leaders, most particularly the United States (Little, Grieco & Holmes, 2001).

Conclusion

The creative nexus central to Allied success in WWII established the framework of Cold War Civil military informatisation. The ICTs which drive the current form of globalisation extend the post-Cold War military dispensation, both in high tech weaponry and in information warfare at all levels from electronic countermeasures to broadcast propaganda. The military trajectory of surveillance leads us to cruise missile diplomacy. These gunboats of the twenty-first century, targeted through high technology surveillance, have become the weapon of first resort of an untrammelled super power.

The civilian trajectory can be traced through the 1980's AI projects to current attempts at "knowledge extraction". These reflect an assumption of the ultimate superiority of the high level abstraction of data.

However, a new paradigm is emerging from the interstices of this technical dispensation as a bottom-up and networked response, The feedback loop of systems theory and cybernetics set out by Beer (1972) is now incorporating the intentionality of those on the receiving end, bringing the possibility of a new paradigm both for both management and governance, built upon yet contradicting the Cold War legacy.

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