Technology, Trust and Terror

LANGDON WINNER

The beguiling but ultimately mistaken notion that technologies are 'merely tools' – things we pick up, use and then put away – poses a major barrier for understanding how we live today. Missing in the tool/use perspective is an acknowledgment of a basic fact about people's relationship to the technological realm: our utter dependence upon the large, complex, artificial systems that surround us on every side, giving structure to everything we do.

For countries in the North, such dependence is welcomed with open arms because it seems crucial to prosperity and freedom. Large-scale, geographically extensive technologies enable us to move about as we wish, to communicate freely and to be released from the urgent demands of day-to-day survival that confronted previous generations and that still vex the less prosperous nations around the globe.

But now another, more troubling dimension of technological complexity demands attention. Dependence on complex technological systems looms as a source of vulnerability. If any major component in the systems that support modern life ceases to function for a significant period of time, our prosperity, freedom and comfortable lives are threatened. This was a major concern in 1999, you will recall, as people agonised about the possibility of disastrous system collapse caused by Y2K programming. There were widespread fears that the energy grid, airline transportation, banking and other systems would be disrupted by computer malfunctions, plunging society into chaos. It turned out that, despite minor glitches here and there, the predicted Y2K chaos never arrived. But during the last months of 1999, the perception of vulnerability bordered on mass hysteria.

Responses to Vulnerability
There are several ways that our society routinely deals with the spectre of vulnerability. One strategy is to ensure that technical devices and systems are well engineered and protected from calamitous failure. Engineers and systems designers make sure that structural parts can hold an increment more than the normal loads they must support. Redundancies are also built into many systems so that if one part fails, another part takes over.

But good engineering is only part of the story. In free, democratic societies there is another way in which ordinary people have managed their relationship to vulnerability: they embrace an attitude of trust, holding on to the reasonable expectation that key technologies will always work reliably and not break down in ways that jeopardise our health, safety and comfort. This relationship is reciprocal; trust also informs the structure and operation of technological systems themselves. Many key components are built in ways that leave them open to the possibility of inadvertent or deliberate interference. Electrical power lines, phone lines, gas pipelines, dams, aqueducts, railroads, aeroplanes, elaborate works of architecture and the like, are often more or less naked to the world, open to view, minimally guarded from the kinds of interference that could render them inoperable. For many decades a common but largely unspoken expectation has been that people in prosperous industrial societies can be trusted not to disrupt or destroy the workings of the key parts of the global technological order.

Most people accept the presence of major complex technologies because their well-being hinges on them, because there's no good reason to act destructively and, of course, because the law punishes overt acts of sabotage. Exceptions include occasional bombings by anarchists in the early 20th century, acts of destruction by the Weathermen and political extremists in more recent times – Timothy McVeigh and the Unabomber among others. But for the most part, the relationship of openness and trust between individuals and complex systems has proven fairly resilient.

A very different understanding of how to manage large, complex systems characterises closed, guarded, totalitarian societies such as the Soviet Union under Joseph Stalin and Kim Il Sung's North Korea. Regimes of this stripe hardened the design of their technologies and installed vast systems of policing and surveillance because they did not trust their own people. For any society that adopts strategies of this kind – pervasive suspicion and obsessive protection of core technologies – an inevitable consequence is the destruction of civil freedom.

What would happen to our own society if the long-standing conventions of openness and trust were suddenly afflicted by a pervasive sense of vulnerability and dread? Would our rights, liberties and democratic institutions survive?

Vehicles for Destruction

In the aftermath of the attacks upon the World Trade Centre and the Pentagon, along with the subsequent anthrax scares, such questions have renewed urgency. Americans are now profoundly aware of their vulnerability. Dams, reservoirs, bridges, power plants, chemical plants, aqueducts, electrical transmission lines, liquid natural gas tankers – even the daily mail and systems of food supply – all seem wide open to attack.

As far as I can tell, both planes that left Boston on September 11 on their way to the Twin Towers flew right over my house in the Hudson River Valley. If the pilots had wanted to do maximum damage to the region, a far better target would have been the nuclear reactors at the Indian Point electrical power plant about sixty miles south. Since these facilities were not designed to withstand a direct hit by an airliner, targeting them might have caused catastrophic failure, and possibly a core meltdown as the fuel sank into the mud and water of the Hudson River. The resulting plume of radioactive steam and debris would have killed thousands of people very quickly and rendered much of the Northeast permanently uninhabitable. Perhaps we are lucky that the Al-Qaeda terrorists were so obsessed with the symbolic value of the World Trade Centre that they neglected what may have been more productive targets, America's 103 nuclear power plants.

Within the collection of infrastructures upon which we depend, there are many others that are essentially wide open, loosely protected. The nation's containerised cargo system provides a good example. Each year some six million sealed containers arrive from all around the world. At present, only two percent of these are ever inspected (although a new international programme aims to boost the level to 5-10 percent). If anyone had the ability to make or purchase a nuclear device or dirty bomb, a convenient way to deliver it would be to ship it by containerised freighter and, at the appointed moment, set it off. A recurring nightmare: one morning we turn on our televisions to find that San Francisco, San Pedro or New York has been levelled by a nuclear blast from a weapon hidden in one of those large steel crates.

There are many other horrifying scenarios, of course. If anyone had the desire to use it, a readily available, flexible delivery system for maximum destruction is the automobile, a fact all too clear in Ireland, England and the Middle East in recent decades. There are now some 230 million registered cars and trucks in the USA. The Oklahoma City bombing demonstrated how easy it is in an open society to fill a rental vehicle with explosives made of readily available chemical fertilisers and set it off in the middle of town. Just as we previously had not thought about commercial airliners as flying bombs, Americans do not regard their beloved automobiles as flexible, ubiquitous instruments of destruction, although they sometimes serve that role in the Middle East and other troubled regions of the world.

Recognition of the vulnerability of open, complex, geographically extended technological systems is by no means new. In 537 A.D. the Gothic chieftain Vitiges and his forces laid siege to Rome. A crucial part of Vitiges' strategy was to cut the aqueducts leading to

the city, forcing the Romans to rely on the inadequate stream of water from the Tiber River. As a result, the population fled Rome in droves, as much in response to water shortage as to the sack of the city. Scholars have long debated the various developments that caused the fall of the Roman Empire. But as geographer Gray Brechin observes in *Imperial San Francisco*, "the destruction of the aqueducts conclusively ended the rule of a city that had once boasted of itself as the *caput mundi* – the world's capital".

The Withdrawal of Trust

Following the atrocities of September 11, the world's current *caput mundi*, the United States, has struggled to find ways to confront revelations of its own vulnerability. To this point most of the emphasis has centred on a rapid shift from trust to mistrust, installing muscular socio-technical fixes that promise security against terrorism and place our whole population under suspicion.

Most prominent among proposed remedies is the USA-PATRIOT Act – "Uniting and Strengthening America by 'Providing Appropriate Tools Required to Intercept and Obstruct Terrorism'". This astonishing piece of legislation extends the government's power to listen in on private conversations, including cell phone conversations, nationwide; authorises surveillance of e-mail, web browsing and other Internet communication; and allows police to obtain a warrant to search a person's home without the person's knowledge.

Other steps in this vein include changes in America's immigration rules that allow the Attorney General to keep foreigners in detention even though an immigration judge orders them released. President Bush issued an executive order aimed at creating special military tribunals for foreign nationals suspected of terrorist acts, courts that lack many of the protections afforded by our laws and Constitution. Along this path hundreds of Muslim and Arab persons have been detained before being charged with a crime or breach of immigration status, in direct contradiction to the US Constitution. Even now, more than a year after the attack, it is difficult to obtain accurate accounting of who is being held and for what reason.

As the shadow of secrecy and suspicion has fallen across the land, useful government information about the nation's technological infrastructure – web sites on water systems, nuclear power plants, chemical plants and the like – have been removed or are severely restricted in content. For scholars, it is now much more difficult to study what used to be regarded as a perfectly mundane question: the structure and operation of technological systems. What used to be public information freely available to citizens is now regarded as crucial national 'intelligence' to be shielded from the grasp of spies and saboteurs.

The wave of new federal legislation and regulation is now mirrored in a host of anti-terrorist laws passed by state legislatures, ones that feature strengthening the power of the police to monitor the activities of citizens who, for one reason or another, must be watched. In this new mood, the definition of terrorist activity is sometimes so broad and vague that it casts a shadow over a wide range of political activities – organising public protest marches, for example. Civil liberties groups are concerned that ordinary forms of political protest could be defined as terrorist and suppressed. This might include, for instance, the public gatherings to protest globalisation like those in Seattle and other cities in recent

years. Unfortunately, episodes of political repression during times of civic distress – the Palmer raids after World War I, the incarceration of American citizens of Japanese decent during World War II, the malicious persecution of dissidents during the McCarthy era of the 1950s, and so on – are all too common in American history. When the nation feels threatened, freedom takes a beating.

A Public Chill
On radio and television talk shows and in newspaper editorials since the 9/11 attack there has been a strong tendency to define terrorism in broad, loose, inflammatory terms. The same penchant also afflicts lawmakers at all levels. Last spring the Maryland House of Delegates passed an anti-terrorism law extensive in its sweep. Dana Lee Dembrow of the Maryland House of Delegates remarked, "I realise that this bill basically says you can tap someone's phone for jaywalking, and normally I would say, 'No way'... But after what happened on September 11, I say screw 'em".

The nation's obsession with security now casts a chill upon public life and the only question is "How cold will it get?" For example, since the 1960s there has been a lively debate about privacy and personal liberty in the age of electronic data. A rough consensus formed that citizens ought to be free from the snooping of Government, corporations and private individuals. That consensus has now been demolished by the belief that widespread surveillance is necessary and that ingenious systems like the FBI's Carnivore (which can monitor everyone's e-mail and Internet activities) are exactly what is needed to defend the country.

Within post-9/11 security measures, protections of the US Constitution have been seriously weakened. Thus, the Fourth Amendment insists, "The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized". But under the provisions of the USA-PATRIOT Act, authorities can now search everywhere, indefinitely, online and off, with one general warrant.

There is, alas, widespread spillover of these measures into civil society as a whole. Hoping to deflect suspicion, many Americans have become guarded and self-censoring. How often in recent weeks have I heard people say, "No, I don't worry about anti-terrorist legislation. I'd never do anything the authorities would be interested in anyway". Evidently, patriotism requires us to be compliant and predictable.

Typical of the mood of panic just after the 9/11 attacks was a news segment on NPR that asked security experts about everyday vigilance against terrorism. What should ordinary folks watch out for? Look for any signs of "unusual behaviour", one expert advised. This would include people wearing clothing that seems out of place, or saying things or making gestures that were not appropriate for a particular place or occasion. As I listened to the story, it struck me that what was identified as dangerous "unusual behaviour" were simply varieties of freedom – wearing what we like, saying what comes to mind, acting freely in public.

When Stable Structures Dissolve

We cannot know the specific intentions of the September 11 terrorists. But if one of their aims was to render our way of life much less open and free, they have surely succeeded. At present Americans are restricting freedom of travel, limiting access to information, and narrowing the boundaries of political speech. In programmes like the Justice Department's "Terrorist Information Protection System" (TIPS) we are modifying social life in ways that define people as suspects rather than citizens. In all deliberations about public policy (regardless of topic) terrorism and security have become the overriding concerns.

Just as sixth-century Romans abandoned their city when the aqueducts were cut, Americans seem to be abandoning essential parts of the democratic civic culture that developed during the past two centuries. This appalling turn of events is certainly evident in the material features of public buildings and grounds. A visit to Washington, D.C. shows the place transformed by ever-present ugly cement barriers, recurring security searches and ubiquitous surveillance cameras. The city has been redefined as capital of Homeland, a strange new country where once-cherished freedoms of thought, expression and movement are regarded as luxuries too dangerous to afford. (Citizens should ask: Is Homeland governed by the same constitution as the old USA?)

In the current mood, people view terror as something that has suddenly arrived from outside, inflicted upon an otherwise contented, harmonious society by 'evil-doers' from distant parts of the world. Obviously, there's much truth in that view. There are malevolent actors out there prepared to inflict death and destruction.

But seen from another vantage point, the terror we experience – the dread that now afflicts everyday life – resides in the very systems we have so ingeniously built during the past century. Modern, complex technologies succeed by wresting enormous stores of power from the natural realm, seeking to direct these powers in ways that are controllable and useful. An unhappy possibility can never be entirely eliminated, however: the prospect that these enormous forces will somehow be unleashed uncontrollably from systems and infrastructures originally built to contain them. In recent years, fears of this kind have focussed on rare technological accidents – the explosion of the Challenger space shuttle, for instance. Such misgivings also underscore contemporary evidence about environmental ills, including global warming. Our technology's controlled use of fossil fuels over many decades has generated uncontrollable, highly destructive shifts in climate.

Following the 9/11 attack, the horizons of catastrophe have shifted. The accomplishment of a jet airline is to contain and direct the high-energy fuel whose combustion enables rapid flight; the achievement in the engineering of skyscrapers is to defy gravity by ingeniously stacking tons upon tons of steel and other materials in high structures so that – despite their obviously precarious position – they will not fall down. But what if the physical potential in these achievements were suddenly released in ways not part of the original blueprint?

The horror of the World Trade Centre attack was that the power of two wonders of modern technology – the skyscraper and the jet airliner – came crashing together causing the carefully contained power of both systems to be released in catastrophic explosion, inferno and collapse. In this light, the ingenuity of the terrorists is to trigger processes that cause stable structures to dissolve.

Deeply buried in our experience of modern technology is the elementary terror that powers we sought to control will escape our command and come back to injure or destroy us. Perceptions of this kind have surfaced in countless science fiction novels and films of the past century, turning our worst fears into mass entertainment. But beyond the paperbacks and movie screens an urgent question now sounds. How many systems of megatechnical might can one introduce before they begin to overwhelm the culture of democracy? As we construct complex, tightly coupled, geographically extended, powerful, but ultimately precarious systems, one result is a world filled with ticking time bombs waiting to go off.

A Fortress Mentality

America's knee-jerk response to this terror at present is the familiar strategy of hardening systems to prevent disruption. We are building new barriers around crucial systems and strengthening their internal components, surrounding them with elaborate methods of policing and surveillance. If it continues, this strategy of hardening technological systems will be a major drain on our economic resources and a hazard to both freedom and civility. But for the time being Americans and their leaders seem prepared to pay these costs, even though they will rapidly degrade our institutions – further starving schools of funds and commitment, for example – and weaken the fabric of democratic sociability.

Unfortunately, it is far from clear that the new measures will succeed. A study by the Department of Transportation released last spring found that in attempts to smuggle weapons through newly bolstered airport security gates, thirty percent of the guns and seventy percent of the knives got past the guards and scanning devices. Similar tests of security at nuclear power plants also produced disappointing results; breaching the barriers around these facilities seems to be fairly easy.

The human demands of policing complex systems are, over long periods of time, probably beyond people's ability to bear. You may recall an episode just after 9/11 when the Golden Gate Bridge was rumoured to be a terrorist target. Passage was closed for a while and then National Guard troops were brought in to screen the traffic. But television coverage showed exactly what you'd expect, guardsmen standing around, bored, shooting the breeze, not paying attention to the vehicles going by. And this was a nationwide terrorism alert at the highest level!

Faced with shortcomings of this kind there are calls to redouble our efforts by spending even more money, installing more sophisticated equipment, hiring more security personnel, subjecting the public to spiralling levels of hassle, search, surveillance and mistrust. An impartial observer looking at us from afar might be puzzled by how quickly and thoroughly these initiatives have begun to modify the American way of life. Why didn't the nation explore more fruitful ways of responding to the terror people feel? Why didn't Americans try harder to preserve their traditions of openness, trust and freedom?

In quest of security the nation is now preparing to go to war with a large nation said to belong to an "axis of evil". Again, this conveniently defines terror as something 'out there' rather than acknowledging some of its foundations 'in here', within the very frameworks that support high-tech ways of living.

Toward Safer Systems

In my view, there are far better ways of responding to 9/11 than the kinds of knee-jerk militarism, Orwellian surveillance and pre-emptive strikes on human rights that our leaders currently prefer. Urgently needed are measures that would address sources of insecurity and terror found at the very roots of modern civilisation. Hence, it seems wise to design technical systems that are loosely coupled and forgiving, structured in ways that make disruptions easily borne, quickly repaired. Certainly it makes sense to rely upon locally available, renewable energy and material resources, rather than foster dependency on global supplies always at risk. It seems sane to rely on technologies operated by people in local communities whom we get to know in a variety of roles and settings, not just as technical functionaries. It also seems high time to begin reducing our dependence upon overwhelming, risk-laden powers wrested from nature. Now we know: these powers may destroy not only fragile ecosystems, but the habitats of freedom as well.

Fortunately, the richness of human knowledge includes workable systems alternatives to today's complex, power-centred, globally extended, increasingly war-hungry dinosaurs. The construction of more peaceful, resilient systems can be accomplished through imaginative efforts (many of them well under way) aimed at living lightly on the earth with justice and compassion. Moving steadily along this path could also help eliminate grievances in the world's population that now serve as spawning grounds for terrorist attacks.

As the present atmosphere of hysteria, acquiescence and political opportunism subsides – and I believe it will – we must renew efforts to build institutions that merit our trust rather than fuel our fears.

Previously published in *Tech Knowledge Revue* (Vol. 3, No. 1, 22 October 2002).