Chapter 2

The internet of history

Rethinking the internet's past

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Introduction

When the internet expanded in the 1980s and early 1990s, it was cloaked in romance.[1] The internet's pioneer users developed a distinctive argot, introducing acronyms like MOO and MUD (which refer to adventure and role-playing games). To use the internet in this period was like belonging to a cult, with its own inner secrets, sub-cultural style and tough entry requirement of technical competence. Users were overwhelmingly young, and in the know.

Even when the internet entered the mainstream in the mid-1990s, it still retained something of its early exotic allure. Long articles appeared in the prestige press, explaining how the internet worked and the amazing things that it could do. Words like 'cyberspace', derived from internet pioneers' romance with science fiction, entered the general vocabulary.

It was around this time that the first serious attempts were made to research the origins and development of the internet. However, these early histories were conditioned by the awestruck period in which they were written, something that was reflected in the way they all spelt the internet with a capital 'I' (Abbate 2000; Gillies and Cailliau 2000; Berners-Lee 2000; Rheingold 2000; Banks 2008; Ryan 2010).[2] Their view of the internet was largely uncritical.

There is a clear parallel between these histories of the internet and pioneer histories of the British press, published in 1850–87. British press historians were so awed by the advent of mass journalism, and the power for good that it represented, that they reverently used capital letters to spell Newspaper Press (e.g. Hunt 1850: 178; Grant 1871–2: 453). They, too, were uncritical.

Indeed, an uncritical orientation is almost built into the way in which most internet history is written. Conventional internet history concentrates on the early development of the internet, its Edenic phase, and tells the history of the internet as a Western story. The trouble with this approach is that the internet is much more subject to commercial and state control than it was 30 years ago. And although the internet was a Western invention, it is now a global phenomenon. Updating and de-westernising the history of the internet changes its trajectory. It ceases to be a simple story of progress.

Technical development of the internet

The technical history of the internet can be briefly summarised. The internet began as a small, publicly owned computer network established in 1969 in the United States. This network expanded with the development of a shared computer language and set of protocols. E-mail (or network mail, as it was first called) was introduced in 1972. The term 'internet' emerged in 1974 as a simple abbreviation for *internetworking* between multiple computers. The modern internet dates from 1983, with the establishment of a network of networks wholly independent of the US armed forces.

A US-centred network expanded into a fully international network during the 1980s. A key moment of transition was when CERN, the European Organization for Nuclear Research, adopted internet protocol (IP) for its internal network of computers in 1985, and opened its first external IP connections in 1989. The internet also reached Asia by the late 1980s, though it was not until 1995 that Africa established its first home-grown internet services. By 1998 the internet reached every populated country in the world. However, the diffusion of internet use remained geographically uneven.

The internationalisation of the internet was accompanied by its popularisation. The first key applications of the internet were e-mails, bulletin boards and listservs deployed during the pioneer phase of 1970–90. This was followed by the killer application of the 1990s: the world wide web publicly launched in 1991, the introduction of a graphical browser in 1993 which made the web easier to use, and the development of search engines in the late 1990s that in effect simplified the web, and made it easier to navigate. The 2000s saw the rise of social media and user-generated content, exemplified by the launch of Facebook in 2004. This was followed in the 2010s by the take-off of smartphones which became an integral part of many people's lives. These different uses and applications resulted in the internet being taken up by a widening gyre of users, estimated to be 3.1 billion people in 2014 (Internet World Stats 2015).

Underpinning this remarkable phenomenon were four distinct strands of technical innovation. One was the transformation of the computer from a vast machine occupying an entire room, and requiring the attendance of a white-coated priesthood, into a powerful, easy-to-use artefact that can sit on a lap or be held in a hand. Another was the development of computer networking from the development of shared codes for transporting and addressing communications through to the development of cloud computing supported by massive server farms. A third was the transformation of connective software that facilitated the accessing, linking, storage and generation of information from the read-only technology of the world wide web to the read-write technology that made possible the rise of social media. A fourth strand was the development of communications infrastructure. The internet was able to 'piggy back' on phone lines and cable that had already been established to enable interoperability between countries. Its subsequent massive expansion was facilitated by the development of high-bandwidth cable and also the growth of cellular wireless networks.

However, the evolution of the internet was not simply a technological process determined by scientific innovation. It was also shaped by the objectives of the people who funded, created and fashioned it. Their objectives were to clash, culminating in a battle for the 'soul' of the internet.

Military–scientific complex

It is a much-remarked-upon paradox that although the internet can be viewed as an agency of peace, it was a product of the Cold War. When, in 1957, the Soviet Union launched a satellite orbiting the Earth, it won the first lap of the 'space race'. This galvanised the Pentagon into setting up the Advanced Research Projects Agency (ARPA), whose many projects included a scheme to promote interactive computing through the creation of the world's first advanced computer network (ARPANET). Although the network was conceived originally as a way of sharing expensive computer time, and enabling communication between computers with different operating systems and interfaces, it acquired another rationale. Computer networking could facilitate, it was argued, the development of a sophisticated military command and control system capable of withstanding a nuclear attack from the Soviet Union. The recasting of this project led to major public investment (Edwards 1996; Norberg and O'Neil 1996).

It also resulted in the design of the early internet being influenced by military objectives, in a form that is increasingly downplayed in internet history (e.g. Hafner and Lyon 2003). One overwhelming military concern was the creation of a computer network that would withstand Soviet attack. This led the military to sponsor a devolved system without a command centre that could be destroyed by the enemy. It resulted in a network that was difficult not only to 'take out' but also to control. This also accorded with the concerns of computer scientists who designed the new system, and who did not want to be subject to a centralised, hierarchal chain of command.

Military considerations also led to the development of network technology that would enable the system to function even if parts of it were destroyed. A key military attraction of packet-switching (central to the development of the internet) was that it dispensed with vulnerable, open lines between sender and receiver. Instead, messages were disaggregated into units ('packets') before dispatch, sent through different routes depending on traffic and network conditions, and reassembled on arrival. Each packet was wrapped in a kind of digital envelope with transport and content specifications. The open, peer-to-peer neutrality of the system not only suited military objectives but also accorded with the ethos of academic science.

A further military concern was to have a networking system that could serve different, specialised military tasks. This encouraged the creation of a diverse system that allowed different networks to be incorporated, once minimum requirements had been met. It also led to the addition of satellite and wireless for internetworking, since these were well adapted to communication with jeeps, ships and aeroplanes. But if the internet's modular structure served the military

need for flexibility, it also suited academics who wanted to enhance the internet's value as a research tool by incorporating more networks. The add-on nature of the internet thus met the objectives of both partners.

Mutual tact seems also to have prevented the raucous campus protests against the Vietnam War in the later 1960s and early 1970s from souring the harmonious relationship between scientists and the military (Rosenzweig 1998). When a serious clash of priorities developed over the issue of security, this was resolved amicably through the division of the internet into military and civilian networks in 1983.

The mutual trust that developed between the military and scientists resulted in the latter having considerable autonomy. As a consequence, the culture of academic science became part of the founding tradition that shaped the early development of the internet. This culture stressed the importance of public disclosure, collective dialogue and intellectual cooperation to further scientific advance. It gave rise to the cooperative development of networking protocols, and their open release – something that had to be defended subsequently.

The US state thus bankrolled the network design and development of the internet. It also assisted indirectly the building of the internet in other ways. The US defence budget funded the first American electronic digital computer in 1946, and subsidised the subsequent technical advance of the US computer industry (Edwards 1996). The American state also supported the American space programme, whose by-product – orbiting satellites – also contributed to the later development of the internet.

In effect, the American state underwrote a major part of the internet's initial research and development costs. This was not something that the private sector was willing to do. Indeed, in 1972 the telecommunication giant AT&T declined the government's offer to take over ARPANET, the forerunner of the modern internet, on the grounds that it was not likely to make a profit. A computer network linked to the defence programme had, in the corporation's view, no commercial future. Yet, after supporting the research and development costs of the internet, and also shouldering the financial burden of building a significant user base, the American state 'shepherded' the internet to market. In 1991, the ban on commercial use of the public internet was lifted; and in 1995 the public internet was privatised.

The internet thus had a curious beginning. It was a *Dr Strangelove* project, whose subtext resembled the subtitle of the satirical 1964 film: 'How I learned to stop worrying and love the Bomb'. It was also the progeny of an activist state, functioning in a classic social-democratic way to promote growth and jobs, in a country whose political culture celebrates small government. And as a consequence of the relative autonomy accorded to scientists by the military, the design of the internet was imbued from the outset with the values of academic science.

Countercultural values

If the military–scientific complex shaped the early internet, its subsequent development was strongly influenced in the 1980s by the American counterculture

(and later by its European counterpart). This counterculture had different strands, although these were often intertwined. A communitarian strand aimed to promote togetherness through the fostering of mutual empathy and understanding. A hippy sub-culture sought individual self-realisation by breaking free from repressive convention, while a radical sub-culture hoped to transform society through the transfer of power to the people. These different currents within the counterculture influenced how the emerging internet was used.

In a strikingly original study, Fred Turner (2006) documents the way in which hip journalists and cultural entrepreneurs acted as mediators, bringing together two divergent groups and sustaining a creative partnership between them. Their brokerage skill lay in flattering the two groups, and awakening hope. They told computer scientists, accustomed to being viewed as nerds, that they were cool messiahs destined to transform the world; and they briefed activists in the counterculture – already in steep decline by the 1980s – that a technology existed that could make their fading dreams come true. Together, computer scientists and activists, they proclaimed, could free the computer from its utilitarian purpose, and make it work for humanity.

A promethean partnership between scientists and activists was forged that played an important role in re-imagining the computer. Thus local area networks in California, usually funded as low-subscription-based services supported by volunteer labour, were created as virtual communes in the 1980s. This was typified by the WELL (Whole Earth 'Lectronic Link), established in the San Francisco area in 1985, originally as a dial-up bulletin board system. It was the brainchild of Stewart Brand, then a radical rock concert impresario, and Larry Brilliant, a left-wing doctor and Third World campaigner. Brilliant enrolled numerous fellow former members of The Farm, a large, self-sufficient agricultural commune in Tennessee. They created an electronic commune that grew into 300 computer-mediated 'conferences' which brought together social and political activists, as well as enthusiasts of all kinds. One of the WELL's largest sub-groups was fans of the radical rock group the Grateful Dead. Deadheads (as they were disrespectfully called) spent hours online discussing the Grateful Dead's enigmatic lyrics and exchanging music recorded at live gigs – something that the rock group supported as part of its public stand *in favour* of the 'pirating' of its music. However, participation in the WELL diminished after a few years. The electronic commune was bought in 1994 by a shoe manufacturer, Bruce Katz. The internecine conflict that followed the takeover led to its steep decline (Rheingold 2000: 331–4).

Similar communal experiments occurred in Europe, typically with the local state acting as a midwife. The best known of these was Amsterdam's Digital City (called DDS in the Netherlands). This began as a pilot project sponsored by the local council in 1994, and was reconstituted in 1995 as a 'virtual city' with a Foundation grant. Different squares in the 'city' were given over to specific topics (such as politics, film and music), and in each of these squares, cybercafés were created as meeting places. The experiment captured the imagination of radical activists, university students, workers in the creative industries and others living

in Amsterdam. At its height, the project involved thousands of people, facilitated popular access to online services and mobilised online voting on a range of issues. However, public involvement fell away in the later 1990s after the initial excitement wore off. The project was then weakened by internal conflicts, and failed to secure long-term funding.

More enduring were experiments that linked geographically dispersed grassroots networks, some influenced by radical American students (Hauben and Hauben 1997). These included Usenet (1979), BITNET (1981), FidoNet (1983) and PeaceNet (1985). Usenet newsgroups, built around the UNIX system, proved to be the most important of these networks. Set up initially to discuss issues to do with UNIX software and troubleshooting, they diversified to cover a wide spectrum of topics from abortion to Islam. Usenet newsgroup sites rose from just three in 1979 to 11,000 by 1988, and over 20,000 by 2000 (Naughton 2000: 181–2). This poor relation started as a dial-up service was subsequently allowed to ride on the ARPA network. It was then carried by the internet.

Meanwhile, the hippy strand of the counterculture helped to turn the computer into a playground. During the early 1990s, a cult was created around text-based adventure games in which participants could take on assumed identities and interact with others, freed from the visual markers of age, gender, ethnicity, class and disability. Celebrants hailed this as a space in which people could explore their real selves, break free from the constraints and prejudices of everyday life, attain greater empathy with others and build a better world based on liberated subjectivities (Turkle 1995). Others saw it as a liberating context in which people could have promiscuous, virtual sex freed from the conventions of the offline world (and sometimes pass themselves off as being younger and more attractive than they were in real life) (Ito 1997).

The counterculture also contributed to the emergence of hip computer capitalism. Thus, Steve Jobs and Steve Wozniak, who launched Apple in 1980, came out of the alternative movement. Jobs had travelled to India in a quest for personal enlightenment, while Wozniak was heavily involved in the radical rock scene. In 1982, Wozniak personally funded the organisation of a rock festival dedicated to the Information Age. At the festival, which attracted more people than Woodstock, there was a giant video screen on which was projected a simple message:

> There is an explosion of information dispersal in the technology and we think this information has to be shared. All great thinkers about democracy said that the key to democracy is access to information. And now we have a chance to get information into people's hands like never before.
>
> (Cited in Flichy 1999: 37)

The counterculture thus reconceived how the computer could be used to advance its vision of the future. Its activists transformed the internet from being the tool of a techno-elite into becoming the creator of virtual communities, a sub-cultural playground and an agency of democracy.

European public service

The third formative influence shaping cyberspace was a European welfarist tradition that had created great public health and broadcasting systems. While the internet was born in the United States, the world wide web was created by Tim Berners-Lee in the publicly funded European Particle Physics Laboratory at CERN.

Tim Berners-Lee was inspired by two key ideas: that of opening up access to a public good (the storehouse of knowledge contained in the world's computer system) and that of bringing people into communion with each other. The son of two mathematicians, Berners-Lee found fulfilment in serving the community. While not automatically anti-market, he resented the exaltation of market values above all else. He is often asked in the United States (though less frequently in Europe), he says, whether he regrets not making money out of the invention of the world wide web. His response is a typical reaction of a public servant:

> What is maddening is the terrible notion [implied in this question] that a person's value depends on how important and financially successful they are, and that this is measured in terms of money. . . Core in my upbringing was a value system that put monetary gain well in its place.
>
> (Berners-Lee 2000: 116)

Berners-Lee's desire not to promote the web through a private company was prompted by his conviction that it would trigger competition and lead to the subdivision of the web into private domains. This would subvert his conception of 'a universal medium for sharing information' and undermine the purpose of his project. He persuaded the management of his publicly funded agency to release the world wide web code in 1993 as a gift to the community. He subsequently became the head of the agency regulating the web (World Wide Web Consortium (W3C)) to 'think about what was best for the world, as opposed to what would be best for one commercial interest' (Berners-Lee 2000: 91).

Thus, the bequest of the web made freely available a vast cornucopia of knowledge and information. It was inspired by the ideal of serving society rather than self.

Commercial honeymoon

However, the 'openness' advocated by technologists took the form of championing scientific access and disclosure rather than opening up the internet to mass consumption. The communards who adapted the internet for new purposes were members of minority sub-cultures who were driven to acquire the necessary expertise. Even the first manifestation of the world wide web, hatched in a scientific laboratory, required significant computer skills to access. The internet still belonged to an exclusive world.

The fourth influence shaping the development of cyberspace was the marketplace. The lifting of the commercial ban on use of the public internet in 1991 had seemingly a wholly benign effect. The arrival of web browsers that displayed

images with texts was, as Berners-Lee (2000: 90) acknowledges, 'a very important step for the Web'. It was followed by commercial search engines that made the web easy to explore. The market, it seemed, was all about popularising the internet, and democratising its use.

In the mid-1990s, all aspects of the internet seemed enormously positive. Even if the internet was a product of a superpower war machine, its military origins had been terminated (in effect, when ARPANET handed over control of the public internet backbone to the National Science Foundation in 1990). A combination of academic, countercultural and public service values had given rise to an internet that was independent, decentralised, diverse and open to innovation. The ways in which the internet could be used had been greatly extended. The growing influence of commerce seemed merely to extend the benefits of this new medium to more people, without detracting from its fundamental nature.

The largely uncritical reception given to the commercialisation of the net during the mid-1990s accorded with the ethos of the time. This was a period of triumphalism when democracy and capitalism had defeated communism, with the collapse of the Soviet Union in December 1991 (Fukuyama 1993). The mood music of that era was accompanied by the lyrics of internet experts. The MIT guru Nicholas Negroponte wrote a celebrated book in 1995, which portrayed the internet as an integral part of a democratising digital revolution. The public, he predicted, will *pull* what it wants from the internet and digital media, rather than accept what is *pushed* at them by media giants. Media consumption, he continued, is becoming 'customised' according to individual taste, and 'the monolithic empires of mass media are dissolving into an army of cottage industries', making obsolete 'industrial-age cross-ownership laws' (Negroponte 1996: 57–8 and 85). Similarly Mark Poster (1995), another revered net expert, concluded that the world was entering the 'second media age', in which monopoly would be replaced by diversity, the distinction between senders and receivers would be dissolved, and the ruled would become rulers. In these, and most other contemporary commentaries, the market was viewed not as a limitation but as an asset.

The coalition that had created the pre-market internet began to fracture during the 1990s. Some academic computer scientists set up internet companies and became millionaires. Others quietly acquiesced to software licensing restrictions, while university administrators looked for ways to make money out of their computer science departments. A new generation of computer industry leaders emerged, whose casual clothes and populism seemed to set them apart from the stuffy corporate culture of their predecessors. Their companies appeared caring and different. Google, for instance, had as its company slogan 'Don't Be Evil', and set up a non-profit, philanthropic wing in 2004. Even the imagery used to describe digital capitalism changed. The early metaphor of the 'information superhighway', with its 1950s association of statist modernism, gave way to the sci-fi electronic sublime of 'cyberspace' (Streeter 2003).

In this environment, digital capitalism seemed cool: the way to make money, express individuality and avoid state control. Indeed, everything to do with the

internet in the 1990s – including its commercialisation – seemed wondrous, transformative and positive.

Commercial transformation

Commercialisation extended the legacy of innovation initiated by public investment. In particular a great university, Stanford, produced skilled, enterprising students who flourished in a dense network of expertise supported by investors. Its adjacent area of Palo Alto and Mountain View, extending to the wider Bay Area tech scene, became an incubator of new enterprises from the launch of Google in 1998 through to the creation of Instagram in 2010.

But commercialisation also changed the character of the internet. The adoption in 1997 of a standard protocol for credit card transactions gave an important boost to online sales. The internet became in part a shopping mall: a place where virtual shops did business, and where products and services were sold. This clearly met a public need. It gave rise to a retail revolution which, so far, has been primarily national rather than international.[3]

Online content (as distinct from offline products and services) proved more difficult to sell. The content that sold best was pornography and games. By 2006, the adult entertainment industry in the US – in which online porn came to play a significant part – made $2.8 billion in 2006 (Edelman 2009). Online gaming proved to be a still greater success, reaping in 2011 an estimated $19 billion in worldwide revenue (with China having the highest proportion of gamers among internet users) (Statistics Portal 2015; cf. DFC Intelligence 2010). Its online triumph enabled the video-gaming industry to overtake the Hollywood movie industry in terms of revenue (Movie Picture Association in America 2013; Newzoo 2013).[4] By contrast, journalism was a much less commercially successful online product.

Commercialisation also led to the growth of online advertising. While some advertising sites like craigslist and Gumtree proved to be immensely popular, online advertising could also be intrusive. The advertising industry introduced first of all the banner advertisement (a horizontal strip, reminiscent of early press display advertisements). This was followed by advertisements of different shapes such as 'button', 'skyscraper' and pop-up 'interstitials' and, later, audio-visual advertisements (more like television commercials).

The growth of advertising was accompanied by the proliferation of spam. The first recorded example of spam occurred in 1978. It proliferated to the point when, according to John Naughton (2012: 82), it accounted for well over half of global e-mail traffic in 2009. The technically proficient were able to filter out this tidal wave of mostly unwanted information.

Advancing market influence also introduced unobtrusive controls. Internet corporations lobbied government for changes in the law that served their interests. In particular, they pressed for the legal protection of intellectual property rights in a way that threatened to undermine the open, collaborative tradition on which the internet had been built (Lessig 1999; Weber 2004). In 1976, the United

States passed a Copyright Act which extended copyright to software. This was buttressed in 1998 by the Digital Millennium Act, which greatly strengthened legal provision against piracy that threatened digital media companies. Its effect, however, was to overprotect intellectual property rights at the expense of legitimate 'fair use' of web content (Lessig 2001) in so restrictive a form that it was difficult to enforce. More recently, some leading internet and telecommunications companies have been pressing for the abandonment of net neutrality – the cornerstone of the open, peer-to-peer design of the internet – to optimise revenue. So far, their lobbying has been unsuccessful.[5]

Commercialisation also established more subtle forms of control based on market power. The beguiling vision of boutiques, cottage industries and sovereign consumers, conjured up by Nicholas Negroponte (1996), proved to be a fantasy. At an international level, a small number of corporations established a leading position in different sectors of the internet. Indeed, four of these had in 2015 a level of capitalisation that made them among the biggest companies in the world: Apple ($700bn), Google ($430bn), Microsoft ($380bn) and Oracle ($175bn). A detailed national market breakdown complicates this picture a little. For example, although Google is the foremost search engine in the world, Baidu dominates in China, as do Yandex in Russia and Yahoo in Japan (Haucap and Heimeshoff 2013: 55, table 2). But in their respective national markets, one search engine dominates. A similar picture applies in relation to news. A small number of large news organisations (overwhelmingly legacy media) dominate online news consumption in their respective countries, with a small elite group of news organisations like the *New York Times* and Globo building an international audience in their respective language markets (Curran et al. 2013).

Some leading internet companies used their market power in ways that were exclusionary. For example, Apple iPhones and iPads do not allow the addition of applications that have not been approved beforehand by Apple. Disobey the Apple Way, and your handheld computer is liable not to work. The fact that smartphones are tethered to controlled mobile networks in contrast to the way that freely programmable computers are connected via landline networks has enabled the imposition of this new layer of control (Naughton 2011; cf. Lametti 2012).

Indeed, a number of internet leaders sailed so close to the wind, or were judged to be so anti-competitive, that they ran into trouble with the authorities. The European Commission recently imposed a fine on Microsoft, and is currently investigating Google and Amazon (EC 2015; EC 2013). Apple is under investigation by the US Federal Trade Commission (Golson 2015), while Facebook faces investigations in five European countries (Schechner 2015).

Digital capitalism turned out to be not very different from other forms of large-scale corporate capitalism. Indeed, the leading digital corporations could be a good deal more ruthless while seeming to be more caring and informal. Their sharp edge was epitomised by Steve Jobs, the driving force behind Apple. He undertook a product test on his pregnant, long-term girlfriend, asking in a survey of almost 100 friends whether he should opt for her or another woman he

fancied. Which, he asked, was the prettier? Who did they like better? Who should he marry? (Isaacson 2011: 272). Although capable of inspiring intense loyalty, Jobs was also insensitive. When one candidate droned on in a job interview, Jobs broke in saying: 'Gobble, gobble, gobble, gobble'. The interview panel cracked up with laughter, prompting the poor man to get up and leave, saying: 'I guess I'm not the right guy' (Isaacson 2011: 142).

Jobs studied under a Zen Master but this did not prevent his company from being exploitative. Apple's elegant products were manufactured partly through Foxconn, a company whose factories in China are notorious for their long hours, low wages and soulless, crowded dormitories. When a number of Foxconn workers committed suicide in 2010, the company response was not to improve working conditions but to build a safety net around its facilities (Mosco 2014: 161). While this put Apple in an unwelcome spotlight, Amazon, Google, Microsoft, Cisco and HP also outsourced work to low-wage contractors with poor records. Likewise, an undercover investigation into Amazon UK found that workers walk miles every day to fulfil exacting packaging and shipping targets for just above the minimum wage. The company relies heavily on agency and seasonal staff, without the security and higher pay of permanent employees (Cadwalladr 2013).

Apple, Facebook, Amazon, Microsoft and Google all made strenuous efforts to dodge taxes (Sikka 2015). Thus, Amazon channelled 15 billion euros to a subsidiary in Luxembourg in 2013 to evade taxes in countries where it made large amounts of money (Bergin 2014). Similarly, Google has taken advantage of tax treaties 'to channel more than $8 billion in untaxed profits out of Europe and Asia each year' into a Bermuda tax haven (Bergin 2014).

More recently, internet companies have come under attack from environmentalists. Their profligate use of energy in industrial-scale server warehouses is giving rise, it is argued, to needlessly large carbon emissions (Glanz 2012). There has also been an explosive growth of non-recyclable e-waste caused by dumped computers, monitors, mobile phones, DVD players, iPods, iPads and microchips, positively encouraged by the way new products are deliberately launched with a short life span (Gabrys 2013). The 'immaterial', it turns out, has a large environmental footprint.

Commercialisation of the internet also gave rise to the development of a new regime of commercial surveillance from the 1990s onwards (Schiller 2007; Deibert et al. 2008; Zittrain 2008). One method entailed monitoring data and traffic over a network (for example, Google searches) in a form that tracks users, gathers information about which websites are visited and what users do on these sites. Another method was to install software that monitored the activities of a specific computer and its user. This software had the potential to enter the 'backdoor' of other computers, enabling the monitoring of their activity. The third approach was to collate data from different sources to compile a social network analysis about the personal interests, friendships, affiliations and consumption habits of users.

Surveillance technology came to be deployed very extensively. In the United States, an estimated 92% of commercial websites aggregated, sorted and used for

economic purposes data about people's use of the net (Lessig 1999: 153). Most people made themselves vulnerable to this monitoring by waiving their rights of privacy to gain free access. 'Human rights' protection of privacy was relatively weak in the United States, although stronger in Europe.

This technology came to be used in ways that had not been intended. According to a study released in 2000, 73% of US firms routinely checked on their workforce's use of the net (Castells 2001: 74). More importantly, autocratic governments adopted – as we shall see – commercial surveillance software to monitor and censor the internet. Methods developed to assist marketers and advertisers were deployed to support autocracy.

It used to be widely thought that this was a problem confined to authoritarian states. Monitoring communications in the West was directed, it was assumed, at specific people and undertaken solely for legitimate purposes such as preventing serious crime and terrorism. It is now becoming clear that national security agencies are seeking to collect big data streams, and then process them afterwards (Andrejevic and Gates 2014). There are various ways of collecting this information. The Snowden leaks reveal that the NSA can compel private companies like Google, Microsoft, Facebook and Skype to hand over consumer data without users themselves knowing (Bauman et al. 2014; Greenwald 2014; Lyon 2014). Another way of collecting information entails placing data interceptors on the global submarine cables that are the primary arteries of the internet (Brown 2014). This is something that the UK's Government Communications Headquarters is seemingly doing: other national security agencies in Europe are also routinely tapping internet cables (Bauman et al. 2014). There is now a growing demand for the public to be told more clearly how extensive is this shift towards mass monitoring of communications; what safeguards are in place to prevent abuse; and what protection is available for public interest whistle-blowers.

In short, the commercialisation of the internet played an important part in popularising the internet, and making it accessible to a wider public. It also extended investment and innovation, after an initial public outlay. But commercialisation also had strongly negative features. It gave rise to economic concentration and the abuse of market dominance. It led to the creation of global digital giants, some of which dodged tax, exploited workers and lobbied for changes in the law that served their interests rather than the public interest.[6] And it led to a system of commercial surveillance that was adapted by dictatorships to repress dissent, and is now being used in liberal democracies in ways that potentially threaten civil liberties.

Revolt of the nerds

However, the steady advance of commercialism was resisted. The first people to take a stand were computer scientists who opposed the imposition of 'proprietary software' by large corporations.

The nerds' revolt began in 1984, when Richard Stallman, a radical programmer at MIT, set up the Free Software Foundation. He had been outraged when a

colleague had refused to pass on a printer code on the grounds that it was now restricted by licence. This seemed to Stallman an enforced form of private selfishness that violated the norm of cooperation on which his professional life had been based. His outrage turned to anger when AT&T announced its intention to license the widely used and previously unrestricted UNIX operating system. In his view, this amounted to the corporate capture, with the full authority of the law, of a program that had been produced communally.

Richard Stallman, a bearded figure with the appearance of an Apostle, gave up his secure job and set about almost single-handedly building a free alternative to the UNIX operating system. It was called GNU (standing for 'GNU is Not UNIX'). Between 1984 and 1988, Stallman designed an editor and compiler, which were hailed as masterpieces of skill and ingenuity. Then, Stallman's hands sustained repetitive strain injury, and he slowed down. The GNU project was still some way from completion. A then unknown Finnish student, Linus Torvalds, who had heard Stallman give a charismatic talk in Helsinki, filled the breach. With the help of his friends, Torvalds developed the missing kernel of the GNU system in 1990. The computer community collectively improved the resulting GNU/Linux operating system, making it one of the most reliable in the world. Such was its sustained success that IBM decided in 1998 to hitch its wagon to the protest movement. It officially backed the Linux system, agreeing to invest money in its further development without seeking to exercise any form of proprietary control.

IBM also embraced, on the same terms, the Apache server. This derived from a program released freely by a publicly funded agency, the National Center for Supercomputing Applications (NCSA) at the University of Illinois. Initially full of bugs, it was transformed by the hacker community through cumulative improvements ('patches') and renamed Apache. It became a widely used free server – its success again accounting for its open-source adoption by IBM.

This was followed by the launch of the freely available client software Mozilla Firefox, in 2003–4. By 2011, it had become the second most widely used web browser in the world, having grown against the odds at the expense of Microsoft's Internet Explorer. One of Mozilla Firefox's attractions was that it provided a way of blocking online advertising.

What partly underpinned the effectiveness of this concerted protest was that it enlisted the protection of the state (something that radical libertarians tend to ignore). The Free Software Foundation set up by Stallman released its projects under a General Public Licence (GPL). This contained a 'copyleft' clause (the wordplay is typical computer nerd humour) requiring any subsequent improvement in free software to be made available to the community, under the GPL. Contract and copyright law was thus deployed to prevent companies from modifying free software and then claiming the resulting version as their property. It was also used to ensure that future refinements in free software were 'gifted' back to the community.

The successful open-source (OS) movement kept alive the tradition of the open disclosure of information. It perpetuated the cooperative norms of the scientific community in which people make improvements, or develop new applications

(like the world wide web), on the basis of open access to information and then return the favour by making the basis of their discoveries freely available. It also kept faith with the values of academic science, with its belief in cooperation, freedom and open debate in pursuit of scientific advance. The result was the creation of a practical alternative to proprietary software.

The OS movement drew upon highly trained computer scientists at universities, research laboratories and in the computer industry, as well as skilled hackers. OS activists tended to have a shared belief that the power of the computer should be harnessed for the public good, and were inclined to view any form of authority with suspicion. While their motives were altruistic, they also gained satisfaction from the thrill of creativity and recognition from their peers (Levy 1994). The OS community was also guided by standards, rules, decision-making procedures and sanctioning mechanisms. It was partly this that made it so effective (Weber 2004).

User-generated content

The OS campaign was linked to the drive to participate in the creation of online content. The OS champion, Richard Stallman, had been one of the people who had argued in the 1990s that there should be a web-based online encyclopaedia which would be generated and revised collectively in much the way that OS code is produced. This dream was fulfilled when Jimmy Wales and Larry Sanger launched Wikipedia in 2001.

It became one of the largest collaborative ventures in the world. By 2015, Wikipedia was the seventh most popular website globally (Alexa 2015a). It had almost 35 million articles in 288 languages, attracted nearly 500 million unique visitors every month, and had reached 18 billion page views by 2014 (Wikipedia 2015). It has established itself as an invaluable (though not always reliable) source of information on a wide spectrum of topics. This achievement was underpinned by the self-correcting mechanism of collective revision, a team of some 70,000 active editors (in 2015), a shared norm of adhering to factual accuracy, unobtrusive safeguards, editorial transparency and an academic tail of footnotes and hypertextual links (Dariusz 2014; Zittrain 2008).

The rise of Wikipedia was followed by the even more spectacular take-off of Facebook. It was set up by Harvard students in 2004, prospered as a young elite social networking site, and then grew exponentially when it became open to all in 2006. It enables users to publish in effect to their friends, while excluding unwanted attention. In 2015, Facebook was the second most popular website in the world (Alexa 2015b), with 1.4 billion monthly active users. Half its users in 2011 logged in once a day (Naughton 2012: 97) – an indication of its importance in people's lives.

Facebook's flotation was accompanied by the launch of numerous other successful social networking sites (SNS), such as LinkedIn (2003), Flickr (2004), Twitter (2007), Gays.com (2008), Jiepang (2010) and Instagram (2010). Most of these had different functions (Flickr, for example, enables the sharing of

photographs and videos), reached different communities or communicated in different languages (Chinese in the case of Jiepang). In normal circumstances, they were primarily social sites, as their name suggests.

Most of these sites were commercial in origin, and were increasingly controlled by major digital groups. But they were free at the point of use, and were sustained by the collective talents, interests and resources of the community they served. For example, YouTube, the video-hosting website (acquired by Google in 2006), offers a space in which users can circulate what they enjoy, and also distribute content they have created, edited or manipulated, often using software tools made available free from OS programmes. The success of this and other similar websites, and the mushrooming of SNS in general, marks the renewal of the do-it-yourself, communal tradition initiated by experiments like the WELL and Amsterdam's Digital City.

The radical strand of the early internet also found expression in the founding of WikiLeaks in 2006. A small, non-profit organisation, it receives, processes and makes publicly available information supplied by whistle-blowers and others. It caused a sensation in 2010 when it released footage of an American helicopter gunning down Iraqi civilians and two journalists in Baghdad in 2007, with the chilling combatant comment 'Light 'em all up. Come on, fire!'. This was followed by the mass leaking of US diplomatic cables, which, among other things, provided a revealing insight into America's informal empire. WikiLeaks overcame the potential problem of being overlooked in the web's vast emporium by forming strategic alliances with leading media organisations. In effect, WikiLeaks sought to turn the tables: governments rather than users were to be scrutinised through data stored on computers.

But the impact of the diplomatic cable leaks was weakened by the way in which numerous media in the UK, the US and elsewhere failed to follow up allegations raised by the leaks, downplayed their novelty, questioned the legitimacy of the leaks on security grounds and subsequently focused on accusations levelled against Julian Assange, and the retribution levied on the whistle-blower, Chelsea Manning, who was sentenced to 35 years' imprisonment (Schlosberg 2013; Benkler 2011). This showed that traditional media gatekeepers, and their close allies, were still able to see off a networked Fourth Estate, at least on this occasion.

Recalcitrant users

The nerd revolt and the revival of communally generated content were effective partly because they were backed up by recalcitrant users. The pre-market internet had accustomed people to expect web content and software to be free. For this reason, it proved difficult to re-educate them into becoming paying consumers.

This is illustrated by early attempts to monetise the web. In 1993, the publicly funded agency NCSA (National Center for Supercomputing Applications) released its pioneer browser, Mosaic, on the net for free. Within six months, a million or more copies were downloaded. Members of the Mosaic team then set

up a private company and offered an improved, commercial version, Netscape, on a three-month, free-trial basis. However, demands for payment, after the free trial, were widely ignored. Netscape's management then had to decide whether to insist on payment or change tack. It opted to make its service free because it feared – probably rightly – that continued attempts to charge would cause people to migrate to a free alternative. Netscape turned instead to advertising and consultancy as its main source of revenue (Berners-Lee 2000: 107–8).

Initially, there was considerable hostility to the idea of net advertising. Indeed, two thirds of Americans said they did not want any online advertising in a 1995 survey (cited by McChesney 1999: 132). In the previous year, the US law firm Canter and Siegel had been punished for overstepping the mark. It had posted an advertisement for its immigration law advice service to thousands of newsgroups, only to be inundated the next day with so many abusive replies ('flames') that its internet service provider repeatedly crashed (Goggin 2000). Over time, resistance to advertising was successfully overcome, especially after software became available for filtering out e-mailed spam.

Attempts to persuade consumers to pay for online content met with less success. Companies that charged website fees in the 1990s tended to fail (Schiller 2000; Sparks 2000). The music industry, after a long and disastrous delay, found a compromise solution to the online pirating of music: in effect, it opted for charging very much less for online tracks. A growing number of newspaper publishers attempted in 2010–12 to charge for content that they had previously made freely available. Sometimes they attempted to smooth the transition by offering a limited number of articles free. The audit results are now coming through, and suggest that the experiment has been a failure (save in the case of specialised financial journalism). Thus, an extensive cross-national study found that newspaper paywalls were softening (with more content being offered free), while user charges were declining, and now accounted for only about 10% of newspaper audience revenue (Myllylahti 2014). Likewise, another major comparative study concluded that the income gained from paywalls was limited, and growth in paywall and apps revenue typically stalled once 'the supply of loyal users ran out' (Newman and Levy 2014: 12).

A tacit détente has been reached. Consumers seem willing to waive their rights to privacy, and put up with a limited quota of advertising, while continuing to resist paying for online content. Meanwhile a growing number of people have imposed their own imprint by generating, sharing and commenting on online content.

The rapid diffusion of smartphones in the 2010s deepened people's involvement with the internet. In the US, 64% of adults had smartphones in 2014 (Pew 2014), similar to the 61% of adults who had smartphones in the UK (Ofcom 2014a). Smartphones are becoming Americans' ever-present companion: 65% of US smartphone users check their phones within 15 minutes of waking up and within 15 minutes of going to bed (Twohig 2015). In the case of the UK, the diffusion of smartphones and tablets appears to have extended people's love affair with the media. Ofcom reports that the average adult in the UK now spends more time using media and communications than sleeping (2014b). These two countries are

part of a wider trend towards mass adoption of new mobile technology. In 2014 there were estimated to be 2.6 billion smartphones in use, with an especially high distribution in the West (GSMA 2015).

Looking back

The history of the Western internet is thus a chronicle of contradiction. In its predominantly pre-market phase, the internet was powerfully influenced by the values of academic science, American counterculture and European public service. Originating as a research tool linked to a military project, the internet acquired multiple new functions – as the creator of virtual communities, a playground for role-playing and as a platform for interactive political debate. The crowning culmination of this first phase was the gift of the web to the world, creating a storehouse of information freely available to all.

However, this early formation was overlaid by a new commercial regime. A determined attempt was made to charge for software that had previously been free. Major media organisations established well-resourced websites. Search engines, seeking to harvest advertising, signposted visitors to popular destinations. The growth of online entertainment tended to side-line political discourse. New commercial surveillance technology was developed to monitor user behaviour, accompanied by legislation strengthening intellectual property rights. Dominant internet corporations became established, sought to limit competition and belied their 'Don't be evil' image by exploiting outsourced workers and evading taxes in countries where they made large profits.

Yet the old order refused to surrender without a fight. Dissenting computer workers collectively developed and made available OS software. Users, conditioned by the norms of the early internet, often refused to pay for online content and shifted to sites that were free. The spirit that had re-imagined the computer and discovered new uses for it in the 1980s was powerfully renewed in the 21st century. It led to the creation of the user-generated Wikipedia, SNS and the whistle-blower website WikiLeaks.

If the main progressive effort in the West was to combat market censorship and control of the web, and is only now becoming concerned about the excesses of national security surveillance of the internet, its counterpart in the East had a different emphasis. Its efforts were overwhelmingly directed towards opposing and thwarting state censorship. It is to this that we now turn, in a necessarily preliminary attempt to widen the scope of internet history.

March to democracy

It was widely predicted in the 1990s that the global diffusion of the internet would assist the march to democracy. The keyboard, we were told, would prove mightier than the bullet: dictatorships would fall like dominoes because the internet would inspire a clamour for freedom.[7]

This view is refuted by a comparative analysis of internet diffusion rates and measurements of democratic change in 72 countries between 1994 and 2003 (Groshek 2010). It found that 'Internet diffusion was not a specific causal mechanism of national democratic growth' (Groshek 2010: 142). Even in three instances (Croatia, Indonesia and Mexico) where the internet appears to have had a significant democratising influence, the processes of causation were complex. The internet should be seen as a 'coincidental developmental condition', an aspect of larger social and political change that contributed to a nation's democratic development (Groshek 2010: 159).

One reason why the 'internet as the grave-digger of dictatorship' thesis proved to be overstated was that it failed to appreciate that democracy is only one source of governmental legitimacy. Economic success (Singapore), fear of a strong neighbour (pre-1996 Taiwan), nationalism (China), ethnic affiliation (Malaysia), God's will (Iran) and identification with national liberation (Zimbabwe) are just some of the alternative sources of legitimation sustaining resilient authoritarian regimes. In addition to brute force, authoritarian governments have also deployed non-coercive strategies for sustaining their rule, such as co-opting powerful interests, developing clientelist systems of patronage that reward their supporters and adopting a policy of divide and rule (Gandhi and Przeworski 2007; Magaloni 2008). Above all, authoritarian governments can often count on pragmatic acceptance based on the absence of a realistic alternative, the personal struggle to make ends meet or get on and the narcotic of an entertainment-centred popular culture.

The second thing that the 'technology of freedom' thesis got wrong was that it mistakenly assumed that the internet was uncontrollable. It was widely argued in the 1990s that because the internet is a decentralised system in which information is transmitted via independent, variable pathways through dispersed computer power, it could not be controlled by location-bound government. Dissident communications, we were told, could be produced outside the jurisdictional control of national government and downloaded in the privacy of people's homes. Freedom would take wing because it could no longer be suppressed in the internet era.

This failed to take account of the multiple methods developed by authoritarian regimes around the world to censor the internet, and intimidate critics. Authoritarian governments can inculcate a general climate of fear by killing, torturing or imprisoning dissidents. They can require all domestic websites and internet service providers to be licensed, and withdraw these licences if they breach restrictive laws. Authoritarian regimes can outsource censorship by requiring all internet service providers to filter out access to any website on an official blacklist, irrespective of where in the world it originates from. They can monitor the internet behaviour of potential dissidents through surveillance software by, for example, planting a malignant link to a critical petition. They can deploy automated software to identify 'harmful' internet communications, such as critical, anonymous posts, and promptly have them wiped. They can unleash programming to defeat evasion, including the identification of proxy sites, and disable critical sites through DDOS (Distributed-Denial-of-Service) attacks. The ultimate

weapon is to pull the plug – closing down internet communication in a region (China), suspending the texting of messages for a period (Cambodia) or stopping mobile phone coverage in a city (Iran) (Morozov 2011; cf. Deibert et al. 2008; Freedom House 2009; OpenNet Initiative 2015). But internet censorship has always been a work in progress in which fresh measures have been taken to respond to new developments. Thus, to take an example almost at random, the Saudi Arabian government introduced new restrictions on user-generated content, including on Facebook, in 2013 (Noman 2013).

Governments have also sought to make the internet a propaganda tool – what Morozov (2011: 113) calls 'spinternet' – not merely through the creation of official websites but also through more indirect methods. For example, the Chinese government has long seeded support groups to proselytise online, while in Russia the principal internet entrepreneur, Konstantin, is a close government ally. In Iran, the arrest of dissidents facilitated – through gaining access to their e-mail and mobile phone contacts – the rapid round-up of oppositional networks in 2009–10. New technology proved, in this case, to be a more efficient method of identifying and apprehending enemies of the state than the old-fashioned Soviet methods of bugging and trailing suspects.

The extent to which the internet was controlled in practice by authoritarian governments varied greatly. This depended partly on their capacity, and partly also on their wider policy objectives. Some authoritarian regimes, like those in Iran, China and Uzbekistan, became undisputed leaders in censoring the internet; others, like those in Ethiopia and Yemen, were ineffectual because they were dysfunctional as governments; while others still, like the authorities in Malaysia and Morocco, chose to adopt relatively liberal internet regimes to advance economic modernisation (OpenNet Initiative 2011, 2015).

How much control was exercised also depended on the wider context. Some authoritarian governments could rely on poverty as the ultimate censor (as in Myanmar). Other regimes, such as that in Singapore, controlled the internet as a consequence of the hegemonic support that they enjoyed.[8] By contrast, large-scale alienation (as in Iran) could produce activists adept at evading censorship.

In brief, those who predicted that the rise of the internet would lead to the fall of authoritarian regimes were confounded by the way most of these regimes survived in the internet era. Many authoritarian governments across the world had greater resources at their disposal, and were better able to censor the internet, than was appreciated in the cyber-utopian moment of the mid-1990s.

But there is a recent exception where, it is claimed, new communications technology inspired people to rise up against dictators. This claim has been repeated so often that it warrants closer scrutiny.

Arab uprisings

On 18 December 2010, mass street protests took place in Tunisia. They were followed by tumultuous demonstrations, rallies and occupations that caused

President Ben Ali to flee the country on 14 January 2010. The contagion of discontent spread to Egypt, where popular protests forced, on 11 February, the resignation of President Hosni Mubarak after almost 30 years of rule. During January and February, popular protests occurred across much of the region. Some of these were placated by promises of liberalising reform, as in Jordan and Morocco. But there were sustained protests in six 'insurgent' countries: Bahrain, Yemen, Libya and Syria, in addition to Tunisia and Egypt.

Since protests happened over so short a period, and were supported by digital technology, some have called them the 'Twitter' or 'Facebook' revolutions (e.g. Taylor 2011). Social media, it is claimed, enabled flash demonstrations to take place, and encouraged protests to spread across national frontiers. What made this situation unprecedented, it is argued, is that people could communicate with each other on a mass scale and gain strength from each other in ways that could not be controlled by the authorities. Typically, this analysis foregrounds the drama of the uprisings and the enabling role of communications technology, while paying limited attention to the past or to the wider political and social context (e.g. El-Naway 2011; Mullany 2011).

A closer examination suggests that these first drafts of history are seriously flawed. The Middle East and North Africa (MENA) region was not especially primed by new information communication technology to erupt. An analysis of 52 million Twitter users found that only 0.027% identified their locations as Egypt, Yemen and Tunisia (Evans 2011). The Facebook penetration rate in the region's trouble spots was not high: a mere 1% in Syria and 5% in Libya, though it was 17% in Tunisia (Dubai School of Government (DSG) 2011: 5, figure 6). In 2010, less than a quarter of the population in Egypt and Syria were internet users, a proportion that fell to 6% in Libya (DSG 2011: 10, figure 12). This was much lower than in many other authoritarian nations in Asia (Internet World Stats 2011a). This suggests that it was not information communications technology (ICT) that made the MENA region especially combustible.

Indeed, out of the six 'insurgent' countries, Bahrain alone featured in the top five rankings of MENA countries for Facebook user penetration or for internet use in 2010 (DSG 2011: 5, figure 6; and 12, figure 15). In other words, what the great bulk of insurgent countries had in common was that they were *not* part of the ICT vanguard in the Arab region. So, to take a specific example, 24% of Egyptians were internet users, compared with 41% of Moroccans, 44% of Saudi Arabians and 69% of those living in the UAE in 2010 (Internet World Stats 2011b). Yet these latter countries with higher internet penetration rates did not turn on their dictators. This suggests that there were underlying causes – rather than the mere presence of the internet and social media – that were mainly responsible for the Arab uprisings.

This is corroborated by the history of insurgent countries. The Arab uprisings were the culmination of dissent fermented over decades (Wright 2008; Hamzawy 2009; Alexander 2010; Joshi 2011; Ottaway and Hamzawy 2011; Dawisha 2013, among others). In Syria, the 2011 uprising had been preceded by the 1982 rebellion, which had been put down with enormous brutality. Yemen had a civil war

in 1994, and was approaching the condition of a failed state by the time of the 2011 uprising. Bahrain, Egypt, Libya and Tunisia had recurrent protests in the 1980s, 1990s and 2000s. Bahrain had become a beleaguered police state after its parliament had been suspended in 1975. In Egypt, the Kefaya Movement had united disparate anti-government groups in 2004–5. In the first three months of 2008 alone, there had been some 600 protests in the country. A powder keg was waiting to blow.

Underlying this incendiary situation was a mixture of factors – some that were common to all insurgent Arab countries, and others that were country specific. One common factor was growing opposition to regimes that were viewed as corrupt and repressive. Resentment was particularly strong in those countries, like Tunisia and Libya, where it was felt that the benefits of economic development were funnelled towards those closest to the regime (Durac and Cavatorta 2009).

Another factor common to most of the affected countries was high youth unemployment, compounded by rising expectations. Countries across the region expanded their higher education and post-15 education rates (Cassidy 2011; Barro and Lee 2010). But the more highly educated young found that the labour market did not offer the opportunities they had been educated for. The anger and disappointment this generated was a key driving force of the political turmoil that shook the Arab world (Campante and Chor 2011), in much the way that it had been a destabilising element in the former British Empire.

The highly educated, urban young were also especially influenced by Western liberal ideas and values, stressing the importance of freedom and democracy. This increased their antagonism towards the authoritarian governments that had 'failed' them. There was also a feminist, anti-patriarchal undercurrent in some of the protests, most notably in Egypt.

In addition, there were very specific economic causes. There was high, general unemployment and underemployment in all the affected countries. In some states, neoliberal policies had led to the loss of public subsidies and jobs. In general, rising food prices added to discontent. Economic factors were especially important in generating opposition in Tunisia, where resistance began in the poorer areas, and in Egypt, where trade unions played a significant role.

Intra-elite tensions, tribal conflicts and religious enmities were also important contributory factors in the uprisings. Thus, there was strong Shia opposition to the Sunni ruling minority in Bahrain; fundamentalist Islamist opposition to the government in Yemen; and Muslim opposition to the 'secular' regimes in Syria, Egypt and Tunisia. Tribal rivalry was an especially important factor in Libya and Yemen where the government was closely associated with regionally based tribal groupings. There were tensions within the hierarchy of power in a number of countries, not least in Egypt where there was growing antagonism between the military and the Gamal Mubarak faction of the government.

In brief, there was a common thread of active opposition to the regimes in all the insurgent countries, which extended back over decades. This dissent had deep-seated political, economic, cultural and religious causes. This was the principal

reason why the six insurgent countries erupted in 2010–11. The radicalisation of their digital media was the expression of this discontent rather than its cause.

The authorities in these insurgent countries attempted to control the media. In Tunisia, the two main TV channels initially played down both the unrest and civilian casualties, and then attempted to demonise the protesters as thugs and outlaws (Miladi 2011). The Tunisian government also jammed critical content on Facebook and blogs, and stepped up 'phishing' for personal information to disable dissident networks. In Egypt, the authorities attempted to pull the plug after mass demonstrations on 25 January 2011 by blocking Twitter, Facebook and mobile phone messages in quick succession, before shutting down the entire internet on 27 January. Similarly, a complete blackout of the internet was ordered in Libya. But in all three countries the authorities moved too late, and the clampdown was not fully effective. Indeed, the Egyptian government lifted its internet blackout partly because it was ineffectual.

The ability of a small number of techie dissidents to outwit the authorities, with external support, was strategically important. Activists reached phone numbers abroad that automatically forwarded messages to foreign computer networks that sent these back to the country through a variety of means (Castells 2015). Arab activists from across the regions exchanged codes and software that allowed dissidents to access the internet, despite government blockades (Harb 2011). Google stepped in, supplying new software in 2011 that enabled protesters to 'tweet' over the phone (Oreskovic 2011). Arab activists across the region also acted, over a long period, as informal publicists, translating content and relaying visual footage – functioning, in the words of the Tunisian blogger Sami bin Gharbia, as 'the echo chamber of the struggle on the street' (cited in Ghannam 2011). This echo chamber was further amplified by Twitter sympathisers in the West.

Mobile phones, personal computers and social media all played a part in fanning the embers of dissent, supported by the more traditional methods of leafleting and gatherings in mosques. Facebook posts and blogs explained the reasons for protests; Twitter, e-mails and SNS coordinated demonstrations and occupations; mobile phones recorded police and military brutality; and the satellite TV channel, Al Jazeera, based in Qatar, used citizen video recordings to report what was happening across the region. This alternative media power not only facilitated the organisation of opposition but also encouraged protesters to persist in the face of brutal repression.

In short, the uprisings had deep underlying causes and were prefigured by protests over many years, largely ignored in the West. But the emergence of new media – in particular the mobile phone, internet and pan-Arab satellite TV – contributed to the build-up of dissent, facilitated the actual organisation of protests and disseminated news of the protests across the region and to the wider world. If the rise of digital communications technology did not cause the uprisings, it strengthened them.

But it did not strengthen them enough. Two of the insurgent countries had authoritarian upgrades. The Bahrain regime brought in Saudi Arabian troops to

put down protests in 2011. In Egypt, a military coup led by General al-Sisi in 2013 led to the jailing of the first democratically elected President in some 50 years – Mohammed Morsi – who was subsequently sentenced to death. This was accompanied by the killing of dissidents and draconian censorship of the media.

Three insurgent countries were militarised, and plunged into civil wars exacerbated by foreign power interventions (Hinnebusch 2015; Stacher 2015). At the time of writing, Libya is run by rival militia, and has two governments. The authoritarian government in Syria has lost control of substantial tracts of territory now occupied by rival oppositions, who are also fighting each other. Yemen has in effect divided into two countries in a civil war that is not yet resolved. Only Tunisia has made a transition to a peaceful and sustained democracy. Thus, in five out of six countries, the gun proved mightier than the microchip.

In hindsight, the Arab Spring was the subject of enormous simplification, even by some leading experts. For example, Jeffrey Alexander, Co-Director of the Centre of Cultural Sociology at Yale University, wrote an instant book about the 2011 Egyptian Revolution in which he claimed it was a triumph of liberal values, digital media and the power of international civil society (Alexander 2011). The Egyptian military stayed neutral, in his account, for two reasons: the cultural power of liberal ideas, enacted in a 'performative revolution' by the Egyptian people, and the power of Western public opinion that led the American government to exert a restraining influence on the Egyptian military leadership. The only trouble with this analysis is that the military did not stay neutral but overthrew Egypt's short-lived democracy, and the American government accepted the new dictatorship for geopolitical reasons and gave generous military aid to it. This underlines the limits of cultural power and of the digital media that allegedly sustain it.

Advance of women

If one momentous historical change has been the faltering march to democracy, another has been the advance of women. Sharp inequalities persist between men and women in terms of income, life chances and public influence, but they have lessened over time – albeit in an uneven way – across the world (Hufton 1995; Rowbotham 1997; Kent 1999; Sakr 2004, among others). Underpinning this historic shift has been the rise of service industries, increasing female participation in the paid workforce, the decline of social ascription, improved education, better contraception, the emergence of feminism and the erosion of gender theories legitimating inequality.

One way the development of the internet connected to this historic trend was to provide a tool for the *organised* women's movement. In Islamic countries, the rise of leading Muslim reformers at the end of the nineteenth century encouraged the spread of more liberated perspectives (Hadj-Moussa 2009). By the 1980s, the women's movement had become a political force in the MENA region. Feminists generated intense controversy by talking about taboo subjects such as domestic violence, sexual harassment, female genital mutilation and rape (Skalli 2006),

and gained a growing influence, especially among young women from elite or educated backgrounds. But this was in a region where internet use among women was especially limited (Wheeler 2004: 139, table 9.1). It was also a context where female literacy was sometimes low.

Despite these obstacles, important gains were made. Thus, in Morocco, a new generation of women's organisations emerged in the 1980s that operated outside formal political circles. By the early 2000s they had incorporated the internet as part of their campaigning activity, helped by the fact that Morocco had a higher internet penetration rate than its neighbours. The main target of the women's movement was the Moudawana, the family code governing marriage, divorce and child custody, which had previously provided women with few rights. In 2003 campaigners secured reform of the Moroccan family code in a way that raised the minimum age of marriage from 15 to 18, removing the need for women to have a guardian's approval before marriage and giving women the right to divorce their husbands (Tavaana 2011).

This and other successes arose from a concerted campaign conducted through the full spectrum of the media across the region. This produced a sustained backlash that led to the murder of the female Kuwaiti editor Hedaya Al-Saleem by a policeman (subsequently convicted) and the killing of female journalists in Algeria (Skalli 2006: 41). This persecution encouraged a growing sense of cohesion among campaigners, extending across frontiers and supported by frequent online communication between Arab-speaking members of the women's movement.

However, the strongest outpost of the women's movement in MENA was the Persian-speaking theocracy of Iran. Between 1978 and 2005, the number of women's rights NGOs increased from 13 to 430. The growth of the women's movement found expression online partly because women accounted in 2003 for 49% of internet users in Iran, a much higher proportion than in most of the region. The issues discussed on Iran's most popular feminist blogs included divorce, stoning, banning female participation in sporting events and discriminatory laws in general (Shirazi 2011). These were supplemented by other progressive blogs that engaged with personal politics, such as that written by the popular blogger Lady Sun (Sreberny and Khiabany 2010).

This portrayal of the net as an arm of the organised women's movement in the Middle East needs to be qualified in two ways. First, much web content was conditioned by patriarchal values, and was hostile to women's liberation. Second, probably only a small minority of women read online content originating directly from the women's movement. Feminist blogs and publications do not feature, for example, in Wheeler's (2007) small-scale study of young female Egyptian internet users in 2004. Her subjects, who often spent hours each week in internet cafés, emerge as quite instrumental – for example, getting information for essays or seeking to improve their English to get a better job. It was primarily through their online interactions with other women – rather than through any link to an organised movement – that they derived support for negotiating the constraints of their socially conservative environment.

Online campaigning championed women's rights elsewhere in the world. Thus, the #BringBackOurGirls hashtag agitation publicised Boko Haram's abduction of school girls in Chibok, Nigeria in 2014. It is reported to have reached over a million tweets, and helped to transform a story that initially received limited national and international media coverage into a global cause célèbre (Tomchak 2014). Similarly, the #DelhiGangRape hashtag campaign drew attention to the 2012 gang rape of a young woman in Delhi. She was travelling on a bus and was raped by six men including the bus driver, and subsequently died from her injuries. The campaign mobilised street demonstrations, gained international media publicity and contributed to the government's decision to incorporate specific anti-rape provisions in the criminal code (Sharma 2014).

These campaigns against violence directed towards women had international traction because they affronted global social norms. But progress on other women's issues often proved more difficult. Many women had limited access to new communications technologies. In some countries, online female activists were subject to government censorship, exposed to online abuse, and, in a general way, experienced negative media stereotyping. Their access to power and decision making could also be limited. Gender imbalance at the top was reflected in the fact that women in parliaments, around the world, accounted for a mere 11% in 1995 and only 22% in 2014 (Loiseau and Nowacka 2015).

If one response to gender inequality was to try to change it through organised political action, another was to seek to advance in the world as a purposive individual and triumph against the odds. Youna Kim (2010) presents a vivid portrait of young Asian women with high expectations, encouraged by educational success and sometimes privileged backgrounds, encountering – or facing the prospect of entering – the male-dominated world of work in Korea, Japan or China. In this case study, their 'rebellion' took the form of flight to the West, postgraduate education and the search for new opportunities to realise their talents and ambitions. One inspiration for their flight was Hollywood images of independent women who took control of their lives. While respondents recognised that these were fictional idealisations, they also hoped that they were in part true. These dramas contributed to a utopian self-imagining in which respondents aspired to remake themselves, in a Western context, as autonomous women who placed themselves at 'the centre of [their] biography' (Kim 2010: 40).

An unrelated study provides a glimpse into how the internet features in this cultural dynamic. Yachien Huang (2008) found that university-educated women in Taiwan tended to watch the American TV series *Sex and the City* on their computer screens instead of on family television sets, which were often dominated by male surveillance and choice control. Internet bulletin boards also provided these women with an opportunity to discuss and debate aspects of this series. Its appeal for these young women arose partly from changing gender relations in Taiwan. Rising female consumer power and economic expectations had not been mirrored by a corresponding change in the traditionalist culture of Taiwanese society, with its expectation of demure female behaviour, duty and self-sacrifice. The series,

projecting a hedonistic world of independent, affluent women in Manhattan, provided a 'cultural resource' for Taiwanese women seeking to negotiate their obligation to be a 'good girl' with their desire to have more 'individualistic lifestyles and open sexuality' (Huang 2008: 199). It was an inspiration for 'their struggle for agency' in a male-dominated world, but one that tended to take a personal, individualised route. As one interviewee put it, the lesson of the series is 'choose what you want, and don't make yourself miserable' (Huang 2008: 196).

The history of the internet is thus bound up with the struggle for greater gender equality. The internet provided a tool for an organised campaign for women's liberation in the Middle East and elsewhere. It also distributed depictions of autonomous women that inspired the seeking of personal solutions to gender inequality.

Internet and individualism

This last response is one aspect of another important historical change. There has been a cumulative shift from values and beliefs that prioritise the collective good of the community, and of groups within it, to ones that give priority to the satisfaction of the needs, desires and aspirations of the individual. This has been encouraged by, among other things, the rise of the market system, increasing mobility, the weakening of custom and tradition, and the declining influence of the family and collective organisations (Beck and Beck-Gernsheim 2001).

Some see the internet as encouraging this more individual-centred orientation because this is supposedly wired into the internet's DNA. According to Barry Wellman and associates (2003):

> The development of personalization, wireless portability, and ubiquitous connectivity of the Internet all facilitate networked individualism as the basis of community. Because connections are to people and not to places, the technology affords shifting of work and community ties from linking people-in-places to linking people at any place. Computer-supported communication is *everywhere*, but it is situated *nowhere*. It is I-alone that is reachable wherever I am: at a home, hotel, office, highway, or shopping center. The person has become the portal.
>
> (Wellman et al. 2003)

Rainie and Wellman (2012) have returned more recently to this theme, arguing that the incorporation of the smartphone into everyday life has strengthened their argument. 'People are not hooked', they write, 'on gadgets – they are hooked on each other. . . . In the world of networked individuals, it is the person who is the focus: not the family, not the work unit, not the neighborhood, and not the social group' (Rainie and Wellman 2012: 4).

There is clearly some truth in this. However, networked individualism also led to the forging of new communal identities. Thus, Kavada (2015) argues that use of social media contributed to the formation of Occupy's collective voice and

sense of community, while Juris (2012) emphasises that online mobilisation to a shared physical space was also central to the bonding that took place in the Boston occupy movement.

More importantly, communalism can shape online experience, and reaffirm a prior sense of collective identity. Thus, Miller and Slater (2000) found that strong nationalist sentiment in Trinidad gave rise to nationalist web content. Even chat rooms conveyed a sense of being 'Trini' through the display of 'ole talk' and 'liming' – the ability to communicate, be expressive and warm, and to be witty about everyday things – because this was viewed as being part of the island's distinctive national culture. Online encounters with foreigners also led some Trinidadians to feel that they should act as informal national ambassadors. Strong national consciousness thus infused Trinidadians' online experience in ways that supported their national identity. Underlying this intense sense of national belonging, argue Miller and Slater, was the historical experience of slavery, migration and social dislocation.

Similarly, Madhavi Mallapragada's study of expatriate and diasporic Indians (2000) concluded that the internet was widely used to stay connected to a distant homeland. Her subjects sought out web content that displayed India's rich cultural heritage. Some discussed how to deal with their assimilating children, who were turning their backs on their Indian identity. A small number even used the net to facilitate arranged marriages between members of their family and people living in India. Likewise, Larry Gross (2003) argues that the internet provides emotional support, practical advice and a sense of belonging among gay men encountering persecution or prejudice in different parts of the world. In both these instances, the internet supported pre-existing collective identities based respectively on nation and sexuality.

Likewise, the collectivist culture of Japan generated the distinctive Nico Nico Dougwa (NND) video-sharing website in which comments are overlaid on the screen rather than written beneath it. The comments are pithy, often witty and limited to ten. Any user can delete a comment and replace it with another. This creates an atmosphere of live, collective viewing not unlike watching a football match, with spontaneous comments from the crowd.

The website developed a mass following, with some 5 million regular users in 2008. Its acolytes developed a culture of 'kuuki' – 'the shared atmosphere of appreciation that one needs to catch, if one wants to comment appropriately and to understand the joy of being a Nico Chuu [fan]' (Bachmann 2008a: 2). This group togetherness is reinforced by the anonymity of those making comments, in which even a pseudonymous tag is omitted. However, if a distinctive style is recognised, the group may bestow the honour of conferring a nickname.

Nico Nico Dougwa is very obviously the product of a collectivist culture. Yet 'tag wars', reflecting divergent responses to a video, can sometimes occur, causing group cohesion to break down. Online anonymity can also provide a cover for expressing controversial views that would not be acceptable in the offline world. This is a more pronounced feature, notes Bachmann (2008b), of the Japanese internet forum 2channel. His overall conclusion is that the online experiences in

Japan which he studied both reflect and reaffirm group togetherness, while also sometimes giving expression to a desire to escape from it.

The unifying thread of these case studies, mostly located outside the West, is that strongly communal life in the real world can penetrate the online experience, and result in the internet offering support – though sometimes in a complex or contradictory way – for the maintenance of communal identities. The implication of this is that the social impact of the internet is likely to have been different in the collectivist East than in the more individual-centred West.

However, the dynamic of change is towards greater individualism. The internet can provide a space for the expression of individual identity even in collectivist societies. Thus, a study of Japanese students' use of advanced mobile phones concludes that they reinforce individualism and strengthen interiority in three distinct ways (McVeigh 2003). Phones as artefacts enable students to express their individuality through choice of colour, functions, ring tones and phone accessories (such as colourful figurines hung from phone straps). Mobile phones make it easier to express private feelings, primarily through texting and e-mail. Above all, mobile phones increase 'personalized individualization' by providing students with a sense of personal space. In Japan, living areas are often cramped, and there is a high level of surveillance by employers and educators. Students repeatedly stressed that their mobile phones enabled them to communicate privately with friends and create 'their own world' (McVeigh 2003: 47–8). However, there may be more ambiguity in this outcome than this Western author perhaps acknowledges. Students were expressing themselves as individuals within the strongly group-conditioned context of being a Tokyo University student.

Sima and Pugsley's study of blogs and bloggers in China (2010) also argues that the internet enables the showcasing of individuality, and a public process of self-reflection and self-discovery. They contend that this both reflects and expresses the greater individualism of China's 'Generation Y', who are growing up at a time of increasing consumerism and the one-child family rule that encourages a greater emphasis on the self among the young. However, the internal evidence of their article suggests that individual voices can sometimes be presented as a collective voice – that of China's new generation (Sima and Pugsley 2010: 301).

In general, the rise of the internet as a medium of self-communication has enabled greater self-expression, and probably strengthened the trend towards individualism. This would seem to be the case in the West (Castells 2009), and there is some evidence that the internet has also reinforced the trend towards greater individualism in Asia. But communal identities remain strong in many parts of the world, influencing use of the internet.

Retrospect

Historians of the internet have tended to concentrate on the early, Edenic phase of Western internet development. This revised history has emphasised, by contrast, the way in which commercialisation subsequently distorted the internet in

the West, while state censorship, in particular, muzzled the internet in the East. Growing corporate influence, the development of online concentration, the introduction of commercial surveillance technology and the strengthening of intellectual property law all entailed the superimposition of a new set of constraints on the internet as a consequence of advancing market influence. Likewise, the introduction of restrictive internet licensing, the outsourcing of state censorship to internet service providers and the adaptation of commercial surveillance technology to monitor dissidence imposed a further set of controls when the internet developed outside its north-western cradle. In brief, the rise of the internet was accompanied by the decline of its freedom.

However, this trend was resisted in both the East and West. The rise of the OS movement, people's continued reluctance to pay for web content and the revival of the user-generated tradition all represented an attempt to arrest the commercial transformation of the internet. Likewise, numerous online dissidents in the Middle East and Asia sought to thwart the extension of state power over the internet. In their different ways, they were part of the same project: they were both seeking to preserve a vision of the internet as belonging to the people.

If one task of rethinking internet history is to take full account of the later period, another task is to narrate the history of the internet as a global rather than Western phenomenon. This preliminary reconnaissance, which necessarily leaves out large parts of the world, concludes that the internet was less effective in destabilising authoritarian regimes than was widely anticipated. The internet also contributed to the advance of women by providing a tool for the organised women's movement and by distributing the sometimes pirated products of Hollywood feminism. More contentiously, internet self-communication seems to have promoted the expression and assertion of the self, though the evidence also points to the way in which strongly communal cultures could result in the internet supporting group identities.

The interaction between the internet and society is complex. This is underscored by this chapter, which indicates that this relationship has varied both in time and space. Yet, even allowing for this complexity, the weight of evidence points to one firm conclusion: society exerts, in general, a greater influence on the internet than the other way around. That is why many of the prophecies about the impact of the internet – surveyed in the first chapter and encountered again in this chapter – have not been fulfilled.

This is not a novel insight into the influence of new communications technology. It is one that dawned on idealistic liberals in Britain after 1880 when they realised that the popular press was not advancing the cause of progress, as they had anticipated (Hampton 2004). Wiser and more sceptical, they stopped capitalising the 'Newspaper Press'. Perhaps we should do the same in relation to the 'Internet'.[9]

Notes

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