

*To Jack and Gloria Flew,  
for always appreciating the value of  
an education and of knowledge.*

*To Charlotte Sophia Flew.  
My writing of this book has been her introduction  
to the 'very busy' world that she is now a part of.*

# new media

3<sup>rd</sup> edition

an introduction

terry  
flew

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# introduction to new media

## Why 'new' media?

In any discussion of new media, a question that needs to be addressed is why some media are considered to be 'new'. There is a temptation to simply list the latest developments in media technologies and call these new. Yet this approach is inadequate, partly because the rate of change in media technologies, services, and uses is so rapid that any list of this sort will quickly become dated. It also conflates the new and the novel. At one extreme, 'newness' can simply refer to the variants on long-established commodities, as when car manufacturers reveal their 'new' line of vehicles for the coming year, television networks present the 'newest' situation comedy or game show, or mobile phone companies announce a new model that is jewel-encrusted or locates the camera in a new place on the device.

Such an approach is also inadequate because, just as media technologies that we now consider to be 'old' were once 'new' (Marvin 1988; Gitelman & Pingree 2003), so too do media technologies that were once 'new' become 'old'. To many of those born after the 1980s, who Marc Prensky (2001) termed the *digital natives*, the idea of even a world without the Internet, email, mobile phones, computer games, digital cameras, and instant text messaging is simply

preposterous: it is only the folk on reality TV shows such as *Big Brother* and *Survivor* who don't have access to such devices, and that was their choice. Indeed, networked personal computers and other digital media technologies are now so pervasive in our work, our home lives, and the myriad everyday interactions we have with each other as well as with social institutions, that they are ceasing to be 'new' in any meaningful sense of the term. As a result, any approach to new media that simply catalogues the technologies themselves, and fails to ask broader questions about the contexts of their use and their broader social and cultural impacts, ignores the central question of why there is a need to look at new media in the first place.

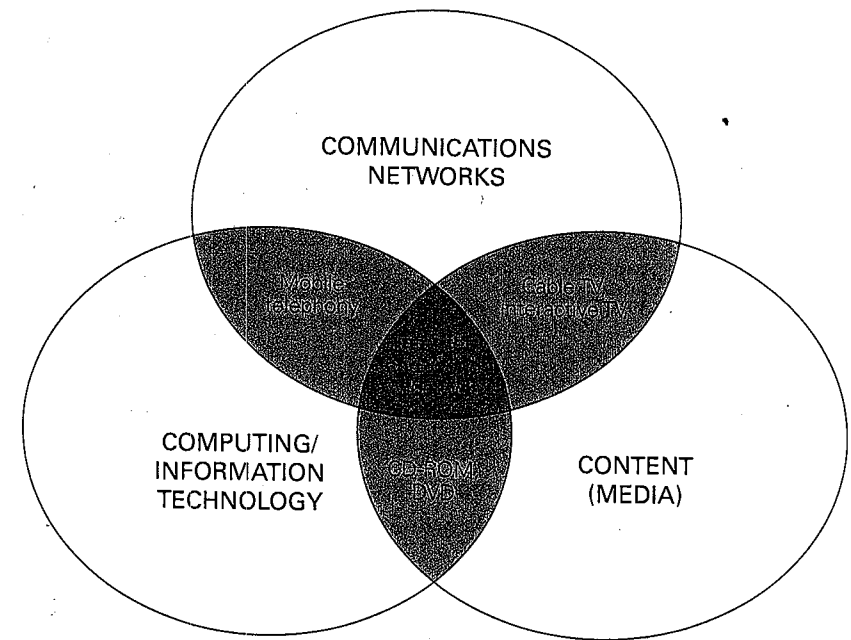
So should we still be speaking of 'new media'? There is a need, as Sonia Livingstone has noted, to ask 'what's new for society about the new media?' rather than simply 'what are the new media?' (1999: 60). This takes us to the larger question of whether, and how, technologies can act as factors in wider social change, yet at the same time be already embedded in a social context (Cowan 1997; Flichy 2005a). In *Novum Organum*, first published in 1620, the English philosopher Francis Bacon proposed that three discoveries had been central to marking out the period in which he lived as one that was markedly different from that preceding it:

It is well to observe the force and effect and consequences of discoveries. These are to be seen nowhere more conspicuously than in those three which were unknown to the ancients, and of which the origin, though recent, is obscure: namely, printing, gunpowder, and the magnet. For these three have changed the whole face and state of things throughout the world; the first in literature, the second in warfare, the third in navigation; whence have followed innumerable changes. (Quoted in Graham 1999: 26-7)

One way of defining new media, which I have used in previous editions of this book (Flew 2002, 2005a), has been that it involved the combination of the three Cs—computing and information technology (IT), communications networks, and digitised media and information content—arising out of another process beginning with a 'C', that of convergence (cf. Miles 1997; Rice 1999; Barr 2000). As a first approximation, convergent media can be seen as combining computing, communications and media content in the way shown in Figure 1.1.

New media can also be thought of as digital media. Digital media are forms of media content that combine and integrate data, text, sound, and images of all kinds; are stored in digital formats; and are increasingly distributed through

Figure 1.1 The three Cs of convergent media



Source: Barr, *Newmedia.com.au*

networks such as those based on broadband fibre-optic cables, satellites, and microwave transmission systems. Such media, or forms of digital information,<sup>1</sup> have the characteristics of being:

- **manipulable:** digital information is easily changeable and adaptable, at all stages of creation, storage, delivery, and use
- **networkable:** digital information can be shared and exchanged between large numbers of users simultaneously, and across enormous distances
- **dense:** very large amounts of digital information can be stored in small physical spaces (e.g. USB flash discs) or on network servers
- **compressible:** the amount of capacity that digital information takes up on any network can be reduced dramatically through compression, and decompressed when needed
- **impartial:** digital information carried across networks is indifferent to what forms it represents, who owns or created them, or how they are used.

This still leaves open, however, the question of what is new for society from the new media. The broad social focus taken in this book towards new media is consistent with a study of media technologies that stresses the need to be aware of how the mediation of communications through technological forms renders communications a form of social practice. We follow Lievrouw and Livingstone (2005: 2) in their observation that any approach to thinking about new media needs to take account of three elements: the artefacts or devices that enable and extend our ability to communicate; the communication activities and practices we engage in to develop and use these devices; and the social arrangements and organisations that form around these devices and practices.

Lievrouw and Livingstone also make the point that these three elements should not be thought of as being linear or layered—the technologies influence communications practices, which in turn shape social arrangements and institutions—but rather as constituting an *ensemble* characterised by ‘dynamic links and interdependencies among artefacts, practices, and social arrangements that ... guide our analytic focus’ (2005: 3). In this way, critical analysis of new media also has wider implications for how the media are studied more generally, since media studies as it emerged in the 20th century understood media production, texts, and audiences as discrete forms, which emerged in a linear fashion at different ‘moments’ of the media production-consumption cycle.

## Internet history

The concept of new media is integrally bound up with the history of the Internet and the World Wide Web. While convergence has now spread across a range of platforms and devices, it was the emergence and mass popularisation, of the Internet that heralded the rise of new media, understood as bringing together computing and information technologies, communications networks, and media content. When we refer to the Internet, we are referring both to a technical infrastructure of computers and other digital devices (e.g. servers, routers) permanently connected through high-speed telecommunications networks, and to the forms of content, communication, and information sharing that occur through these networks. In their analysis of the social implications of the Internet, sociologists DiMaggio, Hargittai, Neuman, and Robinson define the Internet as ‘the electronic network of networks that links people and information through computers and other

digital devices allowing person-to-person communication and information retrieval’ (DiMaggio et al. 2001: 307). A more technical definition has been developed by the Internet Society (ISOC), which in 1995 resolved that the Internet:

X refers to the global information system that: (i) is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent extensions/follow-ons; (ii) is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions/follow-ons, and/or other IP-compatible protocols; and (iii) provides, uses or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure described herein. (Leiner et al. 2003)

The history of the Internet has been well documented, and will not be presented in detail here. It is vitally important, nonetheless, to observe that the history of the Internet, while developing in parallel with the general development of personal computers and other devices for digital information processing and retrieval, is both a history of the common networking protocols for the transfer of digital information, and a history of systems for the publication, organisation and distribution of this information.<sup>2</sup> Three elements of this history are particularly worth dwelling on. First, while the commitment to developing an integrated communications network arose in the USA as a consequence of the Cold War with the Soviet Union, the priorities of the Advanced Research Projects Agency (ARPA)—established in 1957 after the Soviets launched the Sputnik satellite—were arguably driven as much by the desire of the American scientific community to perfect mechanisms of communicating with one another as by the demands of the military.<sup>3</sup> The most significant development to come from ARPA in the 1960s was packet switching. Packet switching meant that long messages could be broken down into smaller ‘packets’; messages could be rerouted if there was a blockage at one message route or point of connection between two computers; and messages would be sent in an asynchronous mode, meaning that the receiver would not receive the message until some time after the message was originally sent. Not only did packet switching overcome limitations of the telephone system, such as the potential for access to be blocked by heavy use by others, but it also established the principle of a decentralised network with no single point from which control can be exercised, which has been so central to the Internet’s development (Gillies & Cailliau 2000: 18–25). With the establishment of

ARPANET as a national long-distance computer network in the USA in 1969, packet switching became central to this network, with the transfer of electronic mail being perhaps the major communications innovation arising from this development. In 1972, ARPANET demonstrated to the public its capacity to retrieve, access, and send data at the International Conference on Computer Communication in Washington, DC, where perhaps the world's first email was sent (although not called this at the time!) (Hassan 2004: 13).

The second major development in Internet history was the development of a common set of networking protocols, which enabled researchers in the various local area networks (LANs) to communicate with one another, through the interconnection of these LANs into a wide area network (WAN). The major breakthrough came in 1974, with the proposal developed by Robert Kahn and Vinton Cerf to develop a common switching protocol that could meet the needs of an open-architecture network environment, which came to be known as TCP/IP (Transmission Control Protocol/Internet Protocol). The quasi-privatisation of ARPANET in 1983, which allowed universities and commercial interests to play an increasing role on the network and which marked the commencement of the Internet proper, was premised on the adoption of TCP/IP as a common interconnection protocol. In sharp contrast to other media, the Internet would become both a public and a global communications medium, as all computers and computer networks could communicate with one another in a common language, whether they were Apples, PCs or mainframes, or whatever local or national computing network they were operating within. As Internet use spread in the 1980s from outside its core constituency of the US government and military, scientists, and defence contractors, the significance of TCP/IP being established as a common Internet protocol would be of increasing significance to more and more people worldwide.

The development of the World Wide Web in the 1990s was the third major development that has made the Internet what it is today. While developments such as TCP/IP and packet switching provided the means by which networks could connect with networks, and computers could connect with computers, the question of how people could connect with other people through such electronic networks had not received as much attention. The conception of the World Wide Web by Tim Berners-Lee in 1989, and its development by Berners-Lee and colleagues at CERN (*Conseil Européen pour la Recherche Nucléaire*, or European Organisation for Nuclear Research) from 1991 onwards would dramatically change the communications capabilities of

the Internet. The significance of developing the World Wide Web became even more apparent in 1992 when Marc Andreessen of the National Centre for Supercomputer Application (NCSA) developed Mosaic as the first Web browser. Andreessen went on to become one of the founders of Netscape Communication, which developed Netscape, the first major commercial Web browser, in 1994. Microsoft quickly followed suit in 1995 with its Internet Explorer browser, released as part of its Windows 95 software suite to much fanfare and to the sounds of the Rolling Stones' 'Start Me Up'.

The ability to use Web browsers such as Netscape and Internet Explorer to access online content through the World Wide Web saw the mass popularisation of the Internet, with the number of Internet users worldwide growing by over 1300 per cent between 1994 and 1998 (see Table 1.1). Four features of the World Wide Web were particularly important in this popularisation. First, it allowed for the display of colourful pictures, music, and audio as well as data and text, and introduced multimedia capability to the Internet. Second, it was based on hypertext principles. Hypertext allows for the linking of information, where links from one information source provide simple point-and-click access to related information available from other sources. The concept of hypertext had circulated in various domains since the publication of Vannevar Bush's article 'As We May Think' in 1945, which proposed the development of a computational machine (the 'Memex') that not only could store vast amounts of information, but could allow users to create ancillary 'thought trails' (Bush 1996). Ted Nelson's experimentations with hypertext through 'Project Xanadu' in the 1960s and early 1970s pointed to the possibilities of interconnected electronic writing, and both the French Minitel system (developed as a national teletext system in 1983) and the Hypercard storage system (available on all Apple computers from 1987 to 1990) drew on hypertext principles in different ways. Third, the value of hypertext became even more apparent with the development not only of Web browsers such as Netscape Navigator and Microsoft Explorer, but search engines such as Yahoo! and Google, which provided vast and easy-to-use databases that gave users easy access to information stored on the Internet. Finally, the World Wide Web was associated with the development of both the common Hypertext Transfer Protocol (HTTP), which provided a platform-independent means of interconnection between websites, and Hypertext Markup Language (HTML) as a relatively straightforward means of writing source code for the World Wide Web. As a result, a much wider range of people could become producers as well as consumers of content on

the World Wide Web. This trend would accelerate as commercial software for developing Web pages became increasingly available, such as Adobe InDesign, Macromedia Dreamweaver, and Microsoft Front Page, and has been further accelerated with the development of programs associated with what is known as Web 2.0.

The Internet has thus become the fastest growing medium ever recorded. It is estimated that as of December 2006 there were 1.076 billion Internet users worldwide, or about 16.6 per cent of the world's population, having grown from 30.6 million users in 1995, or by almost 2000 per cent over an 11-year period (Internet World Stats 2006). Table 1.1 indicates the number of Internet hosts worldwide, or the number of sites from which the Internet is accessed, as well as the rate of growth of Internet use over time.<sup>4</sup>

**Table 1.1** Estimated Internet hosts worldwide

Year	Estimated number of Internet hosts worldwide	Annual rate of growth (%)
1991	376,000	
1992	727,000	96.4
1993	1,313,000	80.6
1994	2,217,000	68.8
1995	4,852,000	188.5
1996	9,472,000	95.2
1997	16,416,000	73.3
1998	29,670,000	80.7
1999	43,230,000	45.7
2000	72,398,092	67.5
2001	109,574,429	51.3
2002	147,344,723	34.4
2003	171,638,297	16.5
2004	233,101,481	35.8
2005	317,646,084	36.2
2006	394,991,609	24.3

Yearly figures are for January.

Source: Internet Software Consortium <www.isc.org>, accessed 3 December, 2006

## THE GLOBAL INTERNET

In the 2000 US presidential election campaign, the Democratic Party candidate Al Gore (now a leading global warming campaigner) made the claim, on the *Jay Leno Show*, that as Vice-President in the Clinton Administration, he had 'invented the Internet'. Gore was roundly criticised for his hubris, particularly as the collaborative nature of the Internet meant that no one could claim to have invented it, let alone a senior politician. Yet there is a subtext to Gore's otherwise hyperbolic claim that cannot be ignored. At the time of its mass popularisation in the mid-1990s, the bulk of the major initiatives that led to the Internet's emergence came from the USA, its user base was predominantly North American, and policies of the Clinton Administration—such as the promotion of a National Information Infrastructure (NII) and a Global Information Infrastructure (GII) modelled on the US NII—played a key formative role in the way in which the Internet evolved globally.

By contrast, the Internet today has a far more globally diverse user base. Of the estimated 1.076 billion Internet users in December 2006, the majority are now from Asia and Europe, and the fastest growing regions for Internet take-up are Africa, Latin America, and the Middle East:

**Table 1.2** World Internet usage and population statistics

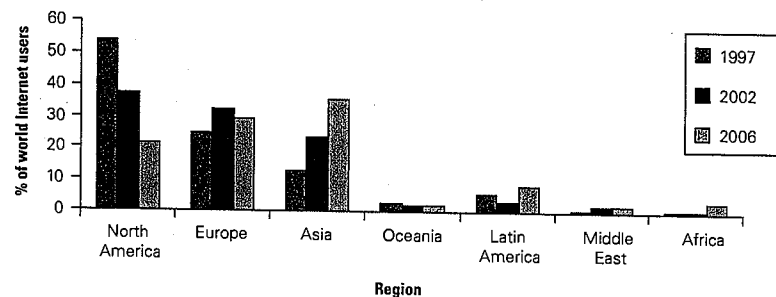
World Regions	Population (2006 est.) (million)	Population % of world	Internet Use Dec. 2006 (million)	% of Population as Internet Users	% of World Internet Users	User Growth 2000–06 (%)
Africa	915.2	14.1%	32.76	3.6%	3.0%	625.8%
Asia	3,667.8	56.4%	378.6	10.3%	35.2%	231.2%
Europe	807.2	12.4%	311.4	38.6%	28.9%	196.3%
Middle East	190.1	2.9%	19.02	10.0%	1.8%	479.3%
North America	331.4	5.1%	231.0	69.7%	21.5%	113.7%
Latin America & Caribbean	553.9	8.5%	85.04	15.4%	7.9%	370.7%
Australia/Oceania	33.9	0.5%	18.36	54.1%	1.7%	141.0%
WORLD TOTAL	6,499.7	100%	1,076.2	16.6%	100%	198.1%

Source: Internet World Stats, 2006

## THE GLOBAL INTERNET (cont.)

To get a sense of the significance of such a change over time, we can compare this data on the global distribution of Internet users to that found in Flew (2005), which contained data from 1997 and 2002 respectively.

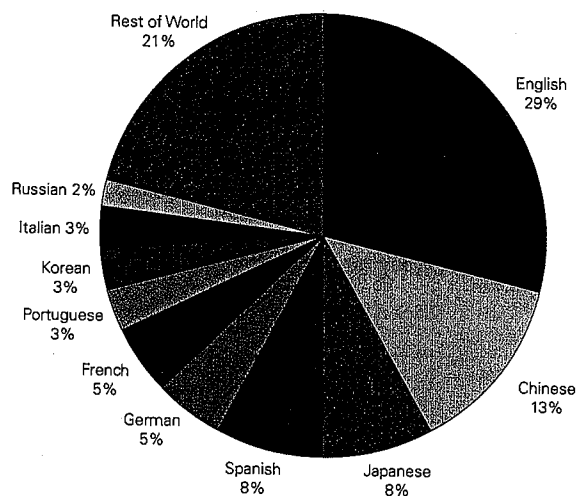
**Figure 1.2** Global distribution of Internet users 1997–2006



Source: Flew 2005: 73; Internet World Stats, 2006

While this data certainly provides considerable evidence of a global 'digital divide', both between wealthier and poorer nations, as well as within nations, it nonetheless also highlights how the world's Internet-using population is becoming more globally diverse. A good indicator of the change is in the top ten languages used on the Web. While English,

**Figure 1.3** Internet world users by language



Source: Internet World Stats 2006

remains the dominant language, accounting for 29.7 per cent of languages used globally in 2006, it is challenged not only by languages such as Chinese and Spanish, which are the written and spoken languages of about 30 per cent of the world's population, but by languages such as Korean, Portuguese, and Russian, which are not as widely used worldwide, but are the languages of some of the world's fastest growing Internet-using populations, in South Korea, Brazil, and Russia. There is also a 'long tail' of languages used, with over 30 languages used by at least a million people on the Internet (Figure 1.3).

## The conduit and the content

The development and popularisation of the Internet marked a high-water mark in the process of convergence. Through the World Wide Web, a rapidly growing number of Internet users were able to access a dramatically increased range of forms of digitised content (text, images, sound, video), delivered across telecommunications networks, via their personal computers, which increasingly became a single media platform able to deal with multiple media forms. This process of technological convergence, or the bringing together of computing, communications networks and media content, was matched by the development of convergent products and services, and processes of industry convergence, or the range of takeovers, mergers and strategic alliances that strengthened links between the computing and IT industries, the large telecommunications companies, and media corporations (Barr 2000; Flew 2005: 11–12).

At the same time, early Internet content was frequently quite impoverished in terms of the capabilities of the new media form. Indeed, the imperative to provide 'content' was often the problem, as it frequently led to the 'dumping' of already existing text online with little consideration of how such material was viewed and used differently from its print-based variants. The much-publicised initiatives of the time to digitise the entire contents of the US Library of Congress envisaged not only a veritable army of information workers on minimum wages undertaking endless document scanning, but also an Internet whose content was largely synonymous with that of the world of print media. One problem was, of course, download speeds; with most domestic users being reliant on 28.8 Kilobyte per second modems for much of the 1990s, access to audio and video was bound to be slow for

many. Interestingly, it was also the case that media artists had to proceed slowly in developing their content for online access. To take one example, the Australian Film Commission's *Stuff-Art* initiative, developed in 1998 to promote the use of the Internet for the distribution of new media artworks, required participants to 'make innovative and entertaining interactive works that are small enough to fit on a floppy disc ... and that download quickly over the Internet' (quoted in Tofts 2005: 141).

The development of the World Wide Web gave a renewed focus to the nature of the *interface*, or the 'front page' from which users access websites, typically through a Web browser and search engine. The quality of interface design draws attention to the nature of *human-computer interaction*, which is at one level a consequence of technical design and computer programming aspects of the interface, but which can only operate effectively when, as Anne Cranny-Francis observes, it recognises 'the cultural practices that enable users to engage with the technology', since it constitutes the 'hidden engine of the user's interaction with the text' (2005: 120). The importance of interfaces to the usability, and hence the popularity, of computers was apparent well before the advance of the Web. The success of Apple Computers in the 1980s was strongly related to its development of a Graphical User Interface (GUI) which, in simulating the environment of a desk top—with files, folders, in-trays, trash cans etc.—was intuitively usable to a vast array of users when compared with the PC-DOS system that was the leading personal computer interface at the time. Indeed, Apple fought a long, bitter, and ultimately unsuccessful legal case against Microsoft between 1994 and 1998 over its claim that Microsoft had incorporated the desktop metaphor into its Windows software, raising the question of whether the 'look and feel' of a GUI and software generally is copyrightable.

The question of the technical *conduit*, or the means by which online content is distributed, delivered, and accessed by the user, has become considerably more complex in the age of new media. With broadcast media, access to a suitable reception device (a television set or radio) gave its audiences content that looked and/or sounded more or less the same regardless of the device being used to access it (except in instances such as the transition from black-and-white to colour televisions). With the Internet, by contrast, a variety of factors come into play in terms of both the accessibility and the quality of the user experience in accessing online content, including:

- the age of the computer being used, and the software installed on that computer

- whether the user is accessing the content from a dial-up or broadband connection, and the speed of downloads available from that connection
- the overall quality of service and the available modes of delivery (dial-up, broadband, wireless broadband etc.) in the physical location from which the content is being accessed
- the type of computer being used (e.g. some material is not available for PCs or Mac computers)
- the software being used to access the content (e.g. the Web browser)
- the nature of the user themselves; for example, they may have a disability or other physical or mental condition that makes certain types of Web design inappropriate.

Sites such as Vincent Flanders' *Web Pages That Suck* ([www.webpagesthatsuck.com](http://www.webpagesthatsuck.com)) delighted in demonstrating the principles of good Web design by drawing attention to examples of bad Web design in a highly amusing manner. In response to the often baroque features of many early websites, where the designers managed to forget about both their users and the means by which they would access such sites, there was a turn towards *usability* in Web design, led by writers such as Jakob Nielsen (2000) and Donald Norman (1998).

The paradox of convergence, and the reason why the concept becomes more problematic over time, is that as the computing and IT, communications and media industries are brought further together by technological and industry changes, the disparities between and across content forms become more significant. If we simply consider computer-based media, two examples illustrate this. The first is *interactive online games*, which require content that is sufficiently rich and compelling to provide an immersive experience for the games player as user. What gamers seek from online media is, therefore, considerably more complex than the functionality and usability sought in Web-based user interfaces. Second, there is the case of electronic mail, or *email*, which is the world's most widely used Internet tool. With very few exceptions, emails themselves tend to be simple, text-based forms, even if they provide attachments or links that are more graphically complex. Indeed, to refer to emails as media content is certainly to stretch the definition of the term; as communications data that is based in the technical media of information and communication technologies (ICTs), they are media content, but they very rarely involve the kinds of production processes that we typically associate with the media content industries.

While the discussion of new media has thus far tended to focus on the Internet and computer-based digital media, a range of wireless technologies

and applications have been developed that are increasingly shifting the locus of ICTs from the desktop to a range of portable, handheld devices. At the forefront of this has of course been the *mobile telephone*. The global take-up of mobile telephones has been considerably greater than that of the Internet, and it is estimated that there are now 2 billion mobile phone users worldwide, which is double the number of Internet users, and greater than the number of main telephone lines worldwide (ITU 2004; MobileTracker 2005). There have also been important transformations in how the mobile telephone is used, with devices being increasingly used for short message services (SMS) or text messages, taking and sending pictures, viewing video, playing games, listening to music, and accessing email and the Internet. These developments have meant that the question of media content that users will seek to access from mobile devices has added further layers of complexity to the question of media content in the context of convergence, pointing to the paradox of convergence: as the proliferation of interconnected digital media technologies and devices is accentuated, the question of developing content that works across multiple media—in both a technical and a consumer demand sense—becomes more and more complicated.



## INTERVIEW: VINTON CERF, 'FATHER OF THE INTERNET'

Vinton Cerf has commonly been referred to as one of the 'founding fathers of the Internet'. Along with Robert Kahn and others, he was centrally involved in the development of packet switching and TCP/IP protocols, through his work on ARPANET in the 1960s and early 1970s and, from 1976 to 1982, his work with the US Department of Defense's Advanced Research Projects Agency (DARPA). Cerf's activities within ARPANET and DARPA were central to what remain two of the central defining characteristics of the Internet: its indifference to the content of data that is digitally encoded, and the capacity for differently configured computer systems to communicate with each other through the sharing of common protocols.

Vinton Cerf was founding president of the Internet Society from 1992 to 1995, and has served in various capacities as an advisor on Internet development, including membership of the Board of Directors of the Internet Corporation for Assigned Names and Numbers (ICANN) since 1999 (for more detail, see [www.icann.org/biog/cerf.htm](http://www.icann.org/biog/cerf.htm)). He received the US National Medal of Technology

from President Bill Clinton in 1995, and the Presidential Medal of Freedom from President George W. Bush in 2005.

He is currently a Vice-President of Google, where he has an additional position of Chief Internet Evangelist. His current interests include the development of an 'Interplanetary Internet'. He visited Brisbane, Australia in March 2007 as a guest of the Australian Interactive Multimedia Industry Association (AIMIA), and Barry Saunders was able to interview him via email during this period.

### ***Did you think the Internet would be as popular as it ultimately proved to be?***

[VC:] Well, I was already pretty excited about the experience with the ARPANET and a thriving community of academics were making good use of that. Email was a popular thing and when Gopher and the Wide Area Information Service (WAIS) popped up around 1992, you could see some very good potential. Tim Berners-Lee's WWW triggered huge popular interest of course. Many of us who have used Doug Engelbart's NLS (oN-Line-System) in the 1960s could see the potential (he invented the mouse, portrait mode display, hyperlinking, computer-aided knowledge work, and much more).<sup>5</sup> I did not anticipate the result of cheap computers and later Internet-enabled mobiles that has triggered a vastly larger level of interest than one would have anticipated in the 1970s when the initial work was being done.

### ***In what ways do you think the Web changed as it became popular?***

***For example, in the 1990s some saw it as a licence to print money.***

[VC:] It triggered production of a vast amount of information contributed by users. Digital cameras and video-cams have exacerbated that trend: the consumers have become the producers. I think it has also expanded to support many new business models (Yahoo!, Google, eBay, Amazon, Skype, *YouTube*, Second Life, etc.—the list is endless). It is a stunningly good medium for collaborative work and play, and it aggregates thin markets into dense ones regardless of location.

### ***Can you tell us something about your association with Google, and the Google approach to the Web?***

[VC:] I am Google's Chief Internet Evangelist. Part of my job is to encourage the creation of more Internet access. Google sees the Web as a vast ocean of information that needs organising or at least indexing so that its content can be quickly searched and accessed. I anticipate many, many new applications that structure information by location, by time, by other organising principles.

I think Google will persist in developing new tools for information sharing and collaborative work.

### ***Is Web 2.0 a significant development? Why? Why not?***

[VC:] The term is more marketing hype than real but there is an underlying opportunity to use new Web services standards to allow the business processes of different companies to automatically interact—accounts payable interaction with accounts receivable; order entry interacting with inventory and fulfilment, and so on. The protocols associated with Web 2.0 will support such innovations.

### ***How do you see the future of the Web?***

[VC:] It will continue to absorb content. It will become increasingly integrated into day-to-day business operations. It will incorporate new information structures that can be more readily searched.

### ***Will Web-based services increasingly migrate to mobile devices?***

[VC:] Yes, there is no question that many people will first be introduced to the Internet through appropriately equipped mobiles.

### ***What is your role in the Interplanetary Internet project?<sup>6</sup>***

[VC:] I am one of the founders of the project and I continue to work with the engineering team on planning, protocol development, funding, and deployment.

### ***What does the Interplanetary Internet project seek to do?***

[VC:] We want to standardise the protocols used in deep space so as to allow missions to support each other. One mission's assets may be very useful for new missions and standards allow for interoperability that is so vital to the success of the Internet itself and can be used to leverage investments in previous mission's assets.

## **Web 2.0**

The concept of Web 2.0 is centrally important to understanding new media in the 21st century. The term first began to be circulated in 2003, and the first conferences were held on Web 2.0 through O'Reilly Media (formerly O'Reilly & Associates) in 2004. Tim O'Reilly (2006), who has been a key

thinker and promoter of Web 2.0, defined it as 'the business revolution in the computer industry caused by the move to the Internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: *Build applications that harness network effects to get better the more people use them ... [or] harnessing collective intelligence*' (emphasis added).

There are both Web 2.0 evangelists and sceptics—as seems to be the case with most new media concepts. *TIME* magazine drew particular attention to the Web 2.0 phenomenon when it declared that its 'Person of the Year' for 2006 was 'YOU', for each person's collective contribution to Web 2.0 (Grossman 2006). Not surprisingly, such prognoses generate equal doses of scepticism about both the sustainability of the phenomenon and the extent to which it is really marketing *hype* or what Steve Woolgar (2002) has called '*cyberbole*'.

Nonetheless, the concept of Web 2.0 has caught on for two particular reasons. First, it has embedded within it a range of the features that have long been seen as central to the Web as a communications infrastructure, such as the scope for participation, interactivity, collaborative learning, and social networking (*social networking media* is a commonly used alternative term to Web 2.0), as well as positive networking effects from harnessing collective intelligence; in other words, the quality of participation increases as the numbers participating increase, and this in turn attracts more new users to the sites. Second, some of the fastest growing websites of the 2000s have been based on Web 2.0 principles. These include sites such as the photography site *Flickr*, the online encyclopedia *Wikipedia*, the online user-generated video site *YouTube*, aggregated Web log (blog) sites such as *Blogger*, *Livejournal* and *Technorati*, and the various personalised Web space sites such as *MySpace*, *Facebook*, *Friendster* and *Bebo*.

The core principles of software programs and Internet sites that conform to Web 2.0 principles are that they are:

- many-to-many in their connectivity
- decentralised in terms of control
- user-focused and easy for new users to use
- open in terms of their technology standards and their Applications Programming Interface (API)
- relatively simple and 'lightweight' in their design, their administrative requirements and their start-up and ongoing development costs

- expected to evolve and change over time, as users make new modifications to the sites.

In their overview of design and application principles that underpin and drive Web 2.0, Musser and O'Reilly (2007) identified the following principles (Table 1.3).

**Table 1.3** Principles of Web 2.0

Principle	Examples
Harnessing collective intelligence—deriving the benefits of large-scale ongoing participation and user co-creations and peer review of content to continuously improve the quality of the service	Google Wikipedia Flickr Amazon Del.icio.us
Data as the next 'Intel inside'—new wealth from online enterprises to be derived from database management	Amazon eBay Craigslist
Innovation in assembly—open APIs that allow for online remixing of content ('mash-ups') and the use of RSS (Really Simple Syndication)	Google Maps Yahoo! Flickr
Rich User Experiences, that promote user interaction and immersive engagement with the available online content	Google Maps GMail Netflix
Software above the level of a single device—services that can span across media devices, particularly mobile media such as mobile phones and PDAs	iTunes TiVo
Perpetual Beta testing—software is incrementally released, and understood as a service rather than as a final product	Google Flickr Open source software more generally
Leveraging the 'long tail'—recognising that there is a move from mass markets to niche markets, but that niche markets can be sustainable over a long period of time (cf. Anderson 2006)	Amazon eBay Google
Lightweight models and cost-effective flexibility—Web 2.0 marketing works off word of mouth rather than high up-front costs in business set-up and marketing	Digg.com (allegedly established with an up-front investment of \$US2800) Flickr

Source: Musser & O'Reilly 2007

The concept of Web 2.0 clearly implies a relationship to an earlier form of the Internet (Web 1.0). O'Reilly (2005) identified some of the differences as

being about a move from personal websites to blogs and blog site aggregation, from publishing to participation, from Web content as the outcome of a large up-front investment to an ongoing and interactive process, and from content management systems to links based on tagging, or what is known as *folksonomy*. A significant factor in its promotion has been lessons learnt from the dot.com crash of 2000, where very large numbers of small investors lost wealth from the unrealistic business models of a plethora of Internet start-ups which, in contrast to the Web 2.0 model, had high initial costs in developing infrastructure, personnel, and marketing strategies.

Bloggers such as Carr (2005) and Shaw (2005) have expressed scepticism about Web 2.0, arguing that such a term is simply marketing bait that will promote over-capitalisation in a new Internet capital-raising bubble (Bubble 2.0), on the basis of poorly defined understandings of the nature of the Internet as a social technology. Moreover, the decision by News Corporation to buy *MySpace* in July 2005 raises a series of questions, yet to be resolved, about the relationship between established, incumbent media and the emergent start-up enterprises that arise in the Web 2.0 space, in a controlled and commodified manner.



## USEFUL WEBSITES

Internet Society, *All About the Internet* <[www.isoc.org/internet/history](http://www.isoc.org/internet/history)>. Excellent collection of papers on the early development of the Internet and World Wide Web. It includes Vinton Cerf's Brief History of the Internet, Tim Berners-Lee on the past, present and future of the World Wide Web, and the website for the series *Nerds 2.0.1*, produced by the US Public Broadcasting Service (PBS) in 1998.

*Internet World Stats—Usage and Population History* <[www.internetworldstats.com/](http://www.internetworldstats.com/)>. This site has the most up-to-date information on how many Internet users there are worldwide and where they are geographically located.

### Web 2.0

Some of the most popular Web 2.0 sites worldwide include:

- *YouTube* <[www.youtube.com](http://www.youtube.com)>—user-generated videos
- *MySpace* <[www.myspace.com](http://www.myspace.com)>—social networking site
- *Flickr* <[www.flickr.com](http://www.flickr.com)>—online photo sharing
- *Blogger* <[www.blogger.com](http://www.blogger.com)>—'how to' site for creating Web logs (blogs)
- *Livejournal* <[www.livejournal.com](http://www.livejournal.com)>—blog site creation and aggregation
- *Technorati* <[technorati.com](http://technorati.com)>—site that aggregates and monitors blog activity worldwide

- *Bebo* <www.bebo.com>—rival social networking site to *MySpace*
- *Friendster* <www.friendster.com>—social networking site with an emphasis on friendships
- *Facebook* <www.facebook.com>—social networking site that was initially focused on high school and college students.

# twenty key new media concepts

In considering the broader socio-cultural impacts of new media, there are some recurring concepts that come into play in identifying what it is to be 'new'. A review of the summary literature on new media (e.g. Elmer 2002; Gauntlett & Horsley 2002; Burnett & Marshall 2003; Lister et al. 2003; Cranny-Francis 2005; Flew 2005; Lievrouw & Livingstone 2005) points to themes and key concepts that act as organising principles for arguments about the specifics of new media and why it is justified to refer to such media as new. This is not to say that these authors present an argument that all that is 'old' is *passé* and of no relevance to understanding the nature of new media; far from it. It is rather to say that, in so far as it is legitimate to talk about new media, there are some key organising themes and concepts. The 20 key concepts are listed in alphabetical order rather than in any perceived order of significance, and they will all be recurring through this book.

## 1. Collective intelligence

*Collective intelligence* is a term used by Lévy (1997) and de Kerckhove (1998) to refer to the capacity of networked ICTs to exponentially enhance the collective pool of social knowledge by simultaneously expanding the extent of human interactions enabled by communications networks that can generate new knowledge, and the greatly enhanced capacity to codify, store, and retrieve such knowledge through collective access to networked databases. This

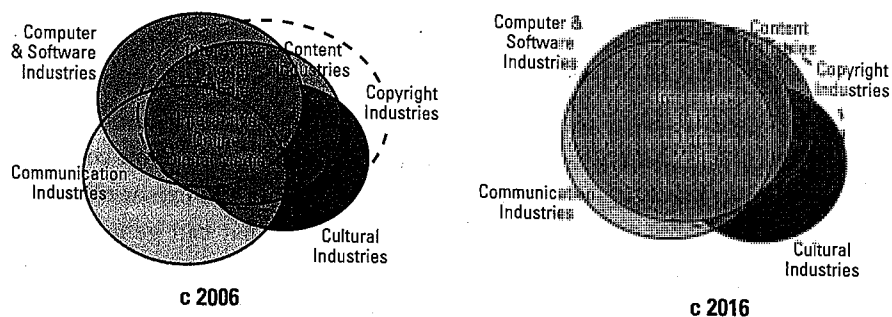
new capacity to collaboratively develop, distribute, share, and communicate knowledge is central to arguments that we are now in a *knowledge economy*. The concept of collective, self-organising knowledge *networks* is also central to claims that *open source* software development will generate superior outcomes to proprietary software developed within corporations, as there is the scope to 'harness the hive' of knowledge that exists within a participating user community (Raymond 1998; Herz 2005).

## 2. Convergence

Convergence refers in the first instance to the interlinking of computing and IT, communications networks, and media content that occurred with the development and popularisation of the Internet, and the convergent products, services, and activities that have emerged in the digital media space. Many see this as simply the tip of the iceberg, since all aspects of institutional activity and social life—from art to business, government to journalism, health and education, and beyond—are increasingly conducted in this interactive digital media environment, across a plethora of networked ICT devices. The Australian Research Council Centre of Excellence for Creative Industries and Innovation (CCI) presents this trajectory for convergence as shown in Figure 2.1.

For writers such as Thomas Friedman (2005), this is in turn generating a global 'flat earth', where activities conducted through digital media can occur in any part of the world. It is noted in Chapters 9 and 10 of this book that there are reasons to question this claim, and that culture, policy and other variables remain critical to the geographical location of new media activities, particularly with the shift towards a global knowledge economy.

Figure 2.1 Trends in convergence, 2006–16



Source: CCI 2005

The second element of convergence is the morphing of devices (computers, mobile phones, televisions, etc.) as they become multi-purpose conduits for a range of activities involving digital media. It was observed in Chapter 1 that trends towards convergence coexist with trends towards divergence in terms of ICT devices (Zetie 2004).

## 3. Creative industries

While the term 'creative industries' has its origins in a policy initiative of the Blair Labour government in the United Kingdom to link the arts, media, and ICT sectors more explicitly in economic and export growth strategies (DCMS 1998), it has gained wider currency as a result of the growing opportunities to link creativity and wealth generation through new products and services developed and distributed using ICTs. Hartley defines the term as describing 'the conceptual and practical convergence of the creative arts (individual talent) with cultural industries (mass scale), in the context of new media technologies (information and communication technologies or ICTs) within a new knowledge economy, for the use of newly interactive citizen-consumers' (Hartley 2005: 5). As this definition makes clear, the rise of the creative industries is seen not simply as an outgrowth of public policy to support creative activities, but rather, as being inextricably linked to new media, globalisation, and the knowledge economy. While there has been much discussion of what are (and are not) creative industries, and how to measure their size and growth, and the term itself is in some dispute (see Hesmondhalgh 2007 for a dissenting perspective), it usefully captures the extent to which individual creativity is increasingly seen as a core intangible asset in the development of new and compelling content in interactive digital media environments, and the extent to which networked ICTs offer a democratising of the capacity for *participation* in media production.

## 4. Cyberspace

Arguably the most influential new media concept of the 1990s, *cyberspace* became the metaphor used to describe the 'sense of a social setting that exists purely within a space of representation and communication ... it exists entirely within a computer space, distributed across increasingly complex and fluid networks' (Slater 2002: 535). The term was first used by the science fiction writer William Gibson in his 1984 novel *Neuromancer*, where it was an abstract concept that eluded concrete definition, but referred variously to a 'dataspace',

the 'world in the wires', and 'the matrix', in which transnational corporations trade information in a space that is visual, ordered, and electronic (Kitchin 1998: 2). Popularised in the early 1990s by Internet activists such as John Perry Barlow and Mitchell Kapor (apparently first used in a 1993 speech given by Barlow to CIA operatives, according to Streeter [2004: 288–9]), the term took off as both metaphor and myth because it came to capture four core elements of the Internet as a digitally networked environment.

First, it described the flows of digital data through the network of interconnected computers that was both not 'real'—since one could not spatially locate it or feel it as a tangible object—and clearly 'real' in its effects. The popular phrase 'Cyberspace is where your money is' captured the extent to which global financial institutions had been leaders in the development of such digital data networks, and decisions made within these institutions of *digital capitalism* could have great impacts on people yet not be located in an identifiable place where such decisions could be controlled. Second, cyberspace was the site of *computer-mediated communication* (CMC), in which online relationships and alternative forms of online identity were enacted, raising important questions about the social psychology of Internet use, the relationship between 'online' and 'offline' forms of life and interaction, and the relationship between the 'real' and the *virtual*. Third, it drew attention to the *remediation* of culture through new media technologies, and the extent to which the Internet has never simply been a communications tool, but a cultural form and 'a social space in its own right ... [which] means looking at the forms of communication, sociality and identity that are produced within this social space, and how they are sustained using the resources available within this online setting' (Slater 2002: 533). Finally, because cyberspace was presented as a qualitatively new space, it was seen as providing new opportunities to reshape society and culture, whether through disembodied identities, borderless communication and culture, or the rediscovery of powerful myths such as the 'American Dream' and frontier civilisation (Mosco 2004). Cyberspace as myth and metaphor was thus integrally linked to the *hype* surrounding the Internet that has been such a recurring feature of new media discourse.

## 5. Digital capitalism

Political economists such as Dan Schiller (2000, 2006), Robert McChesney (1999, 2003), Vincent Mosco (1996, 2004) and Philip Graham (2000, 2006) have used this term to argue that new media and the 'Internet revolution' mark the rise of the Entertainment-Communication-Information (ECI)

sector to prominence in the global capitalist economy, constituting the core infrastructure of global commerce and the fastest growing sectors of international capitalism. Rather than seeing this as heralding a 'new economy', they argue that such trends mark the consolidation and intensification of capitalist relations on a global scale, as information is increasingly commodified as intellectual property through *digital copyright*. Political economists have stressed the key role played by traditional 'Big Media' corporations such as News Corporation and Time-Warner in the new media environment, and argue that there is in fact a further concentration of media ownership and control occurring, alongside a growing international digital divide between information 'haves' and 'have-nots'.

## 6. Digital copyright/Creative Commons

A central paradox of new media has been the way in which digitisation as a technological process has made the copying, distribution, reuse, and repurposing of all forms of media content almost infinitely simpler and quicker, while at the same time the laws that govern the ownership, use, access, and financial payment for such content have become progressively stricter. While copyright law has always contained tensions between reasonable compensation for its original creators and fair use for non-commercial purposes in the public domain, developments in copyright law in the 1990s and 2000s have seen new systems for managing the ownership and use of intellectual property that many critics argue unduly benefit the owners of existing copyrightable material, to the detriment of new applications of creativity that reuse existing digital content in new and innovative ways (Lessig 2001, 2004; Vaidhyathan 2001; Perelman 2002). As an alternative to this use of law to establish monopoly rents through intellectual property rights (IPRs) as a part of digital capitalism, the Creative Commons movement has sought to enable authors, artists, scientists, educators, and other creators of original content to establish more flexible yet legally sound principles through which their work can be used and repurposed to serve non-commercial, public good principles (Creative Commons 2007).

## 7. Digital divide

The National Telecommunication and Information Administration (NTIA) used this term in its *Falling Through the Net* reports in the late 1990s into the differential access to networked personal computers. It has been defined as 'the differential access to and use of the Internet according to gender, income,

race, and location' (Rice 2002: 106). The term has also been important in the context of globalisation, in clarifying the extent to which, as the United Nations observed in 1995, 'more than half of the world's population lives more than two hours away from a telephone' (quoted in Couldry 2002: 186). In an overview of digital divide research, Norris (2001) has proposed that it is important to distinguish between: (1) the 'global divide', or differential Internet access between nations based on access to networked ICT infrastructures, computers, information transmission capacity, local website hosts etc.; and (2) the 'social divide', or the gaps within nations in terms of access to the Internet as a means of social engagement. Critics of the digital divide concept argue that inequalities related to new media involve far more than access, but also include opportunities to participate effectively in online environments (Gandy 2002). Murdock and Golding (2004) have argued that because the computing hardware, software, and skills required change so quickly, and opportunities to learn these new skills are unequally distributed, inequalities in the digital environment continue to reflect other sources of social inequality, such as those arising from income, occupation, or geographical location.

## 8. Globalisation

One of the most widely used concepts in social theory today, globalisation is a term used to both describe and make sense of a series of interrelated processes such as the rise of multinational corporations (MNCs); international production, trade, and financial systems; international communications flows; global movements of people and the increasingly multicultural nature of societies; developments in international law; global social movements such as the environmental movement; the development of international governmental organisations (IGOs), regional trading blocs, and international non-governmental organisations (INGOs); and global conflicts such as the 'war on terror' after the attacks on the World Trade Center and the Pentagon on September 11, 2001. While many of these developments are not new—trade and empire have been a feature of the world system at least since Columbus crossed the Atlantic in 1492—their speed, intensity, and interconnectedness are seen by many as marking a new stage in human social development. As technologies that enable 'borderless' communication, new media are central to debates about globalisation and its impacts. Globalisation has both its advocates (e.g. Cairncross 1998; Legrain 2002; Friedman 2006) and critics (e.g. Mander & Goldsmith 1996; Barber 2000; Klein 2000). For many of its critics on the political Left in particular, the issue is not globalisation per se,

but rather the extent to which the term is used as a cover to extend the power of multinational corporations in an age of digital capitalism; as the Marxist writer Alex Callinicos puts it, 'the enemy is not globalisation, but global capitalism' (2001: 111). This raises a related question, which is the extent to which the trends associated with globalisation mark a *qualitative* shift in the pattern of economic, social, political, and cultural relations within and between states and societies, or whether they constitute a *quantitative* change, or a continuation of long-established trends. Arguments that propose that globalisation marks out a fundamental shift in social relations have been termed *strong globalisation* arguments (Flew & McElhinney 2005); by contrast, there are those who can be described as *globalisation sceptics* (e.g. Hirst & Thompson 1996), who point out the extent to which many of the developments associated with globalisation are not historically new, and question the political motives that lie behind globalisation hype (for an overview of these debates, see Flew 2007).

## 9. Hype

A recurring feature of the development of the Internet and the popularisation of digital media technologies has been their capacity to generate hype about how these technologies will change everything, typically for the better. Lister and colleagues (2003: 11) observed that this is an inherent feature of discourses surrounding new media being linked to the modernist belief in technology as being socially progressive. The "new" is "the cutting edge", the "avant-garde", the place for forward thinking people to be'. Such prophetic hype certainly characterised many analyses of the Internet in the 1990s (e.g. Dyson et al. 1994; Rheingold 1994; Negroponte 1995; Kelly 1997; Dyson 1999), which in turn tended to generate debunking responses that looked at the downsides of the new technologies and sought to reveal that the digital emperor had no clothes (Postman 1993; Sale 1995; Stoll 1995; Robins & Webster 1999). This 'polarisation between narrow suspicion and uncritical enthusiasm' (Woolgar 2002: 3–4) that characterised new media studies in the 1990s has to some extent given way to more empirically grounded research into new media, its uses, and impacts (Silver 2000; Flew 2001; Wellman 2004; Livingstone 2005). The dot.com crash of 2001 also revealed very starkly the dangers of investing in hype around new media companies that rested on fatally flawed business plans. At the same time, the extent to which hype surrounds new media remains pervasive, partly because it helps to boost share prices, persuade politicians and sell product, but also because it taps into what Vincent Mosco (2004) has referred to as the *digital sublime*. Mosco referred to the extent to which

cyberspace possesses not only technical, political, and economic properties, but is also constituted as a form of cultural myth, offering possibilities of transcending the limits of contemporary society and the material world.

## 10. Information overload

The Internet has given its millions of users worldwide unprecedented access to a plethora of information. It was estimated that there were about 30 billion Web pages worldwide in February 2007 (Boutell 2007), while the *Wikipedia* at the end of 2006 had over 1.5 million entries in English alone. Yet the availability of so much information, and the increasing *speed* with which information is sent to users, generates the problem of *information overload*. The problem is not simply dealing with well-known 'Net nuisances' such as spamming or the making of fraudulent claims online, but relates to a problem inherent in the Internet as a source of information. The philosopher Gordon Graham has pointed out that when the term 'information' is used of online content, it refers only to the capacity to access digital data from a computer or other networked device. The fact that this bears no relation to the quality or usefulness of the data generates the problem, since we typically understand information as an epistemologically normative term, because 'to be newly possessed of information implies that we know something we did not know before. But "digital information" can store *misinformation* ... as much as it can store the truth, so that the text or images it generates may be wholly misleading and produce erroneous belief rather than knowledge' (Graham 1999: 89). This tendency to conflate information in the form of digital data with knowledge is, for Graham, an example of misleading hype, and he argues for the need 'not to confuse the power of the Internet as a form of communication with its value as a conveyer of (epistemologically significant) information ... All the undeniable advantages of the Internet make it as powerful an instrument for deception and misinformation as for knowledge and learning' (1999: 90).

## 11. Interactivity

Interactivity is generally seen as a central feature of new media, although there is considerable debate about its meaning. It is typically presented as a feature of new media that distinguishes them from 'old media', which could only offer passive consumption. Lister and colleagues (2003: 20) observe that interactivity 'stands for a more powerful sense of user engagement with media texts, a more independent relation to sources of knowledge,

individualised media use, and greater user choice'. While many forms of media offer some form of interactivity (e.g. digital television, DVDs), the unique features of the Internet in this regard relate to the distinctive elements of interconnectivity and interoperability. *Interconnectivity* refers to the capacity to easily connect interactions across different networks, while *interoperability* refers to the capacity to access all available forms of information and media content using different operating systems. One of the unique achievements in the history of the Internet was the way in which the adoption of Transmission Control Protocol/Internet Protocol (TCP/IP) as a common switching protocol for interconnecting networks promoted both interconnectivity and interoperability.

Interactivity can occur at many levels and degrees of engagement. McMillan (2005) argues that it is important to differentiate three levels of interaction: (1) user-to-user interaction, or the ways in which computer-mediated communication intersects with, or is at odds with, other rules, codes, and conventions of interpersonal communication; (2) para-social interaction, where online media generate new forms of user engagement with the content, which may range from the navigational practices of accessing and organising content to generate *hypertext* 'pathways', to the immersive practices associated with engagement with 'rich media' content such as multiplayer online games; and (3) user-to-system interactivity, or the ways in which users engage with the devices they are using, as studied in fields such as human-computer interaction (HCI) (cf. Reeves & Nass 2002).

Whether enhanced interactivity is synonymous with enhanced forms of participation with new media remains an open question. Tim Berners-Lee, one of the original developers of the World Wide Web, saw the concept of interactivity as it had developed on the Internet by the late 1990s as too constrictive, since it focused on the ability to access and choose content and not on the capacity to create and distribute new content. Berners-Lee (2000: 183) argued instead that the Web needed to be about *intercreativity*, or 'the process of making things or solving problems together. If interactivity is not just sitting there passively in front of a display screen, then intercreativity is not just sitting there in front of something "interactive"'.

## 12. Knowledge economy

The claim that the 21st century is marked by the rise of the knowledge economy points to the increasingly important role played by information, technology, and learning in wealth creation and economic competitiveness

(e.g. OECD 1996). Three related observations lie behind this argument. First, there is the structural shift in employment from agriculture and industry towards the services and information sectors. Nora and Minc (1981) observed that the number of people employed in agriculture and manufacturing industries in the USA fell from 55 per cent in 1940 to 30 per cent by 1980, and that employment in information-related industries rose from 20 per cent to over 405 per cent over the same period. Similarly, Castells and Aoyama (1994) found that the proportion of the population involved in the handling of information, as distinct from the handling of goods, grew by 80 per cent in the USA between 1920 and 1990. Second, new media and ICTs greatly accelerate the production of new knowledge (David & Foray 2002). They do this by enhancing access to existing knowledge through networked databases, promoting online interaction between designers, producers, and users, and dramatically increasing the speed with which new knowledge can be disseminated into the public domain. In these ways, they promote not only new knowledge, but the pooling of *collective intelligence* across all knowledge domains. Finally, it is argued that innovation, or the development of new products and services, now 'comes closer to being the sole means to survive and prosper in highly competitive and globalised economies' (David & Foray 2002: 11). As knowledge is not synonymous with information, this presents the question of how to promote individual creativity and foster knowledge networks among people within and outside organisations, as the evidence on knowledge creation and knowledge transfer indicates that 'there are advantages to working together, however well people may be connected by technology' (Brown & Duguid 2000: 146). One consequence of the increasingly interactive as well as networked nature of digital media environments is the rise of *user-led innovation*, as users of online products and services are not simply consumers, but innovators in their own right.

### 13. Networks

The centrality of networks and networking to new media needs to be understood at three levels. First, the Internet is itself a *technical network*, or a global 'network of networks'. At the core of its physical infrastructure are the wires, cables, wireless transmission systems, and so on that provide the capacity to carry large amounts of information to a series of interconnected points. The Internet has exceeded the possibilities of earlier networked communications systems, such as the telephone system, as a result of its matrix structure, where

all senders and receivers are interconnected through a sub-network of routing systems or servers, which distribute messages as a series of 'packets', regardless of the initial representational form encoded by the signal and decoded by the end-user. Second, there is the importance of *social networks*, understood in social network analysis as emphasising the interdependent and relational nature of links between people and institutions, and their importance in managing resource flows, providing opportunities, presenting constraints, and maintaining durable forms of social infrastructure (Thompson 2003: 54–6). The third level is that of *socio-technical networks*. In the work of Manuel Castells in particular, networks 'constitute the new social morphology of our societies' (Castells 1996: 469), to the point where the *network society* is 'the social structure characteristic of the Information Age' (Castells 2000a: 5). In Castells' work, the technological revolution associated with the Internet and networked ICTs and the social transformation to a global informational economy based around networks are fundamentally linked, since it has only been with the technological advances associated with new media that the capacity of networks to operate at a scale, speed, and level of complexity to become the dominant mode of social organisation. In particular, networked forms of organisation are seen as being the central drivers of processes of globalisation at the economic, geopolitical, and cultural levels and in terms of media use and identity formation (Castells 2001, 2004).

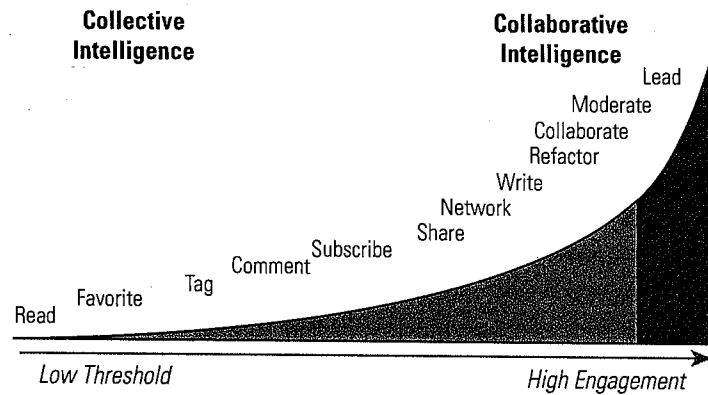
### 14. Participation

In the new media literature, participation is a concept used in three ways. First, in the context of the digital divide, it refers to inequalities in access to new media and the opportunity to use ICTs to participate as a user, worker, citizen, or consumer. At a global level, it refers to the difficulties faced by developing countries in being involved in decision-making concerning the development of ICTs (see e.g. WSIS 2003). The second use identifies the distinctive properties of new media that make it more open and interactive than traditional communications technologies. Kenney and colleagues (2000) argue that new media requires a rethinking of traditional sender–receiver models of communication, since 'Interaction ... demands a two-way (or multi-directional) model of communication. With the interactive features of new media, the receiver is recognised as an active participant.' The extent to which different forms of new media invite user participation is highly variable, and authors such as Berners-Lee have been critical of claims that *interactivity*

is synonymous with participation. At the user level, Mayfield (2006) has developed the *power law of participation* (Figure 2.2), observing that the model of collective intelligence associated with Web 2.0 is not necessarily at the high end of potential user engagement with different forms of online media.

The third use of the term relates to the second, and concerns the question of whether the *participatory culture* that is promoted by new media (Jenkins 2006a,b) is connected to wider processes of democratisation of media access and use in the context of the rise of the *creative industries*, and what Hartley (1999b, 2005) has referred to as 'DIY citizenship' and Bruns (2005) describes as the rise of the 'prod-user' (cf. Deuze 2006).

Figure 2.2 The power law of participation



Source: Mayfield 2006

## 15. Remediation

Bolter and Grusin (2000) have proposed remediation as a way of thinking about the relationship between media forms that is not couched in terms of a transition from 'old media' to 'new media'. Arguing that the relationship between media forms is a 'genealogy of affiliations' rather than a 'linear history', they propose that 'no medium ... can now function independently and establish its own separate and purified space of cultural meaning' (2000: 55). They observe two apparently contradictory features of digital media design and new media content. First, there is the desire to establish immediacy in the relationship between the user and the content, to generate a sense of 'being there' that seeks to efface the extent to which this interaction

is technologically mediated in order to enhance its realism and immediacy. While Web cams, Web logs (blogs), and *YouTube* video feeds are an example of this in the new media environment, contemporary reality TV programs such as *Big Brother* represent a similar tactic from 'old' media, offering their audiences a more unmediated, more real form of access to the show's contestants, along with the opportunity to shape the reality of the contestants through technologically mediated interaction. Second, there is the extent to which digital media content is generated by the combination and collage of already existing media content that is reassembled in the digitally networked environment. Examples such as the online 'repurposing' of print and broadcast media content on websites are obvious examples, but Bolter and Grusin (2000: 96-9) also draw attention to more distinctive and innovative modes of remediation, such as the appropriation of a range of well-established filmic techniques related to character, narrative, plot devices and *mise-en-scène* in computer games.

## 16. Security and surveillance

The Internet has generated a plethora of new information and personal *security* issues, which range from email spamming, computer virus proliferation and online harassment to forms of cyber-fraud and identity theft. The fact that the law nearly always lags behind new issues related to information security has meant that the ICT industry itself has frequently taken the lead in developing technological solutions to such problems. This has in turn raised issues about government sovereignty, democratic participation, corporate uses of personal information, and the scope for new forms of *surveillance*. At the heart of many questions about information security are the tensions between visions of the knowledge economy that are grounded in notions of digital copyright and information as private property, and the Internet as a creative commons based around the social sharing of knowledge in order to build collective intelligence. The ambiguous position of the *hacker* in these debates, whose activities in accessing computer systems and reproducing and altering data on them are both highly illegal yet possibly essential in exposing design flaws in such systems, is indicative of the complex legal and political environment in which such information security questions arise (Dyer-Witford 2002).

Lyon (2002) has argued that a combination of interconnected digital technologies, from the 'cookies' left on personal computers by Web browsers to mark accessed sites, to closed-circuit televisions (CCTVs) in various urban

spaces, have led to the rise of a *surveillance society*. Lyon locates the four key elements of surveillance society as being the growing use of ICTs to mark and locate where people are at particular times in order to coordinate activities better; the management of risk of various forms, from the comparatively low-level—welfare fraud, shoplifting, street crime—to the risks associated with large-scale terrorist actions; the balance between personal privacy and the use of personal information by various sources, from governments to insurance agencies and marketers; and the questions of power associated with who has access to such information, and whose information is accessed, or who watches and who is watched (2002: 5–8). As Lyon notes, one of the great paradoxes of the use of ICTs to address security concerns is that ‘the applications of technology to risk management in the social sphere may themselves be read as a risk’ (2002: 7). This point has been made by many in relation to various forms of anti-terrorism legislation, such as the US *PATRIOT Act*<sup>1</sup> passed by both Houses of the US Congress in the immediate aftermath of September 11. The issue has also been raised in relation to new media companies such as Google and Yahoo! agreeing to cooperate with government authorities in the People’s Republic of China around Internet censorship provisions.

## 17. Speed

New media enable us to do things more quickly. Activities such as transferring funds between bank accounts, enrolling in a course, or buying an airline ticket can now be completed in minutes, whereas before they could often take hours. Search engines such as Google also give us instant access to easily downloadable information from our personal computers. The Internet has also generated a 24-hour news cycle, where it is expected that online sites are constantly updated as new information emerges, rather than relying on the traditional time routines of print or broadcast news production. Microsoft founder Bill Gates (1999) identified ‘business at the speed of thought’ as the key to success in the digital economy, while popular texts such as *Faster: The Acceleration of Just About Everything* (Gleick 2000) and *The Future Just Happened* (Lewis 2001) draw attention to the connections made between speed and new media. Cranny-Francis (2005) has noted that one of the key ways in which we evaluate ICTs and Web content sites is by their speed: how quickly can relevant material be uploaded, downloaded, distributed, and modified. The question of whether this emphasis on speed is having a corrosive impact on politics, culture, and social life was initially raised by the

Canadian communications theorist Harold Innis (1951) in his critique of the spatial *bias of communication* in 20th-century media. Contemporary theorists such as Paul Virilio have questioned the impact of new media in terms of *accelerated modernity* (Redhead 2004), while Mattelart (2003) has referred to ‘informational neo-Darwinism’, which fetishises speed at the expense of critical and reflective thought.

## 18. Ubiquity

In the context of new media, *ubiquity* refers to the extent to which the proliferation of digital devices, the density and interconnectedness of networks, and both the multiplicity of forms of use and the routine nature of uses of new media see new media increasingly embedded in all aspects of everyday life. While new media in the 1990s was largely associated with the Internet as accessed from computers, and for most people computers were largely boxy devices with screens that sat on desks, in the 2000s the range of digital devices that enable access to information and communication services in ways that maximise speed and *mobility* has proliferated. At the same time, the idea that ICT capabilities were always tied to computers was always something of a myth: to take one example, the microwave oven has always essentially been a computer used for the purposes of cooking food, but is designed as it is to appeal more to consumers as a food preparation device. Donald Norman’s (1998) work on the *invisible computer* has drawn attention to the centrality of design and usability in the appeal of new technologies to consumers, in relation to questions of human–computer interaction and interaction design. Recent initiatives around the *disappearing computer* have raised the question of what will it mean for the future development of ICTs and new media as ‘computers disappear from the scene, become invisible, and disappear from the perception of the users’, who nonetheless seek their communication affordances and capabilities (Streitz & Nixon 2005: 34; cf. *Disappearing Computer* 2004).

## 19. User-generated content/user-led innovation

At one level, all Internet content is user-generated, as the medium by its very nature promotes *interactive*, many-to-many modes of communication. The phenomenon of user-generated content, however, refers specifically to the ways in which users as both *remediators* and direct producers of new

media content engage in new forms of large-scale participation in digital media spaces. Massive multiplayer online games (MMOGs), for instance, derive their particular dynamism as media forms from the productivity of the players themselves, and the investments they make in the evolution of the game itself (Humphreys 2004). They represent a model of media production that is recursive, non-linear, and ongoing, leading to the emergence of what Bruns (2005: 23) has termed, in relation to online news sites, the rise of the 'prod-user', who engages with such sites interchangeably as both a producer and a consumer, often simultaneously. Such an understanding of the online user as participant in co-production points in the direction of the open source movement in the software development realm, and its championing of collective intelligence as the cornerstone of better software in the software realm. This in turn links to what von Hippel (2005: 1) has described as user-led innovation, and the *democratisation of innovation*, where 'users of products and services—both firms and individual consumers—are increasingly able to innovate for themselves' and, through digital networks in the knowledge economy, these innovations can be distributed, shared, and improved upon by user communities.

## 20. Virtuality

One of the features of new media is that it enables forms of interaction through computer-mediated communication that are separated in both time and space and have a potentially global reach through digital networks. The Internet has also promoted the *convergence* of modes of communication from one-to-one (e.g. email), one-to-many (e.g. websites), and many-to-many (interactive 'real time' online spaces) that challenges traditional hierarchies between senders and receivers of communication and between producers and consumers of media content. The 1990s saw a plethora of works that drew attention to this 'virtual' nature of communication and discussed the emergence of virtual communities (e.g. Rheingold 1994), virtual identities (e.g. Turkle 1995), virtual reality (e.g. Lévy 1998), and ways of 'being digital' (e.g. Negroponte 1995; Tapscott 1998) that offered newer and better possibilities of life and experience in the 'online' world than in reality, or what was fashionably referred to at the time as the 'offline' world. While it was not hard to identify a strong degree of unsubstantiated hype behind such propositions (see e.g. Lockard 1997; Robins & Webster 1999; Slater 2002), and elements of the 'digital sublime' (Mosco 2004), the question of how

participation in virtual environments intersects with the everyday experience of those involved in sustained CMC remains an important one. Woolgar (2002) has proposed 'five rules of virtuality' that draw on extensive research in the United Kingdom on uses of new media:

- 1 Both the uptake and uses of new media are critically dependent on the non-ICT-related contexts in which people are situated (gender, age, employment, income, education, nationality).
- 2 Fears and risks associated with new media are unevenly socially distributed, particularly in relation to security and surveillance.
- 3 CMC-mediated or 'virtual' interactions supplement rather than substitute for 'real' activities.
- 4 The introduction of more scope for 'virtual' interaction acts as a stimulus for more face-to-face or 'real' interaction.
- 5 The capacity of 'virtual' communication to promote *globalisation* through communication that is spatially disembedded encourages, perhaps paradoxically, new forms of 'localism' and the embedding, rather than the transcendence, of identities grounded in a sense of place, belief, experience, or practice.



### USEFUL WEBSITES

*Wikipedia* <[en.wikipedia.org/wiki/Main\\_Page](http://en.wikipedia.org/wiki/Main_Page)> and *Google* <[www.google.com](http://www.google.com)>. The world's largest online encyclopedia and the world's largest Internet search engine are the two obvious starting points for getting information on new media concepts, who uses them, and the debates surrounding them.

*New Media Studies* <[www.newmediastudies.com](http://www.newmediastudies.com)>. David Gauntlett, Professor of Media and Communications at the University of Westminster, has maintained this lively and quirky site since 2000. It is particularly focused on the relationship between media, theory, identity, and the Web, and it accompanies his two books on Web studies (Gauntlett 2000, 2004) as well as other works.

*Voice of the Shuttle* <[vos.ucsb.edu](http://vos.ucsb.edu)>. First developed by Alan Liu at the University of California in 1994, this site provides a remarkably rich range of academic resources in the humanities, including cyberculture and media studies.