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EDITORIAL

The Virtual World: Problems Without Solutions

Heads of academic institutions are the beneficiaries of a great deal of advice. At times, advice pours in from all quarters especially on matters on which everyone seems to have opinions and solutions. In recent months, I have had the good fortune to have received detailed suggestions on subjects as diverse as strategies to raise my institution to 'world class' status to plans for decongesting campus roads. As an editor, I have always received many interesting suggestions for improving the journal's impact factor. As the, often silent, recipient of a great deal of well meaning advice, I have invariably preferred those who advise to those who complain. Over time, I have learnt to reflect on advice, including a great deal which, curiously enough, is anonymous. Advice (and complaints) has become easier to dispense, with e-mail having become both ubiquitous and, at times, annoyingly efficient. A few days ago I received intriguing advice from a student. A characteristic of youth, one that is undoubtedly engaging, is the unshakeable conviction that every problem has a satisfactory solution. The student, apparently one with a driving interest in institutional quality, suggested that 'access to *Facebook* and *Twitter* should be barred on the campus network'. He argued that this course of action would result in improving the quality of the research output of the institution. Having struggled with the digital revolution for several years, I have only read about *Facebook* and *Twitter*, both of which seem to be gathering strength with each passing day. Celebrities and revolutionaries seem to have converged in equal measure on these sites. The student's mail left me slightly puzzled.

Social networking, both virtual and real, is something I have only observed from a distance. What could be the connection between internet access to these sites and research output? My first guess was that my advisor was implying that several students (and possibly, faculty) spent excessive time on social networking sites rather than on productive academic pursuits. Was there any other connection? I turned for help, inevitably to a student, who suggested that the institutional network connectivity was becoming slower and slower as larger and larger segments of the community became addicted to *Facebook* and *Twitter*. Coincidentally, even as I write this the *Times of India* (18 January 2012) reports that IIT Madras has blocked access to *Facebook* and *Twitter*, as

the local information highway appears to have become completely clogged with traffic to those sites. I was left wondering how students had spent their time a few years ago, in the pre-historic era when the Internet, *Google*, *Facebook* and *Twitter* had not made major inroads into public consciousness.

Modern information technologies have been truly transformative on the way in which academic communities function. Scientists have always communicated by writing papers. Journals have been central to the enterprise of science, since the appearance of the *Philosophical Transactions of the Royal Society* in 1665. Little changed in the manner in which manuscripts were prepared or journals produced for nearly three centuries. Dramatic changes occurred only in the last decade of the 20th century. In the 1970s, when I first began to read and write scientific papers, the first version of manuscripts was invariably written in long hand. Transformation into a typescript required the authors to write legibly or employ typists, who had to correctly decipher scribbles, through long years of experience. The draft manuscript was then typed on a 'stencil sheet' using a manual typewriter. Copies were then rolled off on a cyclostyling machine. Figures were drawn by a draughtsman using tracing sheets and 'India ink'. Copies were produced by the process of 'ammonia printing'. Blue copies were carefully trimmed to size. Manuscripts were sent by airmail to journals, which insisted on multiple copies driving up postal expenses. The postman was a popular and eagerly awaited individual. Acceptance and rejection letters from journals (often more of the latter) were always delivered with unfailing regularity by the local post office. The new technologies began to intrude into India in the late 1970s; some inventions had a very short life. The electric typewriter made a brief entry only to be swept away by computers and printers. The photocopier, always known as the 'Xerox machine', became a fixture in institutions. Manual typewriters, cyclostyling machines and ammonia printing devices disappeared. Draughtsmen, gestetner operators and typists approached extinction. Word processors appeared briefly. By the late 1980s PCs were on the horizon. Changes were fast and furious in the 1990s. Manuscripts could be produced in their entirety by authors, with little pretention to typing or drawing skills. The *Microsoft* world was becoming commonplace. Electronic

submission of manuscripts became the norm in the new century as the speed and power of the internet grew dramatically.

In less than 25 years the process of science publishing has transformed in a manner that could hardly have been anticipated in the 1970s. The traditional printed journal is approaching extinction, even as libraries seek to reinvent themselves. The manner in which scientific lectures are given has changed spectacularly. PowerPoint ensures that slides have a uniformly attractive quality, that often compensates for deficiencies of presentation. In reflecting on the transformative role of technology in communicating science, I could not but help concluding that fearsomely efficient worldwide communication has been a mixed blessing. E-mails demand instant responses. Left unattended, they are drowned by the perennial stream of messages that pour in. Texting on phones is now so common that addicts have forgotten how to spell. *Twitter* appears to encourage brevity (and at times, inanity) to the point where a return to normal(?) communication becomes difficult. The rise of the internet has made free expression an art form, with blogs and comments complementing the power of social networking sites in shaping opinion. Undiscerning browsers on the internet can sometimes find it hard to distinguish between fact and fiction. Governments, both democratic and otherwise, can scarcely conceal their desire to police the internet.

Prompted to think about the new and ever expanding virtual world by a student's e-mail, I was pleasantly surprised to receive a book that provides a historical account of 'the ideas that shaped a century and a company'. The company, of course, is IBM (International Business Machines). Celebrating a century of existence, IBM was for a long time synonymous with mainframe computers. *Making the World Better* is authored by three journalists who examine distinct aspects of 'how the world has changed', while exploring 'IBMs role in that change' (Maney, K., Hamm, S. and O'Brien, J. M., IBM Press, 2011). The three sections, authored independently, provide an engaging view of the growth of the technology and businesses that dominate the world today. IBM entered India in the 1960s. Multinationals were then viewed with deep suspicion; computerization was projected as a device that would result in a loss of jobs. The railways in India were the first to realize the enormous enhancement in operational efficiency by embracing computers. Fifty years later, the computerization of administration in all public departments is slowly becoming a reality. To a great extent, it is the internet with its enormous entertainment value which has served to make computers acceptable in all offices. Kevin Maney's overview of the growth of computers is compelling. Machines that deal with information must be able to 'sense the

world'. Humans do it all the time using 'sight, hearing, touch, smell and taste'. From the punched cards of the 1960s to the touch technology on the most recent devices, progress has been rapid. Computers may soon rival their creators in being able to 'sense the world' in everyway. Storage is, of course, the key element in processing information. The brain does it well, but can be fickle. How often have we been unable to recall a fact which we surely stored away? Computer memories are becoming so vast and efficient that Maney suggests 'we are now approaching total recall'. As storage devices become smaller and smaller, we encounter a new problem – the need to deal with a deluge of data. Maney has an interesting view: 'The human brain has a mechanism for dealing with data overload. It forgets. If indeed we're on a path to building machines that think like us, how ironic if the next great invention in computer memory turns out to be forgetting.' Processing, computing faster and faster, defines the field in a way no other parameter does. Maney describes the road from individual transistors to chips, densely packed with transistors. Moore's law appeared in 1965, which predicted 'that the density of transistors would double roughly every 18 months'. Remarkably the law has held up for nearly half a century. Hardware obsolescence may be traced to the success of Moore's law. Computers have moved to mimic many attributes of the human brain and Maney chronicles the transition from chess playing 'Deep Blue' to the quiz champion 'Watson'. While the former triumphed in a brutal, machine-like manner, the latter defeated human opponents in a more subtle fashion; 'Watson learns from its mistakes.' Towards the end of his overview, Maney turns to networking. He notes that 'when people, computers and devices interconnect, computing's impact is multiplied exponentially'. The internet is now entrenched; cloud computing is a term increasingly heard; hand held devices can operate in the most unlikely places. Computers and communication have merged seamlessly.

Having digressed, I must return to the issue with which I began. Is it sensible to regulate internet usage, especially social networking sites as my advisor suggested? I suspect it would be as effective as 'prohibition' was in curbing alcohol consumption, with cleverer and cleverer ways of circumventing restrictions being invented. Bans often spur creativity.

The internet has evolved as a formless entity that recognizes no political or geographic boundary. Exercising control over the internet may, ironically, be 'a problem with no technical solution', a phrase coined by Jerome Wiesner and famously resurrected by Garret Hardin in his now classic analysis of 'the tragedy of the commons'.

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