What is Cyberspace ?

David G.W. Birch, S. Peter Buck
1991

Introduction

In a recent issue of the *Computer Law & Security Report* [1], Bernard Zajac suggested that readers might want to peruse some of the "cyberpunk" novels - in particular the works of William Gibson - in order to gain an insight into the organisation and behaviour of hackers. While wholly commending the incitement to read Gibson's work, we feel that this view understates the breadth of vision of the cyberpunk genre and could mislead, because the "console men" and "keyboard cowboys" of Gibson's works are not really the same people as the hackers of today.

We thought it might therefore be both entertaining and stimulating to provide readers with an overview of the world of cyberspace and to draw attention to some elements of the works where we feel that there are indeed some points worth further analysis and discussion. Is it possible that, like Arthur C. Clarke's much vaunted prediction of the communication satellite [2], Gibson has produced works which are not so much science fiction as informed prediction ?

Gibson is not the only cyberpunk author, but he has become probably the most well-known. Essential reading includes his books *Count Zero* [3], *Neuromancer* [4], *Burning Chrome* [5] and *Mona Lisa Overdrive* [6]. For readers new to the subject, *Mirroshades* [7] is an excellent anthology of cyberpunk short stories which gives an overview of the spectrum of cyberpunk writing.

Description

Cyberspace is an extension of the idea of virtual reality. Instead of seeing computer data converted into pictures that come from human experience (as in a flight simulator), or extensions from human experience (such as the "desktop" metaphor used with personal computers), cyberspace comprises computers, telecommunications, software and data in a more abstract form. At the core of cyberspace is the matrix or the Net : "The Net... joins all of the computers and telephones on Earth. It is formed by radio, telepho and cellular links with microwave transmitters beaming information into orbit and beyond. In the 20th century, the Net was only accessible via a computer terminal, using a device called a modem to send and receive information. But in 2013, the Net can be entered directly using your own brain, neural plugs and complex interface programs that turn computer data into perceptual events." *View From the Edge*, [8]. In several places, reference is made to the military origin of the cyberspace interfaces :

> "You're a console cowboy. The prototypes of the programs you use to crack industrial banks were developed for [a military operation]. For the assault on the Kirensk computer nexus. Basic module

> was a Nightwing microlight, a pilot, a matrix deck, a jockey. We were running a virus called Mole. The Mole series was the first generation of real intrusion programs." *Neuromancer*, [4].

"The matrix has its roots in primitive arcade games... early graphics programs and military experimentation with cranial jack." *Neuromancer*, [4]. Gibson also assumes that in addition to being able to "jack in" to the matrix, you can go through the matrix to jack in to another person using a "simstim" deck. Using the simstim deck, you experience everything that the person you are connected to experiences :

"Case hit the simstim switch. And flipped in to the agony of a broken bone. Molly was braced against the blank grey wall of a long corridor, her breath coming ragged and uneven. Case was back in the matrix instantly, a white-hot line of pain fading in his left thigh." *Neuromancer*, [4]. The matrix can be a very dangerous place. As your brain is connected in, should your interface program be altered, you will suffer. If your program is deleted, you would die. One of the characters in *Neuromancer* is called the Dixie Flatline, so named because he has survived deletion in the matrix. He is revered as a hero of the cyber jockeys :

"'Well, if we can get the Flatline, we're home free. He was the best. You know he died braindeath three times'. She nodded. 'Flatlined on his EEG. Showed me the tapes.'" *Neuromancer*, [4]. Incidentally, the Flatline doesn't exist as a person any more : his mind has been stored in a RAM chip which can be connected to the matrix.

Operation

So how does cyberspace work ? As noted previously, you connect to the matrix through a deck which runs an interface program :

> "A silver tide of phosphenes boiled across my field of vision as the matrix began to unfold in my head, a 3-D chessboard, infinite and perfectly transparent. The Russian program seemed to lurch as we entered the grid. If anyone else had been jacked in to that part of the matrix, he might have seen a surf of flickering shadow ride out of the little yellow pyramid that represented our computer." *Burning Chrome*, [5].

> "Tick executed the transit in real time, rather than the bodyless, instantaneous shifts ordinarily employed in the matrix. The yellow plain, he explained, roofed the London Stock Exchange and related City entities... 'Th's White's', Tick was saying, directing her attention to a modest grey pyramid, 'the club in St. James'. Membership directory, waiting list..." *Mona Lisa Overdrive*, [6].

Is this view of operating computers and communications networks by moving around inn ethereal machine-generated world really that far-fetched ? When the first virtual reality (VR) units for personal computers will probably be in the shops by next Christmas ? If you still think that VR is science fiction, note that British television viewers will shortly be tuning in to a new game show (called "CyberZone") where the digital images of teams of players equipped with VR helmets, power gloves and pressure pads will fight it out in a computer-generated world (built using 16 IBM PCs fronting an ICL master computer).

Organisation

The world of cyberpunk is near future Earth (say, 50 years at the maximum). Nation states and their governments are unimportant and largely irrelevant. The world is run by giant Japanese-American-European multinational conglomerates, the zaibatsu. Gibson frequently uses Japanese words and Japanese slang to reinforce the expanding role of Japan in the world and in society. In the same way that business has agglomerated on a global scale, the mafia have merged with the Japanese gangs, the yakuza. The zaibatsu are in constant conflict and the yakuza are their agents : "Business has no stake in any political system per se. Business co-operates to the extent that co-operation furthers its own interests. And the primary interest of business is growth and dominance. Once the establishment of Free Enterprise Zones freed corporations from all constraints, they reverted to a primal struggle, which continues to this day." Stone Lives, [9].

Far fetched ? Again, not really. Even as we sat down to write this article, the Chairman and Vice-Chairman of Nomura (the world's largest financial institution) were resigning because of their links with organised crime :

"Sceptics say that four decades of accommodation between police, politicians and yakuza will not be overturned simply by new legislation. There are believed to be almost 100,000 full-time gangsters in Japan, a quarter of whom belong to the Yamaguchi-Gumi, a mammoth organisation with 900 affiliates and a portfolio of operations ranging from prostitution, drugs and share speculation to run-of-the mill protection rackets" [10]. Herein lies a major feature of Gibson's books. The cyber jockeys are not student pranksters or teenage hackers messing about with other peoples' computers for fun or mischief (The Lord of the Files, [11]) : by and large they are either working for the zaibatsu or the yakuza and their (for profit) activities revolve around industrial espionage and sabotage.

Information

A fundamental theme running through most cyberpunk literature is that (in the near future Earth) commodities are unimportant. Since anything can be manufactured, very cheaply, manufactured goods (and the commodities that are needed to create them) are no longer central to economic life. The only real commodity is information. In fact, in many ways, the zaibatsu are the information that they own :

"But weren't the zaibatsu more like that, or the yakuza, hives with cybernetic memories, vast single organisms with their DNA coded in silicon ?" *Neuromancer*, [4].

Naturally, with information so vital, the zaibatsu go to great lengths to protect their data. In Johnny Mnemonic, one of Gibson's short stories, the eponymous "hero" has data hidden in his own memory to keep it safe from the yakuza :

> '"The stored data are fed in through a series of microsurgical contraautism prostheses'. I reeled off a numb version of my standard sales pitch. 'Client's code is stored in a special chip... Can't drug it out, cut it out, torture it out. I don't know it, never did'". Johnny Mnemonic, [12]

With information so fundamental to the business world, the mechanics of business are vastly different from those we know at present. In our current product - and service - based business world, we are used to dealing with items that can be stamped, traced, taxed, counted and measured. When the primary commodity is

information, these attributes no longer apply and the structure of the business world is different. This has already been recognised by many people, including the well-known management consultant Peter Drucker [13] :

> "So far most computer users still use the new technology only to do faster what they have done before, crunch conventional numbers. But as soon as a company takes the first tentative steps from data to information, its decision processes, management structure and even the way it gets its work done begin to be transformed."

Net Running

Hacking is too trivial and undescriptive a term to use for the unauthorised and illegal activities of the cyber jockeys in cyberspace. A much better terms is "Net Running".

> "They found their 'paradise'... on the jumbled border of a low security academic grid. At first glance it resembled the kind of graffiti student operators sometimes left at the junction of grid lines, faint glyphs of coloured light that shimmered against the confused outlines of a dozen arts faculties. 'There', said the Flatline, 'the blue one. Make it out ? That's an entry code for Bell Europa. Fresh, too.'" *Neuromancer*, [4].

Everywhere in the Net, there is "ice". Ice is security countermeasures software. The Net runners spend most of their time in the matrix encountering, evaluating and evading these countermeasures. The encounters with ice are brilliantly described in many of Gibson's books :

> "We've crashed her gates disguised as an audit and three subpoenas, but her [the organisation being attacked] defences are specifically geared to deal with that kind of intrusion. Her most sophisticated ice is structured to fend off writs, warrants, subpoenas. When we breached the first gate, the bulk of her data vanished behind core command ice... Five separate landlines spurted May Day signals to law firms, but the virus had already taken over the parameter ice... The Russian program lifts a Tokyo number from unscreened data, choosing it for frequency of calls, average length of calls, the speed with which [the organisation] returned those calls. 'Okay', says Bobby, 'we're an incoming scrambler call from a pal of hers in Japan. That should help'. Ride 'em cowboy." *Burning Chrome*, [14]

The best ice contains elements of artificial intelligence (AI) : "'That's it huh ? Big green rectangle off left ?' 'You got it. Corporate core data for [another organisation] and that ice is generated by their two friendly AIs. On par with anything in the military sector, looks to me. That's king hell ice, Case, black as the grave and slick as glass. Fry your brains as soon as look at you." *Neuromancer*, [4]. These descriptions cannot be seen as predictions : they are just straightforward extrapolations based on current technology and trends.

Predictions

So what are the core "predictions" of cyberpunk and do they have relevance to security strategies today ?

Computer and communications technology is already at a point where the Net is only a few years away. Charles L. Brown, the CEO of AT&T, put it like this : "The phone system, when coupled with computer technology, permits a person almost anywhere to plug in to a world library of information... Just around the bend is an information network that would increase the range of perception of a single individual to include all of the information available anywhere in the network's universe" [15].

The development of the corporate world so that information becomes the primary commodity is already underway. This does have implications for planning, because too many existing risk management policies are asset-based. As it is easier to value a computer than value the information it holds, too much effort has gone into valuing and protecting physical assets rather than information assets. Already, there is a good argument for saying that the information assets are the key [16] :

> "A new concept of business is taking shape in response to the info-wars now raging across the world economy. As knowledge becomes more central to the creation of wealth, we begin to think of the corporation as an enhancer of knowledge."

How will the information assets be valued ? How will the world of mergers and acquisitions deal with the problem of rate of return on "intangible" assets. An interesting parallel can be drawn with the relatively recent attempts to value brand names and include the brand names as assets on balance sheets.

The legal sector is probably even further behind than the security sector. With the legal system already struggling to catch up with the developments in computer and communications technology, it is hard to imagine how it could come to terms with cyberspace :

> "As communications and data processing technology continues to advance at a pace many times faster than society can assimilate it, additional conflicts have begun to occur on the border between cyberspace and the physical world." [17]

In fact, these conflicts are already causing many problems as evidenced by recent events and court cases in the U.S. [18] :

> "Do electronic bulletin boards that may list stolen access codes enjoy protection under the First Amendment ?"
> "How can privacy be ensured when computers record every phone call, cash withdrawal and credit-card transaction. What 'property rights' can be protected in digital electronic systems that can create copies that are indistinguishable from the real thing."
> "Ten months after the Secret Service shut down the [electronics bulletin boards], the Government still has not produced any indictments. And several similar cases that have come before the courts have been badly flawed. One Austin-based game publisher whose bulletin board system was seized last March is expected soon to sue the Government for violating his civil liberties."

Summary

We hope that this brief overview of the world of cyberpunk has done justice to the excellent books from which

we have quoted and encouraged some readers to dip into the collection.

So is Gibson's work an example of a science fiction prediction that will prove to be as accurate as Clarke's prediction of the communications satellite ? Not really : the world that Gibson writes about is more a well thought out extension of the situation at present than a radical prediction. After all, as Gordon Gekko (the character played by Michael Douglas) says in the film *Wall Street*, "the most valuable commodity I know of is information. Wouldn't you agree ?"

References

1. Zajac, B., Ethics & Computing (Part II). *Computer Law and Security Report*, 1991. 7(2).
2. Clarke, A.C., Extraterrestrial Relays, in *Wireless World*. 1945, p. 305-308.
3. Gibson, W., *Count Zero*. 1987, London : Grafton.
4. Gibson, W., *Neuromancer*. 1984, New York : Ace.
5. Gibson, W., *Burning Chrome*. 1987, New York : Ace.
6. Gibson, W., *Mona Lisa Overdrive*. 1989, London : Grafton.
7. Sterling, B., ed. *Mirrorshades*. 1988, Paladin : London.
8. *View from the Edge - The Cyberpunk Handbook*. 1988, R. Talsorian Games Inc.
9. Fillipo, P.D., Stone Lives, in *Mirrorshades*, B. Sterling, Editor. 1988, Paladin : London.
10. Japan's Mafia Takes on a 6bn Business, in *The Guardian*. 1991, London.
11. Girvan and Jones, The Lord of the Files, in *Digital Dreams*, Barrett, Editor. 1990, New English Library : London.
12. Gibson, W., Johnny Mnemonic, in *Burning Chrome*. 1987, Ace : New York.
13. Cane, A., Differences of Culture and Technology, in *The Financial Times*. 1991, London. p. European IT Supplement.
14. Gibson, W., Burning Chrome, in *Burning Chrome*. 1987, Ace : New York.
15. Wurman, R.S., *Information Anxiety*. 1991, London : Pan.
16. Toffler, A., Total Information War, in *Power Shift*. 1991, Bantam Books : London.
17. Barlow, Coming in to the Country. Communications of the ACM, 1991. 34(3).
18. Elmer-Dewitt, P., Cyberpunks and the Constitution, in *Time*. 1991, p. 81.