

This is a section of [doi:10.7551/mitpress/1847.001.0001](https://doi.org/10.7551/mitpress/1847.001.0001)

City of Bits

Space, Place, and the Infobahn

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Citation:

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DOI: 10.7551/mitpress/1847.001.0001

ISBN (electronic): 9780262279956

Publisher: The MIT Press

Published: 1996



The MIT Press

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"On the Internet, nobody knows you're a dog."

My name is `wjm@mit.edu` (though I have many aliases), and I am an electronic *flâneur*. I hang out on the network.¹

The keyboard is my café. Each morning I turn to some nearby machine — my modest personal computer at home, a more powerful workstation in one of the offices or laboratories that I frequent, or a laptop in a hotel room — to log into electronic mail. I click on an icon to open an “inbox” filled with messages from round the world — replies to technical questions, queries for me to answer, drafts of papers, submissions of student work, appointments, travel and meeting arrangements, bits of business, greetings, reminders, chitchat, gossip, complaints, tips, jokes, flirtation. I type

E L E C T R O N I C A G O R A S

replies immediately, then drop them into an “outbox,” from which they are forwarded automatically to the appropriate destinations. (Note the scare quotes. “Box” is a very loose metaphor, and I will come back to that later.) If I have time before I finish gulping my coffee, I also check the wire services and a couple of specialized news services to which I subscribe, then glance at the latest weather report. This ritual is repeated whenever I have a spare moment during the day.

Traditionally, you needed to *go* someplace to do this sort of thing — to the agora, the forum, the piazza, the café, the bar, the pub, Main Street, the mall, the beach, the gym, the bathhouse, the college dining hall, the common room, the office, or the club —

and where you went pegged your peer group, your social position, and your role.² It also framed expectations about how you should represent yourself by your clothing, body language, speech, and behavior and about the interactions that were to take place. Each familiar species of public place had its actors, costumes, and scripts. But the worldwide computer network — the electronic agora — subverts, displaces, and radically redefines our notions of gathering place, community, and urban life. The Net has a fundamentally different physical structure, and it operates under quite different rules from those that organize the action in the public places of traditional cities. It will play as crucial a role in twenty-first-century urbanity as the centrally located, spatially bounded, architecturally celebrated agora did (according to Aristotle's *Politics*) in the life of the Greek polis and in prototypical urban diagrams like that so lucidly traced out by the Milesians on their Ionian rock.³

S P A T I A L / A N T I S P A T I A L

Now, I just said that `wjm@mit.edu` was my name, but you might equally well (or equally inappositely) claim that it was my address. The categories are conflated due to the simultaneous redefinitions of space, personal identity, and subjectivity that are emerging as the network grows.

The Net negates geometry. While it does have a definite topology of computational nodes and radiating boulevards for bits, and while the locations of the nodes and links can be plotted on plans to produce surprisingly Haussmann-like diagrams, it is fundamentally and profoundly *antispacial*. It is nothing like the Piazza Navona or Copley Square. You cannot say where it is or describe its memorable shape and proportions or tell a stranger how to get there. But you can find things in it without knowing where they are. The Net is ambient — nowhere in particular but everywhere at once. You do not go *to* it; you log *in* from wherever you physically

happen to be. In doing this you are not making a visit in the usual sense; you are executing an electronically mediated speech act that provides access — an “open sesame.”

Your own address is not pinned to a place; it is simply an access code, with some associated storage space, to some computer located somewhere on the Net. It does not matter much what sort of computer it is or where you might find it. (I have never laid eyes on the machine that gives me access to the network. I suppose it is in some back room at MIT. There is no reason for me to seek it out.) To get on the network you establish physical connection to your host machine (through a digital link, by dialing in from any telephone via phone lines and a modem, or even via a cellular modem), provide the access code, and give a password. You can then ask the host to send you the accumulated contents of your inbox, and you can send it your outbox for distribution.⁴ Other users of the network hook into their host machines in the same way. Thus, unlike telephone calls or fax transmissions, which link specific machines at identifiable locations (the telephone on your desk and the telephone on my desk, say), an exchange of electronic mail (e-mail) links people at *indeterminate* locations. If I send you an e-mail message, it will come tagged with my name/address, but you will not know whether I transmitted it from my office or typed it in at home while sipping a glass of wine or entered it into my laptop on a trans-Pacific flight and then sent it from a public telephone at Narita airport. And I need not know where you are — your current street address and zip code or your telephone number; I just direct my message to your network name/address, and I can be sure that it will eventually end up at whatever machine you choose to log in from.

If I wanted to be particularly careful about concealing my identity and location — perhaps because I intended to do something embarrassing like downloading pornography or illegal like grabbing

pirated software copies — I could route my correspondence through an “anonymous remailer.” This is a machine that functions like a numbered postbox or Swiss bank account; I can use it as an address that reveals nothing about me, and I can drop messages onto it for subsequent pickup.

So the Net eliminates a traditional dimension of civic legibility. In the standard sort of spatial city, *where* you are frequently tells *who* you are. (And who you are will often determine where you are allowed to be.) Geography is destiny; it constructs representations of crisp and often brutal clarity. You may come from the right side of the tracks or the wrong side, from Beverly Hills, Chinatown, East Los, or Watts, from the Loop, the North Side, or the South Side, from Beacon Hill, the North End, Cambridge, Somerville, or Roxbury — and everybody knows how to read this code. (If you are homeless, of course, you are nobody.) You may find yourself situated in gendered space or ungendered, domains of the powerful or margins of the powerless; there are financial districts for the pinstripe set, pretentious yuppie watering holes, places where you need a jacket and tie, golf clubs where you won't see any Jews or blacks, shopping malls, combat zones, student dives, teenage hangouts, gay bars, redneck bars, biker bars, skid rows, and death rows. But the Net's despatialization of interaction destroys the geocode's key. There is no such thing as a better address, and you cannot attempt to define yourself by being seen in the right places in the right company.⁵

C O R P O R E A L / I N C O R P O R E A L

The incorporeal world of the Net has its own mechanisms for coding and class construction.

Some network acquaintances know me merely by the neutral identifier “wjm@mit.edu,” for example, but most prefer to address

me by one or another of my many more meaningful aliases. A few establish a direct linkage to a unique, known, embodied subject by listing me as “William J. Mitchell” in their personal directories of acquaintances, then select that alias as the recipient of their messages. My family, friends, and immediate staff, who send me messages very frequently, find it natural to use the abbreviated and more intimate alias “Bill.” (It is not an ambiguous one in the bounded context of our acquaintance.) Proper names are not always necessary, though. Students, staff, and faculty at MIT often address their messages to “Dean,” for instance, because that describes the role I play in their professional lives; if somebody were to replace me in that role, their messages could automatically, transparently, and immediately be redirected. My Finger file on the Net supposedly establishes who I am IRL (in real life), but it is itself just a set of potentially opaque or misleading descriptor values.⁶

Other correspondents address me implicitly rather than explicitly when they broadcast messages to groups defined by membership lists or by possession of specified characteristics — graduate students and instructors participating in particular seminars, researchers and scholars interested in certain topics, or just friends who sometimes like to do things together. (Membership of such groups separates the information-rich from the information-poor. Here, as elsewhere, class correlates with privilege.) Or they might find me by searching a database to find somebody matching a given profile.⁷

In this fashion, alias by alias, bit by bit, my disembodied electronic identity is constructed. But as Frege taught us in his famous analysis of “The Morning Star Is the Evening Star,” it is not trivial, and perhaps not even true, to say that `wjm@mit.edu` is `Dean@mit.edu` or that either one is the embodied William J. Mitchell! When names float around without precise, unambiguous attachment to unique things, referential complexities abound.

It may even be that something with a definite electronic identity has no physical embodiment at all. Consider, for example, the Usenet Oracle.⁸ You can e-mail questions to the Oracle, who resides in Indiana, and he will send you back answers. Whenever you submit a query, he will also send you another one and ask you to respond. He actually does nothing more than randomly match supplicants to respondents, and he is just a fairly simple piece of software. Yet he seems to have a personality and a characteristic sense of humor.

FOCUS E D / FRAGMENT E D

While I present myself to others on the Net through the aliases and descriptors I choose and the connections these aliases and descriptors establish, I also construct those others and they simultaneously construct me. (Different keystrokes for different folks.) But the process of mutual construction usually gives very little away. Because communication takes place without my bodily presence or the sound of my voice, others who “know” me quite well may not realize how I look or how I present myself in person, and thus may be unable to make the usual inferences from that.⁹ (I am not inevitably subject to placement and displacement like Eliza Doolittle.) I can very easily conceal, leave carefully ambiguous, or falsely signal gender, race, age, body shape, and economic status. My representation on the Net is not an inevitability of biology, birth, and social circumstance, but a highly manipulable, completely disembodied intellectual fabrication; electronic cross-dressing is an easy and seductive game.¹⁰ Conversely, I have found that it can be a jarring, dislocating experience actually to meet somebody I have long known through network interactions and for whom I have, by virtue of these interactions, presumptively devised a persona.¹¹ There are games of constructing electronic closets, and moments for coming out of them.¹²

On the Net I must present my password rather than my person whenever I want to identify myself — to show that it's really me. It follows that, if I can somehow obtain somebody else's password, I can, like an *Invasion of the Body Snatchers* alien pod, extinguish that poor soul from the scene and falsely assume his or her identity. (That person could do the same to `wjm@mit.edu`, of course.) Footsy with gender and social marking, and with the integrity of personal identity, need not stop here; I can create as many network identities as I want for myself, and others will have no way of knowing that these software-conjured zombies all belong to me. Try deconstructing *Invasion* not as campy allegory on cold-war commies but as a resistant glimpse into a world of unstable identities, ambiguously located intentions, and concealed control, and it looks very prescient.

My software surrogates can potentially do much more than provide origins and destinations for messages; when appropriately programmed, they can serve as my semiautonomous agents by tirelessly performing standard tasks that I have delegated to them and even by making simple decisions on my behalf.¹³ (As the citizens of the polis relied upon their helots, so the users of the Net will increasingly depend upon their programmed agents.) It is a hacker's no-brainer, for example, to create a software receptionist — less politely known as a Bozo filter — that screens incoming electronic mail by checking the origin addresses, throwing away junk items, and sorting the rest in priority order. A slightly smarter agent might automatically contact other agents to reconcile diaries and arrange needed meetings at convenient times. (My agent will call your agent.) Another might sleeplessly monitor the stock markets for me, buying and selling according to some programmed strategy. Yet another might continually scan the wire service news to pick out items likely to interest me, and it might have the capacity to interrupt and alert me immediately when something really

important shows up. And a more maliciously conceived one might be programmed to roam the digital highways and byways looking for trouble — for opportunities to corrupt the files of my enemies, to plunder valuable information, to eliminate rival agents, or to replicate itself endlessly and choke the system. Fritz Lang got it wrong: the robots in our future are not metallic Madonnas clanking around Metropolis, but soft cyborgs slinking silently through the Net. The neuromans of William Gibson are a lot closer to the mark.

While the Net disembodies human subjects, it can artificially embody these software go-betweens. It is a fairly straightforward matter of graphic interface design to represent an agent as an animated cartoon figure that appears at appropriate moments (like a well-trained waiter) to ask for instructions, reports back with a smile when it has successfully completed some mission, and appears with a frown when it has bad news. If its “emotions” seem appropriate, you will probably like it better and trust it more.¹⁴ And if cartoon characters do not appeal, you might almost as easily have digital movies of actors playing cute receptionists, slick stockbrokers, dignified butlers, responsive librarians, cunning secret agents, or whatever personifications tickle your fancy.¹⁵

How do you know who or what stands behind the aliases and masks that present themselves?¹⁶ Can you always tell whether you are dealing directly with real human beings or with their cleverly programmed agents? Was that politely phrased e-mail request for a meeting from `wjm@mit.edu` originated by the flesh-and-blood William J. Mitchell or was it generated autonomously by one of his made-to-order minions? (That, of course, was Turing’s famous question. He thought that indistinguishability would demonstrate machine intelligence. But it might equally well follow from a human being playing dumb or engaging in discourses that do not require any smarts.) Does the logic of network existence entail

radical schizophrenia — a shattering of the integral subject into an assemblage of aliases and agents? Could we hack immortality by storing our aliases and agents permanently on disk, to outlast our bodies? (William Gibson's cyberpunk antiheroes nonchalantly shuck their slow, obsolescent, high-maintenance meat machines as they port their psychic software to newer generations of hardware.)¹⁷ Does resurrection reduce to restoration from backup?¹⁸

S Y N C H R O N O U S / A S Y N C H R O N O U S

A face-to-face human conversation — the sort for which dinner tables and traditional seminar and meeting rooms are designed — is a spatially coherent, corporeal, and strictly synchronous event. The participants are all present in the same place, everybody hears the words as they are spoken, and replies usually come immediately. The telephone and talk radio have allowed conversants to be dispersed spatially but have not altered this condition of synchrony. (Until the introduction of the answering machine, you had to be by the phone, at the right time, to take a call.)

But there is an alternative. Where necessary, as when Pheidippides was dispatched to run from Athens to Sparta and back, the ancient Greeks used messengers for asynchronous communication. The letter and the postal system, the fax machine, the humble home answering machine, and the fancy corporate voice mail system are all more up-to-date devices for asynchronous communication and so — more significantly in this context — are the network's e-mail and bulletin board systems.¹⁹ In the asynchronous mode, words are *not* heard as they are spoken, but are repeated at some later point. Replies do not come immediately. The unity of the face-to-face conversation is fractured both spatially and temporally.

We usually find the laggardliness of the Postal Service's snail-mail, its enforcement of slug's-pace asynchrony, to be a nuisance. As

much more efficient asynchronous communications systems have become commonplace, though, we have seen that strict synchrony is not always desirable; controlled asynchrony may have its advantages. We all know how inconvenient an unexpected demand for communication — a knock on the office door when one is deep in thought or a telephone call at the wrong time — can be. Business people and academics have gratefully discovered that it is usually much easier to communicate between Boston and Tokyo by fax than it is to find convenient times at both ends for telephone conversations. Answering machines and voice mail systems eliminate the frustration of telephone tag. You can attend to your e-mail whenever it is convenient to do so, not when you are unexpectedly and arbitrarily interrupted by a telephone ring. We are discovering that strictly synchronous communication is really just a limit case of asynchronous communication.

The tilt toward electronic asynchrony will have increasingly dramatic effects upon urban life and urban form. In the familiar, spatial, synchronous style of city, there is a time and a place for everything.²⁰ Gathering spots like restaurants and cafés are open, and people come together in them, for well-defined periods. Workers carry out their tasks during standard business hours, and there are predictable rush hours as they travel to and from their workplaces. Buses and trains have schedules, appointments and meetings are arranged for specific moments, theatrical performances, television programs, and university classes are slotted for particular times. Just as each city has its characteristic spatial organization, so it has its own daily, weekly, and seasonal rhythms — very different for New York, Rome, Delhi, and Tokyo. As there is prime real estate, so there is prime time. But now extrapolate to an entirely asynchronous city. Temporal rhythm turns to white noise. The distinction between live events and arbitrarily time-shifted replays becomes difficult or impossible to draw (as it often is now on the television news); anything can happen at any moment.²¹

When, for example, does an online forum take place, and where do you show up for it? You cannot say. The discussion unfolds over an indefinite period, among dispersed participants who log in and out at arbitrary moments, through uncoordinated posting and receipt of e-mail messages.

N A R R O W B A N D / B R O A D B A N D

The bandwidth-disadvantaged are the new have-nots. It's simple; if you cannot get bits on and off in sufficient quantity, you cannot directly benefit from the Net.

The consequences of this are brutally obvious. If the value of real estate in the traditional urban fabric is determined by location, location, location (as property pundits never tire of repeating), then the value of a network connection is determined by bandwidth, bandwidth, bandwidth. Accessibility is redefined; tapping directly into a broadband data highway is like being on Main Street, but a low baud-rate connection puts you out in the boonies, where the flow of information reduces to a trickle, where you cannot make so many connections, and where interactions are less intense. The bondage of bandwidth is displacing the tyranny of distance, and a new economy of land use and transportation is emerging — an economy in which high-bandwidth connectivity is an increasingly crucial variable.

Since the cost of a high-bandwidth cable connection grows with distance, information hotspots often develop around high-capacity data sources, much as oases grow up around wells. “Smart” office buildings, for example, may have their own dish antennas for satellite communications and fiber-optic links to the outside world, and they provide internal broadband connections to these sources. University campuses may connect their internal computer networks to long-distance telecommunications backbones, so creating

privileged, information-rich communities. Teleports, which concentrate powerful telecommunications equipment, may be built to serve industrial parks or financial districts.²² And telecottages may play similar roles in rural areas.²³

So some very contentious public policy issues start to pop up. The American telephone system was set up to provide “universal service” reaching not only to profitable markets for telecommunications services, but also to poor communities and to remote and sparsely populated areas where the costs of providing service are high and the customers are few. As part of the package, telephone companies became regulated monopolies, and unprofitable services were cross-subsidized by profitable ones. But will the fast lanes of the information superhighway — the switched, broadband, digital networks that will be required for the most advanced services — be deployed with the same lofty goal? Or will they serve only the affluent and powerful, while rural communities languish at the ends of information dirt tracks and economically marginalized neighborhoods get redlined for telecommunications investment?

Broadcast bandwidth is another matter — one of radiation epicenters and transmitter power rather than of network topology and cable capacity. There is only so much electromagnetic spectrum, so it is a definitively fixed resource in a given broadcast area. And there are only so many geosynchronous satellite “parking spaces” in the Clark Circle.²⁴ So powerful organizations will, no doubt, increasingly contend for shares of the bit radiation business in localities dense with receivers, and will seek like ancient despots to bring concentrations of population under their control.²⁵

No network connection at all — zero bandwidth — makes you a digital hermit, an outcast from cyberspace. The Net creates new opportunities, but exclusion from it becomes a new form of marginalization.²⁶

Since bandwidth costs money, most people still have to be content with very limited bandwidth access. And this cannot, of course, fully substitute for face-to-face (F2F) contact; only the most hopelessly nerded-out technogeeks could be persuaded to trade the joys of direct human interaction for solitary play with their laptops in darkened rooms. But what is the difference anyway? Just a few more bits.²⁷ (Hacker lore has it that burgeoning cyberspace romances progress through broadening bandwidth and multiplying modalities — from exchange of e-mail to phone and photo, then taking the big step of going F2F, then climbing into bed.) With improvements in telecommunications technology we can expect growing availability of higher-bandwidth connections, which will make machine-mediated conversation and companionship seem better bargains.

Electronic interaction will become increasingly multimodal, as when videoconferencing combines sound and vision.²⁸ Robotic effectors combined with audio and video sensors will provide telepresence. Intelligent exoskeletal devices (data gloves, data suits, robotic prostheses, intelligent second skins, and the like) will both sense gestures and serve as touch output devices by exerting controlled forces and pressures; you will be able to initiate a business conversation by shaking hands at a distance or say goodnight to a child by transmitting a kiss across continents.²⁹ Exercise machines increasingly incorporate computer-controlled motion and force feedback and will eventually become reactive robotic sports partners (at any level of strength and skill you may choose). Today's rudimentary, narrowband video games will evolve into physically engaging telesports: remote arm wrestling, teleping-pong, virtual skiing and rock climbing.³⁰ Network pimps will offer ways to do something sordid (but safe) with lubriciously programmed telehookers.³¹ (This is an obvious extrapolation of the telephone's

transformation of the whorehouse into the call-girl operation.) Telemolesters will lurk. Telethugs will reach out and punch someone.

With higher bandwidths, ever-greater processing power, and more sophisticated input/output devices designed to take advantage of these capabilities, the boundary that has traditionally been drawn by the edge of the computer screen will be eroded. Through head-mounted stereo displays (an old idea of Morton Heilig's, which was first implemented by Ivan Sutherland in the 1960s and is now finally being popularized) or through holographic television (it's coming), you will be able to *immerse* yourself in simulated environments instead of just looking at them through a small rectangular window.³² This is a crucial difference: you become an *inhabitant*, a *participant*, not merely a spectator.

The distinction between voyeurism and engagement that arises here can be a particularly critical one in contexts that traditionally have demanded presence. Paul Virilio has reminded us that seventeenth-century theologians debated whether a Mass seen by means of a telescope was valid.³³ They reasonably concluded that it was not, and still today, video participation in a Mass is reserved for the old, the infirm, and the disabled. But what about immersive, multi-sensory, telepresence at Mass? In a virtual church?

Once we have both a "real" three-dimensional world and computer-constructed "virtual" ones, the distinctions between these worlds can get fuzzed or lost. Ivan Sutherland's original head-mounted stereo display used prisms to insert simulated three-dimensional objects into real scenes. And through video projection of computer displays onto real desktops, or (as in some advanced military aircraft) through superimposition of computed stereo displays onto actual scenes, the proscenium dividing the "real" world from the "virtual" can be made to disappear. You can find yourself

on stage with the actors, trying to distinguish the scenery from the walls.

CONTIGUOUS / CONNECTED

Spatial cities, of course, are not only condensations of activity to maximize accessibility and promote face-to-face interaction, but are also elaborate structures for organizing and controlling access. They are subdivided into districts, neighborhoods, and turfs, legally partitioned by property lines and jurisdictional boundaries, and segmented into nested enclosures by fences and walls. For the inhabitants, crossing a threshold and entering a defined place — as an owner, guest, visitor, tourist, trespasser, intruder, or invader — is a symbolically, socially, and legally freighted act. There is always a big difference between being a local and being an alien, being on your own turf and being on somebody else's, enjoying your privacy and appearing in public, feeling at home and knowing that you are out of place. So it is on the Net, as well, but the game gets some new rules: structures of access and exclusion are reconstrued in entirely nonarchitectural terms (if we continue to define architecture as materially constructed form), and you enter and exit places not by physical travel, but by simply establishing and breaking logical linkages.

Places in the cyberspace³⁴ of the Net are software constructions. Each piece of software running anywhere — on any machine or collection of machines in the Net — creates environments for interaction, virtual realms that you can potentially enter. The text window provided by a word processor is one such place. So is the “drawing surface” or “three-dimensional modeling space” within which you produce and view graphic constructions on a CAD system. So are the “desktops” and “file folders” provided by operating systems, the “cards” of Hypercard, and the “mailboxes” and “bulletin boards” of e-mail systems. Like architectural and urban

places, these have characteristic appearances, and the interactions that unfold within them are controlled (often very rigidly) by local rules. A software “there” can be a one-dimensional place in a screen-displayed text; a two-dimensional place to put things on a “desktop” surface; a three-dimensional virtual room, storehouse, library, gallery, museum, or landscape; or even an n -dimensional place in an abstract data structure.

Some virtual places, like hermits’ huts, can be occupied by only one person at a time. But others are designed to serve as shared-access, multiuser locations for joint activities — electronic calendars that can be updated by several staff members, CAD files that can be accessed simultaneously by several participants in a design session, or virtual chat and conference rooms. Sharing a virtual place is not quite the same thing, of course, as sharing a physical place like a room, a bed, or an umbrella in the rain. Bodies need not be in close proximity, and they need not be enclosed by the same architectural or natural boundaries. The crucial thing is simultaneous electronic access to the same *information*. At their simplest, shared places are created by displaying the same scrolling text on multiple personal computer screens. In more sophisticated places, inhabitants share the same two-dimensional graphic display or even the same immersive, multisensory virtual reality.

Shared “rooms” on the Net often announce themselves by descriptive or allusive names (like the signs on bars and other hangouts) — The Flirt’s Nook, Gay and Lesbian, Red Dragon Inn, Romance Connection, Starfleet Academy, Teen Chat, Thirtysomething, Born-Again Onliners, Pet Chat, and so on. You can cruise them by scanning menus, and look in when they catch your interest, as you might bar hop down a street. The point (as in more traditional meeting places) is not just to be there, but to present yourself and to interact with others. Within these places, the participants must somehow greet and introduce themselves to one another, have

some way of signaling that they want the floor, and follow some agreed convention for taking and relinquishing it. It can all be done simply by typing text or (if the available technology permits) by activating computer-animated body doubles.

Many of the places in cyberspace are public, like streets and squares; access to them is uncontrolled. Others are private, like mailboxes and houses, and you can enter only if you have the key or can demonstrate that you belong. (To get into my private electronic mailbox at MIT, for example, I have to identify myself and present a correct password to a gatekeeper agent named Kerberos.) And sometimes, as with movie theaters and hotel rooms, you have to pay to get in. But software walls — once erected — can be breached, locks can be broken, privacy can be violated, and turf can be trespassed upon, so cyberspace already has its outlaw hackers and phreaks and posses of lawmen chasing them, its viruses and Trojan horses, and its burgeoning mythology of transgression and retribution — those colorful tales of Acid Phreak and Phiber Optic, Clifford Stoll (the electronic sleuth) and Officer Phrackr Trackr, bumbling Keyboard Kops, the Pakistani Brain, the fabled Bulgarian virus factories, and the great virus-induced Internet Crash.³⁵

You get from place to place in cyberspace by following logical links rather than physical paths. Sometimes, as for example in the graphical user interface provided by the Macintosh operating system, the places are nested to form a strict hierarchy: you go down a level in the hierarchy by clicking on a folder icon to open a “window” into a place, and you get back up a level by clicking on a corner of a window to close it — just as Dorothy clicked her heels to get back to Kansas. Alternatively, as in many hypermedia systems and adventure video games, the circulation system may be more freeform: each place provides clickable entry points to an arbitrary number of other places, and you can wander at will through the resulting labyrinth. (The symbols indicating these entry points may look like

gateways or doors, but this is not essential.) To explore the whole, vast territory of the Net, you can use navigation programs like Gopher and Mosaic; these allow you to poke around in other people's computers at will, following the logical "paths" that relate machines, directories, and files.³⁶

Click, click through cyberspace; this is the new architectural promenade.

BIT CITY

The network is the urban site before us, an invitation to design and construct the City of Bits (capital of the twenty-first century), just as, so long ago, a narrow peninsula beside the Maeander became the place for Miletos. But this new settlement will turn classical categories inside out and will reconstruct the discourse in which architects have engaged from classical times until now.

This will be a city unrooted to any definite spot on the surface of the earth, shaped by connectivity and bandwidth constraints rather than by accessibility and land values, largely asynchronous in its operation, and inhabited by disembodied and fragmented subjects who exist as collections of aliases and agents. Its places will be constructed virtually by software instead of physically from stones and timbers, and they will be connected by logical linkages rather than by doors, passageways, and streets.

How shall we shape it? Who shall be our Hippodamos?

First MIT Press paperback edition, 1996

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The book was set in Bembo and Meta by Wellington Graphics and was printed and bound in the United States of America.

Library of Congress Cataloging-in-Publication Data

Mitchell, William J.

City of bits : space, place, and the infobahn / William J. Mitchell.

p. cm.

Includes bibliographical references and index.

ISBN 978-0-262-13309-8 (hc. : alk. paper) — 978-0-262-63176-1 (pb. : alk. paper)

1. Computer networks. 2. Information technology. 3. Virtual reality.

I. Title.

TK5105.5.M57 1995

303.48'33—dc20

95-7212

CIP