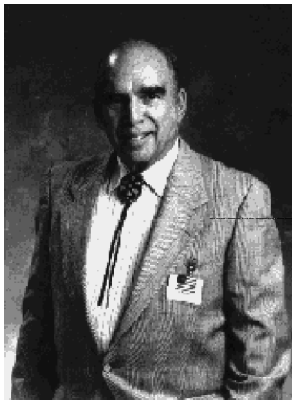Ed Burnett

Being Digital

During the course of a career that spans over 40 years in the direct mail marketing business, Ed Burnett has helped mailers select over 10 billion names for direct mail and telemarketing campaigns. He is President of Ed Burnet t Consultants, Inc., one of the five major direct marketing firms that makes up THE DATABASE AMERIC A COMPANIES. His firm specializes in direct mail consultation, list compilation and list brokerage. He is widely recognized as the pioneer of many of the list marketing concepts and techniques utilized today throughout th e industry. These concepts and techniques are freely shared in the numerous articles he contributes to all of the major trade publications, and are gathered together in the book he recently authored for Prentice Hall, The Complete Direct Mail List Handbook: Everything You Need to Know About Lists and How to Use Them for Greater Profit. He is also the author of Database Marketing -- The New Profit Frontier.

 Ed Burnett

ABSTRACT

According to Ed Burnett, bits are replacing atoms as the basic commodity of human interaction. It is the rise of the importance of data and the information superhighway that will define the future of technology and human interaction. Here, Mr. Burnett explains the meaning and importance of bits. He also discusses "open systems," a concept that exercises the entrepreneurial part of our economy and challenges both proprietary systems and broadly mandate d monopolies. In the "open system" of the future we will compete with our imaginations, resulting in greater success for the imaginative and more choices for the consumer.

Introduction

"Computing is not about computers any more. It is about living." Thus writes Nicholas Negroponte in the introduction to his visionary new book, Being Digital.

Bits, "the DNA of information," are rapidly replacing atoms as the basic commodity of human interaction. Negroponte shows us the dramatic effects of this change.

The change from atoms to bits is irrevocable and unstoppable. When I meet an adult who tells me he has discovered CD-ROM, I can guess that he has a child between five and ten years old. When I meet someone who tells me she has discovered America Online, there is probably a teenager in her house. One is an electronic book, the other a socializing medium. Both are being taken for granted by children the same way adults don't think about air (until it is missing).

Bits Are Bits

The DNA of Information

The information superhighway is about the global movement of weightless bits at the speed of light. As one industry after another looks at itself in the mirror and asks about its future in a digital world, that future is driven almost 100 percent by the ability of that company's product or services to be rendered in digital form.

A book has a high-contrast display, is lightweight, easy to "thumb" through, and not very expensive. But getting it to you includes shipping and inventory. In the case of textbooks, 45 percent of the cost is inventory, shipping and returns. Worse, a book can go out of print. Digital books never go out of print. They are always there.

A bit has no color, size, or weight, and it can travel at the speed of light. It is the smallest atomic element in the DNA of information. It is

a state of being: on or off, true or false, up or down, in or out, black or white. For practical purposes, we consider a bit to be a 1 or a 0. The meaning of the 1 or the 0 is a separate matter. In the early days of computing, a string of bits most commonly represented numerical information.

Try counting, but skip all the numbers that have anything other than a 1 and a 0 in them. You end up with the following: 1, 10, 11, 100, 101, 110, 111, etc. Those are the respective binary representations for the numbers 1, 2, 3, 4, 5, 6, 7, etc.

Bits have always been the underlying particle of digital computing, but over the past twenty-five years, we have greatly expanded our binary vocabulary to include much more than just numbers. We have been able to digitize more and more types of information, like audio and video, rendering them into a similar reduction of 1's and 0's.

The number of bits that can be transmitted per second through a given channel (like copper wire, radio spectrum, or optical fiber) is the bandwidth of that channel. It is a measure of how many bits can get down a given pipe.

First, bits commingle effortlessly. They start to get mixed up and can be used and reused together or separately. The mixing of audio, video, and data is called multimedia; it sounds complicated but is nothing more than commingled bits.

Second, a new kind of bit is born--a bit that tells you about the other bits. These new bits are typically "headers."

Broadcast television is an example of a medium in which all the intelligence is at the point of origin. The transmitter determines everything and the receiver just takes what it gets. In fact, per cubic inch, your current TV set is perhaps the dumbest appliance in your home (and I'm not even talking about the programs). If you have a microwave oven, it likely has more

microprocessors than your TV.

Debunking Bandwidth

I recently met one socialite, a wealthy an d charming woman, who knew so much abou t Microsoft's operating system that she started a small business that provided consulting services for her "less-wired" peers. Her business car d read, "I do Windows."

Bandwidth is different. It is not well understood, especially now that fiber optics is taking us from a modest to an almost infinite bandwidth, wit h nothing in between. Bandwidth is the capacit y to move information down a given channel . Most people think of it by likening it to th e diameter of a pipe or to the number of lanes on a highway.

(Bits per second, bps, and baud mean the sam e thing; the third is named for Emile Baudot, th e "Morse" of telex.)

Think of the capacity of fiber as if it wer e infinite. We literally do not know how many bits per second we can send down a fiber. Recen t research results indicate that we are close t o being able to deliver 1,000 billion bits pe r second. This means that a fiber the size of a human hair can deliver every issue ever made of the Wall Street Journal in less than one second.

As soon as we use the ether for higher-powe r telecommunications and broadcast, however, we have to be very careful that signals do no t interfere with each other. We must be willing to live in predetermined parts of the spectrum, and we cannot use the ether piggishly. We must use it as efficiently as possible. Unlike fiber, w e cannot manufacture any more of it. Nature did that once.

With the exception of communications lines a few feet or yards long or the presence o f unskilled installers, there is no reason to us e copper in telecommunications today (especiall y

if you include the maintenance cost of copper) . The Chinese are using fiber for a totally different reason--the villagers dig up the copper to sell on the black market.

Many people are ignoring the copper stepping - stone. They are buying into the wholesale an d immediate need for, and provision of, fiber fo r limitless bandwidth to maintain a majo r competitive edge, without recognizing tha t Mother Nature and commercial interests, mor e than regulatory incentives, will make fibe r happen naturally. Like dogs in heat, broadban d pundits are sniffing all the political opportunities for high-bandwidth networks as if doing so were a national imperative or civil right. In fact , unlimited bandwidth can have the paradoxica l and negative effect of swamping people with too many bits and of allowing machines at th e periphery to be needlessly dumb. Unlimite d bandwidth is hardly wrong or bad to have, but - like free sex - it is not necessarily good either . Do we really want or need all those bits?

New information and entertainment services are not waiting on fiber to get to the home; they are waiting on imagination.

Fortunately for the telephone companies, mor e than 50 percent of the telephone traffic across the Pacific and 30 percent across the Atlantic is fax data running at 9600 bps, instead of 64,000 bps, which is also available.

Bits are different. A ski lift may be a bette r analogy. The lift is moving at a constant speed, while more or fewer people get on and off . Similarly, you put a number of bits into a packet and then drop that packet in a pipe capable o f delivering it at a speed of millions of bits pe r second. Now, if I drop a packet of 10 bits every second into a fast-moving pipe, my effectiv e band-width is 10 bps, not the speed of the pipe.

While this sounds wasteful, it is in fact a cleve r notion, because other people are dropping packets into the same pipe--the basis of such systems as

the Internet and ATM (asynchronous transfer mode, the way all telephone networks will work in the near future). Instead of tying up an entire telephone line, as you now do for a voice, packets are put into the queue with names and addresses attached to them, so they know when and where to get off the ski lift. You pay for packets, not minutes.

Another way of thinking of the same packetizing of bandwidth: the best way to use a billion bits per second is to use a thousand bits in a millionth of a second, a million bits in a thousandth of a second, or the like. In the case of television, for example, think of receiving one hour of video in a few seconds, versus the faucet approach.

Bitcasting

Unlike young digital companies such as Apple and Sun Microsystems, television technology companies were old-age homes for analog thought. To them, television was about pictures, not about bits.

The Japanese know full well that digital TV is the future. When Akimasa Egawa, the hapless director general of Posts and Telecommunications' Broadcasting Administration Bureau, suggested in February, 1994, that Japan join the digital world, Japanese industrial leaders cried foul the next day and forced him to eat his own words. Japan had spent so much public money on HDTV, it was not about to cut its losses so publicly.

I recall vividly at the time a televised panel of the presidents of the giant consumer electronics companies swearing they were fully behind good old analog Hi-Vision, implying that the deputy minister was off his rocker. I had to bite my digital tongue because I knew each of them personally, had heard them say the opposite, and had seen their respective digital TV efforts. Saving face, I fear, is to have two of them.

The object of this ferment is the set-top box,

currently little more than a tuner but destined to be much more. At the rate things have been going, we will soon have as many types of set-top boxes as we now have infrared remote-control units (one for cable, one for satellite, one for twisted pair, one for every UFV transmission, etc.). Such a smorgasbord of incompatible set-top boxes is a horrible thought.

"Open systems" is a vital concept, one that exercises the entrepreneurial part of our economy and challenges both proprietary systems and broadly mandated monopolies. And it is winning. In an open system we compete with our imagination, not with a lock and key. The result is not only a large number of successful companies but a wider variety of choice for the consumer and an ever more nimble commercial sector, one capable of rapid change and growth. A truly open system is in the public domain and thoroughly available as a foundation on which everybody can build.

The growth of personal computers is happening so rapidly that the future open-architecture television is the PC, period. The set-top box will be a credit-card-size insert that turns your PC into an electronic gateway for cable, telephone, or satellite. In other words, there is no TV-set industry in the future. It is nothing more or less than a computer industry.

The key to the future of television is to stop thinking about television as television. TV benefits most from thinking of it in terms of bits. Motion pictures, too, are just a special case of data broadcast. Bits are bits.

Today's TV set lets you control brightness, volume, and channel. Tomorrow's will allow you to vary sex, violence, and political leaning.

Most television programs, with the exception of sporting events and election results, need not be in real time, which is crucial to digital television and largely ignored.

The Bit Police

There is simply no way to limit the freedom o f bit radiation, any more than the Romans coul d stop Christianity, even though a few brave an d early data broadcasters may be eaten by th e Washington lions in the process.

I am convinced that by the year 2005, Americans will spend more hours on the Internet (o r whatever it is called) than watching networ k television.

Copyright law is totally out of date. It is a Gutenberg artifact. Since it is a reactive process, it will probably have to break down completel y before it is corrected.

In the digital world it is not just a matter o f copying being easier and copies more faithful . We will see a new kind of fraud, which may not be fraud at all. When I read something on th e Internet and, like a clipping from a newspaper , wish to send a copy of it to somebody else or to a mailing list of people, this seems harmless . But, with less than a dozen keystrokes, I coul d redeliver that material to literally thousands o f people all over the planet (unlike a newspape r clipping). Clipping bits is very different fro m clipping atoms.

The medium is no longer the message.

Commingled Bits

A CD used as read-only memory (ROM) has a storage capacity today of 5 billion bits (usin g only one side, because that is easier t o manufacture). This capacity will be increased to 50 billion on one side within the next couple o f years. Meanwhile, 5 billion alone is huge, when you consider that an issue of the Wall Street Journal has approximately 10 million bits (thus, a CD-ROM can hold about two years' worth) . Put another way, a CD represents about 10 0 classics or five years of reading, even for thos e who read two novels a week.

In the digital world, the depth/breadth proble m disappears and we can expect r eaders and authors to move more freely between generalities an d specifics. In fact, the notion of "tell me more" is very much part of multimedia and at the root of hypermedia.

In the digital world, this is not the case . Information space is by no means limited to three dimensions. An expression of an idea or train of thought can include a multidimensional network of pointers to further elaborations or arguments, which can be invoked or ignored. The structure of the text should be imagined like a comple x molecular model. Chunks of information can be reordered, sentences expanded, and words given definitions on the spot (something I hope yo u have not needed too often in this book). Thes e linkages can be embedded either by the author at "publishing" time or later by readers over time.

Multimedia products include both interactiv e television and video-enabled computers. A s discussed earlier, the difference between thes e two is thin, thinning, and eventually will b e nonexistent.

It is important to think of multimedia as mor e than a private world's fair or son et lumiere of information, mixing fixed chunks of video, audio, and data. Translating freely from one to th e other is really where the field of multimedia i s headed.

The Bit Business

It takes about a billionth of a second for light to travel one foot, which is something not likely to change. As we make computer c hips smaller and smaller, their speed can increase a little. But in order to make a big difference in overal l computer power, it will be necessary to desig n new solutions, for example, with many machines running at the same time.

Transporting bits is an even worse business to be in than that of the airlines with their fare wars .

The telecommunications business is regulated to such a degree that NYNEX must put telephone booths in the darkest corners of Brooklyn (where they last all of forty-eight hours), while it s unregulated competitors will only put their telephone booths on Fifth and Park Avenues and in airline club lounges.

If the management of a telecommunications company limits its long-term strategy to carrying bits, it will not be acting in its shareholders' best interest. Owning the bits or right to the bits, o r adding significant value to the bits, must be a part of the equation.

Being digital will change the nature of mass media from a process of pushing bits at people to one of allowing people (or their computers) to pull at them.

Interface

Where People and Bits Meet

I spend a minimum of three hours a day in front of a computer and have done so for many years, and I still find it very frustrating at times. Understanding computers is about as easy as understanding a bank statement. Why do computers (and bank statements) have to be so needlessly complicated? Why is "being digital" so hard?

It used to be considered wasteful and frivolous to devote time and money to the user interface, because computer cycles were so precious and had to be expended on the problem, not the person.

To remind yourself of how important sensing, effecting, and feedback can be, think of the last time you pushed an elevator button and the light did not come on (presumably because the bulb was burned out). The frustration is enormous: did it hear me? Interface design and function are very important.

Using a computer thirty years ago, like piloting a moon lander, was the realm of a precious few schooled in the hocus-pocus needed to drive these machines, sometimes with primitive languages or none at all (just toggle switches and blinkin g lights). In my opinion, there was a subconscious effort to keep it mysterious, like the monopoly of the monks or some bizarre religious rite in th e Dark Ages.

When people talk about the look and feel of computers, they are referring to the graphical user interface, which "professionals" call a GUI. The GUI improved enormously starting around 1971 with work at Xerox and, shortly after, a t MIT and a few other places, and it culminated in a real product a decade later when Steve Jobs had the wisdom and perseverance to introduce the Macintosh.

At home I used to have a very intelligent VC R with near-perfect voice recognition and knowledge of me. I could ask it to record programs by name and, in some cases, even assume it would do so automatically, without my asking. Then, all of a sudden, my son went to college.

I have not recorded a TV program in more than six years. Not because I can't. It is because the value is too low for the effort. It is needlessly hard. More important, VCR usage and remote-control units in general have been treated as a button-pushing problem. Likewise, the general interface with personal computers has been treated as a physical design problem. But interface is not just about the look and feel of a computer. It is about the creation of personality, the design of intelligence, and building machines that can recognize human expression.

A dog can recognize you from your gait more than one hundred yards away, whereas a computer does not even know you are there. Almost any pet can tell when you are angry, but a computer does not have a clue. Even puppies know when they have done wrong; computers

don't.

The challenge for the next decade is not just t o give people bigger screens, better sound quality, and easier-to-use graphical input devices. It is to make computers that know you, learn about your needs, and understand verbal and nonverba l languages.

Worse, telephone designs have been "featured" to death. Number storing, redialing, credit car d management, call waiting, call forwarding, auto answering, number screening, and on and on are constantly being squeezed onto the real estate of a thin appliance that fits in the p alm of your hand, making it virtually impossible to use.

Workstations are nothing more than persona l computers with long pants.

My dream for the interfac e is that computers will be more like people. This idea is vulnerable t o criticism for being too romantic, vague, o r unrealizable. If anything, I would criticize it for shooting too low. There may be many exoti c channels of communications of which we ma y not even be aware today. (As somebody married to an identical twin and with identical twi n younger brothers, I am fully prepared to believe from observation that extrasensor y communication is not out of the question.)

The real power of the pixel comes from it s molecular nature, in that a pixel can be part o f anything, from text to lines to photographs. Pixels are pixels is as true as bits are bits.

Graphical Persona

The real power of the pixel comes from it s molecular nature, in that a pixel can be part o f anything, from text to lines to photographs. Pixels are pixels is as true as bits are bits.

Games manufacturers do not make any money on the hardware; they make it on the games. It i s truly a story about razors and blades.

But the games manufacturers, like thos e proprietary-minde d computer companies that are now extinct, have so far missed the opportunit y to open up their closed system s and compete with imagination. Sega and Nintendo will also b e extinct if they do not wake up to the fact that PCs are eating their lunch.

Looking and Feeling

Personal computers are less able to sense human presence than are modern toilets or outdoo r floodlights that have simple motion sensors . Your inexpensive auto-focus camera has mor e intelligence about what is in front of it than an y terminal or computer system.

The primary reason for so few advances i n speech recognition is lack of per spective, not lack of technology. When I see speech-recognitio n demonstrations or product advertisements wit h people holding microphones to their mouths, I wonder, Have they really over looked the fact that one of the major value s of speech is that it leaves your hands free? When I see people with thei r faces up next to the screen--talking--I wonder , Have they forgotten that the ability to functio n from a distance is a reason to use voice? When I hear people claim or demand user-independent recognition, I ask myself, Have they forgotte n that we are talking to personal, not shared , computers? Why does everybody seem to b e addressing the wrong parts of the problem?

Speech is also more than words in that it ha s parallel subcarriers of information. Anybod y who has a child or a pet knows that how you say something can be much more important tha n what you say. Tone of voice is very important . Dogs, for example, respond almost totally to tone of voice and have very little innate ability to d o complex lexical analysis, in spite of th e exaggerated claims of their adoring owners.

In the next millennium, we will find that we are talking as much or more with machines than we are with humans. What seems to trouble people

most is their own self-consciousness about talking to inanimate objects. We are perfectly comfortable talking to dogs and canaries, but not doorknobs or lampposts (unless you are totally drunk). Wouldn't I feel stupid talking to a toaster? Probably no more so than you used to feel talking to an answering machine.

Less is More

Imagine a future in which your interface agent can read every newswire and newspaper and catch every TV and radio broadcast on the planet, and then construct a personalized summary. This kind of newspaper is printed in an edition of one.

What are the subsequent letters in a sequence that starts O,T,T,F,F?

By the way, the answer to the question raised above is S, S. The sequence is determined by the first letter of each word as you count: one, two, three, four, etc.

Digital Life

The Post-Information Age

E-mail is exploding in popularity because it is both an asynchronous and a computer-readable medium. The latter is particularly important, because interface agents will use those bits to prioritize and deliver messages differently. Who sent the message and what it is about could determine the order in which you see it--no different from the current secretarial screening that allows a call from your six-year-old daughter to go right through, while the CEO of the XYZ Corporation is put on hold. Even on a busy workday, personal e-mail messages might drift to the top of the heap.

Prime Time Is My Time

I don't know about you, but I would throw away my VCR tomorrow for a better scheme. The issue to me is one of schlepping (and returning)

atoms (by what is sometimes called "sneaker net"), versus receiving no-return, no-deposit bits. With all due respect to Blockbuster and its new owner, Viacom, I think videocassette-rental stores will go out of business in less than ten years.

My VCR of the future will say to me when I come home, "Nicholas, I looked at five thousand hours of television while you were out and recorded six segments for you which total forty minutes. Your high school classmate was on the 'Today' show, there was a documentary on the Dodecanese Islands, etc. . . ." It will do this by looking at the headers.

The agent of change will be the Internet, both literally and as a model or metaphor. The Internet is interesting not only as a massive and pervasive global network but also as an example of something that has evolved with no apparent designer in charge, keeping its shape very much like the formation of a flock of ducks. Nobody is the boss, and all the pieces are so far scaling admirably.

The state of Maryland offers the Internet to all of its residents, as does the city of Bologna, Italy. Obviously, all these people don't use it, but in 1994, 20 million to 30 million people seemed to. My guess is that 1 billion people will be connected by the year 2000.

Good Connections

The fax machine is a serious blemish on the information landscape, a step backward, whose ramifications will be felt for a long time. This condemnation appears to fly in the face of a telecommunications medium that has seemingly revolutionized the way we conduct business and, increasingly, our personal lives. But people don't understand the long-term cost, the short-term failings, and the alternatives.

Fax is a Japanese legacy, but not just because they were smart enough to standardize and

manufacture them better than anybody else, likeVCRs. It is because their culture, language, and business customs are very image-oriented.

For example, most business letters today are prepared on a word processor, printed out, and faxed. Think about that. We prepare our document in completely computer- readable form, so readable in fact that we think nothing about passing a spell-checker over the words.

Then what do we do? We print it on paper bond letterhead. The document has now lost all of the properties of being digital.

We next take this piece of paper over to the fax machine, where it is re-digitized into an image, removing what little qualities of feel, color, and letterhead that might have been in the paper. It is dispatched to a destination, perhaps a wire basket next to the copying machines.

Fax is still not an intelligent medium. The reason is that you have removed the computer readability, which is the means by which the recipient can automatically store, retrieve, and manipulate your message.

The vast majority of Internet users today are newcomers. Most have been on it for less than a year. Their first messages tend to flood a small group of select recipients, not only with page after page of messages but with a sense of urgency suggesting the recipient has nothing better to do than answer them.

Connecting around the globe is a black art. The problem is not being digital, but being plug-ready. Europe has twenty (count 'em) different power plugs! And, while you may have become used to that small little plastic phone jack, the so-called RJ-11 plug, there are 175 others in the world. I am the proud owner of at least one of each and, on a long and circuitous trip, a full 25 percent of my luggage volume is likely to be a combination of phone jacks and power plugs.

One example of deliberate digital sabotage is when hotels break off the small plastic release chip of an RJ-11 jack, so that you cannot plug your laptop into the wall. This is worse than charging for income faxes. Tim and Nina Zagat have promised to include a notation in their future hotel guides that tells this, so that the digerati can boycott these establishments and take their digital business elsewhere.

Digital Fables And Foibles

Just listen to your fax or data modem next time you use it. All that staticky-sounding noise and the beeps are literally the handshaking process. These mating calls are negotiations to find the highest terrain from which they can trade bits, with the greatest common denominator of all variables.

Currently absent from most renditions of the home of the future are household robots: a curious turn, because twenty years ago almost any image of the future included a robotic theme. C3PO would make an excellent butler; even the accent is appropriate.

The future of any appliance is likely to be stripped-down or puffed-up PC. One reason to move in this direction is to make appliances more friendly, usable, and self-explicating. Just think for a moment about how many machines you have (microwave oven, fax machine, cellular telephone) that have a giant vocabulary of functions (some useless) about which you have not bothered to learn, just because it is too hard. Here is where built-in computing can help a great deal, beyond just making sure the microwave oven does not soften the Brie into a puddle. Appliances should be good instructors.

Some of us need to use reading glasses to see a map, which turns us into Mr. Magoo for driving. A much better way to deliver navigational assistance is by voice.

Since you are not using your ears to drive, they

make an ideal channel for telling you when to turn, what to look for, and that if you see such-and-such, you have gone too far. The challenge of exactly how to phrase the directions is difficult (that's why humans do such a lousy job of it). The road is filled with many ambiguities. "Take the next right" is perfectly clear if the turn is several hundred feet or yards away. As you get closer, however, is it the "next" right, this right, or the one after?

One of the reasons that talking cars have been unpopular is that they've had less personality than a seahorse.

Epilogue: An Age Of Optimism

I am optimistic by nature. However, every technology or gift of science has a dark side. Being digital is no exception.

The next decade will see cases of intellectual property abuse and invasion of our privacy. We will experience digital vandalism, software piracy, and data thievery. Worst of all, we will witness the loss of many jobs to wholly automated systems, which will soon change the white collar workplace to the same degree that it has already transformed the factory floor. The notion of lifetime employment at one job has already started to disappear.

The decentralizing effect of being digital can be felt no more strongly than in commerce and in the computer industry itself. The so-called management information systems (MIS) czar, who used to reign over a glass-enclosed and air-conditioned mausoleum, is an emperor with no clothes, almost extinct. Those who survive are usually doing so because they outrank anybody able to fire them, and the company's board of directors is out of touch or asleep or both.