10.
MEET THE SPIME

SEARCHING You first encounter the SPIME while searching on a Web site, as a virtual image. This image is likely a glamorous publicity photo, but it is also deep-linked to the genuine, three-dimensional computer-designed engineering specifications of the object—engineering tolerances, material specifications, and so forth.

Until you express your desire for this object, it does not exist. You buy a SPIME with a credit card, which is to say, you legally guarantee that you want it. It therefore comes to be. Your account information is embedded in that transaction. The object is automatically integrated into your SPIME management inventory system. After the purchase, manufacture, and delivery of your SPIME, a link is established through customer relations management software, involving you in the further development of this object. This link, at a minimum, includes the full list of SPIME ingredients (basically, the object's material and energy flows), its unique ID code, its history of ownership, geographical tracking hardware and software to establish its position in space and time, various handy recipes for post-purchase customization, a public site

for interaction and live views of the production change, and bluebook value. The SPIME is able to update itself in your database, and to inform you of required service calls, with appropriate links to service centers.

At the end of its lifespan the SPIME is deactivated, removed from your presence by specialists, entirely disassembled, and folded back into the manufacturing stream. The data it generated remains available for historical analysis by a wide variety of interested parties. That variety and those levels of interest are what you, a Spime Wrangler, consider of genuinely crucial interest. The SPIME is a set of relationships first and always, and an object now and then.

The key to the SPIME is identity. A SPIME is, by definition, the protagonist of a documented process. It is an historical entity with an accessible, precise trajectory through space and time.

A SPIME must therefore be a thing with a name. No name, no SPIME. This presents a serious semantic challenge. The labels that we attach to objects are never identical with the phenomenon itself; the map cannot be the territory. There is a frail, multiplex relationship between labels and materiality.

For instance, when I described that "bottle of wine" a while ago, everybody presumably knew that I meant a particular, coherent object. Yet that "bottle of wine" was a momentary congelation of material and energy flows. It has now become nameless, but it remains a process, still

underway and mostly unknowable to me. That "bottle of wine" was once sunlight on Italian earth, lakes of grape juice, yeast in fermentation tanks, wood pulp for the label, colored inks, cork from Spain or maybe Portugal, plus a Californian grocery chain reacting to consumer trends and stocking a brand with some shelf appeal. Then I found it, bought it and consumed it. It continued as a dissociated flow of recyclable glass, consumed paper, hydrating fluids and a narcotic in my bloodstream, long since metabolized.

When I bought that "bottle of wine" I was also financing a situation that names and defines those complex flows as a "bottle of wine"—a technosocial set-up that allows me to interact with that object as a consumer item first and only, blindly uninvolved with its extensive history as pre-bottle and post-bottle. Buying and drinking it was my own business, and the rest of it is none of my business. How much of that business ought to be mine? Well—enough for me to have some reasonable security in the thought that my more general business won't come to a sudden, ugly, unsustainable end.

In an age of *Craftwork*, I'm living off the land with most of my objects made by myself or my immediate kin. I know a lot about what I have, but I'm basically poor and ignorant.

In an age of *Bureaucracy*, I can engage in markets. But I'm just a gray flannel man in the crowd; I have to shut up and settle for what comes out of the assembly line.

In an age of GIZMOS, I'm an unpaid developer. I'm eyeballs, I'm keypunches, I'm Web site hits.

In an age of SPIMES, the object is no longer an object, but an instantiation. My consumption patterns are worth so much that they underwrite my acts of consumption. I can get *Products* in profusion, but I've been kicked upstairs into management. I don't worry much about having things. I worry plenty about relating to them.

How? Mostly through naming. Naming enables the generation of pattern. Naming enables measurement. Naming gives me something to speak about.

In my relationship to objects, I have "advanced to the stage of science!"

"When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind: it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science."

So said Lord Kelvin. In an age of SPIMES, Lord Kelvin is not talking about physics. He's talking about the economy.

A MULTIPLEX, GLOBAL BUREAUCRACY
ALREADY EXISTS WHOSE PURPOSE
IS ATTACHING IDENTITIES TO OBJECTS. THAT IS
A NONPROFIT, QUASI-AUTONOMOUS

NON-GOVERNMENTAL ORGANIZATION KNOWN AS THE UNIFORM CODE COUNCIL, INC.® ALONG WITH ITS EUROPEAN TWIN, THE EAN INTERNATIONAL, IT RUNS AN IDENTITY REGIME THAT IS KNOWN AS THE GLOBAL EAN-UCC SYSTEM – BETTER KNOWN TO THE PUBLIC AT LARGE AS BARCODING.

The scope and scale of this enterprise is colossal. Barcoding has permeated commerce.

Having discarded my Italian wine bottle back in Tarzana, California, I'm currently sitting at a kitchen table in Belgrade, Serbia, where I gamely continue to labor on this book. There are twenty-three household objects sitting on this Balkan kitchen table. They are the common, quotidian objects that sit on this kitchen table most every day. There is nothing special about them, except that I just decided to subject them to an inventory.

Five of these everyday objects have barcodes, either adhering to them with gummed paper, or worked right into their surface finish. These five items would be two pens, the woolly winter hat, the packet of paper tissues, and the wine-bottle's local equivalent (which is a bottle of "Vuk Stefanovic Karadzic" brand Serbian plum brandy).

The phone handset on this table has its coding in another room, attached to the parent phone cradle. The phone cradle features two barcodes, a model number, and an ID number from the USA's regulatory Federal Communications

Commission, even though this phone is a machine in Serbia that has never been anywhere near America.

The TV remote control on the table is an extension of its extensively coded client, the television.

The stereo headset once had a barcode on its discarded packaging.

If you add the computer (which is no longer the laptop I was using in California, but an older, local model gamely crunching on a ported version of the same text), then we are immersed in identity coding. And this isn't the Los Angeles basin here, that sophisticated thicket of metropolitan consumerism—this is Belgrade, a city that is edgier in every sense.

I can also go trolling for kitchen-table objects that have Web sites embossed on them, inviting some End-User digital interaction. Then I get the plastic clamp, the brandy bottle, a pencil, and the blank compact disk (which sports five Web sites on its packaging alone).

Five of these objects: the saltshaker, the peppershaker, their stamped metal tray, and the wooden pencil holder—are Balkan heirlooms.

The coasters are too cheap to barcode.

The plastic cigarette lighter is so oddly and grimly anonymous that I'm pretty sure it was built in some Chinese basement and then filled with smuggled butane.

What we see in this household microcosm is a slow multi-decade, S-curve waves toward increased identity for objects.

Look at the variety here, as tomorrow composts today.
We have:

I.
Primeval *Artifacts*, handmade;

II.
Mass-produced *Products* from the local Communist era, pre-dating the local advent of identity coding;

II.
Trivial *Products* too cheap or small to code;

III.
Coded *Products*, including some strays whose codes fell off or were dumped when they left the supply chain;

IV.
Two GIZMOs that are the remote adjunct interfaces for a larger, fully-coded communication system;

V.
Coded *Products* that also invite interaction with a Web site;

VI.
A subset of Web site-only, non-barcoded *Products*;

VII.
An awesomely complicated personal-computer GIZMO whose End-User can Web surf with it, and go out to briskly interfere at length with various supply chains, potentially purchasing practically everything else on this kitchen table through e-commerce;

VIII.
One radically GIZMOized *Product* with two barcodes, (one glued on, one inscribed,) plus a Web site, an email address, a complete postal mailing address, and a glue-on, metal-and-plastic, interactive, electronic anti-theft tag. That object would be the bottle of Serbian brandy, which by this concerted effort has definitely established itself as the kingpin of Balkan consumerism.

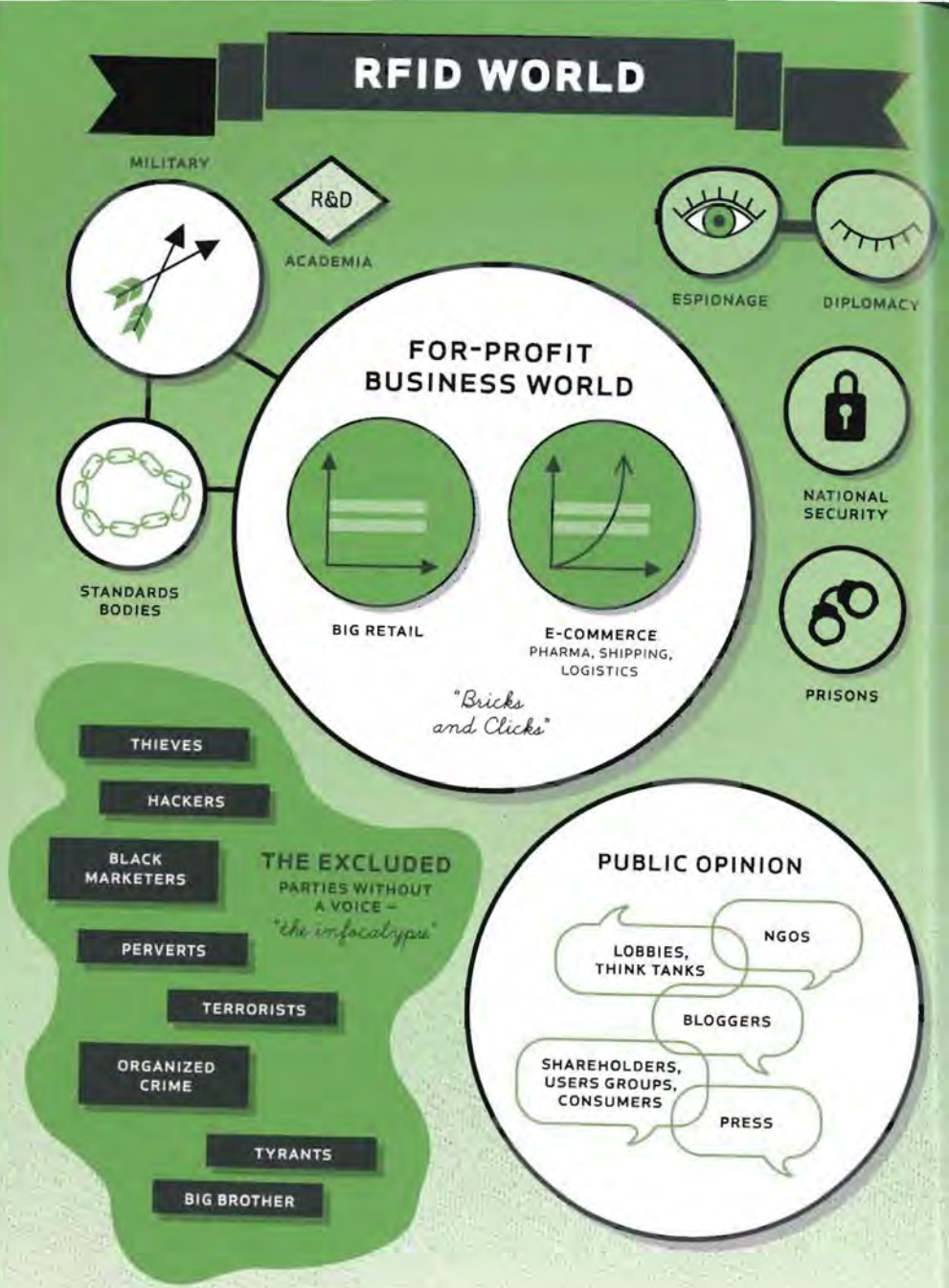


FIGURE 4

11.

ARPHIDS

The EAN-UCC revolution has been a colossal success. It's a coded delivery system, and it delivered what it was designed to deliver: by adding identity to objects, it enabled more accurate inventories, automated re-ordering, improved market analysis, a quicker movement of objects to and off the retail shelf, plus a sharp reduction in human errors in the supply and retail chain. And that achievement brought a lot of money to a lot of people.

Barcoding started as an R&D notion, then leapt the chasm of commercialization, into a firm foothold in the food & beverage business. It accelerated upslope in short order, into general merchandise, into healthcare, into government, and even onto the back of the book you are holding right now. Barcoding works. It is a great industrial advance. Pretty much any enterprise with a transportation chain can work more efficiently with barcoding.

On this very day, barcodes were scanned somewhere on this planet an estimated five billion times. The industrial payoff for exploiting barcodes has been 50 times larger in scale than was once estimated, when the system was first proposed, back in 1975. This success was also its bane, eventually. Now that people know about the full joy

and utility of a coded identity system for objects, paper barcodes are becoming obsolete.

The familiar system of black and white bars has passed the top of its S-curve. It is under threat from the new, radically disruptive, and far more capable EPC or "Electronic Product Code." Those aren't here yet. I don't have a single EPC object on this kitchen table. I know they are on the way, though.

Last night I watched the local television, and saw that the pet dogs of Belgrade were receiving injections of Radio Frequency ID identity chips. The local dog pound is being outfitted with an RFID reader, and when strays are collared, they'll be scanned. Then lost dogs do not have to have their homely pictures photocopied onto telephone poles. Lost dogs can be rescued quickly and returned to their grieving owners, which is sweet and nice.

But that's not the only way to describe what I just saw. We might also say that an RFID-injected elite of dogs will be returned to their owners posthaste, because these dogs now have a machine-readable identity. All other dogs are in grave and increasing danger. Belgrade is a rough town with a serious stray-dog problem. Being a Belgrade dog without an injected RFID may become a capital canine offense in relatively short order. We've got a yawning digital divide between the injected elite and the canine proletariat.

One could launch into a jeremiad at this point and point out that this grim dog-pound technology could be transferred at little cost and expense to, say, human vagrants, and then gypsies, ethnic minorities, political opponents, and/or anything else that moves, breathes or votes... but that doesn't much advance the analysis. What does advance the debate is the shocking realization that RFID chips are happening already *in Belgrade*. Serbian television news is promoting this technology to the general civil population as a public-service benefit. Who knows? This new coding system might even work as intended, at least in the sense of relieving some owners of worry—and bureaucratically liquidating some hazardous feral dogs.

Barcodes are made of paper. Electronic codes are electronic. That's why the EPC coded objects are coming; for the same reasons that electronics shoved paper aside in a host of other applications.

Paper codes are too slow, limited and small in scope for the ever-burgeoning needs and desires of the object identity enterprise. There's only so much data their one can cram into paper barcode digits.

A new-and-improved code would, obviously, import and store much more identity. It would also announce its identity more loudly, under a wider set of circumstances, to a wider set of scanning devices, and in more sophisticated ways.

Hence a new-model electronic identity: RFID, or "Radio-Frequency ID." RFID is busily composting EAN-UCC, even as we speak. The term "RFID" almost ranks with "EAN-UCC" in its acronymic ugliness. So henceforth, I

will follow slang practice in the infant RFID industry and refer to radio-frequency ID labels as "arphids." We need to get used to thinking of these things as the seeds of [illegible] dom, not as some raw cluster of capital letters. We're better off referring to them with a neologism—"arphid"—that subtly implies some newfangled, infestating, autoreplicating plague.

First generation arphids barely work. They barely work in the following way: an RFID is a very small chip of silicon with a tiny radio antenna. An RFID tag can be as small as half-a-millimeter square and no thicker than a paper price tag. When it's hit by a blast of radio energy in the proper wavelength, the antenna will bend with the radio energy. The bending causes it to squeak a jolt of electrical energy through the attached silicon chip. The chip then automatically broadcasts a built-in ID code back through that tiny antenna.

That is a "passive" arphid, which already exist in large numbers. Passive arphids are cheap and easy to make in huge volumes. "Active" arphids have their own power supply, which allows them to get up to a wider variety of more sophisticated digital hijinks.

Arphids are tiny computers with tiny radios. They're also durable and cheap. It follows that one can build a new and startlingly comprehensive identity system with arphids. The arphid's antenna and chip get built into a weatherproofed, durable ID tag, to be glued, attached, or built-in to objects. A handy arphid wand (a "reader"

or "transceiver-decoder"), beams radio energy into the arphids, then reads their unique codes as they bounce back out.

If a barcode is like a typewritten page of paper, then an arphid is like a written page on an Internet Web site. Those are both "writing" of a sort, but only a naïf could consider them the same. An electronically transformed means of production and distribution enables a wide variety of potent new behaviors.

Barcodes must be scanned within the visible sight of an optical reader. So barcodes require an attentive human reader focused on the paper code at hand. Arphids behave more like bats: their unique bouncing radar shrieks can be heard in total darkness, and while objects are in motion, and even all at one time, in massive arphid flocks. No deliberate human act is required to probe arphids with a radio pulse. An arphid-management system could be automated to inventory every arphid in its radio range, as often as you please.

For common, passive arphids, that radio range is quite short: less than ten meters. Since arphids are little radio stations, they have to behave that way through the laws of physics; as you move farther away from them, their coverage weakens and breaks up. This is considered a feature rather than a bug, because it prevents saturation of radio signals, a form of electromagnetic pollution.

Furthermore, metal and liquid—plumbing, wiring, metal appliances, a wide variety of everyday clutter—will reflect

ns in the arphid wavelengths. This
or absorb radio beams-world environments are full of radio
means that most real-w ds become effectively invisible.
shadows, where arphids be an elementary matter to build a
Otherwise, it would b nside some fiberglass van, and drive
super-arphid reader ins s trolling for rich people with a lot of
through urban streets t inable stuff. Then thieves could rob
arphid-tagged, purloin l profit and minimal risk. This night-
the rich with maximal ittle less likely to happen because
mare scenario is a litt e from far away. Not that reading
arphids are so feeble possible to do. It's just expensive.
feeble signals is imp NSA are sure to consider arphids
Spy agencies like the ng with their little-known but long-
of great interest, alon out the weak "Tempest" radiation
abiding curiosity abo nputer monitors. Secretly snooping
that leaks out of com else's arphids already has a name:
data from somebody n as "skimming."
it's a dirty trick known u are, in tomorrow's emergent world
So imagine: here you r arphid tags, your arphid-reading
of SPIMES, with you able network nodes full of arphid-
wand, and some cap re. Let's consider what can happen
management softwar nabling means of a "mobile ad-hoc
when you have the e salting your arphids with a whole
network." This means laced every ten meters or so. These
lot of arphid wands. P held scanning devices any more, so
"wands" are not handl described as arphid "monitors."
they might be better be cheap and easy to make, because
A "monitor" should h active arphid. It's an arphid that
it's basically just an

happens to have a steady source of power, a longer communication range, and a more sophisticated chip. It's been moved from passive to active; it's now a boss arphid. Monitors might be plugged into the wall, like contemporary appliances. Further into the future, they might be wireless and running off an onboard micropower system.

The point of installing these monitors is that they can communicate information about the arphids to one another. Then they can filter that torrent of data and move the valuable information over long ranges. They become bosses, guards, co-ordinators. Add these monitors into the mix—active hubs of arphid data, repeaters, relayers, linked to a global network

—and you have created an

INTERNET OF THINGS

12.
AN INTERNET OF THINGS

Given an INTERNET OF THINGS, you can read your arphids anywhere. Via Net, via cell phone, via satellite—it would seem that the sky's the limit.

But the sky's not the limit at all—for an Internet of Things, the sky is the *metric*. Global positioning satellites provide a splendid source of measurement for a space-time Spiming world.

Your arphid monitors are hooked into the satellite based Global Positioning System. Then your network become a mobile system of interlinked objects that are traceable across the planet's surface, from outer space, with one-meter accuracy, around the clock, from pole to pole.

A Global Positioning System is a literal world-beater—although satellite coverage breaks up whenever you move under a roof. A Local Positioning System, indoors, is handier yet. Global Positioning works by combining and analyzing signals from several cooperating satellites, up in space. The same thing can work on a local scale, inside a house.

If you have multiple monitors combined in a network, that means you can add arphid radio signals together, and triangulate them. It's an indoor, radar air-traffic control system for objects.

Real air traffic control systems are grim, complex bureaucracies, heavy with fail-safes. Who can make objects that integrate elegantly and dependably within an INTERNET OF THINGS? Who can make that system as relatively simple and inviting as, say, the Internet's Web browsers and Weblogs? It's a design space rife with profound opportunity.

You, a human being, don't want the cognitive burden of knowing what your host of objects is doing all the time. What you want is the executive briefing.

Management has its perks as well as its burdens. The drawback of becoming a Wrangler is a ceaseless struggle through changing fields of data and relationships. The benefit is that many previously knotty problems simply vaporize, they become trivial.

The primary advantage of an INTERNET OF THINGS is that I no longer inventory my possessions inside my own head. They're inventoried through an automagical inventory voodoo, work done far beneath my notice by a host of machines. I no longer bother to remember where I put things. Or where I found them. Or how much they cost. And so forth. I just ask. Then I am told with instant real-time accuracy.

I have an INTERNET OF THINGS with a search engine. So I no longer hunt anxiously for my missing shoes in the morning. I just Google them. As long as machines can crunch the complexities, their interfaces make my relationship to objects feel much simpler and more immediate.

I am at ease in materiality in a way that people never were before. Although I live in a much cleaner way than my forebears did, I am not achingly burdened by glum moral guilt about my acts of consumption. That's no longer a burdensome matter requiring constant conscientious decision-making on my own part. Instead, it's been designed into the metrics of the production stream. Whenever I shop, I shop with a wand in my hand. It would never occur to me to shop without a filter and an interface. And someone built that for me, it was designed—as a Wrangler, I need an interface for capitalism itself. In the old days, the best term for an idea like that was probably a "lifestyle magazine." Those toney, glossy little empires were the native haunts of the design profession. But those things were made of paper. They just sat there on a table. They couldn't *do anything*.

But now that design decisions are at my fingertips instead of stuck on paper, I can do a lot.

13.
THE MODEL IS THE MESSAGE

Sometimes I really want an object, the thing *qua* thing, the literal entity itself, physically there at hand. At many other times, many crucial times of serious decision, I'm much better served with a representation of that object.

Suppose that I'm trying to create a new kind of object, to shape a new kind of thing. I don't want to be burdened with the weighty physicality of the old one. I want a virtual 3-D model of the new one, a weightless, conceptual, interactive model that I can rotate inside a screen, using 3-D design software.

Then I'm not troubled by its stubborn materiality; I am much freer to radically alter its form. I can see left, right, front, back, port and starboard. There's no gravity, no friction, no raw materials for making physical models. I'm spared the old exigencies of foamboard and modelling clay, of chickenwire frames and plaster.

I can change those immaterial plans as many times as I want. I can restore the changes, save the changes, erase the changes, export the changes. Because it's only data, it's weightless and immaterial. I can research vital

information about it without lifting my hands from the keyboard or taking my eyes from the screen. I can show my work to a host of scattered co-workers at very little cost; I can offshore it to India, email it to China, get it back within the day... I've got an object processor! I'm crunching shapes! I'm processing objects! I'm no more likely to return to the older methods than authors are likely to return to typewriters.

After a while, once I'm used to this new routine, I don't even think of my model as "the model" any more. My model has become the central part of the creative effort. The modelling arena is where I shape my things. The physical object itself has become mere industrial output. The model is the manager's command-and-control platform. The object is merely hard copy.

In a SPIME world, the model *is* the entity, and everyone knows it.

Yesterday's old, creaky, limited 3-D modelling programs, such as ProE, FormZ, Catia, Rhino, Solidworks, are long-forgotten. Thanks to exponential, Moore's Law-style increases in processing, storage and bandwidth, an advanced SPIME 3-D modelling program can easily boast a finer grain of detail than the physical object it models. Instead of approximating form with a crudely nested set of polygons, a program with this capacity can generate more modelling polygons than the object in question has molecules. There's more stored in the map than there is in the territory.

Practically every object of consequence in a world has a 3-D model. Those that were not built with models have 3-D modelling thrust upon them. They are reverse-engineered: one aims a digital camera at the object and calculates its 3-D model by using photogrammetry.

While you're at it, you might as well photogrammetize your home and/or office, too. Your SPIME management software will surely become more efficient when it can measure and calculate the radio effects of the local walls, floors, ceilings, and furniture. Mind you, SPIME coverage is always patchy—always, because the laws of physics dictate that. No model is ever total and perfect. But you can always invest some more Wrangling ingenuity to make your Spiming just that little extra bit faster, more secure, less patchy.

How do you climb up that extra notch? With more processing speed, more storage and more bandwidth. How much does that cost? Something, but less all the time.

Where and when will you hit the SPIME limit to the measuring, labelling, and timing of made things, and this mapping of their environment? One might imagine (like Jorge Luis Borges in his prescient parable *Tlön, Uqbar, Orbis Tertius*), that the territory can't support the map. Sooner or later, reality will be historicized to the point of collapse. One is just bound to bog down and go broke in mud streams of sensor data, in ever-deeper sediments of bookkeeping.

Really, though? How, exactly? Why? For how long? Of course any particular processor, storage network or bandwidth network is subject to entropy and obsolescence. They will break, they will fail, they will have limits. But it may be that that process of deploying them, and extracting useful knowledge from analyzing that deployment, is endless.

Vannevar Bush said that science was the "endless frontier." Will we ever know so much about how things work that we can't afford to learn any more?

We can't know the answer to that. But we can surmise that a Wrangler, by nature, is someone pressing hard against these limits. So: having eagerly Wrangled my walls, floors and ceilings, and having contingently nailed down the balky behavior of my SPIMES, I now begin to wonder seriously about the other physical contents of this piece of space and time. Yes, to be sure, I have all my SPIME objects named, coded, identified, and historicized—but what about their *environment*?

I am scandalized when it dawns on me that there are some "objects" in this area which are unnameable! Those would not be manmade objects at all, but environmental phenomena such as humidity...smog particles...pollen, magnetic fields, toxins, mice, dust mites, fluctuations in temperature... Certain local phenomena have not been subjected to a fully monitored historiography! Yet they can have measurable effects on both me and my precious SPIMES! Something must be done.

Here I take my technosocial cue from the experts of long-term object management, who are museum curators. Museum curators know well that the serious-minded care of precious objects over a long time must require both closely cataloged objects, and a closely monitored environment surrounding them.

Anything the museum curators of old used to do, I, as a modern Wrangler of SPIMES, can do at low cost and high intensity. So it's high time I added new functionality to my SPIME monitors. While the monitors are sitting there emitting and receiving those radio ID waves from identified objects, they might as well briskly measure light exposure, airborne pollution and pathogens, traveling microbes, pollen counts.... When inscribed into a silicon chip, functionality is very cheap. I've got bandwidth and storage galore, so why not add to my objects, a matter of course, a capacity to measure acceleration? Magnetic fields? Tilt? Chemical exposure? Any phenomenon that might trouble me and my possessions in any conceivable way? You never know when data like that might come in handy. After all, I don't have to think about it. I'll just explore it, store it, and maybe mine it later with some well-defined, handy interface.

Did I mention clocks? Of course every SPIME must have a clock, that sensor for time. *Shouldn't every object know what time it is? Fashionable items, perishable items—these goods have a time bomb ticking in them already! Anything with a sell-by date surely needs a clock! Given*

a long view, everything has a sell-by date. All things must pass; some of them just measure their way there.

IT MAY NOT SEEM THAT I "NEED"
ALL THAT INFORMATION,
BUT THAT'S AN OLD-FASHIONED WAY TO THINK.
I DON'T "NEED" EVERY WEB PAGE
ON THE INTERNET, EITHER.
IT'S NOT A QUESTION OF DESIGNING
AN INTERNET OF THINGS
TO MEET MY SO-CALLED "NEEDS."
IT'S VASTLY CHEAPER
AND SIMPLER JUST TO ENABLE AUTOMATIC
INFORMATION-GENERATING
DEVICES AND PROCESSES, THEN SEARCH THEM
MECHANICALLY AND CYBERNETICALLY,
TO FIGURE OUT WHAT I "NEED."

I can't possibly waste my time trying to tell the Internet what's handy for me. That approach simply makes no sense. Just jam it all in there, all you folks everywhere! I'll make it my own business to winkle out what I need. You give what you give, and I'll give what I give. Then I'll search out my own answers in this blooming plethora. I can't waste time and energy telling you what I "need," or defining the problems of mine that you're supposed to "solve." I'll just use search engines to follow the tracks of other linkers and searchers. If it was good enough for people

just like me, then it's probably good enough for me. It works for Google. I want a world that's auto-Googling.

Who owns the SPIME? This 3-D model awaiting its materiality.... This new-minted object on its way through a long set of human-object interactions? Who can alter it? What can they do with it? This ownership question in SPIME can never be settled. The fact that it's unsettleable is why there is money in it. There are no permanent solutions to SPIME questions. Only Customers and Consumers imagine that there are permanent solutions to physical ownership and intellectual property issues; End-Users know it's all a shell-game, while SPIME Wranglers don't even bother with the shell—they *are* the shell.

Wherever there is an insoluble intellectual-property question, there is a SPIME career. That's where I Wrangle. When and if it gets more or less figured out, I bump up the S-curve and I go Wrangle somewhere more advanced.

14.
FABBING

These Wrangling questions become especially acute with the advent of the "fabricator." We can define "fabricators" as a likely future development of the devices known today as "3-D printers" or "rapid prototypers."

The key to understanding the fabricator is that it radically shortens the transition from a 3-D model to a physical actuality. A fabricator in a SPIME world is a SPIME that makes physical things out of virtual plans, in an immediate, one-step process.

The fact that a fabricator is a wondrously cool notion doesn't mean that it's necessarily going to work in physical reality. Real fabricators would certainly be shot through with a wide variety of technical limitations, material constraints, shortcomings and holes. We can nevertheless confidently expect any SPIME technosociety to rejoice, agonize and sweat over fabricators, because fabricators are the SPIME equivalent of a Philosopher's Stone.

Shaping things, in one push-button step, from a virtual 3-D plan, is a staggeringly complicated manufacturing process. From the point of view of a SPIME Wrangler, however, it's a glorious, commonsensical event of wellnigh mystical simplicity. You just decide what you want

to possess, push a button and bang! Lo, where there was once a 3-D schematic, there is now a newly minted object. You made a "fabject!" Build a SPIME tag into it, and it's ready to join the world!

The feedstock for a contemporary 3-D printer can be laser cured plastic, or heat-melted plastic dust, or liquid-sprayed starch, or glued sheets of cellulose, or, perhaps, some solid feedstock that was precisely chipped away. From a SPIME Wrangler's point of view, the ideal feedstock for a fabricator would be some renewable, recyclable, pollution-free goop whose material qualities—tensile strength, color, insulation, resistance to heat—are all specifiable on command. Materials like that don't yet exist. On the other hand, we've lacked a good reason to find them.

There can't possibly be just one such kind of universal cosmic wonder-blob fabricator food. That is a utopian notion. But the higher a SPIME technosociety climbs up that S-curve, the more rapidly it can compost all previous means of manufacturing.

As for the ARTIFACT world, and the GIZMO world—when fabricators rule the earth, their systems get entirely disintermediated; all their tiresome nonsense of industrial assemblage and shipping gets raked up and baked down to compost.

A SPIME technosociety would want to route everything possible through the needle-eye of fabricators, in much the same feral way that a Customer society wants to lay

its railroads all over the planet, or a GIZMO society lusts to put everything that matters to it: politics, business, news, gossip, jobs, sex, scandals, terrorism even—onto the Internet. There is a wild, irrational technosocial lust to achieve such things that no cost-benefit analysis can possibly tame. Economies will pulsate, groan and implode before an impetus of such profundity. If fabricators can be made to happen at all, they will be made to happen with gusto.

We've reached a point where we need to take a breath now.

Let's try to summarize the central line of SPIME development. Identity is the key enabler.

1

First, we have the capacity for identity—the code—which is modestly pasted onto the object.

2

In the second stage, a much thicker and more capable identity is embedded into the object, and that identity is historically traced.

3

In the third stage, the means of production are re-engineered around the capacity for identity. The object becomes an instantiation of identity. It's named, and it broadcasts its name, then it can be tracked. That's a SPIME.

WHY WOULD "IDENTITY"
EVER BECOME "MORE IMPORTANT"
THAN A REAL, NO-KIDDING PHYSICAL OBJECT?
HOW IS SUCH A THING EVEN POSSIBLE?

THE ANSWER IS FOUND IN A NEW MEANS
OF FOCUSING SOCIETY'S ATTENTION
AND ENABLING JOINT EFFORT.

Only a limited number of people can interact with any particular physical object. A real, physical thing is too small, too parochial, too limited to remain the center of importance for a large number of people. A real, physical thing occupies too small a piece of space and time. Most people in the world will never be able to see it or touch it. Its ability to interact with people is sharply limited. So only a limited number of people can contribute their skills and their insights to the process of that object's development.

For people outside that small circle, a physical object has limited importance. It might be a very important piece of technological development—it might be an

atomic bomb, made in utter secrecy in a desert compound by a tiny elite of boffins. But most people would have no say in it. There is no way to make them care about it every day. They may be its victims, but they're not its stakeholders.

The object's virtual representations, however, can have stakeholders. For instance, it makes more sense to own shares of a company than it does to own physical pieces of a company. Like shares of stock, models of an object can be shown and distributed to a wide public. The models are more open than real objects. The models can attract a huge amount of creative effort worldwide—if they can find a method to cluster human attention.

Not everything in a SPIME world is a true-blue SPIME. Objects can also be *Artifacts*, **MACHINES**, PROPOSALS, even GIZMOS. But the SPIMES are the objects that are considered most important. SPIMES that get intensely Wrangled by many people can develop much faster than other objects. This means their S-curves are steeper. They have Rising Star quality, and they can return more on investment. They are interesting, glamorous, provocative. They are a locus of popular desire. People want to contribute to them, to know about the people who use them, to learn about them, to relate to them, to enter their fields. They are signifiers of power and desire.

They are the apotheosis of everything designers have been hired to do for the past ninety years.

15.

SPIME ECONOMICS

Those industries that can't or won't make the transition to SPIMES are in a dullard's line of work. Their S-curves will flatten. They will be occupied by *rentiers* and obscurantists. They will stagnate; like OPEC, they may have revenue, but they have no friends.

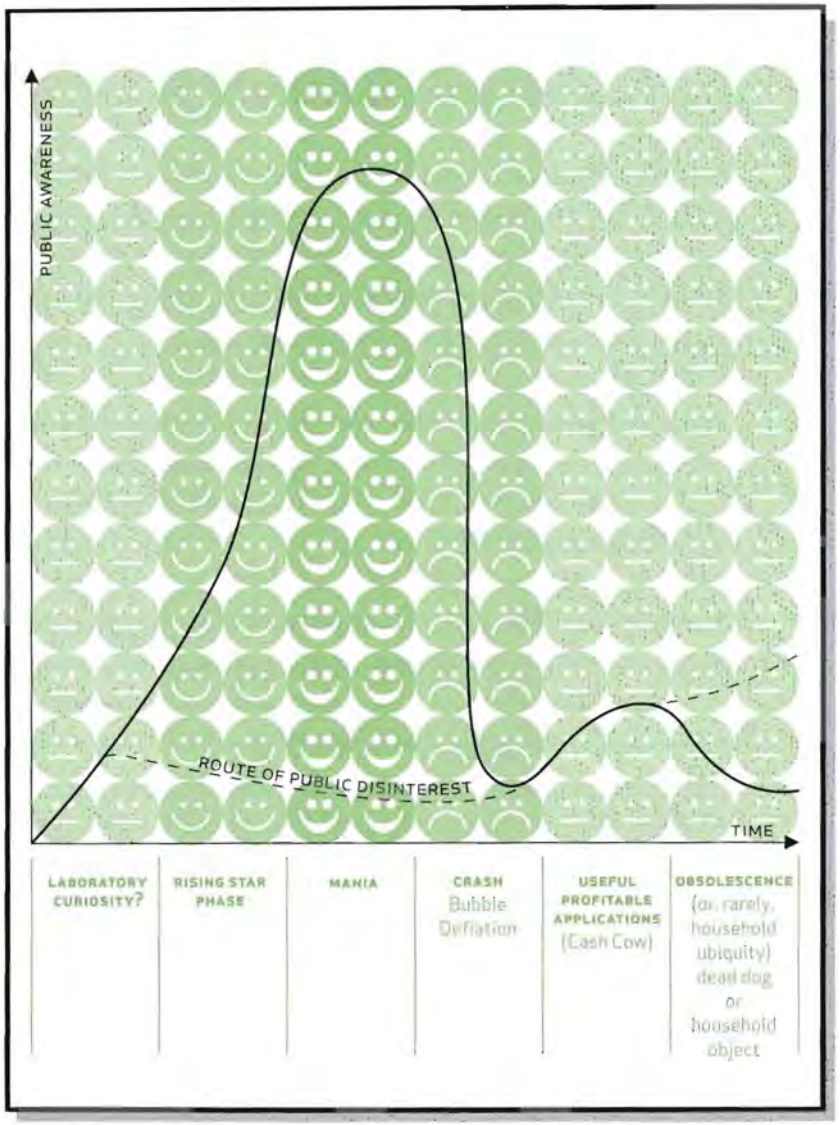
How is all this supposed to be made to pay, though? Well, the SPIME doesn't pay. The SPIME is economics itself.

Consider a bar of gold. It is precious. It has scarcity value. It's an *Artifact*.

But you can't compel anyone to do anything about your gold bar unless you hand it over. Your stake simply becomes his stake. Your gold bar can't appreciate in value; it has no return on investment; it does not harness human effort; it is a lump of metal.

You can advance to paper money, backed by some vague assurance by the authorities about gold bars, which are stacked up some place under their command and control. The presses whir, paper certificates appear in millions. That's a **MACHINE**. This paper money has a much higher traffic flow and is much easier fodder for the literate and numerate Customers.

Public Perceptions of Technological Development



Cross a line of transition—cross the Line of No Return, cross the Line of Empire—and you can dispense with the gold backing. That money is worth money because the Consumer populace believes that it's fungible. It's backed up by the stark fact that it's consumed by everybody everywhere. Everybody knows about it, it's got a good brand, there's plenty and it works just fine. It's a PRODUCT.

Now dispose of the paper too, and metricize the global flow of electronic funds around the clock. Electronic financing certainly has its drawbacks and design flaws—it's profoundly unstable, it's fragile, it's always in flux, and it's subject to almighty panics. Currency transaction volumes are bigger than the worth that is generated by national economies. But electronic money girdles the earth seven times in a second. It's a GIZMO.

In a SPIME, value transmutes into a public interaction with past and future. It's not about the material object, but where it came from, where it is, how long it stays there, when it goes away, and what comes next. And just how long this can go on. Every market is a futures market.

Really? Yes. Consider your credit history. Your insurance. Your retirement funds. Would you rather have a bar of gold? How about a stack of paper cash? How long would you survive on that? The Line of No Return is already gone.

How about the Line of Empire? Has the world of GIZMOS crossed that line yet? Can it defend itself from attacks by nomads who refuse to buy into its logic and generate nothing it wants?

FIGURE 5

Read the newspaper. Look at your computer screen. You tell me.

Let's consider what electronic commerce looks like and how it differs in kind from earlier forms of economic behavior. Being an author, I do rather a lot of interaction with Amazon, an online bookseller that has become a generalized retail interface. I rather haunt Amazon. But I don't buy very much. I just involuntarily help them to compost the previous means of retail.

Let's consider what it is that Amazon, or any online bookseller, is up to when it sells what it claims are "books." When you buy books off the Amazon Web site, you do not touch any physical books—what you do is *perceive the virtual identity of books*. You never touch or see the physical book itself until it has been shipped to you through a physical distribution system.

A book listed on the Amazon site is much more than ink on paper. A book on Amazon bears the relationship to a normal paper book that an RFID tag bears to a paper barcode.

Once an Amazon book arrives in your physical possession, it looks, feels, and behaves like any ordinary book. Yet, in short order, you can use Amazon's data-mining capacities: you can find out its cost and its publisher, whether other editions have been published and the image of their covers; what other books that author has written; what readers think of the book and what other books those readers have bought; what other publications quote the book; and a host of even more intimate technosocial interactions.

You are heartily invited, even seduced at every opportunity, to contribute to this labor yourself. You can offer comments about the book, to be read by other Amazon End-Users. You can even sell the same book to other End-Users of Amazon, and Amazon, purportedly a book retailer, does not mind a bit when you usurp their industrial role and become a book retailer yourself, a direct "competitor," in earlier economic terms.

There are still many aspects missing from the spectrum of services provided by Amazon.com. It would be exceedingly useful and healthful to know the full composition of that book. How long will it last before yellowing and falling to bits from acid paper? What (possibly bioaccumulative) substances will subtly boil out of its glue and ink, settling into your body in years to come?

How much would it cost Amazon to add these interesting facts about the product they offer? Very little. Because somebody already knows—they're just not telling Amazon. Nobody's figured out that they could or should ask. Or that it might really matter to people.

Now imagine that we establish an Amazon.org, a social-software entity that hangs around the fringes of Amazon, answering these questions. Questions about objects. What questions? Not the profit-centric questions that obsess Amazon. The serious questions.

16.
THE DESIGNER'S QUESTIONS

Wim Gilles was a Dutch engineer, designer and design teacher. Back in the 1950s, Gilles decided to codify his method of analyzing industrial products, turning it into a useful algorithm for students. These questions are the questions a designer needs to ask when he plans to shape things.

Many parts of this 60-year-old **Wim Gilles** analysis still work just fine, while the aspects that have become different—well, those differences are excellent metrics for just how the relationship of humans to objects has changed.

Soon we'll get to **Gilles'** specific metrics, but first let's detour. Who might want to ask and answer these questions most frequently? Can we spread the labor around so that we can derive benefit without being crushed by cognitive loads and opportunity costs? Yes, because it is now entirely possible to ask these questions in gangs, on the Web, through social software, in "commons-based peer production." Open-source production of software is a maelstrom of Wrangling at the moment, because it's important. Open-source production of objects is an even larger challenge to the status quo.

So let's imagine that WE are a group of Wrangling enthusiasts, properly obsessed with our SPIMES. WE could be a government agency, a non-governmental organization (NGO), a group of hobbyists; WE could be a group of hobbyists forming an NGO and lobbying to sway governments, which is pretty much exactly what the Open Source movement is doing right now in Switzerland, Brazil and Spain.

But never mind the outcome of any particular incidental skirmish in the Wrangling. Every real industry is always surrounded by a huge technosocial haze of some kind: not just the paid employees, but regulators, educators, standards bodies, journalists, critics, advertisers, industrial trade groups, shows and expositions, labor unions, boards of directors, former employees, the retired, consultants, related industries up and down the supply chain, competitors, industry analysts, industrial spies, police investigators, fraudsters, forgers, fences, the invaluable people running the junkyards and doing industrial Superfund clean-up—you can name them. These onlookers outnumber people paid by the industry by orders of magnitude. If they can be united, the commercial enterprise they surround looks severely outnumbered and outgunned.

So let's see what this cluster of entities might do about turning themselves into a **Wim Gilles** SPIME COLOSSUS—

given that they have very capable and extremely cheap computational power, bandwidth, and data storage.

The first thing **Prof. Gilles** suggests is that we should assemble all the items with which our new-and-improved design might have to compete.

"WHAT'S THE SCOPE AND SCALE OF THE INDUSTRY?"

Learning this was rather difficult in the pre-digital 1950s, but since WE at Amazon.org are sitting in the vast data shadows of Amazon.com and their ilk, that's dead easy for us. WE just contact our nutty completist-hobbyist friends, and set up a gorgeous Weblog database complete with photos and tech specs of everything made in the business. Unlike **Gilles**, WE don't stop with the living "competition." WE're interested in stuff that no longer exists, and the things that aren't yet made, and the things made in very distant countries with other markets, and the small-scale, odder things the industry used to make before they sold out and hit the big time.

So of course our database swiftly becomes far more comprehensive than Amazon's. Amazon merely wants to sell us available commercial things. WE, by contrast, want to know all about the works. And Amazon wants to promote them. WE don't need to promote them; we just want to know if they're any good.

Gilles now digs down into the basic characteristics of the object at hand.

"WHEN WAS IT MADE?"

Every Spime Wrangler wants to know about "when." For the SPIME, it's all about timescales.

"WHAT ARE THE FUNCTIONAL PRINCIPLES?"

Are WE engineers? No, WE can't all be. But some of us are. And the rest can help find the manuals. Then there's the "help desk." Google is already a much better help desk than most purported help desks supported by companies. WE're a vast user's group. WE can track all the most "frequently asked questions." WE may not know how these objects (supposedly) function, but WE know plenty about the endless struggles of people trying to make these objects perform in real life.

"HOW DOES THIS OBJECT OBEY GOVERNMENT REGULATIONS, AND THE DICTATES OF STANDARDS COMMITTEES?"

Piece of cake to find that out. It's all public domain. With any kind of luck, in a SPIME world, government diktats are built right into the device specs. As for standards committees, they're commonly manned by greybeards, pundits, professors, retirees and minutiae freaks—pretty much exactly the kind of people that WE are, ourselves. A standards committee looks and acts a lot more like us than it's ever going to look like a retailer or a manufacturer.

"WHAT DOES IT TAKE TO MAKE IT WORK?
HOW MUCH ENERGY,
HOW MANY RESOURCES?"

WE've got sensors. WE can measure all that for ourselves. And WE won't be much surprised if our real-world estimates differ wildly from the claims of the manufacturer and retailer. That's one good reason why potential buyers of these objects would want to consult with us, rather than them.

"IS IT SAFE?"

Nobody ever knows what "safety" really means, but there is room aplenty for vivid public Wrangling in the turgid worlds of risk assessment and "Fear Uncertainty and Doubt." One thing is for sure—there is scarcely a commercial entity in the world with any spark of credibility when it comes to assessing the safety of its own products. As for government regulatory agencies, they are notoriously subject to "regulatory capture" by the wealthy commercial entities they supposedly govern.

But the capturers can't capture all the agencies all the time, and WE will make it our business to collate the output of agencies that aren't corrupted. Governments won't do that work of assessing their own regulatory performance, because governments are far too jealous of their own credibility—but WE will.

WE could get a lot of healthy public attention just by going to every national government and consumer-safety org in the world and summarizing their safety assessments, grouped under a single heading: the identity of the object in question. Then you put that on a handheld screen between the purchaser and the object on the shelf. Who's going to pay us to do all that work? That's likely not the shrewd question to ask. A shrewder question is: who's paying us not to?

"WHAT'S ITS CAPACITY?
HOW MUCH CAN IT DO?"

The manufacturers and sellers of a product are surprisingly unlikely to know this. That's because they designed and sold the object for a specific set of purposes that

they themselves had in mind. WE know better, because WE are in intimate touch with the biggest otaku crank hot-rod fans of crazy post-consumer alteration, the cost-is-no-object fanatics who are using the object under circumstances never originally intended. You want to know what that thing can do when you strip it down, soup it up, and put it on the street? Ask us!

"WHAT ABOUT HYGIENE?"

Hygiene is a subject never properly addressed under the previous technosocial regime. The 20th century's ignorance in this regard rivaled the 18th century's naivete about germs. So let's talk for a minute about, for instance, shoes. Did you ever notice that the soles of running shoes are made of heavy-duty, high-performance plastics? That's good, right? Because you want to run in those objects, repeatedly pounding them against hard surfaces with the full thudding weight of your body.

But when you do run (or even just knock around the house in your shoes and tracksuit, pretending to be athletic), what happens to the soles of those shoes? They wear away. They abrade from the burdens of your weight and surface friction. Their soles transmute into microscopic particles of high-performance plastic. And pal,

you are *breathing* those particles. It's not as if you lit up that running-shoe like a cigarette and sat and smoked it—but, well, it *is* rather like that, actually. It's just *slower*.

You want to know where those particles go inside your body, and what that process does to you. It isn't pretty. But WE can explain that to you. WE took the trouble to find that out.

Through compiling data from hundreds of previous medical studies, WE are able to show strong correlations between various pollutants and asthma, testicular atrophy, cerebral palsy, kidney disease, heart disease, hypertension, diabetes, dermatitis, bronchitis, hyperactivity, deafness, sperm damage and Alzheimer's and Parkinson's diseases. WE can test our own blood for various pollutant loads and add that up on maps. Why not join in and have a look? You give a little, you learn a lot.

What can happen to you and your shoe-wearing body when a load of that byproduct builds up inside your system? Since inhaling abraded shoes was never before defined as a medical syndrome, WE and our org are the world leaders in exploring that phenomenon. You'll want to talk personally to the guys and gals who experienced that remarkable situation. They're in our "medical support group." Them, and their physicians and lawyers.

"HOW DO YOU MAINTAIN IT AND SERVICE IT?"

Did you ever notice how many books there are for sale about popular objects, books like *The Missing Manual* or *The Repair Manual for the Compleat Idiot*? Did you ever wonder why companies are so bad about writing popular books about the objects they presumably know best? Well, there are three reasons why their books and manuals are lousy. First, all their public documents are vetted through a PR department, so they are basically promotional items. Second, they don't care much about you or what happens to you, after they take your money.

And third and most crucially, they don't know very much about their own stuff. Why? Because knowing about their stuff is not their reason for being. They are a commercial enterprise. So they are trying to be a lean, mean, businesslike business, making and maintaining these objects with as few paid employees as possible, so as to produce a high ROI for investors and a big output-of-value per employee.

Nobody pays commercial enterprises to fully understand what they're doing. That's not their metric.

WE, by contrast, know a lot about their objects. That gap in expertise is traditional. That gap is the only reason that designers ever existed. Designers know more about objects than the people who are making money from them. That's because designers aren't required to pay elaborate attention to shareholders and sales. Designers pay attention to things. They pay an intense, **Wim Gilles** style of attention.

"HOW LONG DOES THE PRODUCT LAST?"

An absolutely critical issue for the SPIME Wrangler. If we were **Wim Gilles**, this would have been the first question WE asked! WE like to go right out to dumps, disinter dead examples of the product, document them with necrotic fascination, and put the images right on the Web site. WE're frankly fascinated by the ways in which they decay. WE can also shine 'em up, fix 'em, put 'em on eBay, and make a mint. WE certainly know a great deal more about *abandoned* objects than any commercial firm. Whenever a company dies, WE just subsume it.

"WHAT ARE THE USES AND LIMITATIONS?"

"The Street Finds Its Own Uses for Things." And the Net—the Net is like all the streets at once, pouring their traffic together.

"WHAT ABOUT PATENTS
AND RIGHTS PROTECTIONS?"

Keeping up with intellectual property hassles is a full-time job. Most every complex object that comes off the chute is full of some kind of wicked barbed-wire snag, hidden in there by some MBA who gets it about "consumer lock-in."

But we're not Consumers. We're Wranglers.

"Shrink-wrap licenses." Who reads those?

"Disclaimer notices." Who bothers with those?

WE do. Because we're people who've already been cruelly nailed by shrink-wrap licenses and disclaimer notices. People come to us just because WE've numbered and counted all those mousetraps. WE Wrangle them for you.

You can help. The better they get at hurting you with all this surreptitious IP warfare, the more you need to talk to us.

"WHAT ARE THE PRODUCT'S MATERIALS?"

Is if fabbable? If it's fabbable, then we're probably fabbing it already. If it's not fabbable, you'll want to talk to the guys who are willing to make it fabbable. You're going to love our SPIME Wrangler Fabbability guys. They are fanatics, visionaries, the very idea enchants them. They spend most of their time trying to make fabs that are fabbable.

"WHAT ARE THE METHODS OF CONSTRUCTION?"

WE've got our guys who talk biomimicry, WE've got our guys who talk room-temperature auto-assembly, but... Okay, this may sound radical, but let's cut to the chase here. There's only one interesting, important method of construction: fabbing. If you still think otherwise, you want to talk to our guys who can fab stuff out of artificial diamond. *Diamond*, carbon atoms nano-assembled into diamond, right out of the white-hot vapor-deposition fab-spout. If diamond isn't durable enough for you, you're in the wrong universe.

"WHAT ABOUT PACKAGING?"

WE like trackable packaging in a network. If it's too dumb to know where it is and what time it is, WE don't even call that a "package."

Most of traditional packaging design was about the firm establishment of what they used to call "branding." WE Wranglers don't need to be told about "branding" by the paper surface of some package. What kind of lame customer-relations management is that? WE just wave a

SPIME wand at the package, and a SPIME management dashboard pops up on the handheld wand screen, linked to global databases like a mobile phone. Brand *that*, fella. If you're not in charge of what's happening there, it may well be that your worst competitor is.

What is a "brand"? It's a mark seared into the surface of something. Is that the best you can do in the way of establishing a relationship between us?

"WHAT ABOUT STORAGE?"

WE're totally into inventory management. Inventory management is our very reason for being.

You know what the real story of storage is? Where's the place where manufactured objects spend the vast majority of their time on planet Earth? It's the dump. The junkyard. You never go there, but WE always do. WE'll be there waiting. The things tossed off the truck get torn to shreds and reverse-engineered.

"WHAT IS THE EXISTING SALES PITCH?"

If you give the likes of us a "sales pitch," WE'll look at it like you offered us a hand-hammered flint rock. There's nothing you can tell us in a "sales pitch" that WE can't refute with a search engine in five seconds flat.

Whenever you coin a jingle, or trademark a slogan, and WE put those words into any Internet search engine, it's almost immediately going to lead us straight to your worst enemies. Those enemies won't be the first on the list—you'll be the first, because you spent so many millions making those words into popular taglines. But they're also a golden road to publicity for anyone who is particularly determined to hurt you. They can agglomerate the same traffic, that you built up at such cost.

"WHAT ARE THE MEANS OF DISTRIBUTION?"

You distribute the fab data, then fab it on the spot. That's the Wrangler's favorite method, of course. There are some interesting distribution alternatives. For instance, you can leave a SPIME on the side of the road and let it offer ten bucks to any passer-by who can forward it toward New York. Your results may vary.

"WHAT ABOUT PRICE AND VALUE?"

Now this is a truly fascinating topic. As SPIME Wranglers, WE're keenly aware that a deep engagement with identity can cause older pricing systems to crumble in unpredictable, nonlinear ways. For instance, imagine a world where every collectible appears in an issue of one.

"WHAT ABOUT TRADE DISCOUNTS?"

WE *are* the trade! Who pays retail? Come on, WE're all insiders now.

"WHAT IS THE VOLUME OF SALES?"

It's not about how many items jumped off the shelf this quarter. It's about how many objects there are in circulation, and what's being done with them. The volume of sales is trivial; it's developments within the installed base that tell us how many new ones may be needed or wanted.

"WHAT IS THE IDENTITY OF THE PURCHASER?"

There are no purchasers. There are only Wranglers.

Who cares about "the purchaser"? If the purchaser's not in the Wrangling game, the purchaser is like a child. You want to know the identity of the early adapters, alpha geeks and stakeholders, on other words, all the people who most want to know about you. There are the people you want to know about, not the "purchasers." Get these

people working in a direction you can leverage, and you can forget about mere "purchasers"—they'll show up as sure as lemmings pour into the sea.

"WHAT'S THE IDENTITY OF THE USER?"

It's good that **Gilles** makes a distinction between "purchaser" and "user," but WE Wranglers would like to have some coherent ideas about the demographics of everyone who interacts with SPIMES in any way whatsoever. WE're not all that interested in pigeonholing people inside demographics—what interests us most is when people *transit across* demographics. A rural fundamentalist who somehow moves to a foreign country, triples her income and is now a refined international diplomat—she sounds like someone we might want to talk to.

"WHAT DOES IT LOOK LIKE?"

Just as in the days of **Raymond Loewy**, it's still important to make a pleasing visual expression with a product. Being Wranglers, we want to know what the thing looks like at every stage of its lifecycle, not just when it's fresh from its shrink-wrap and styrofoam blocks.

"WHAT DOES IT FEEL LIKE?"

Yield to the hands-on imperative!

After asking these questions, **Gilles** tells us what to do with the answers:

> "Collate the positive and negative aspects of the products studied, and compare them in order to draw conclusions with which to formulate guidelines for the new product, which should possess as many of the positive characteristics as possible and as few of the negative ones as possible."

So that's it, right there. That's the crux of shaping a new thing that's rather like the older versions, except better. Not much to that, eh? Sounds like anybody could do it! Since I've now finished paraphrasing the work of famous designer **Wim Gilles**, I'll toss in another creative secret, for free: how to become a famous guitarist!

"You put your fingers firmly on the fret board, and then move your other fingers up and down on the strings!"

So no, it's not that easy. Design is hard to do. Design is not art. But design has some of the requirements of art. The achievement of greatness in art or design requires passionate virtuosity. *VIRTUOSITY* means thorough mastery of craft. *PASSION* is required to focus human effort to a level that transcends the norm. Some guitarists have passion, especially young ones. Some have virtuosity, especially old ones. Some few have both at once, and during some mortal window of superb achievement, they are great guitarists.

The vast majority of people who play the guitar do it to amuse themselves and maybe few friends. These people are also the core of the audience for great guitarists, because, although they will never be great, they know what passionate virtuosity sounds like. They are cognoscenti, and without them, you may have genius, but you have no scene.

Then there are forms of music better handled by masses of people formally organized in orchestras. Or is that so? What if the principles of organization are being transformed? What I electronicize the sounds of musical instruments into sampled bits, combining that sonic product with new methods of assembly and distribution? Does that effort, make any sense at all? If it does, then how fast will that compost the old method? In what areas first, in what subcultures, in what applications? Where is the Line of No Return? Where is the Line of Empire?

PASSION and *VIRTUOSITY* don't vanish, but they may well manifest themselves in structures that were previously inconceivable. Until the 1920s, "industrial design" did not exist as a profession.

Let's imagine that an enterprise such as "Amazon.org" comes to exist. Is that enterprise going to "design" things?

I doubt that an org will ever win a design award. But it offers the potential to do what modern industrial designers always *talk* about doing, which is designing the industrial system itself. It's about re-shaping the great beast from start to finish. And over again. Over again. And over again. Making new mistakes. Learning from all the old ones.

Today's Net is a condition like the early days of the horseless carriage, where they used to ship them with a mockup of a wooden horse on the front, so that cars wouldn't panic the horses still in the street. It's in the sexy but vaguely absurd mode of **Raymond Loewy's** streamlined pencil-sharpener, a period artifact that was mocked by **Henry Dreyfuss**. **Loewy** had slipped a sleek, handsome monocoque shell over the pencil sharpener, but inside, both he and **Dreyfuss** knew that it still had the same old grinding mechanical guts.

The Web is a layer of veneer over 20th century industrialism. It's still a thin crispy layer, like landlord paint. It's a varnish on barbarism.

The heat is on. The varnish is cracking as the barbarism grows more obvious, harder to bear.

The 20th century's industrial infrastructure has run out of time. It can't go on; it's antiquated, dangerous and not sustainable. It's based on a finite amount of ice in our ice caps, of air in our atmosphere, of free room for highways and transmission lines, of room in the dumps, and of combustible filth underground. This is a gathering crisis gloomily manifesting itself in the realm of bad weather and resource warfare. It is the legacy we received from world-shaping industrial titans such as Thomas Edison, and Henry Ford, and John D. Rockefeller—basically, the three 20th century guys who got us into the Greenhouse Effect.

It's no use our starting from the top by ideologically re-educating the Consumer to become some bizarre kind of rigid, hairshirt Green. This means returning to the benighted status of Farmers with *Artifacts*. End-Users will always legally and politically evade any effort to reduce them to the status of Consumers, and even Consumers will stoutly refuse to become Customers or Farmers; they know that any such effort of repression is the path of the Khmer Rouge and the Taliban.

THE ONLY SANE WAY OUT OF A TECHNOSOCIETY
IS THROUGH IT, INTO A NEWER ONE
THAT KNOWS EVERYTHING THE OLDER ONE KNEW,
AND KNOWS ENOUGH NEW THINGS
TO DAZZLE AND DOMINATE THE DENIZENS
OF THE OLDER ORDER. THAT MEANS REVOLUTIONIZ-
ING THE INTERPLAY OF HUMAN AND OBJECT.
IT MEANS BRINGING MORE ATTENTION
AND ANALYSIS TO BEAR ON OBJECTS
THAN THEY HAVE UNDERGONE.
IT ALSO MEANS ENGAGING
WITH THE HUMAN BODY AND ITS AFFORDANCES,
WITH OUR HEALTH AND OUR EASE
AND OUR COMFORT,
WITH OUR WORKING ENVIRONMENT,
OUR HOME ENVIRONMENT,
WITH OUR LUNGS, AND OUR SKIN,
AND OUR BONES.

17.
TOMORROW'S TOMORROW

Look hard at the people who use the Internet most often. You'd think these End-Users would be pretty far removed from the grim exigencies of manual labor; after all, it's not like they are coal miners.

We don't need to wax all stereotypical here; doubtless there are coalminers working today whose creamy skin is spotless and whose hair is a crisp bouffant. But, well, hang out with real hackers, sometime. I do that. I do a whole lot of it, because they are interesting. These masters of the digital universe, the heavy-duty programmers who build and maintain the Internet, they are commonly portly guys with wrist supports, thick glasses and midlife heart attacks.

They weren't born that way. They didn't get that way by accident, either. They got that way by chronic, repeated abuse. That's not a digital problem, that's a physical problem. It's still about an industrial system that cruelly sacrifices human flesh for the sake of dysfunctional machinery. They sit, type and stare in screens. All day, every day. It