

Modern-Day Dark Ages: So Much Stagnation

Renaissance, or rebirth, by definition follows something terminal. The European Renaissance followed its Dark Ages. While today's historians use more politically correct terms and don't call them Dark Ages, most agree there were decades, if not centuries, of "nothingness." Life went on, but there was little enlightenment. The establishment—the clergy and the nobility—seemed okay with the stagnation.

Similarly, there is so much "nothingness" today. In IT, it's about lack of nutrition and much of the spending is wasted. In sustainability and cleantech, it's about lack of agreement—there's rancor in spite of so many global concerns. In health care, it's about lack of availability—much of the world does not have access to advances, some even after decades of progress. It's fine to throw out grand challenges like reverse-engineering the brain, but in many ways, would it not be easier to just bring light to our Dark Ages?

Let's explain—starting with information technology.

"Empty Calories" in Infotech

The research firm Gartner expected global IT and telecom spending to be \$3.3 trillion in 2010. Robert Mahowald, a director at IDC, another IT research firm that collects market data by sector—software, telecom, and so on—says there is some cross-selling between sectors, but, in total, it is safe to say that the global spend is in excess of \$3 trillion a year. Neither IDC nor Gartner, however, tabulates internal corporate IT costs: salaries, benefits, and internal burdened charges.

If they did, it would reveal that most enterprises spend 80 percent to 90 percent of their IT and telecom budget with outside vendors. That is a dangerously high dependence on a supply chain. Many enterprises don't

even realize this because only a fraction shows up in the budget of the CIO. Research and development (R&D) technology is charged to product development, telecom to call centers and business intelligence to the corporate planning group. Mobile charges come via expense reports and Amazon Web Services via corporate cards and are charged to even more budgets.

Even in automobile and aerospace, which have much more mature supply chain management, companies such as Ford and Boeing get around 70 percent of components from suppliers. In those industries, supplier consolidation and tiering makes sense because Ford and Boeing are dominant customers and can dictate design standards and justifiable economics.

In technology, by contrast, buyers have little leverage—even companies as big as Ford and Boeing make up less than 0.5 percent of an IBM's or Oracle's revenue. The top 25 global technology vendors, such as HP and AT&T, now make up more than 50 percent of the volume of the IT amount spent externally. The top 25 global technology buyers (dominated by large banks and government entities), however, barely make up 5 percent of the total spend.¹ As a result, buyers have little control over vendor product design and innovation strategy when they individually control so little of a vendor's revenue.

With a few exceptions, such as Apple, Intel, and Google, the bigger technology vendors have not been innovating much. The three biggest chunks of external technology spend are in telecommunications, outsourcing, and software. Telecommunications vendors invest in capital expenditures (capex), outsourcing vendors in training their people, and software vendors in tweaking older versions. Not much is spent on breakthrough R&D or real innovation. Would you believe Verizon does not use the word “research” anywhere in its 10-K? Why should it invest in R&D when it can just leverage all the cool stuff that Apple and Google are delivering? Even those companies spend only 10 percent or so of revenues on R&D. Outsourcing vendors—by the way, over half of IBM's revenues are from outsourcing—typically spend less than 2 percent of revenues on R&D, and much of that is on “solution centers,” which are more about marketing than research. They, in turn, conveniently leverage innovation coming out of salesforce.com and Dell. Software vendors invest somewhat more in R&D than do telecom and outsourcing vendors—but parse that spend and you find much of it is going toward version 7, 8, or 12 of their products, some first introduced 10 to 20 years ago. So it is not really impactful innovation. Also, many of the software R&D dollars go toward porting products to new hardware platforms and devices or in “localization” to newer countries. Here's the irony: Some technology vendors spend more on internal IT than they do on R&D. The attitude toward real innovation is that “It's somebody else's job.” When pushed, the stock answer from most technology vendors is that too much R&D spending offers only diminishing returns.

In contrast, they do not believe they get diminishing returns from their sales and general and administrative (SG&A) costs, which make up 25 percent to 60 percent of their revenues—five to ten times what they spend on R&D. Indeed, Paul Melchiorre, who did very well as an “elephant hunter” selling mega-dollar contracts at software vendors like SAP and Ariba over the last two decades now says, “The next generation of software winners will not just re-architect their products for cloud computing. They will also drastically reengineer their own sales style and operations.” Take a look at SG&A roles at technology vendors, and you see opportunities to “deduplicate” many of the roles—or, to use our term, turn them into polymaths that could handle multiple roles:

- Sales operations manager
- Inside sales manager
- Analyst relations director
- Public relations manager
- Revenue accountant
- Pricing analyst
- Customer contracts attorney
- Investor relations manager
- CIO
- Controller
- Alliance manager
- Business development manager
- Channel manager
- Channel marketing manager
- Competitive intelligence manager
- Events coordinator
- Advertising manager
- Industry/vertical sales manager
- Marketing coordinator
- Web leads marketing manager
- Pre-sales lead support
- Database marketing manager
- Inbound/outbound sales support
- CFO

By the way, often that’s not just one employee per role. In addition, many roles are supplemented with consultants who, for example, coach vendors how to deal with industry analysts.

But let’s not just blame IT vendors. What Ford and Boeing keep in house in their manufacturing are strategic areas—for example, design of the aircraft or manufacture of the engine. In many IT shops, the thin sliver that stays in house is often not strategic: Many are technicians such

as desktop support staff, database administrators, and network managers. They are important, but they mostly provide infrastructure—not innovation—support. Some CIOs keep such staff members in-house because they are the most visible to users and so they give the perception of “better customer care.”

In a *CIO Magazine* Executive Council survey of 600 CIOs, 34 percent were classified as “function heads”: Only 4 percent of this group were focused on “driving business innovation” whereas 79 percent of them reported they supported “improving IT operations/systems performance.” This is at the highest level; further down in the IT organization, there is even less of a focus on innovation. Yet these companies still spent 5.1 percent of their revenues on IT. Another group—45 percent of the CIOs were classified as “transformational”—and 40 percent of this group reported that they were “driving business innovation” while spending a bit more—5.5 percent—of their revenues on IT. Finally, the third group—another 21 percent—were classified as “business strategist”; 70 percent of this group reported they were “driving business innovation,” and they spent 7.2 percent of revenues on IT.²

So, across all groups, a bedrock of about 5 percent of revenues is going toward “keeping the lights on”, not innovation, IT. Traditionally, IT has been conservative—the old adage used to be “No one got fired for buying from IBM.” Today, that saying has become a little broader—to include IBM, Verizon, Oracle, Accenture and other large vendors. Too many IT executives live in fear of one of their smaller vendors going out of business. And since many CIOs report to the CFO, their mandate is often focused on control and compliance, not on innovation.

Two grand challenges for most IT groups should be:

1. Spend 25 percent of IT budgets with start-up vendors less than 5 years old
2. Dramatically reduce the “empty calories” in the five IT budget areas we discuss in the next section.

Let’s start with software.

Software

Every year, software vendors send customers a bill for 15 to 25 percent of the “licensed value” of their software. This payment is supposed to cover support (bug fixes, help desk) and maintenance (periodic regulatory updates, enhancements). During implementation, few customers tax the software vendor’s support lines. In fact, most customers additionally pay a systems integrator (SI) or the software vendor’s consultants to provide on-

site implementation help. Yet they are charged the full software support and maintenance fee. Typically, after a year of going “live” on the software, support needs drop off again. Yet companies continue to be charged full support and maintenance fees. Since the support fees are on the licensed value, users are also charged on the “shelfware”—software licenses the company originally bought but has not deployed. If you were to amortize the cost of annual software vendor’s support and maintenance charge over the number of calls made to its support desk, a price of \$10,000 per call would not be unusual. Makes the much ridiculed \$600 military commode look downright affordable, right?

In the meantime, software vendors have been automating much of the support into knowledge bases so customers can self-service. They are moving support for stable, older releases to their offices in low-cost locations (or using offshore firms to support them). They are increasingly letting user communities handle routine queries. If users resist migrating to newer releases, software vendors often charge them a premium to stay on a stable older release that costs little to support. No wonder software maintenance gross margins are often at the 90 percent-plus level, and is attracting third-party maintenance from the likes of Rimini Street described in Chapter 9.

Even at that huge premium, software quality and warranties are weak. The torrent of patches from Microsoft is just one proof point. A common joke in the industry is that if Microsoft made a car, it would crash twice a day, and it would require you to retrain every time you traded in an older model—and ask you if you were sure if you wanted the airbag to deploy.

The American Law Institute issued the final draft of the *Principles of the Law of Software Contracts* in 2009. The introduction says, “Law governing the transfer of hard goods is inadequate to govern software transactions because, unlike hard goods, software is characterized by novel speed, copying, and storage capabilities, and new inspection, monitoring, and quality challenges.”³

In many software negotiations, buyer enterprises assign a general counsel who finished a real-estate transaction the day before and will work the day after on a labor issue. Counsel is hopelessly outgunned compared to the battery of intellectual property attorneys available to software vendors.

IT Infrastructure

The average corporate data center is shockingly inefficient compared to the next-generation centers being built by Google, Amazon, and Yahoo! Some of the centers being built for Wall Street buck this trend, but it is not uncommon to see power usage effectiveness (PUE)—the ratio of power entering a data center divided by the power used to run the computer infrastructure within it—at 2.0, when a world-class benchmark approaches

1.2. Additionally, as we describe further in Chapter 18, new world-class data centers are being located by the Googles and Amazons in places that deliver significant tax breaks and attractive energy rates.

So why can enterprises not walk away from their internal boat anchors? Many are locked into multiyear outsourcing contracts and face stiff early-termination penalties. Meanwhile, there is little in the legal language to force outsourcers to move to more efficient data centers.

In the traditional hardware sourcing model, companies bought servers and routers that were grossly underutilized. As enterprises start to deploy “virtualization” software, they are finding their baseline usage is often lower than 20 percent.

You and I can buy a terabyte of storage for less than \$100 and it’s a one-time payment. Yet many enterprises are paying \$100 or more per gigabyte over a three-year useful life, when you amortize the cost of storage and support for it. Granted that is high-availability, enterprise-grade storage, but is it worth 1,000 times as much? Then, when you look at duplication of storage—multiple backups to meet compliance needs, archived e-mails sent to multiple addresses with the same attachment, and the like—the waste is numbing.

Most companies sign up for multiyear outsourcing contracts to support their PCs and other office equipment. These contracts are priced on assumptions of likely incidents based on employee counts. If most companies kept a small reserve of loaner units and bought support “by the drink”—say, from Best Buy’s Geek Squad or from a local PC support shop—they could spend 20, 40, perhaps 60 percent less. Even more efficient would be a move to dumber but cheaper net terminals and to perform more computing “in the cloud.”

Technology Services

As companies implement technology projects, they tend to hire SIs like BearingPoint. Even though many SI proposals proudly state they have done hundreds of SAP or Java development projects, typically these SIs do not pass along much in the way of productivity or automation gains. In fact, since they are more “experienced,” they expect to be paid a premium. But even after companies pay premiums for specialized talent, IT projects still fail at unacceptably high rates. Time-to-completion metrics coming out of newer “agile” development methods, as described in Chapter 3, often show a two to three times improvement opportunity compared to traditional SI delivery models.

Another problem in the SI world is consultant travel. That often adds another 15 to 25 percent to base fees, which are already high to begin with. The common reasoning is “We are bringing the best talent to the

project.” Often, the reality is those consultants are available, and on the bench. The traveling consultants usually have a Monday–Thursday on-site policy, which forces the entire project to adjust to a four-day workweek. There is a reason why it is nearly impossible to get an upgrade on most U.S. airlines on a Thursday night. Consultants who fly weekly qualify for elite levels, which get upgrade priority. Over the longer term, some clients also report health and other productivity issues with consultants who travel that frequently. SIs implement constraint-based solutions for their clients all the time, so implementing a staffing model that constrains their own travel would not be difficult. Many SIs are implementing telepresence for internal communications but have not shown much initiative in using it on client projects and cutting back on project travel.

SIs are engaged on a project basis, but outsourcers, in contrast, get multiyear support contracts and bring their own issues. Typical productivity gains they agree to pale compared to what disruptive vendors like Amazon are showing is possible. Their service levels are deceptively generous—they may say 99.99 percent system availability—but there are plenty of exceptions for planned and unplanned downtime. Compared to cloud computing vendors, which are supporting hundreds and thousands of customers simultaneously at the 99.99 percent level and are frequently reported in the media for unscheduled downtime, the average outsourcer leads the life of Riley and rarely gets negative press or much of a punitive penalty for missing a service level.

Offshore vendors, particularly those from India, won plenty of kudos (and plenty of hostility from the Lou Dobbses of the world) in the last decade not just for their affordable rates but also for their commitment to quality and productivity improvements. Just as the Japanese auto manufacturers took good lessons from teachers like W. Edwards Deming in the 1960s and 1970s, Indian vendors took Capability Maturity Models and Six Sigma seriously in the 1990s. In recent years, however, that intensity has worn off. Toyota’s recent issues with its brakes, in particular, have affected the Japanese quality image, and something similar has been happening with India’s image around services. Much of the Indian staff—60 to 80 percent of their employee bases—are recent college graduates. In fact, they are called “freshers” in most Indian firms. They are technically sound but, typically, have little understanding of the client’s business processes. Also, as is common in many young employee bases, they tend to have high staff-turnover issues. In contrast, cloud computing vendors we discuss in Chapter 18 are showing massively (often across thousands of customers) shared-service application support models, which offshore firms are having a hard time matching as they mostly support customers on an individual contract, siloed basis.

Telecommunications

Most companies pay a bewildering range of landline, conference calling, calling card, employee Wi-Fi, mobile, and other messaging fees. Phone companies are also creative with their monthly plans, with shortfall charges, early-termination, and other fees.

In most companies, the spend on telecommunications typically exceeds the cost of all other IT costs—hardware, software, technology services, internal staff—put together. Not surprisingly, there is plenty of waste.

International mobile roaming is an example of significant “empty calories” in this sector. A study by Harris Interactive showed that the average U.S. employee spends \$693 in international roaming calls on an overseas trip.⁴ Although that may sound exaggerated, it buys only 200 to 500 minutes on many U.S. mobile plans, depending on the country you are visiting. It seems like everyone is in cahoots. Providers such as AT&T charge \$3 to \$4 a minute for a call to the United States from some countries. The European Union has capped roaming costs of its telcos but has no such caps for U.S. providers from its jurisdiction. United States regulators have largely ignored the issue. In fact, they exacerbate the problem since telco bills attract heavy taxes—15 percent to 25 percent of base charges, as we show below. Device manufacturers sometimes have a locked subscriber identity module (SIM) card like Apple does on the iPhone. You cannot swap (without “jailbreaking” the phone and potentially invalidating the warranty) in a SIM card of a local provider or that of MAXroam described in Chapter 9, which would allow you to make the same calls for pennies, not dollars, a minute.

Multinational companies are reporting increased competition in carrier-provided multiprotocol label switching (MPLS) services for their global wide-area-network (WAN) deployments. The major North American providers—AT&T, Verizon, Sprint, and Global Crossing—are having to compete with European providers, such as BT, Cable & Wireless, Orange, and T-Systems and Asian ones such as NTT. As Chinese, Korean, Brazilian, and Indian vendors mature, expect even more competition; but for now the cost of that networking is sizable.

Then there is the waste around telecom taxes—like tobacco, telcos are a favorite target for all kinds of taxes. Here are some taxes listed on the Web site of Eatel, a local telecom serving portions of the U.S. state of Louisiana:⁵

- E-911 Emergency Service Fee
- End User Charge (End User Common Line Charge)
- FCC Local Number Portability Charge
- Federal Universal Service Charge (FUSC) Federal Subscriber Fee
- Franchise Fee (Municipal Fee)

- Line Recovery Charge (LRC)
- Local Access Charge
- Mississippi Emergency Telecommunication Training Charge
- Network Access Charge (NAC)
- State Subscriber Line Charge
- Regulatory Cost Recovery
- Telecommunications for the Deaf Fund
- Universal Service Fee (USF) or Federal Universal Service Charge (FUSC)

Other IT Spend

What if gas cost \$5,000 a gallon and you had a leaky gas tank? That describes the situation with printer ink.⁶ Many enterprises are starting to look at options such as Cartridge World described in Chapter 9. They also have guidelines (driven by cost and a desire to be more “green”) for their employees to avoid much printing. Still others are reevaluating the volume of their printed advertising and other marketing material—since much of that seems to go straight into the recipient’s garbage.

Another area of spend coming under scrutiny is that on IT strategy consultants and IT research firms. An expression has been making the rounds the last few years:

In the '70s, buyers turned to IBM for advice.

In the '80s, to Andersen.

In the '90s, to Gartner.

Today, they turn to each other.

Peer benchmarking opportunities and market intelligence via boutique research firms like Altimeter Group (discussed in Chapter 17), Redmonk, Horses for Sources, and decent quality but free blogs, such as ZDNet (featured in Chapter 9), GigaOm, TechCrunch, and other sites, are helping companies lower costs of IT market intelligence.

Everywhere you turn, there is waste in infotech. Let’s now look at some of the issues around sustainability and cleantech.

Lack of Agreement around Cleantech

In 1987, the United Nations laid out a simple, uncontroversial definition for sustainable development: It is development that meets “the needs of

the present without compromising the ability of future generations to meet their own needs.”⁷

Sustainable development has turned out to be anything but simple and uncontroversial. Remember the story of the blind men who tried to describe the elephant—by its tail, by its trunk, and so on? If they were to try to describe sustainability, we would get similar, wide-ranging feedback:

- It’s a massive opportunity for a new generation of technology.
- It’s a new revenue source for governments via carbon-based taxes.
- It’s about energy independence and national security.
- It’s about climate change—we are running out of time.
- It’s the next generation of good jobs, as Germany’s Solar Valley has shown.
- It’s about back to basics. As Chapter 1 described, the Amish now look progressive.
- It’s a move by businesses to “guilt” us into paying more for “green” products.
- It’s about our kids and future generations.

As he left Copenhagen in December 2009, President Obama softened the criticism around what was widely called a disaster of a summit on climate change: “This is hard within countries. This is going to be even harder between countries.”⁸

Obama was not kidding about it being “hard within countries.” Reader comments on the U.S. Chamber of Commerce site reveal a very wide range of disagreements about climate change:⁹

I’m an avid environmentalist and make a living practicing environmental engineering. We are against cap and trade. It is just another excuse for the government to collect money based on the bogus argument that global warming is largely the result of industrial activities.

Reader in Florida

Someday we’re all going to pay for our energy usage and its waste, one way or another, so we better start dealing with it sensibly now, rather than wait until things get even worse. It’s time to put ideology aside and become excited about the possibilities!

Reader in California

Our business has a high cost of energy, and if cap and trade passes and our electrical costs go up any more, we are going to be driven out of business and over 100 people will lose their jobs.

Reader in Wisconsin

The Chamber supposedly believes in measures to address climate change but opposes any [legislation] it sees ... despite the indisputable fact that every National Academy of Science of the entire industrialized world has stated unequivocally that we need to do something about carbon buildup.

Reader in Montana

Even savvy investors like Vinod Khosla, the legendary venture capitalist and now a major cleantech investor, point to the difficulty in building consensus across varying viewpoints, when he writes, “There are many, many solutions in the ‘green’ space that will make a good return, but will not move the needle on carbon emissions.”¹⁰

Don’t get us wrong. As in infotech, there is already plenty of waste in cleantech, but the biggest issues seem to be around the emotion and disagreement on how to even get started. The doomsday ecological and energy scenarios should be unifying consensus—instead, the scenarios themselves are spawning debates.

Inconsistent Coverage in Healthtech

Total U.S. spending on health care was \$7,290 a person in 2007, nearly two and a half times the Organization for Economic Cooperation and Development average of \$2,984.¹¹ Yet the number of medically uninsured in the United States grew from 39.8 million in 2001 to 46.3 million in 2008.¹² That’s almost 15 percent of the country uncovered. We are starting to see scenarios like these at health camps: “The sea of tents and pilgrims wasn’t in Haiti or Guatemala. It was in Virginia, where uninsured Americans turned up in such big numbers [for health checks] that hundreds had to be turned away.”¹³

What about coverage for the mainstream, insured population?

Margaret Newman (the author’s wife) has spent 20 years in nursing, doing her training in the United Kingdom and working at various health facilities in the United States. She qualifies her comments by saying they reflect “my narrow perspective working in the bowels of a hospital” as she lists various areas for improvement:

- Insufficient conversations with patient:

Studies have shown that a doctor who sits at the level of the patient—on the side of the bed and spends even three to five minutes talking with the patient is sued less frequently. Patients feel the doctor really heard them and that the doctor had related to them as a person and picked up

information this way that impacted the patient's care and successful recovery. Instead, we rely mostly on tests to provide that "conversation."

- Incomplete patient records:

I'm looking forward to the day when a person comes to a hospital and their medical records from any part of the world can be accessed instantly. This would provide a complete medical record for the doctor, avoid possible delays in diagnosis and treatment, avoid repeat testing and so save money, and of course, add to the patient's comfort and confidence in the doctor and the medical system.

- Overdependence on hospital care:

Doctors in the spirit of not taking away hope continue to offer/encourage costly treatments for a terminal patient that often does not add much to their quality of life. Hospice can provide excellent medical, emotional, and spiritual support for the patient and family, and doctors need to get over their "death is a failure" attitude and refer patients in a timelier manner.

- Overworked medical staff:

Some doctors work very long hours, and I'd say one of the most important questions to ask a doctor in the ER is "How long is it since you came on duty and when did you last sleep?" Many mistakes can be made because the caregiver is simply tired.

Of course, things are much worse in the developing world. Some sub-Saharan countries report life expectancy at less than 40 years. Infant mortality is unconscionably high in the developing world, where the Bill and Melinda Gates Foundation has been giving out grants for health care research. HIV/AIDS, malaria, and other insect-borne diseases; respiratory ailments like pneumonia and tuberculosis; and poor-water-driven diarrhea and hepatitis are prominent areas of research.¹⁴ Some of these diseases were supposed to have been cured long ago—another case of inconsistent availability.

The World Health Organization provides other sobering statistics in its 2009 summary:

- 112 million underweight children
- 9 million child deaths
- 99 percent of maternal mortality is in the developing world¹⁵

Of course, as in infotech, there is plenty of waste in healthtech—in some ways, it’s worse. As in cleantech, there are rancorous disagreements—especially around the beginning and ending of life. The major failure in healthtech, however, is that a large percentage of the world still does not benefit from significant medical breakthroughs.

Turning the Tide

As Camus famously said, “In the midst of winter, I finally learned that there was in me an invincible summer.” Funding for innovation projects is right there in the trillions of dollars wasted each year in technology. Just go chisel off this baseline—you don’t need to get out a begging bowl for new funding.

Over the next 21 chapters, we show how innovators and disruptors are addressing some of the grand challenges and some of the more mundane ones we discussed in this chapter. Several innovators showcased in Chapter 7 are challenging traditional telco mentality. Chapter 9 showcases disruptors who are influencing technology economics in a major way. Chapter 12 and the profile on Kleiner Perkins show how cleantech is evolving. Chapter 14 shows how healthtech is changing.

Recap

There was plenty of living during the Dark Ages, but there was little forward movement. It was defined by its relative “nothingness.” Similarly, in many ways, we are living in our own Dark Ages. In information technology, there is lack of nutrition—much of the spending is wasted. In sustainability, there is lack of agreement—there is rancor in spite of so many global concerns. In health care, it is about lack of availability—much of the world does not have access to all the advances in technology—or even basic health care.

Enough of the focus on problems. Let’s move to solutions that enable us to escape these Dark Ages. Let’s start with General Electric in the next chapter to see how its product R&D and IT groups are addressing many of the opportunities in infotech, cleantech, and healthtech.