Information Technology
And the Corrosion of Competitive Advantage

DOES IT MATTER?

THE SUMMARY IN BRIEF

In a May 2003 article in the Harvard Business Review entitled “IT Doesn’t Matter,” Nicholas G. Carr introduced the idea that information technology (IT) does not provide a competitive advantage to companies in a strategic manner. In Does IT Matter?, Carr argues that IT has become a commodity, and because the very nature of strategy requires differentiation, IT cannot possibly qualify. Although IT has made spectacular gains in the last half century, it is no different than other disruptive technologies that have transformed the world since the beginning of the Industrial Revolution. It may have provided a differentiated advantage to some companies early on, but over time IT has grown cheaper and more standardized so that it is easily accessible to everyone. IT can be used to supplement and improve strategy implementation, but it is not the foundation of a competitive advantage. To handle this new approach to IT, executives will have to prevent the commoditization of IT architecture and applications from destroying their companies’ barriers to competitive advantages. Although that role is not yet entirely clear, executives need to prepare for the prospect that IT doesn’t matter to strategy.

What You’ll Learn In This Summary

✓ How information technology (IT) transformed from a potential strategic advantage to a commoditized cost of doing business.
✓ How the infrastructural technology of IT is like previous infrastructural innovations such as telephone lines and telegraph wires.
✓ Why the only way for IT to fulfill its potential is to become a shared, standardized utility.
✓ How mitigating risk and controlling cost are becoming more important than innovation and investment in IT.
✓ How companies coming together to share new technology can corrode individual advantage while increasing the benefit for the economy at large.
✓ How IT has affected productivity.
A New Business Infrastructure

One of the greatest discoveries of the 20th century was the microprocessor. It dramatically improved the efficiency of the earlier supercomputers and changed the way the world did business. It moved us from mainframes to local area networks to personal computers. It created the proliferation of information technology (IT) and its infrastructure, which were the major forces shaping business over the last 40 years.

Corporate spending habits reflect the great importance of IT to business. In 1965, corporate spending on IT was about 5 percent of capital expenditures. It grew to 15 percent in the 1980s, 30 percent in the early 1990s, and over 50 percent by the turn of the century. Even with the recent slowdown in IT spending due to the bursting of the Internet bubble, the average company still invests as much in IT as in all other capital expenditures combined.

Attitudes and practices changed as well. Twenty years ago, computers were considered suitable only for low-level employees. Now, any senior executive without one is a dinosaur. Once networks and then the Internet emerged, executives finally took notice and focused on the strategic implications of IT on a wide scale and how it could be used to create competitive advantages.

Scarcity Makes a Business Resource Strategic

There is an assumption in the business world that the strategic advantage of IT has increased with its ubiquity. This is incorrect. Scarcity, not ubiquity, makes a business resource strategic. By now, the core functions of IT — data storage, data processing, and data transport — are available and affordable to all businesses. It is the cost of doing business for all, but it provides distinction to none. Without distinctiveness, the only basis for competition is pricing, which eventually slashes prices close to cost, and squeezes out profit.

Investments in resources that provide differentiation can deliver higher profits, while commodity inputs cannot. Only when a company can distinguish commodity resources from those that have a potential competitive advantage will it avoid wasted cash and strategic dead ends.

Changing Role of IT

The transformation of IT from a source of advantage to the cost of doing business raises many challenges. Executives need to re-examine spending and management of IT and rethink relationships with vendors. Different companies will reach different conclusions, but most will find that as IT merges into general business infrastructure, mitigating risk and controlling cost will become more important than pursuing innovation and new investments.

IT is probably best understood as the latest in a series (continued on page 3)
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of broadly adopted technologies that have reshaped industry, such as the steam engine, the railroad, and electricity. All briefly gave competitive advantages to forward-looking companies, but then became commodities. Over time, they mattered less to the competitive fortunes of individual companies.

Information technology is headed in the same direction. As IT’s advantage dissipates, its great transformational power fades in a necessary and natural process. Only by becoming a shared and standardized infrastructure will IT deliver its greatest economic and social benefits and fulfill its potential.

The Nature and Evolution of Infrastructural Technologies

In the mid-1800s, the newest technology was railroads. By connecting longer tracks and faster locomotives with ongoing developments in ocean and coastal shipping, the spread of railroads created global markets and competition as well as new business organizations and methods. After the railroads came the intercontinental telegraph wires, the electric grid, the telephone system, the highway system, radio and television broadcasting, and most recently, computer networking. All connected far-flung companies so that they could work together. Though these examples are often compared — especially the railroad and the Internet — analysis has typically focused on boom-or-bust cycles or technology’s effect on specific industries. But how do individual companies adapt to these new technologies?

Advantages of Access

Proprietary technologies can be owned by a single company and can be the basis for long-term strategic advantages as long as they remain protected from competitors. Infrastructural technologies offer more value when shared than when used in isolation, and it is inevitable that they will become part of the general business architecture. In early development phases, the line between proprietary and infrastructural technologies blurs if access is restricted through physical barriers, high costs, government regulations, or lack of standards. The companies that have the means to access the technology will be able to use it to their advantage.

Companies can also gain advantages if they have foresight about the best use of the technology. The characteristics of the ultimate end-state are always unclear in the beginning, but the companies that can anticipate how the technology will change business will establish an edge over their competitors.

The Fate of Hardware And Software

Is IT an infrastructural technology destined to become a commodity input? The question is hard to answer because IT is made up of both physical hardware and abstract software. Past infrastructural systems were inflexible and served only one or a few functions. IT systems can be instructed through software code to serve infinite uses. However, the information system remains similar to older technologies like railroads and telephone networks because it still needs standardization to reach its full potential.
Commoditization of Hardware

Originally, computers were proprietary machines taking up large rooms, and only a few people knew how to use them. Over time, the hardware became standardized because PCs had to be easy to use, they had to talk to one another, they had to run a shared operating system, and they had to be fairly cheap. By turning business PCs into indistinguishable “boxes,” Michael Dell turned the old proprietary technology on its head and made hardware a commodity. After PCs became standardized, servers and workstations followed, and then storage systems and networking gear. Instead of working with machines that run on proprietary chips, companies are finding that the infrastructure of IT is becoming more and more standardized and commoditized.

To overcome this commoditization, technology companies try to push the state-of-the-art to satisfy their most demanding companies. They end up “overshooting” the needs and capabilities of most customers, who are willing to buy the bare bones version, shifting competition from specifications to prices.

Eventually, individual hardware components will disappear, and companies will just connect directly to the IT infrastructure as they do now for electricity. This sets the stage for grid computing, where computers don’t just exchange files; they blend together into essentially one machine. All processors and memory systems are shared while the computing and storage requirements of individual users are distributed with greatest efficiency. Grid computing would require a new kind of software to coordinate all the pieces, but the final step in the commoditization of hardware would be complete — and largely invisible.

Commoditization of Software

Software has no tangible form or limits on innovation, so it appears safe from commoditization. In reality, software is a real product that needs to achieve real results; therefore, it is susceptible to the same rules of economics, markets and competition as other physical goods. The history of software development is an ongoing attempt to realize economies of scale and amortize the high development costs over as many users as possible. Eventually, software wants to be free, or more accurately, shared. That would make it a commodity input.

Early on, the cost of writing proprietary software was so prohibitive that companies were willing to pool resources, sacrifice distinctiveness, and save costs. Software houses centralized expertise, turning a proprietary resource into a purchased good. Though they served different clients with “custom applications,” there was actually not much customization. The advent of PCs also transformed software into a packaged good because:

- Businesses could afford more computers.
- Nontechnical employees interacted directly with computers.
- Networking became important.

By the end of the 1980s, companies could buy generic programs for databases, accounting, and HR management, and that culminated in enterprise resource planning (ERP) systems that brought all management systems together as modules in a single integrated system. The loss of distinctiveness was worth the savings. Unlike a physical product, software never decays, so there is no logical repurchase cycle. Software makers resort to constant upgrades, which create overshooting and thus opportunities for cheap, commodity versions of applications as well as open source software.

Some professionals insist that the malleability of software ensures unending innovation. But that is not the point.
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Software innovations will continue, but individual companies will not be able to hold them as proprietary resources.

Innovation in the Architecture

Another difference between IT and earlier infrastructural technologies is that the architecture of IT changes. Technical advances in IT architecture can start out as defensible advantages to individual companies but they typically work better when they are promoted broadly and everyone has access.

A critical element of the IT architecture is the way people and devices connect with networks. The last few years have seen a rapid shift from wired connections, usually using Ethernet cables, to wireless connections, usually using wireless fidelity (Wi-Fi) antennas. Wi-Fi is one of many advances hailed as the next big thing because it creates greater flexibility for users and it is cheaper to install and maintain than wired networks.

Vanishing Advantage

In the 1990s, IT was touted as a way to increase productivity, outweighing the cost of implementation. But the economic benefits ended up in the pockets of consumers not companies. The IT investments allowed companies to maintain competitive parity but not an advantage. The short-lived advantages that did exist occurred because of anomalies.

The adoption of IT infrastructure has occurred at different rates in different industries. For instance, the financial services industry was an early and heavy investor in IT, while the fragmented health care industry, shielded from competition, was slow to adopt IT. Now, ironically, the health care industry holds more potential for providing competitive advantage than the financial industry, where IT infrastructure has become more standardized.

Access barriers, such as the cost of building computers and assembling programming staffs, kept businesses from investing in IT during the early days. There are also advantages of foresight when visionary leaders sense how technology will be used in the future. These can produce a foundation for strong and durable advantages during the build-out of IT infrastructure.

Breaking Down the Barriers

Other problems arise if you believe that advantage doesn’t come from technology at all, but from how it is used. An early mover advantage can backfire when competitors leapfrog. The time it takes for competitors to catch up is the replication cycle. Over time, the technical replication cycle gets shorter. The rapidly increasing affordability of IT functionality has destroyed the most important barriers to replication.

Open networks are also destroying the advantage of proprietary networks. Since IT capabilities are more valuable when shared than when used in isolation, competitors will work together. Along with standardization of technology comes standardization of use. Enterprise technologies standardize an entire process, imposing constraints on the process. The software becomes the process for every company that uses it, so there is little room for a company to distinguish itself.

Some may argue that we are only in the beginning of the Digital Age and unfathomable discoveries still lie ahead. But history shows that the transformational power of an infrastructural technology dissipates as its build-out nears completion. There are many signs that this end is near.

- IT is outstripping most of the business needs it fulfills.
- Essential IT functionality has become affordable to all.
- Capacity of the universal distribution network (the Internet) has caught up with demand.
- Leading vendors — Microsoft, IBM, HP — are rushing to position themselves as “on demand”

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infrastructure services — essentially as utilities.
● An enormous investment bubble has expanded and
burst, which historically suggests that the infrastruc-
tural technology is reaching the end of its buildout.

The Corrosion
Of Traditional Advantages

Though infrastructural technologies eventually lose
the power to create competitive advantage, they retain
the power to erode competitive advantage. The railroads
destroyed the advantages of companies situated near
ports. The telegram destroyed the advantages of long-
cultivated international business relationships built on
written correspondence and confidential couriers. That
neutralizing effect will be very strong with IT because it
is so flexible and deeply entwined with business
process. It can corrode advantages across many aspects
of a company’s business.

There is also a corrosion of performance and advan-
tage as different companies adopt the same or similar
information systems. The IT infrastructure will become
more homogenized as companies continue to look to
outside vendors to operate key systems or processes. The
Internet has magnified the effect by undermining the
advantages of proprietary, closed networks, but it has
shifted power from companies to customers. The Internet
enables customers to compare prices, features and quali-
ty. IT has become a type of solvent for business strategy,
pushing companies toward competitive parity.

All of this does not mean your company should give
up strategy. Strategy is now more important than ever.
Only the strategically astute companies will rise above
the competitive free-for-all. For instance Dell estab-
lished its strategy before building its much-vaunted IT
system. By cutting out wholesalers and retailers, Dell
changed the economics of the industry. Building to
order reduced the need for inventory and working capi-
tal and was more efficient. Dell was already the low-
cost provider when it launched its Web store. Dell’s IT
investments are actually quite conservative and have
always been aimed at reinforcing the efficiency of its
operations. IT has buttressed Dell’s advantage, but it is
not the source of that advantage.

Building on the Past

Strategy requires a broader definition of competitive
advantage that encompasses traditional sustainable advan-
tage and a more transient leveragable advantage. A lever-
agable advantage is a privileged market position that
provides a stepping stone to another privileged position
— a way station, not a destination. It is a deliberate move
that builds on the past and prepares for the future.

IT infrastructure also dissolves existing advantages by
blurring traditional boundaries. Networks and the
Internet make it easier to collaborate so industry pro-
ductivity can increase, but an individual company’s dis-
tinctiveness and profitability can dissipate as well. How
do managers defend their competitive advantage while
allowing information to flow freely?

Some believe that there should be no stand-alone com-
panies. Nobel Laureate Ronald Coase stated in 1937 that
using the market entails transaction costs above the price
of the good. A company will do anything itself if that
decreases transaction costs. Anything else, it will out-
source. High transaction costs create larger companies
while low transaction costs create smaller companies.
The Internet has reduced transaction costs so much,
some believe there is little a company has left to do.
Companies will break up and groups of people will
come together to create a product and then disband.

But these people misread Coase. He also indicated
that lower transaction costs within a company increase
management efficiency, allowing the company to do
more, which increases its size. In addition there may be
strategic reasons to keep activities in-house even if they
could be more cheaply outsourced. The post-company
pundits would eventually strip companies down to plug-
and-play business networks. But there is more to com-

IT Neutralizes Advantages

A Harvard Business School doctoral student, Mark
Cotteleer, studied the neutralizing effect of IT on a large
manufacturer’s adoption of an international enterprise
resource planning (ERP) system to replace disparate
regional systems. Cotteleer measured performance by
speed of order fulfillment before and after the installa-
tion. Before the installation, it typically took North
America 51 days to fill an order, while Europe took 35
days and Asia just 36 days. The installation of the ERP
system immediately erased these differences, bringing
the regions into parity. One month after installation,
North America, Europe and Asia reduced to 29, 27 and
28 days, respectively, and a year later, 35, 33 and 37
days. Although local managerial differences increased
the time, they still stayed in close alignment, and after
another year, North America was the leader. The advan-
tage originally held by Europe and Asia had been oblitted
by the introduction of IT.

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panies than information processing — the physical and human characteristics. Without these extra characteristics or a strategic intent, you have a commodity.

Successful strategy comes from looking both inside and outside the company to achieve both a privileged industry position and to exploit internal capabilities. The maturation of IT infrastructure and its corrosive effects on competitive advantage demand that managers see a competitive goal as a goal and a passageway. A means and an end. They must balance agility with stability, and openness with guardedness.

Managing the Money Pit

When a resource becomes essential to competition but inconsequential to strategy, it risks becoming more important than its advantages. No current company builds its strategy around rail service or electricity, but a lapse in supply or spike in their cost can be devastating. Fortunately, infrastructural technologies become more stable and resilient as they mature, but young infrastructure presents business risk because businesses are forced to invest in technology they do not fully understand.

Oxford Health Plans lost $3 billion in market capitalization when it had billing software problems. Nike lost $400 million when it had difficulty installing supply-chain software. Every company has its own horror stories. IT projects are always more expensive and take more time than expected. The goal is to bring the failure rate down by managing the risk of IT in individual firms.

Spend Less

The greatest risk that IT presents is overspending. Although IT is a commodity and its price falls rapidly, it is entwined in so many business functions that it consumes a large portion of corporate funding. Here are several ways the IT money pit can be managed:

Cut out waste. Suppliers like Intel and Microsoft continually roll out new upgrades, even though the average business PC user doesn’t need much more than word processors, spreadsheets, e-mail, and Web browsing. Commoditization allows buyers to negotiate better deals, insuring long-term viability of PCs, tying payment to usage, and allowing them to go to other vendors.

Use all capacity. The massive amount of spending in the late 1990s left many companies with more capacity than they needed. Use superfluous server space, hardware and software.

Put tighter controls on IT usage. Up to 70 percent of what is stored on corporate networks consists of employees’ saved e-mails, spam, MP3s, and video clips.

Restrict employees’ ability to save files indiscriminately.

Put more rigor in systems planning. Higher-level managers must be more creative about finding ways to explore cheaper hardware, software and service alternatives. Amazon.com was able to shift more than 90 percent of its servers from proprietary Unix systems to an open-source Linux system in three months, cutting $17 million from its quarterly IT budget.

The commoditization of IT will continue to give companies new opportunities for reducing costs and risks. The ability to find and capitalize on these trends will be a hallmark of effective management in the future. Instead of assuming that annual IT budgets will grow every year, companies should begin to assume that IT budgets should go down every year.

Even small delays in purchases can dramatically reduce costs because of the ongoing fall in IT prices. Companies that stay off the leading edge reduce their chance of being saddled with buggy or soon-to-be-obsolete technology. It is now clear that many of the smartest users of technology stayed back from the cutting edge. UPS hung back during the 1980s and 1990s, and followed in FedEx’s tracks, learning how to make its rival’s systems better and cheaper. When UPS rolled out its own logistics-management software, it was more open and easier to use than FedEx’s.

Innovate When Risks Are Low

There are still times when it makes sense to get out ahead of the competition with IT innovation, if you can reduce or avoid the high costs associated with being the first mover. Companies with substantial market power can pursue infrastructural innovations that fortify existing advantages, as with Wal-Mart’s early move to promote radio frequency identification (RFID) in the con-
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sumer packaged goods sector. These tiny chips allow more precise control over inventory and improve productivity for the entire industry. By pushing RFID to become a commodity, Wal-Mart neutralized it as a potential strategic weapon for competitors, reaped the most gains as the scale and cost leader in the industry, and pushed most of the costs of adopting the technology onto the shoulders of suppliers.

Companies can also reduce risk by pursuing highly specialized innovations that competitors will have trouble adopting. Sometimes a startup company can capitalize on new IT to gain an edge over industry leaders. JetBlue has used today’s open IT infrastructure to succeed where older airlines, which are locked into their IT infrastructure of reservations, flight scheduling, and pricing, cannot. JetBlue gives its pilots laptops to track flight plans, while reservation agents work at home using PCs and make calls on the Internet. These tactics are strategically meaningful because JetBlue’s competitors’ existing business models do not allow them to rapidly adopt such innovation.

Focus on Vulnerabilities

IT has many operational dangers, including service outages, security breaches, vindictive or careless employees, and even terrorism. IT disruptions can be expensive and prevent a company from making its products. Companies must study and fix their vulnerabilities both on the outside and on the inside. The current decentralization of hardware and software purchases and hiring of IT staff is also a cause for concern.

Also, consider the changing nature of IT functions. Instead of viewing IT positions as generic, managers must find people with different skills. As more IT functions are performed remotely by contractors, and IT departments shrink, IT staff will need to be able to negotiate with vendors and manage a far-flung workforce. Senior executives such as the CIO need to promote a sense of realism about the strengths and limitations of IT to prevent over-optimistic predictions and high spending. Eventually, a CIO’s job should be to render him- or herself obsolete because the IT infrastructure is so stable and robust that it no longer requires high-level management.

The Future Of Technological Change

The bewitchments of broadly adopted infrastructural technology are hard to resist, and they explain the out-sized hopes that some people have placed on computers. The late 1990s were a time of infinite possibilities, all brought about by the Internet. Proponents promised to bring us into a new Digital Age where we would be freed from the old physical world and the old way of doing business. Since the Internet boom went bust, there are fewer of these claims, but people still want to see IT as a revolutionary force that “changes everything.”

But 50 years after the computer revolution began, has it truly been transformative? IT is certainly ubiquitous. Computers have simplified many tasks and, coupled with the Internet, changed the way we communicate, gather information, and shop. IT has not fundamentally changed the way we live and work. A time traveler from the 1930s would still be able to make sense of what he would see here today. Compared to the cataclysmic changes in society and business brought about by the technological innovations of the 1800s — rail, telegraph, telephone, electricity, internal combustion engine, refrigeration, indoor plumbing, photography — these 20th-century changes seem modest and more of an extension of the past than a break with it. Life is unthinkable without the advances of the 19th century, but you can’t say that about IT. Would you rather do without your toilet or your computer?

Additionally, it is hard to find the effects of IT on productivity. Not all of the large investments in IT during the 1990s produced high rates of return. Some believe the connection between IT investment and productivity is random, but the strong, continued expansion in U.S. productivity since the turn of the century does have some relationship to the large expenditures in IT, which have allowed companies to do more with fewer employees.

Complementary Investments

Most gains in productivity are also a function of complementary investments. The gains hinge as much on related process and organizational innovations as on the original technology. The growing consensus is that IT can boost productivity but only when combined with broader changes in business practice, competition, and regulatory control.

There are other issues to consider in the future, such as what happens when computers take over jobs done by people. If economic growth is strong — output rises faster than productivity — companies and the whole economy benefit. The commercial sector becomes more efficient, displaced workers move into new jobs, and general living standards rise. But if productivity growth races ahead of economic growth, the number of jobs can decline, unemployment may increase, the supply of goods can outstrip demand, prices may drop, and the divide between wealthy and poor may widen. The American economy is resilient, but we cannot dismiss the possibility that strong productivity gains from IT will end up doing harm as well as good.