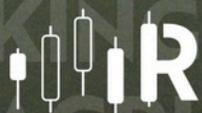




# CHAPTER 6

# TECHNOLOGY



BUSINESS BEATS BASICS

# TECHNOLOGY

## INTRODUCTION

Journalism about technology spans a few broad but distinct areas, most of which share a common origin in digital electronics. Once known as “high-tech” and now increasingly simply called “technology,” the subject covers computing, software, consumer electronics, and telecommunications; the Internet, “new” media, and social media; parts of biomedicine and biotechnology that rely heavily on computational tools; some military technologies such as drones; and some parts of energy technology, especially batteries and solar cells. And that’s just the beginning.

Technology journalists cover the world of scientists and engineers. They cover the inventors, innovators, and entrepreneurs who imagine, build, and market new versions of many of the technologies cited above. Technologists can work in industries or universities, privately owned enterprises, nonprofits, or government-run programs.

The technology beat also includes aspects of economics – particularly, the coverage of the financiers, venture capitalists, and government agencies who fund digital innovations. Not to mention the marketing, engineering, and management executives who decide on the projects that turn broad innovations into specific products.

Technology has spawned many important news and analysis stories about business, economics, society, and even politics. Technology reporters may write for the business desk of a news organization, though sometimes they are grouped together in their own section or a part of the science section. No matter where they work, technology reporters are recognized as a breed of their own with a distinct set of skills, knowledge, and experience.

This primer aims to provide the basics of technology journalism – and instill an appetite for learning more about it.



# WHERE TO BEGIN

The technology beat has four main story types, each linked to business and the economy. Most technology reporters will cover all four types of stories, though some reporters succeed by concentrating on a single area.

## PERSONAL TECHNOLOGIES

Think smartphones, tablets, computers, speakers, and anything wearable, like a smartwatch. A common approach to covering personal technology is to report on how well new gadgets work while emphasizing what's new or improved. Reporters compare and contrast features while learning how they work (and sometimes don't), all while trying to scoop one another on the possible trajectory of future products. Some reporters become "power users" in order to gain an edge on the market, while others rely heavily on expert opinion to evaluate new products.



## THE COMPANIES THAT CREATE AND MARKET NEW TECHNOLOGIES

The method of judging the performance of high-tech companies has some unique qualities. Because of the tendency for new technologies to destroy the value of their existing products and business lines, tech companies need to constantly innovate. Companies have to invest heavily in research and development and frequently acquire outside research groups or companies that possess important technical knowledge or complementary products. While all businesses

experience the forces of creative destruction to some degree, tech companies often experience these forces more dramatically.



## THE INVENTORS & LEADERS

Steve Jobs, Mark Zuckerberg, Sergei Brin, Bill Gates – these people draw as much, or more, coverage than the technologies their companies promote. Reporting on the people behind the technologies is as important as understanding the technologies themselves and can help humanize a technology story for the reader. It is also sometimes easier to report on the person than to actually understand the mechanics behind the technology – assuming you can gain access. Interviews with established inventors and leaders are difficult to obtain, and critics often suffer retaliation in the form of loss of access for future stories.

## SOCIAL EFFECTS OF TECHNOLOGIES

Because technology reporters have specialized knowledge and many sources on technological change, they are often asked by editors to report on social and cultural trends arising from those changes. For example, think about social media and how the many evolutions of it have greatly altered how many people interact with one another. Social media has also impacted how businesses connect to and, ultimately, sell to their audience.

# CORE CONCEPTS TO KNOW

Technology is ever changing, so the technology journalist is always redefining what they cover. Specific gadgets and gizmos come and go. It wasn't that long ago that the world knew nothing of Facebook or the iPhone. Change is constant. Entire platforms – the cable set-top box, the mobile phone, even the car dashboard – undergo revolutions, and new technological systems emerge.

While technologies constantly change, essential business and economic concepts endure. Most innovations survive because they win in the economic marketplace; few depend entirely on government support. The following concepts apply broadly to the technology field.

## BUSINESS MODEL

Successful innovations generally need a way of paying for themselves. In this context, the term “business model” refers to the manner in which a technology gets paid for and how a business is run. The most common model is the sale of individual products to a lot of people. A different type of model involves “subscriptions,” where customers pay in advance for access to a service (e.g. cable television, magazines) usually on a monthly or yearly basis. This model often involves making it costly for the consumer to switch, or providing benefits for subscribing for longer periods, such as a reduced rate for paying for a year up front vs. paying month to month. Another common model in the technology field calls for giving away a basic product for free and then selling add-ons to boost revenue.

In practice, even successful technologies can lack a business model, calling their future into doubt. YouTube, for example, is wildly popular but originally attracted little advertising and revenue. The company used to be an example of an innovation that was socially successful but economically a failure. The company has

since seemed to find a profitable business model that works for it – albeit through ongoing trial and error as it adapts to its users' preferences.

## CREATIVE DESTRUCTION AND DISRUPTIVE TECHNOLOGIES

New technologies often succeed by destroying existing ones. Businesses are also disrupted, so they must either adapt or die. Often, even entrenched technologies succumb to the forces of “creative destruction.” The term was coined by Austrian economist Joseph Schumpeter, who argued that the birth and death of industries was an inevitable consequence of technological innovation.



## INTELLECTUAL PROPERTY

Ideas and knowledge – about design and processes especially – are critical to creating value from innovation. The real value of an iPhone, for instance, lies in the “intellectual property” – the intangible items that come from the creations of human thought – and includes copyrights, patents, trademarks and trade secrets. These intangible items are the true value of the physical device. The value of ideas, and the need to protect that value, unites technology companies around a new business model that depends on profiting from the “marginal costs” of copying ideas easily and quickly.

## MOMENTUM OR PATH DEPENDENCE

Why do some technologies persist even after new ones become common? Examples of “old tech” surviving abound. Television didn’t kill radio. Bicycles survived the advent of cars. Even the pencil, a celebrated breakthrough from the 19th century, survived the arrival of the pen. One reason is what the historian of technology Thomas Hughes calls “momentum,” or what the economist Paul David calls “path dependence.”

The gist of this powerful concept is that old habits are hard to break; having started down a path, society often sticks with an older technology because the costs of changing are too great, or the benefits don’t outweigh the hassle of making the change. “Path dependence” is then the flip side of “creative destruction.”

Not everything gives way – either tradition wins, or old technologies get reinvented. The gas-powered car gets new life from an electric battery. The radio, which people once listened to in their living rooms, becomes portable and gains new use. And so on. In explaining the persistence of mature technologies, British historian Harold Edgerton refers to “the shock of the old” and challenges readers to rethink the importance of always inventing something new.



## PLATFORM OR STANDARDS

Technologies have to work with other technologies, and when they do, they form a “platform” built around a set of standards that companies agree to follow or, in some cases, the government imposes on suppliers. The DVD player is a typical platform; every DVD shares a certain technical standard that enables all DVD players to play all DVDs from their region. Windows is another platform/standard that creators of code write to a set of specifications that define those standards and ensure that all Windows programs will work on all Windows computers. Standards offer new companies an easy way to piggyback on an existing market, but can also limit innovation.

## OPEN VS. CLOSED PLATFORMS

When creating new technology, perhaps the most important business decision is whether to be “open” or “closed.” Most new mobile phones are open, meaning they work with any cellular network, but they can also be open for any applications written to their specifications. By contrast, Apple’s iPhone originally worked only with one mobile network, AT&T, and all iPhone applications required the approval of Apple itself, making it a closed platform. Although no longer the case, the closed iPhone had the benefit of greater consistency than other open phones at the time. But closed systems are mini-monopolies and often come with a greater cost to consumers.

Makers of new technologies often talk about being open. But in practice, the benefits of being partly closed are so great that they may stop short of being totally open. Ink-jet printers are an excellent example. Hewlett-Packard’s printers work with every computer and so they qualify as open. Yet the ink cartridges are closed; the only source is HP. Thus, partly open

systems are common because – like Gillette and its razor blades – they enable a company to sell a platform inexpensively and then recoup its profits by selling essential parts. Printers, for instance, are often sold very cheaply because the manufacturer expects to earn most of their profit on ink.



## NETWORK EFFECTS

Platforms and standards are linked to one of the most important aims of any successful technology: gaining and keeping market share – or networks. Market share is always important to businesses, but probably even more to technology businesses because of a process called “network effects.”

The principle is simple to grasp but hard to carry out: The more people who use a network, the greater the network’s value. Thus, Google gives away its search service because it can sell advertising spots on its service; the more users, the higher the advertising rates. For some technology companies, gaining market share is more important than profits. In that scenario, they will sell their product or service at a price where they lose profit. The goal of this strategy, known as a “loss leader,” is to gain enough followers that their “network” reaches a “tipping point,” suddenly becoming valuable.

The TV streaming service Hulu illustrates the process. Hulu began giving viewers the chance to watch television programs whenever they wanted free of charge. Once enough viewers got accustomed to visiting Hulu, the company began finding ways to sell them entertainment.

## TECHNOLOGICAL SYSTEMS

New technologies often can be declared dead on arrival if they fail to take advantage of an existing technological system. Imagine for instance the fate of a new airplane that can travel faster and less expensively than existing planes and can even be built for less. But the plane requires extra-long runways that make landing in existing airports impossible. In short, the plane is terrific but requires every airport in America to be rebuilt. Can this airplane succeed commercially? Not likely – because air travel is a technological system that demands each piece to work in harmony. Electric cars have faced a similar problem, as a system of charging stations is crucial for more people to adopt the technology.

The lack of a technological system to support a new innovation isn’t always lethal. Technological systems can be constructed around great new technologies, but that takes time and often demands that society gains tremendously from the change.



## UNINTENDED CONSEQUENCES

Technologies often get popular for reasons inventors didn't anticipate. The telephone was conceived by its inventor, Alexander Graham Bell, as a way to broadcast music and news – as a kind of radio. He never imagined that the technology's chief use would be for two individuals to talk to each other over a single line. Similarly, the leading computer designer of the 1950s predicted that a mere dozen computers could satisfy the demand for computation in the entire United States.

Conversely, technologies sometimes bite back, as Edward Tenner has noted, harming society in unanticipated ways. No one, for instance, ever anticipated that one effect of the smart phones would be distracted drivers. Because new technologies have unintended consequences, monitoring how society adapts them – and is changed by them – is an important part of technology reporting.

## THE BEST TECHNOLOGY DIDN'T WIN OUT

Scientists and engineers often embrace technological determinism, insisting without much reflection that the best technology ought to win out. But for a variety of reasons, commercial success in technology isn't a science experiment.

Many times, the winning technology standard is demonstrably weaker than competing standards. And to supplant an existing technology, an improved one cannot be only slightly better. The replacement usually must be an "order of magnitude" – more than ten times – better than what's existing. Improvements on such a scale often do occur, but advances by themselves don't ensure success in the market either.

Sometimes, inventors and entrepreneurs who are fast followers – skilled at packaging breakthroughs made by others – end up gaining commercial advantage. Fast followers take advantage of the reality that technology leaders often release products before the market can absorb them. The failures of trailblazers often led to the success of others who learned more completely the valuable lessons from a product's introduction. The iPod is a great example of this tendency. Apple wasn't the first maker of an MP3 player – not nearly – but the companies who pioneered the technology failed to grasp what consumers wanted. Apple combined slick industrial design and ease of use with an underlying technology first developed by others. Fast following, rather than being first, often defines success.



# CHALLENGES AND PITFALLS

Here are some of the common mistakes made by technology reporters and how to avoid them.



## “THE PR PERSON MISLED ME”

It happens, even to the most experienced reporters. Technology PR representatives tend to exaggerate the potential of technology, and it is easy to be swayed by the hype. One way to defend yourself against the PR spin is to go to the PR rep from a rival company or a promoter of a competing technology. The PR rival often has plenty of reasons why their rival will fail.

Hype coming from scientists can be harder to identify. A common red flag is when scientists have their own companies. Be sure to apply extra scrutiny to their technical claims, as they have a vested interest in the technology succeeding.

## “I CAN’T UNDERSTAND THE BASIC TECHNOLOGY”

You may never understand them, and that’s okay. Electronics is based on complicated physics and mathematics. One workable compromise is to identify people who do understand these technologies, poll the views of at least three of them, tally their common conclusions and then identify inconsistencies. Points of disagreement can be looked at more closely. If disagreements remain, tell the reader that not even experts agree on whether the new technology will work or not.

## OVERSIMPLIFICATION

In trying to write simply and clearly about technology, you can sometimes introduce errors and distortions that draw complaints, erode your credibility, and even force you to publish corrections. Sometimes the nuances that make up a technology are an important distinction that need to be pointed out or explained to readers. Don’t be afraid to get into the nitty-gritty because you think it’s too complicated for readers to understand. It is your job to help them understand.



## “THIS ALREADY HAPPENED”

Never write that a technological breakthrough is the first or the best, unless there’s overwhelming independent evidence in support of that claim. Often there isn’t time to learn the history of a field, so avoid such grand claims. It always helps to learn the key milestones of your technology beat so you can always have that background knowledge to draw from in these situations.

## “I CAN’T PREDICT THE FUTURE”

No one can. But technology reporters are constantly asked to provide insights into the new big thing – or at least an indication of what’s around the next bend in the road. Fortunately, many scientists and engineers specialize in looking ahead. There are even professional futurists. Learn how to qualify your predictions by presenting several scenarios with a range of possibilities, each supported by reasonable forecasts, rather than betting on one outcome.



## BRANCHING AWAY FROM HOME

Technologies compete on a global field, and your local innovation leaders play an international game. Be sure to talk regularly to technology leaders in other places and to take on the perspective of other countries, cultures, and regions when reporting on the impact of technology. Even if you’re reporting for a local paper, focusing solely on your backyard does a disservice to your readers who are part of a global community.

## FORGETTING THE PAST

Technology moves so fast that often reporters forget to look backwards, but the past often provides parallels to the present. Many technological challenges of today, especially in business, can be at least partly illuminated by quickly looking at past experiences. Some innovators actually relive the past, and the technologies they present as new aren’t actually new at all. They may have been tried before – and failed for reasons that can help you assess the latest version. For example, reporting on electric vehicles can be enhanced by recounting GM’s failed attempt in the 1990s.

In choosing historical analogies, cast a wide net and talk to professors of history who specialize in technology. Henry Petroski’s *The Pencil: A History of Design and Circumstance*, for instance, contains an extraordinary chapter on the global competition for the top spot in pencil-making technology – and the push by the U.S. government and technology companies to dethrone Germany as the leader.

The benefit of discussing older technologies is that people are already familiar with them, which eases the burden of explaining how they work and opens the space for highlighting complexity.

# MAKING CONNECTIONS

For any reporter covering tech – whether they’ve been doing it for a day or a decade – the most important resource is people. Some of these people are formally trained experts; others are self-taught “hackers,” who’ve acquired immense knowledge on the fly. These two kinds of experts serve the same functions: they translate technical concepts and jargon into plain English, they teach reporters the essential lingo of the field, and they stand ready to help a journalist fact-check the technical aspects of a story on deadline and fix mistakes before they are published.

Experts alert reporters to what’s significant and new in the blizzard of information about mature and emerging technologies. They help reporters decode new buzzwords and evaluate competing claims about similar products and services.

Aside from these experts, the best technology sources are people who work in the field and have a front-row seat to what’s coming out of the lab and into the market. Good technology journalists will maintain a long list of these people and check in with them often. Over time, a small number of people will emerge as your go-to experts who are committed to helping you present a balanced and accurate

picture of both established and emerging technologies.

Universities are one place to look for them. Professors are valuable because they see the big picture and are more likely to be independent (i.e. not tied financially to the companies making the technology they are commenting on).

Product designers and strategists at companies can also provide clear explanations and valuable assessments of rivals. Public relations (PR) people, although often focused on the interests of the company or entity they serve, can sometimes quickly provide guidance and even inside knowledge on a deadline. A PR person can even become a trusted source.

Gadflies – insurgents and trouble-makers who have plenty of criticism – are also important to be in contact with, perhaps more so in technology than any other beat. University dropouts and social rebels have a long history of success in high-tech fields. Some insurgents are kooks and time-wasters of course, but a select few can strip away hype, putting technical advances in an accurate and fair context. They also can provide inside sources willing to speak knowledgeably about urgent issues.



# OTHER RESOURCES

## REPORTS

Published reports on new technologies, especially from U.S. government agencies, are valuable background information. These should be read at the outset of reporting on a field. Marketing companies produce tons of technology reports – but many are commissioned by the very companies whose products they promote, so these reports should be used with caution. Suppliers of new technology can also usually provide clear, reliable, and relevant information about how their technologies work and what they deliver. But companies often fail to highlight how these technologies fall short of expectations and how they compare to similar technologies offered by rivals. Investors can sometimes provide timely guidance about new markets and innovations, especially venture capitalists who assist early-stage and private companies with obtaining funds, talent, and strategies.

## CONFERENCES

One easy way to meet many plugged-in people quickly is to attend industry conferences. The technology industry is organized around product categories; each has periodic gatherings, such as Demo and TechCrunch Disrupt. University researchers also hold conferences. Because of the cost of attending conferences, reporters should choose them carefully – and look for those happening close to home.

This chapter is based on the “Beats Basics” Technology section, originally published in 2011 and written by G. Pascal Zachary, a former professor and author of several books on the history of technology.

