

# Smart Gadgets and The Internet of What?

Technological Advances, Shifts in Consumer Behavior, and What This Means for Business

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In recent years there has been considerable hype about “the rise” of smart devices, mobile devices, smart appliances, the Internet of Things (IoT), and even the rise of machines – no, that last one is not a “Terminator 3” reference – but what there does not seem to be much of is clarity on what all of these things are, how they relate and differ, and what the implications of their “rise” mean for consumers. With technology advancing daily constantly, legacy product and service providers are struggling to keep up and remain solvent.

Many companies, such as Apple, Corning, and Netflix, have kept pace with the rapidly changing world of technology – improving or even rethinking and replacing their core offerings. However, several companies did not adapt quickly enough to the tech revolution and have been liquidated, gone into bankruptcy, or were chopped up and sold off, such as Kodak, Borders, RCA, and Blockbuster.

Because smart devices (phones, tablets, TVs, appliances, wearable technology, and the vast IoT) have changed how consumers communicate and how they engage with their environment, service and content providers such as news agencies, cable television companies, and internet service providers (ISPs), have not only had to figure out how to go mobile, but also how to monetize their content or services in this ever-changing technological landscape. Conversely, new smart tech and the shift in how consumers access content have also enabled small players to enter the market in new ways. It seems that there is more than one paradigm shifting as a result of ubiquitous smart devices.

*“Smart” Terms in Layman’s Terms*

Before diving into the proliferation of smart devices and a play-by-play of their climb into consumers’ pockets and homes, it’s best to first lay out what it is all these devices are and do, as well as how consumers interact with them and how they interact with each other.

Obviously, there is some overlap among smart devices, wearable tech, smart appliances, and the Internet of Things. There are those who consider (some, if not all) wearable tech and smart appliances to be smart devices; however, others claim that most lack the autonomy and interactive nature of smartphones, smart watches, tablets, etc. and even rely on these devices and the software installed on them (such as apps) to be fully operable or interactive and are therefore not truly smart devices. Below is a diagram that helps elucidate how all these things relate.

## Constant Connection

In the last two decades, mobile phone use in the U.S. has risen from just under 34 million subscribers in 1995 to just over 300 million in 2013. According to Our Mobile Planet, a research project commissioned by Google, smartphone penetration in the U.S. is at 56 percent – although, data/information measurement and insight company Nielsen stated that 67 percent of mobile subscribers had smartphones by the end of 2013.

Recent reports assert that the average person checks their phone roughly every six and a half minutes, or as Kleiner Perkins Caufield & Byers’s annual Internet Trends report puts it, people check their phones 150 times per day. A study by ICD Research revealed that the first thing 80% of 18-44-year-olds do when they wake up is check their smartphone. With seamless information sharing from wearable tech, smart appliances, and the myriad of IoT gadgets, people go to their smart devices more and more frequently to check in on their personal stats (be it pedometer steps or energy use), manage their various accounts (from Facebook to utilities), and plan their lives (scheduling calendar events and creating shopping lists based on the reported contents of their fridge).

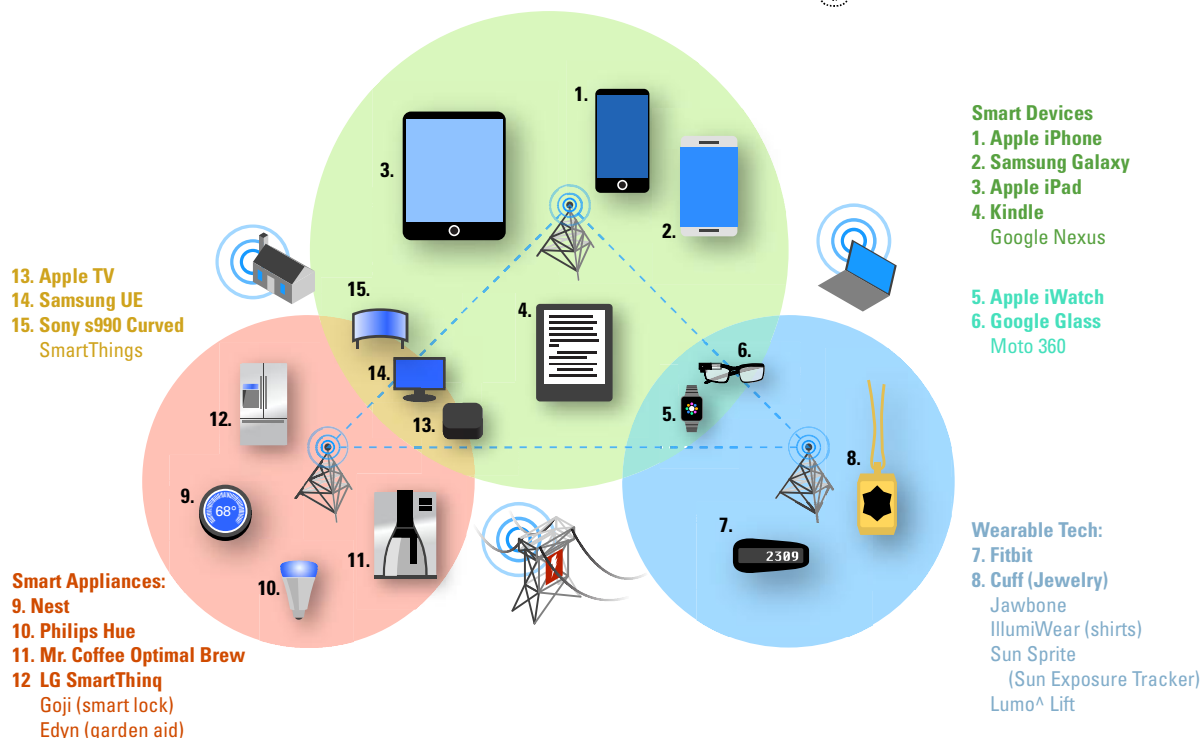
*Meet George Jetson!*

Although not quite there yet, 3D printers are bringing consumers closer to the Jetsons’ futuristic Food-a-Rac-a-Cycle that instantly synthesizes meals, while the Internet of Things is bringing them closer to not just the automation of cooking, but the automation of comfort. Smart appliances, such as the Nest

Category	Definition	Examples	Characteristics
Smart Devices	Any interactive but autonomous electronic device that is connected to a network or other devices through broadband, Bluetooth, NFC, Wi-Fi, 3G, 4G, or any other such protocol.	Smartphones, tablets, smartwatches, smart TVs, etc.	Inclusive of many types of devices Enabler of the Internet of Things (including wearable technology and smart appliances) Typically have a human engaged with them (attached to them?)
Smart Appliances	Any network enabled appliance (device/equipment designed to perform a specific/domestic task) that interacts/communicates/"talks" with its owner (via the owner's smartphone, tablet, computer, etc.) and/or other smart appliances and devices.	Washers, dryers, refrigerators, freezers, ranges, ovens, dishwashers, microwaves, electric fireplaces, coffee machines, lighting systems, thermostats, etc.	Nascent technology Can streamline appliance repairs via diagnostic tools Can provide advance notice of appliance/consumer needs Can self-adjust to custom settings Can communicate with smart grid to operate at off-peak hours
Wearable Technology	Any network enabled clothing or accessory that incorporates computer/advanced electronic technologies for practical functions and features as well as strictly aesthetic ends. Also referred to as "wearables" or wearable tech.	Smartwatches; activity trackers such as smart bands, jewelry, and key chains; personal health monitors and pedometers; smart eyewear, smart or electroluminescent shirts; etc.	Nascent technology Not all wearable tech is "smart," can be purely aesthetic Some wearables can be used to monitor and improve personal health Some can be used for personal safety alerts
Internet of things	The system of various interconnected protocols, domains, and applications as well as the uniquely identifiable smart (computerized) devices and appliances that communicate/transfer information across these platforms through the existing Internet infrastructure.	All of the "things" and none of the things.	Not actually comprised of physical objects Is the connectivity and associated data of smart devices, appliances, and wearables Potential catalyst for the "Rise of Automation" (see the next issue of the Consumers' Research Bulletin)

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## Internet of Things



thermostat enable consumers to set a schedule for the cooling and heating of their homes. With the Nest, consumers can control their thermostats from their smart devices and personal computers, potentially saving them in energy costs, say, when they forget to turn off their air conditioning when they leave town for a few weeks.

In May, LG unveiled a line of smart appliances (not currently available in the U.S.) that utilize LG HomeChat, a software program which enables consumers to communicate with their refrigerator, lightwave oven, and washing machine. Consumers can send text messages to these devices, requesting updates on the status of dinner, telling them to start a load of laundry, or verifying whether the milk will soon expire. New LG appliances are also equipped with SmartDiagnosis, a feature that facilitates the repair of malfunctioning appliances. For simple issues, like clogged filters, consumers can get over-the-phone instructions for how to do the repair themselves. For more complex problems, SmartDiagnosis streamlines the repair process by giving advanced notice of what is wrong and how to fix it, so repair persons can come prepared with parts and a plan.

Soon, homes won't simply be "connected" via smart appliances, devices, and the users that interact with them, but with the "smart grid" as well. According to the U.S. Department of Energy,

*"[The smart grid system is] 'computerizing' the electric utility grid. It includes adding two-way digital communication technology to devices associated with the grid. Each device on the network can be given sensors to gather data (power meters, voltage sensors, fault detectors, etc.), plus two-way digital communication between the device in the field and the utility's network operations center. A key feature of the smart grid is automation technology that lets the utility adjust and control each individual device or millions of devices from a central location."*

Coupled with smart appliances and devices, this system will potentially enable consumers to cut energy costs by notifying them (and their appliances) when the optimal run times are for low-cost energy use.

### **Legacy Companies, Products, and Services**

Just as video killed the radio star, technology is slaying corporate sloths and dinosaurs. Over the last few decades, many companies have met their demise due to a failure to innovate, adapt, or both. In the wake of the tech revolution there have been some clear losers and clear winners (for now). It is also important to note that the tech revolution and the rise of smart devices have not simply affected

companies that produce technological gadgets – although, tech companies have had to work very hard to stay competitive. Corporations that were able to anticipate and adjust for industry shifts or even completely transition away from their core product offerings have fared well (again, so far) during a time of rapidly advancing technology and changes in the way consumers engage with technology, media, and even retail. Others have not been so successful in how they approached these developments.

### *Keeping up with the Jobses*

On the following page is a table of select "winners," in that these companies endured, and in some cases excelled, over the last twenty years of change. Some highly successful companies do not appear in the table, because they were more vanguards than survivors of advances in technology. One such example would be Amazon (founded in 1994), which revolutionized book sales, publishing, and reading. However, some companies younger than Amazon have been selected, such as Netflix and Paypal, because they immediately and drastically shifted gears after market entry.

It remains to be seen whether all these "winners" will prevail as smart devices continue to displace e-readers (like Barnes & Noble's Nook) and digital cameras (such as those produced by Fujifilm), but for now they have weathered the tech revolution and the rise of smart devices. It is difficult to imagine a world without Apple, but its predecessors in brand loyalty and success seemed irreplaceable just before they fell off the map. There's likely no singular formula to staying relevant; however, Corning's strategy of making sure it's where the action is – always being at the cutting edge of its technological specialty – appears to be fairly successful.

Newer companies aiming to establish themselves as tomorrow's "winners," specifically those involved in the sharing economy, have capitalized on the ubiquity of smart devices and seem to see more and more opportunity where legacy businesses see challenges. For example, Uber, an app-based ridesharing company, is no longer simply offering ridesharing and car-for-hire services. The company recently rolled out uberESSENTIALS, a mobile app-based delivery system that promises a selection of snacks, beverages, toiletries, household goods, personal health/hygiene items, and even over-the-counter-medicines to be delivered in fewer than ten minutes. Who would have guessed that convenient stores could become even more convenient?

Winners	Offering(s)...	Survived by...
Corning (est. 1851)	Initially offered glass (for microscopes and cars) and ceramics (such as CorningWare and Pyrex) and transitioned into optical fiber/cable (used in communications), ceramic emission control devices, high-strength alkali-aluminosilicate thin sheet glass (such as Gorilla Glass), and high-purity fused silica (used in spaceship windows).	Doing what it does best, R&D. Making or improving glass products used in “it” goods such as Gorilla glass for iPhones and LCD screens for televisions. Creating products/solutions for various/unlikely industries.
Barnes & Noble (est. 1886 as Arthur Hinds & Company )	Book Publishing and retail, wholesale, and online sale of books.	Focused on online sales Developed Nook e-reader Pulled back on CD/DVD sales
Fujifilm (est. 1934)	Began with color film and photofinishing equipment/chemicals and transitioned to digital cameras, medical imaging equipment, graphic arts equipment, flat panel (LCD) displays, optical devices, copiers and printers.	Capitalized on film as long as it could, while simultaneously preparing for digital Developed new revenue streams/business lines Uncharacteristic business model reconstruction
Apple (est. 1976)	Started with personal computers (Mac line), later adding consumer electronics (iPod, iPhone, iPad, etc.), computer software, and online services.	Brand loyalty Simplicity & ease of use Masters of reinvention and staying ahead of competition The Apple experience – great customer service and trendy stores Unconstrained cash flow
Netflix (est. 1997)	Initially offered DVD rentals by mail and shifted its focus to online film and television video streaming via membership subscription.	Paying attention to demand Emphasis on convenience Utilizing emerging technology Commitment to adaptation
PayPal (est. 1998 by Confinity Inc.)	Began with device-to-device money transmission service (via PDAs) and transitioned to online payment and now mobile payment services.	Convenience & security Immediately seized opportunity to shift to online payments from device-to-device payments Acquisition by eBay and subsequent acquisition of VeriSign – eating up or crushing e-payments competition

Compiled by Consumers' Research

### The Last Kodak Moment

As with the previous section, on the following page is a table of select “losers” that poorly weathered the last two decades, in that these companies failed to foresee, adapt to, and revolutionize for or along with the technological innovations of the last twenty years. In some cases, stalled efforts to keep pace were made –an unfortunate case of too little too late – and in others, too much reliance was placed on brand loyalty, past success, and obdurate executives.

Of the “losers,” Kodak may have fallen the hardest—both figuratively and financially. For over 100 years, Kodak stood at the helm of the film production industry. Even today, Kodak is referenced to describe picture perfect, or as they are sometimes called, “Kodak moments.” With a roughly 70 percent profit margin on film sales, it was easy for Kodak to “sit pretty” at the top, selling cheap cameras and making money off its expensive film. However, when the imaging industry tides turned, profit margins on digital sales were only five percent and even holding

the number one position in digital camera market share in the mid-2000s did not give Kodak the boost it needed, especially when camera phones all but replaced digital cameras in the late-2000s. Kodak fell into what is often referred to as the “success trap,” not being pliant where flexibility and change were requisite to persevere in a time of transition. In the span of less than a decade, Kodak cut over 25,000 thousand jobs, divested its digital camera manufacturing operations, was delisted from the Dow Jones Industrial Average, went into bankruptcy (in 2012), ceased producing digital imaging devices (cameras, scanners, printers, etc.), sold several of its divisions, sold off its digital imaging patents, and has only recently emerged from bankruptcy with its new business model – marketing its imaging services to commercial customers (possibly mirroring IBM’s successful strategy of shifting its focus from hardware to consulting services).

Losers	Offering(s)...	Cause of Demise...
Kodak (est. 1888)	Photographic film products, printers, scanners, and imaging solutions and services for businesses.	Fell into success trap, relying too heavily on brand and historic success, overlooking effect of digital cameras on film business Unable to remain competitive in digital cameras – price undercutting & cell phones with cameras Specialty was chemicals (used in photo paper), not digital Slow to diversify product offerings (i.e. acquisitions) Failed to grasp how Internet changed process of capturing and sharing images (i.e. Facebook, Picasa, Photobucket, etc.)
Polaroid (est. 1937)	Film, consumer electronics, and (originally) eyewear.	Despite early adoption of digital camera production, failed to capture a large enough market share to remain competitive Another case of the success trap (see above)
Motorola (est. 1928 as Galvin Manufacturing Corporation)	Consumer electronics (radios, TVs, wireless telephone handsets, mobile phones, etc.), wireless network equipment, broadcast network products (set-top boxes and DVRs), etc.	Lack of cohesive plan for network and handset technology due to internal friction between divisions Despite owning profitable digital network patents, moved too slowly from analog to digital with own products Iridium – ‘nuff said Post-9/11 supply chain issues Partnered with Apple on Rokr (1st iTunes enabled phone) - motivated Apple to make mobile devices Developed and patented several smartphone components, but did not release its own smartphone until 2009 (too late)
Borders (est. 1971)	Retail sale of books and media (music and videos) via chain of stores.	Shifted focus to retail CD & DVD as music and video transitioned to digital Outsourced online sales to Amazon No brand/supplier loyalty in book retail
Blockbuster (est. 1985)	Home movie and video game rentals.	Transitioned too late to DVD-by-mail, streaming, video on-demand, etc. Inconvenient and excessive/unreasonable late fees Did not buy Netflix in 2000 when it was offered at \$50 million
Yahoo (est. 1994)	Web portal, search engine and related services (Yahoo Mail, News, Sports, Finance, Maps, etc.), advertising, video sharing, etc.	Ok, Yahoo isn't quite dead yet, but it has fallen well behind Attempted to charge for services such as email & file sharing, while competitors (like then start-up Google) were offering more advanced services for free Didn't accept 2008 \$45 billion buyout offer from Microsoft - core business (without assets) now valued at \$11.6 billion Hasn't developed mobile products with sufficient traction

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Although it did not follow quite the same path as Kodak, Polaroid – despite its name being used as a proprietary eponym for several decades – also fell into the success trap, unable to effectively compete in the digital age and only recently releasing its first “smart camera” (under the licensed Polaroid name, not the original company).

Blockbuster also faced bankruptcy after its bout with the success trap, not adjusting to the changing demands and behaviors of its customers. Borders (liquidated) and Yahoo (drastically deflated) didn't suffer from the success trap like the other companies, but certainly made costly missteps. Finally, Motorola lost its footing due to a web of internal friction and competing interests, however, is broadening its horizons and working on a comeback. The lesson all these companies learned was that no company is safe from technology and shifts in consumer behavior.

### Challenges in Monetizing Media and Internet Service

From the advent of mass media – whether considered the first government bulletins in ancient Rome and China or the emergence of the printing press – until the arrival of the Internet, content for mass communications had largely been determined for consumers and had few to no available alternatives. Throughout the 20th century, consumers subscribed to magazines, read local or national newspapers, listened to local or national radio programming, or watched public-access or cable television programming – all with content determined or provided by a finite number of sources. It was not until the proliferation of Internet-enabled personal computers and now smart devices (and the infinite trove of wonders available online) that consumers were empowered to seek out content they desired and the content paradigm began to shift. Now there



is seemingly limitless content available in a myriad of formats. Just as broadcast media rocked the print media world in the mid-20th century, smart devices are disrupting all sorts of media, changing the way consumers engage with mass media and their environment.

For example, in the last few decades, consumers have transitioned away from exclusively watching television programming provided by cable companies on traditional TVs to streaming hours of video content on personal computers, mobile devices, and smart or “connected” TVs. According to Business Insider, smart or connected TVs will be in 43 percent of U.S. households by 2016.

With average monthly cable subscriptions at \$90 per month projected to soar to \$200 per month in 2020, consumers are canceling their subscriptions and replacing them with other services, such as Netflix, Hulu Prime, Amazon Prime, etc. Some consumers who are less willing to use paid access services resort to illegal video streaming and download sites to access content that was previously only available through purchase or rental. Furthermore, many of the major lures to paid cable, such as professional sports channels and premium programming, now offer their programming direct-to-consumer via smart or connected TVs. With these shifts in consumer behavior the major cable companies (including Comcast and Time Warner Cable) have reported significant drops in subscriptions in recent years, with a net loss of 113,000 subscribers in the third quarter of 2013 alone.

According to MarketWatch, a DowJones subsidiary that provides financial information coverage and analysis, the cable industry is currently experiencing its worst year and it is not expected to improve. Many customers believe their cable bills are too high and there is an increasing amount of individuals opting to watch shows illegally. Furthermore, by forgoing cable TV consumers could potentially save over \$1,000 per year. As cable bills continue to climb, analysts expect more consumers to drop their subscriptions and instead turn to cheaper alternatives.

Cable companies won't be the only businesses to struggle from this change in consumer behavior. With the increase in streaming traffic, Internet service providers (ISPs) – which are often cable television providers as well – are facing challenges to meet demand. Thus far, fixed-internet providers have been able to do so without greatly impacting profits largely by making efficiency and productivity improvements, but this likely will not hold for much longer. Furthermore, mobile traffic is growing at an unsustainable rate that cannot be easily addressed due to spectrum scarcity. Mobile providers have been able to avoid exceeding capacity, because roughly 80 percent

of mobile traffic is offloaded onto fixed networks via Wi-Fi connections, putting further strain on ISPs.

A white paper, compiled by Cisco Internet Business Solutions Group, suggested that ISPs should rethink flat-rate pricing for fixed-internet (broadband) services and transition to value-based pricing. Value-based pricing is built upon the concept of use-based pricing (where consumers pay based on tiers of different bandwidth and speed options), but also include improved or premium broadband service options. Most consumers are not in favor of the tiered system, as they have grown accustomed to unlimited broadband access at fixed fees, despite (dial-up) Internet access initially being metered and billed based on use.

In addition to cable companies and ISPs, print media companies and even retailers are, or will be, facing challenges due to smart devices and the increased use of mobile technology. Consumers do not want to pay for online news and magazine articles. As a result, many agencies are struggling to monetize their content. It doesn't help that consumers also don't want to be bombarded with ads. Furthermore, advertising on news sites continues to decline and other sources of revenue remain elusive. Media companies are experimenting with paywalls (where some content is free and some is paid), traditional ads (such as banners), sponsored content (designed to be read), and “native” ads (designed to be shared/go viral); however, neither larger traditional media companies, nor small innovative startups seem to have figured out the best formula for monetizing their content.

As for retail companies... Consumers using smartphones and tablets spend a majority of their time using mobile apps as opposed to mobile web, so their mobile path to purchase is often driven by the availability and ease of use of an app. Additionally, mobile purchasing is continuing to grow at a faster rate than purchasing via personal computer. Many major retailers have adjusted to this by creating their own apps, but this isn't their only challenge. Consumers are engaging in product and pricing research before making purchases at much higher rates than in the past. Furthermore, mobile apps like QR and barcode scanners also aid consumers in price comparison shopping to ensure they get the lowest price available. (For more on this, flip to the “Holiday Sales” article on Page 2).

In an area where there is a lot of uncertainty for businesses, one thing is certain – consumers are wielding more power now that they are armed with information and greater choice.

## Enabling Access

Although more traditional products like maps, planners, cameras, compasses, radios, calculators, alarm clocks, phone books, game consuls, mp3 players, address books, point of sale devices, etc. are being displaced by smartphones and tablets, apps on these devices, or gadgets that connect to them (such as Square), consumers and even business in general aren't necessarily worse for the wear. Smart devices have given consumers and small businesses greater access to services and opportunities that were previously unavailable to them.

One example, discussed in the previous issue of the Consumers' Research Bulletin, is how consumers are now able to use smart devices and apps to monitor their personal health. They can count their steps, take their temperature, and check their blood pressure, pulse rate, and oxygen levels. They can even share this information with their healthcare providers to improve quality of care.

Sure, traditional travel agencies have all but become obsolete because of how consumer behavior has shifted (due to the availability of information and ease of online booking), but such shifts have opened the door for innovative businesses and services that better serve consumers and their demands. The "there's an app for that" mentality will continue to push businesses to "adapt or perish" (see article on Page 17), but it also gives start-ups the opportunity to meaningfully compete and positively disrupt.

Another key way smart devices improve access is by enabling lower income consumers to regularly connect to the Internet. Many lower income consumers do not have fixed access to the Internet in their homes, due to prohibitive costs (of the service as well as personal computers); however, mobile access through pay-as-you-go and monthly mobile plans can cost less than half of what ISPs charge for monthly fixed access and (in some cases) subsidize the cost of a mobile device through a contract.

## Consumer Risks and Privacy Concerns

Consumers aren't the only actors shifting their behavior. Hackers have also switched gears and have begun to target smart devices. With all this increased access and Internet use comes the increased creation of data, and with more data comes more risk. Major retail companies and banks have recently experienced serious security breaches that have compromised the private information of employees and consumers alike. Additionally, consumers are concerned about their privacy and how businesses are using their personal data. However, to learn more about "big data" privacy and security risks, keep an eye out for the next issue of the Consumers' Research Bulletin. ◀