Part I

The Convergence of Technology Production and Consumption

Chapter 1

The New Monday Morning Quarterback

For a week every January, Las Vegas replaces Silicon Valley as the technology hub of the world. The International Consumer Electronics Show (CES) attracts 150,000 exhibitors, attendees, government officials, investors, and fans from around the world.[1] They come to see an orgy of technologies at the show that even outshines Vegas's other outlandish attractions.

The show has traditionally been a harbinger of technology and societal trends with the products that are launched there: 1981 saw the introduction of the camcorder, 1991 the Interactive CD, 2001 the Microsoft Xbox. Each year in between and after there have been other spectacular announcements.

The year 2011 was no different. It will likely go down as the "Year of the Tablet." Over 100 options from Motorola, Dell, Samsung, Toshiba, and others competed for attention at CES.[2] They were all hoping to match the phenomenal launch of the Apple iPad a few months prior.

If the 7,000 journalists, bloggers, and analysts at the show were not exhausted from analyzing the varied tablet form/factors and new features, they were chasing down rumors at the show about whether Apple was about to launch a Verizon version of the iPhone. (The rumor was later confirmed as Apple provided an option to the AT&T network that was previously an exclusive for the iPhone in the U.S. market.)

Lost in the excitement about iPad killers and iPhone rumors at the show was an even more significant nugget—the list of exhibitors included companies from just about every non-technology vertical industry.

There was Walgreens—yes, the pharmacy chain—showing off its Refill application that allows you to scan the bar code from a previous prescription using a mobile phone, transmit it, and get a text message to go pick it up at a nearby store. At many of its stores, you could use drive-through lanes and related technologies.

Whirlpool showcased its Duet washer/dryers with LCD screens and various laundry apps designed to give users advice on stain removal and other laundry questions.

Nike introduced a GPS-enabled Sportwatch developed in collaboration with the navigation vendor Tom Tom.

Ingersoll Rand showed off tech innovations around its Schlage home security and Trane thermostat products.

Ford chose to unveil its all-electric Focus at the CES show rather than at the traditional car launch showplace, the Detroit Auto Show, which was only a week later. In a later guest column for *Fortune,* Bill Ford, Executive Chairman, wrote, "Many of Ford's suppliers are now nontraditional suppliers like Microsoft and retailers such as Best Buy, which are helping provide the charging and IT infrastructure for this new form of mobility."[3]

Not to be outdone by Ford, GM showcased a retail, boxed version of an OnStar-equipped rearview mirror. This opened up OnStar to nearly any vehicle—from a Ford to a Toyota. Its features such as automatic crash response, turn-by-turn navigation, stolen vehicle location assistance, emergency and roadside services, and hands-free calling were long a reason to buy a GM car with the built-in OnStar.[4]

3M showed off its Patterned Transparent Conductors (PTC). Using technology that enables a high degree of pattern control of conductive

materials on flexible substrates, 3M is able to produce conductive traces down to two microns wide or less to support projected capacitive touch sensing. This capability supports the development of new touch-enabled consumer electronic devices. PTC is able to decrease the amount of space needed on the device bezel. Using silver, it offers a significantly lowered resistance that allows sensors to support fast response times, even in tablet sizes.

What's going on here? These companies live far from Silicon Valley and are known as retailers and auto companies. Why are they competing for booth space and geek attention with technology vendors?

The Monday Morning Letdown

What's going on, in Malcolm Frank's words, is the "Sunday Night versus Monday Morning phenomenon." Frank, SVP of Strategy and Marketing at Cognizant, is regaling an audience of CIOs at a customer conference in Orlando. The slide shows a picture of *Rumors*—the Fleetwood Mac 1977 album. His audience giggles as his voiceover tells the cynicism of his young sons as they happened upon his record collection and he tried to justify why we bought complete albums back then, not just individual MP3 tunes. The reaction of his sons only accentuates what he is seeing at work.

At Cognizant and in other outsourcing firms he has previously worked at, Frank has always been surrounded by young workers—a theme common in technology services. He sees their Monday morning reaction—no Facebook listing of colleagues? No iPads? No thumb drives allowed? This is pretty striking after Sunday night at home with HDTV, Flip video cameras, Microsoft Kinects, Bose audio gear, and Apple retina displays.

Yes, it is a trend called "consumerization of technology," and Apple gets plenty of credit for it.

> Of course, it was not just Apple. Microsoft introduced the Xbox in 2001; HP announced more of a focus on entertainment with its Media Center PC in 2002; Skype arrived in 2003 and would change calling habits for millions around the world; the massively multiplayer game

> World of Warcraft disrupted our lives in 2004; and in 2005, with the Sony Rootkit issue, consumers started to hear about intellectual property issues previously limited to corporate corridors. Since 2005, Google's growing Web and mobile presence has introduced consumers to analytical power that big companies paid bucketloads of money for. The Apple iPhone—considered one of the most successful product launches ever—and all kinds of GPS, gaming, entertainment, and other gadgets have only accelerated the consumerization trend. The Wii reshaped our expectations of computer interfaces; the Kindle, our expectations of books. *Electronic House* magazine has celebrated houses with all kinds of home theaters and elaborate security systems. eBay has built a cottage industry of individuals doing business from home. JetBlue has moved call reservations to agents working from home. SOHO is no longer just a Manhattan neighborhood but a growing revenue category for technology companies as the acronym for small office, home office.[5]

TAF—The Technologically Advanced Family

Matt Murphy and Mary Meeker of the venture capital firm Kleiner Perkins brought out the global consumer technology proliferation numbers vividly in a presentation they gave in February 2011.[6] They include 18.8 trillion mobile minutes, 972 million Google users, 10 billion Apple applications downloaded, and 130 million active Zynga users.

We are just getting started. Globally, only 14 percent of the world is on a 3G or faster network, so the market for smart phones and mobile applications is still embryonic.

Then there is the potential demographic stretch. Mark Zuckerberg, CEO of Facebook, thinks the age requirement of 13 is too restrictive for users of his social network. He says, "My philosophy is that for education you need to start at a really, really young age."[7] He does have a point. Many families get even younger children mobile phones, encouraged by billing plans that cost as little as $9.99 a month for the extra line. Nintendo has a workaround for kids under 13. Their policy states, "For children under the age of 13, we have developed a Family Account system. In order for a child under 13 to have a Club Nintendo account, the child's parent or guardian must register for Club Nintendo and create

a Family Account. That parent or guardian can then create sub-accounts for other family members."[8]

On the other end of the age spectrum, companies like General Electric and Intel are beginning to market a new type of patient care called "aging in place." These services rely on new monitoring technology that may effectively replace retirement homes and assisted living centers.[9] Instead of being intimidated by e-book readers like the Kindle, many elderly readers say they often find them lighter to hold than books, can increase font size, and use the "text to speech" feature to have the book read to them.

In the middle we have digital minimalists like Kelly Sutton, the founder of CultofLess.com, a website that has helped him sell or give away most of his possessions. He was left with his laptop, an iPad, an Amazon Kindle, two external hard drives, a "few" articles of clothing, and bedsheets for a mattress.

Sutton got rid of much of his clutter because he felt the ever-increasing number of available digital goods have provided adequate replacements for his former physical possessions.

"I think cutting down on physical commodities in general might be a trend of my generation—cutting down on physical commodities that can be replaced by digital counterparts will be a fact," said Mr. Sutton."[10]

Then there is the phenomenon of the "technologically advanced family."

Joshua Moore is 12 years old, born and raised in Silicon Valley, and the child of two software industry executives. His house has always been filled with digital devices, making Joshua very comfortable being immersed in technology. His baby pictures were taken on a digital camera, transmitted to his relatives via webcam, and shared on Ofoto.com as soon as that site came online in 1999.

Josh has three computers, a tablet, an Android and WebOS phone, an iPod Touch, an Xbox Kinect, a Wii, and a slew of other electronic devices on his desk in his bedroom. He uses these devices to produce a popular YouTube channel and for his blog on GottaBeMobile.com. His digital camera has recorded videos and taken pictures from the top of Half Dome in Yosemite and Mount Haleakala in Maui, and 40 feet down while scuba diving. His parents don't pay him any allowance,

because he earns money on his own with his blog, as a Google YouTube Partner, and with Google AdSense.

Josh is just one of the digitally advanced members of his family. His older sister, Adriana, seriously considered only sending invitations to her upcoming wedding via Facebook and is always connected to her friends on her iPhone. His mother, Young, used her MacBook Pro to study for and take the California Bar exam. And his father, Dennis, is a veteran of established software companies like Oracle and SAP, as well as start-ups (including C3 Energy, which has plenty of buzz even though it has been in stealth mode for years), and is a popular blogger himself. Dennis even started one of the first "corporate alumni" groups—The OracAlumni Network—to help friends and colleagues from Oracle to stay in touch and professionally network. The whole family stays in synch via Google Calendar, which allows them to keep their busy schedules open enough to have time for family brunch or dinner and to make sure that Josh always has a ride. After all, it's not all about bits and bytes.

Maybe it's all in the DNA. Dennis learned to program at age 13 at the New York City public library and then at NYU's Courant Institute. He got a TRS-80 in 1977, and worked his way through Princeton as a programmer before moving out to Silicon Valley in the late 1980s. Dennis and Young met when they were both working at Oracle Corporation, where Young was then one of the few female executives. Three of Dennis's five siblings are also in the computer industry, in roles ranging from digital advertising to programming.

Josh thinks it's quaint when his parents describe things like darkrooms, telephones with dials, TVs without remotes, going to the bank, waiting until after 7 p.m. to make an affordable phone call, having to go to the library to look something up, and screens you can't manipulate by touch. Of course, it is a fair bet his own kids will think that today's tablets and cell phones are antiquated.

BYOT—Bring Your Own Technology

BYOT is an acronym increasingly heard in corporate IT circles. It is the recognition that with so much consumer technology, enterprises could be leveraging it, not fighting it.

Unisys ran a poll that asked, "What percentage of the cost of your job's IT tools would you be willing to fund if you had freedom to choose what you could use?" Nearly one-third (32 percent) of the respondents said that they would be willing to pick up the full cost. Twenty-one percent said that they would pay up to half of the cost, and another 21 percent said that they would fund up to 30 percent of the cost.[11]

Savvy CEOs have been walking in to their CIOs and asking, "Where's my iPad?" And no, not offering to pay 30 percent of the cost!

The lightbulb has gone on in even savvier CEOs. "If the consumer lives in the world of iPads and Kindles, can our own product be rethought to be more appealing to this tech-savvy consumer?"

New Form/Factors in Every Product

Welcome to the new Monday morning quarterback. This consumer is willing to try new technology-enabled form/factors in just about everything.

- There is the "smart" pen and pad from LiveScribe. The Echo records everything you doodle on its special dot paper pad and then allows you to plug into your computer and see the exact replica in digital format. It also has a voice recorder so you could be recording that interview or conversation while you are taking notes.
- There is the smart shirt for athletes from Under Armour. *Wired* magazine describes the UA E39 as "It weighs less than 4.5 ounce and is made from the same material as the rest of the company's line of compression-based apparel. Yet just below the sternum, the shirt also contains a removable sensor pack called a 'bug' that holds a triaxial accelerometer, a processor, and two gigabytes of storage. The information collected can be broadcast via Bluetooth to smartphones, iPads, and laptops so that scouts and trainers can view the power and efficiency of each athlete's movements."[12]
- PixelOptics offers the smart version of bifocal or progressive eyeglasses. It alters the focal power of the lens when you tilt your head or tap the frame.

- The Plaza in New York has developed the smart hotel room. The iPad in each room allows you to order room service, make restaurant reservations, book wake-up calls, print out boarding passes, and control the room's lighting and air conditioning.
- There is the smart restaurant—Do (as in Dough) in Atlanta, Georgia. Not only are paper menus replaced by iPads, the tablets can also be used to tell the valet to pull up your car. They also allow patrons to change music while they marvel in the brilliant video graphics that cover every wall of the restaurant. The tech-enhanced bathrooms boast motion-sensored hand dryers and sinks with iPad "mirrors" positioned on the walls.[13]
- Moen is pitching its smart shower. The IOdigital wall-mounted control panel, with a handheld remote, lets you set and maintain water temperatures. For baths, it also allows you to set the water level. And these are pretty unimpressive compared to the features of the vertical spas the company offers!
- There is the smart lawnmower courtesy of Toro. The TimeCutter SS brings speed controls to Zero Turn technology Toro has pioneered. Choosing the "high mode" is meant for maximum speed for mowing the flat, open spaces in the yard. The "low mode" allows for enhanced maneuverability when cutting around trees, landscaping, or other tight spaces.
- Rain Bird has for decades made lawn maintenance "smart" by allowing us to control irrigation times for various zones. Its ESP-SMT irrigation controller makes that much smarter. It utilizes historical and real-time weather data (you input data like your zip code, allowed watering days, and the plant/soil type for each zone) to determine optimum watering needs of the landscape based on the on-site current weather conditions. It calculates the site's evapotranspiration (ET) rate each day and then deducts effective rainfall amounts from the ET rate to determine how much water is needed to maintain the optimum level of moisture in the soil.
- There is the smart version of the long indispensable level from Stanley. Once the user has downloaded the application, he or she begins by calibrating the level with a gravity-driven (bubble) level to create a simulation that takes advantage of the accelerometer in the mobile device.

Not Just "Smarter" Products, also "Smarter" Services

Not just products, but also look at how services are becoming smarter.

- USAA Bank supports mobile deposits. Use the camera on your phone to take an image of the back and front of the check and voilà—no need to go to a branch or even to an ATM machine to make a deposit. It is also partnering with PayPal to allow customers to pay almost anyone with an email address or mobile phone number.
- Progressive Insurance offers Snapshot, a small telematics device that connects to the insured car's electronic diagnostic port. It allows Progressive to analyze data from the device on your driving patterns and if safe, it promises up to 30 percent discount on your premium.
- State Farm Insurance has In-Drive, which "mashes" up the GM On-Star FMV and Progressive's Snapshot just mentioned. Offered in collaboration with Hughes Telematics, a small device allows drivers to access emergency roadside assistance, vehicle diagnostics, and maintenance reminders. And if you allow State Farm to collect data like vehicle mileage, speed, and braking performance, it offers insurance discounts up to 50 percent.[14]
- There's Nationwide Insurance's iPhone application. It allows you to collect and exchange accident information, take pictures of the accident scene, start a claim, display your insurance card and other account information, and locate nearby tow trucks and authorized repair shops.
- There's EPB Fiber Optics (Chattanooga's municipally owned fiber-to-the-premises network), which offers 1 GBPS broadband to consumers—that's 100 times faster than what the average telephone or cable company offers residents in most other states.
- The Hamilton County, Indiana, sheriff's office has a next-gen 911 (emergency) call center. Each agent in the office can view "five large screens [that] simultaneously show call status, caller information, police radio activity and other data—all of which can be shared instantly over radio, phone, Internet, dispatch and cellular systems."[15]
- There's the SmartMeter from utilities like PG&E that allows consumers to monitor their hourly energy usage and better manage their electric bills.

- Over the past 15 years, starting with a deployment in Texas, there has been a steady rollout across the United States and broadly across North America of the AMBER (America's Missing: Broadcast Emergency Response) alert system, which is triggered when young kids are abducted (the program honors Amber Hagerman, who was abducted when she was nine). In 2011, the U.S. FBI released a Child ID app for the iPhone. It allows parents to store on their iPhones recent pictures of their children along with vital statistics—age, height, weight, distinguishing marks—to easily and quickly share with law enforcement in case a child goes missing.

These are available to the average consumer. When it comes to professional and corporate customers, the version of smart is much smarter. In fact, they are not products, but "platforms" that allow companies to sell a variety of services, accessories, and ancillary products.

- Take the Emerson platform, Trellis, for data center management. It is a portfolio of hardware, software, and services designed to allow data center managers to optimize efficiency, availability, and capacity utilization.
- John Deere and its FarmSight initiative, which is planned to help farmers in three areas: Machine Optimization for increased up-time, Logistics Optimization for better fleet management, and Decision Support with user-friendly monitors, sensors, and wireless networks to enable access to machinery and agronomic data.
- Take Siemens, the German giant, which offers a variety of telematic services with transponder, satellite, and other technology to cities around the world as they roll out electronic toll collections in their version of smart services to their citizens.
- Georgia-Pacific (G-P) has its enMotion, which automatically dispenses towels at the wave of a hand. It's perfect for restaurant and other commercial washrooms and kitchen sinks. The dispensers are hygienic, they lower waste with predefined sheet lengths, and can be customized with time delays and sensor ranges. More importantly, it allows G-P to sell various types of paper (its prime product), air fresheners, and other products.

So, the Genie Grants You Your Smart Product Wish

Back to the CEO and the CIO conversation. Why are our products not similarly smart?

So, you meet the proverbial Genie and he grants you your wish. Your product is smart now. But as the story goes—are you sure you want that wish granted? Are you ready for your new world? You are now a Technology Vendor, and that means:

- *Getting used to technology product half-lives.* A sign of the times is Best Buy, which sells plenty of extended warranties with mobile devices, TVs, and digital cameras. It has introduced its version of "shortened" warranties via its Buy Back program. As customers lust after newer versions of everything, that program promises (for an upfront fee) to buy back anytime within two years of an electronics purchase date (four years for TVs), giving you a gift card to use toward another purchase.
- *Adjusting to Moore's Law.* Not every industry adjusts easily to price/performance improvements common in technology. Take auto dealers. Initial versions of DVD players, navigation systems, and Bluetooth speakers all sold for thousands of dollars. Dealers continue to expect those prices even as handheld Garmin GPS units and BlueAnt speakerphones are available at a fraction of the cost. Importantly, these devices are portable, so customers can take them when they travel or switch from one family car to another. Indeed, there is a cottage industry of FM transmitters, power inverters, backup cameras, portable satellite radios, coolers, and other gadgets you can buy for your car, many for less than $20.
- *Rethinking product documentation.* In a world where no training is needed to navigate Amazon.com and any "live" help is a keystroke and online chat away, companies still ship products with clumsy, printed product manuals.
- *Understanding technology law.* Technology licensing and other legal nuances require a different mindset. As an example, Nike+, which allows users to track information collected by sensors in its shoes such as the elapsed time of the workout, the distance traveled, pace, or calories burned, has four pages of terms of use on its website.

- *Getting used to competition from left field*. Whirlpool has over 40 percent of the U.S. appliance market and historically has looked at companies like GE and Sears as competition. Soon, though, as appliances get smarter and the guts become more software and sensors, competition will also come from Korean companies like LG and Samsung, which have traditionally been focused on electronic products. Young-ha Lee, president and CEO of LG's Home Appliance Company, said at the CES event described earlier, "This year will be the beginning of a new era of home appliances. By that I mean that we have reached the tipping point where appliances are now run entirely by CPUs and computer code. Just as automobiles became rolling computers a decade ago, home appliances are experiencing the same transformation."[16]

If Siemens, a company founded in 1847, Toro, founded in 1914, and Moen, founded in 1937, can do it, so can anybody else. They are not startups by a long shot.

Of course there is the nightmare scenario. If our products are not viewed as smart, what about the risk from standing still? Will our customers increasingly view them as dumb?

Conclusion

Traditionally classified as technology "buyers" and "user organizations," many companies are learning to embed technology in their products and themselves become technology "vendors." Others, like 3M and GE, would be offended if you mentioned they were "learning" to become technology vendors. They have long viewed themselves as technology vendors even if Silicon Valley may disagree. Then there are companies like UPS, which calls itself "about half a transportation company, half a technology company."

Let's look at UPS in detail in the case study that follows.

Case Study: UPS—That's Technology "Amore"

There will be no more stress, 'cause you've called UPS . . . THAT'S LOGISTICS.

In the fall of 2010, UPS launched a global TV ad campaign around the Dean Martin classic "That's Amore," sung in Mandarin, Spanish, and English. The lyrics went along with the theme of "We (Heart) Logistics," which replaced UPS's previous theme of "What can Brown do for you?"

UPS is unabashedly proud of its "brown collar," "box kicker, label licker," "logistics is sexy" image. Its 2010 revenues of almost $50 billion and a history of over a century justify that pride.

Look under its zillions of bar-coded labels, however, and you see a marvel of technology that keeps a massive data center in Mahwah, New Jersey, and another outside Atlanta, Georgia, humming. Twelve mainframes rated at 52,000 MIPS, nearly 16,000 servers, and 190,000 workstations are part of its technology landscape.[17] UPS says its package tracking is done by one of the world's largest DB2 site (the IBM database software). It stores over 10 petabytes of data. It is one of the largest users of mobile minutes in the world. UPS.com, available in 32 languages, handles 48 million tracking requests on a peak day during holiday season. Its technology helps optimize truck routes and famously minimize left turns. It is investing in a variety of fuel-efficient trucks and techniques, such as continuous descent approach, to glide its planes for fuel efficiency and noise reduction.

Tom Ryan, at TKR Consulting Associates, is a former analyst at Gartner and Aberdeen Group (the technology research firms) who specializes in logistics, supply chain, and transportation solutions. He adds, "UPS has been one of the leaders in leveraging technology for competitive advantage in the marketplace, especially computer and automatic identification technology. In its early days as a small package delivery company, UPS employed multiple 'large forehead' type people to build route optimization software for all of their delivery routes worldwide. They then designed and had built custom mobile terminals to allow their

drivers to be more efficient in their route tasks as well as provide real-time updates to their corporate tracking systems. In order to eliminate manual typing errors by their operations staff, UPS leveraged existing bar-code technology and invented one of the first two-dimensional bar codes (PDF417), so that one scan of one bar code could convey all the data about the shipment that was needed. UPS used this real-time data to build one of the leading in-transit visibility systems so that from pickup to delivery each customer can know where their stuff was 'when it had wheels on.' As UPS expanded its transportation logistics services from small packages to less-than-truckload and more, it brought this optimized highly visible infrastructure to play."

Scott Davis, the Chairman and CEO of UPS, agrees with Ryan's assessment, when he says, "Often when I'm talking to investors I tell them that we're about half a transportation company, half a technology company. And 20 years ago that wouldn't have been the case. Twenty years ago we were a package transportation company."[18]

Let's look at four of countless aspects of this "half a technology company." Let's start with the ubiquitous Mr. Brown—the UPS driver most of us are familiar with.

The DIAD

A Delivery Information Acquisition Device (DIAD) is what UPS's truck drivers use to guide their delivery routes and more. The DIADs help UPS drivers in their brown trucks deliver over 22 million packages a day during the peak holiday season. It was introduced back in 1990, way before the iPhone or the iPad was even conceived of. And its battery lasts all day—much longer than most Apple or Android devices.

Jackie Woods of UPS says:

> The DIAD has been a solid foundation for UPS to not only provide outstanding service to our customers, but also has been an invaluable tool for our drivers to improve day-to-day efficiencies for more than 20 years. What started as a device to provide customers with proof of delivery visibility and to collect timecard information from our drivers has grown into a personal assistant of sorts providing a wealth

of detailed information on package deliveries and pickups, including customer preferences and specific requests, while the UPS driver is on-road. The device also uses GPS to provide guidance to our drivers to ensure packages are delivered to the right location and to maintain our standard of service excellence.

The capabilities of the device have grown significantly over the years, moving from the first generation device, which did not have the ability to communicate, to the fifth generation, which incorporates an industry-first for rugged, handheld devices—the ability to communicate over both CDMA and GPRS cellular technologies within the same device. This will allow UPS to increase our coverage, experience fewer outages and leverage best-cost carrier options.

Strengthening our coverage footprint is essential in continuing to service "day of" customer requests for pickup or delivery changes to help manage customers' changing business or personal needs. The DIAD V has additional features such as a camera, dimensional imaging, enhanced wireless LAN capabilities, touch screen and keypad, more memory and faster CPU, and is approximately half the size and weight of its predecessor, the currently deployed DIAD IV. The DIAD V began deployment to test sites in June of 2011. Deployment of more than 100,000 devices to more than 70 countries continues through 2013.

Wood continues:

The journey through the five generations of DIAD devices has been an interesting one. Up through the fourth generation device, UPS has influenced the rugged handheld industry in significant ways, including defining requirements for device communications (LAN, WAN, Bluetooth), imaging capabilities, and durability requirements. As you can imagine, a device used by UPS drivers has to support features that allow us to best service our customers and withstand harsh environmental factors such as weather, wide temperature ranges, and drops to concrete—all while presenting a professional image to our customers.

UPS has made a significant non-recurring engineering (NRE) investment over the years with hardware vendors (Honeywell is replacing Symbol [part of Motorola], which provided earlier generations) to achieve the required functionality and durability to run our business. The most recent generation, DIAD V, has allowed us to realize the fruits of our labor as it is the first DIAD we were able to purchase

> "off the shelf" with limited customizations (like the brown color, of course. Previous customization required country and regulatory certifications for the device and accessories for each country in which the equipment would be used so there are other efficiencies to leverage).
>
> We continue to work closely with industry partners to help define and influence their product roadmaps. However, at this point, with the rapid evolution of smart phones and hand held devices, our hope is that the industry advancements will outpace our needs and moving new devices into UPS operations will be as common place as replacing a cell phone.

An electronic manifest is downloaded into DIADs as drivers start their workday, so the driver can see each scheduled package delivery displayed on the DIAD in the exact order of delivery needed. If a driver is about to deliver a package to the wrong customer, or is forgetting to deliver one of a group of packages to a customer, the DIAD alerts the driver with an audible alarm. UPS tries to minimize changes to the day's schedule because unlike other carriers, a UPS driver is trained to deliver multiple services—pick up and deliver overnight packages, collect COD payments, and pick up and deliver ground packages to the commercial and residential customers on his or her route. Urgent customer pick-up messages can, however, be transmitted in color-code to the DIAD to alert the driver.

UPS says the DIAD allows it to eliminate the use of about 90 million sheets of paper per year, sparing over 7,000 trees.

The Green Initiatives

It makes sense for a company with a huge fleet of planes, trucks, and workstations to look for fuel and energy efficiencies. Some of the industry-leading innovations UPS has pioneered include the following.

Continuous Descent Approach

A UPS cargo airline pilot lines up with the runway much earlier—sometimes up to 40 miles away from landing—and cuts the thrust once and descends at a consistent rate.

UPS pioneered the approach and found nitrogen oxide emissions dropped by 34 percent below 3,000 feet and engine noise fell by 30 percent within 15 miles of the airport. The planes also saved 250 to 465 pounds of fuel per flight.[19]

Package Flow Technology

CIO David Barnes (who happens to also be one of the most respected CIOs in the industry) started his career at UPS as a part-time loader over 30 years ago and describes the then and now:

> If you were a pre-loader in the morning, it was a great college part-time job. Get in there before class. But you have to memorize the routes of three drivers. A very painful process because if you misloaded that package and you put 101 Main St. behind something else, the driver had to loop back and that's not very efficient. . . .We'd done it one way for 90-plus years at the time. We are very good at it—industry leading. How could you do it dramatically different? We threw out all the norms and developed a system called Package Flow Technology. Just one small aspect of that program was to take a fresh look at how you optimize networks. And as a result of optimization routines that we put within that software within the practices at UPS, we were able to reduce our mileage in a given year in the United States alone by 30 million miles—that's about 3 million gallons of fuel. And perhaps more important to all of us it represents 32 million tons less of CO_2.

Smart Pickup

This new service, introduced in 2010, is designed for customers who want the convenience of a scheduled pickup but who may not ship a package every day. The service ensures that a UPS driver stops at a customer location to pick up a package only when necessary. The service is expected to eliminate 8 million miles from the total driven by UPS each year in the United States and will save an estimated 793,000 gallons of fuel and 7,800 metric tonnes of CO_2 emissions.

Telematics Analysis

In this initiative UPS monitored the driver's—and the truck's—workday. It captured data on more than 200 vehicle-related elements from speed, RPMs, and oil pressure to seatbelt use, the number of times the truck is placed in reverse, and the amount of time spent idling. The data was uploaded when a driver returned to his or her center at the end of the day, to the data center in Mahwah, New Jersey. At the two Georgia test sites, the initiative helped slash the amount of time trucks idled by 24 minutes per driver per day—a fuel savings of $188 per driver per year. Multiply that by more than 90,000 U.S. package drivers, and the potential savings is significant. It also helped reduce maintenance costs. Currently, the company replaces a starter approximately every two years, whether a vehicle makes 30 or 150 stops a day. The telematics allows UPS mechanics to base the decision instead on things like the actual cycles of each starter, and the amount of voltage it draws when it's used.

Data Center Efficiencies

CIO Barnes again:

> In the Atlanta (data center) we chill the cold water that runs through those chillers at night. We have a 500-gallon tank buried beneath the data center. We chill the water at night. We get lower electricity rates at night and then we use that chilled water during the hot summer days to chill the plant down. It's very, very environmentally sensitive. It reduces the demand for power generation at peak times during summer days.

And:

> I think when most of us started years ago (the data center) was always a refrigerated room when you walked in there. It was humidity control for good purposes and, by the way, still good purposes—but very cold. Today if you walked in ours they are lukewarm. And so the issue of having to chill these things down really isn't something that's very efficient. So we are running them a lot hotter.

The UPS Store

Scott Galloway cringes when you ask him about his 15 years in the ERP software industry. He was a marketing executive with Powercerv and then president of Verticent, a spin-off software company focused on the metals industry.

"'The long sales cycles, the long implementation projects, the low customer ROI—and we were far less complex than SAP, Oracle and some of the other larger software vendors," he says.

He traded that career for an investment in a UPS Store franchise. It is Store # 4,586 in Tampa, Florida. Galloway says, "This is simplicity personified compared to the career in ERP." Simplicity sounds like an oxymoron when you are also talking about the largest DB2 database in world. Few of the over 4,000 store operators in the United States have a technology background like Galloway does. So, UPS strives to keep the processes and technologies simplified and standardized.

In 2001, UPS acquired the Mail Boxes Etc. franchise. Rebranded as The UPS Store, it has steadily grown the volume of stores and the range of products in such stores. Besides the mainstay shipping, the stores offer copying and printing services, packaging supplies, mailboxes, notary services, and plenty more. The shipping, of course, allows for a wide range of global destinations via multiple air, ground, and other paths. It has to account for millions of rates, corporate discounts, and taxes.

The store deals primarily with four software modules—the Customer Manifest System (CMS), the Mailbox Manager, the Point of Sale (POS), and Quickbooks (Administration) from Intuit.

The CMS is constantly being updated by UPS for changes in rates, taxes, insurance, customs requirements, and for new products like digital printing—which is increasingly emailed in and customers stop by to just pick up the finished job. The Mailbox Manager is updated for integration with postal rules, as in form 1583-A to authorize them to deliver mail in your post box at the store. The Point of Sale is updated to add ever more scanning and messaging formats so package delivery status or mailbox renewal information can be emailed to customers. Quickbooks is the standard version that you and I can buy. The chart of accounts is uniquely configured for UPS store franchises. And in an

extremely useful and powerful service, UPS aggregates and shares regular financial information sent by franchises and other shipping trends from its mainframes. You can see the huge leverage each store gets from UPS's scale when it comes to such benchmark data and market trend intelligence.

More standardization beyond the software comes into play when you look at the equipment in the store. The scanner gun to read bar codes is from Symbol (the Motorola unit). The weighing scale is from Mettler-Toledo and the label printer is from Epson.

Such standardization also facilitates training. Galloway raves both about the range of web courses (hundreds of them in short, five-minute modules ideal for staff training) and the in-person training available. Galloway runs the store part-time with his wife and one staff member. As part of his induction into the franchise, he spent a week with another store operator, did a two-week course at the franchise headquarters in San Diego (UPS corporate is in Atlanta), and then another in-person week in another store.

While many of the operators are curious, they are not expected to keep up with how UPS planes are innovating with continuous descent approaches or how their delivery trucks minimize left turns or what UPS is planning in their fifth-generation DIADs as we described earlier.

The Industry Solutions

UPS has increasingly been using its vast logistics network to provide industry solutions.

As its website says, "Especially over the last decade, we've added a lot of capabilities that many people would never associate with UPS, such as repairing laptops for a computer manufacturer, filling prescriptions for medical devices, and providing online printing services."

In the automotive industry, it has worked with GM around the supply chain for warranty parts; in healthcare, it has helped French pharmaceutical company Boiron with warehouse management; in high-tech, it has helped Cisco build out its European supply chain; and in government, it has worked with several agencies at various national and regional levels.

Each industry brings its own set of compliance and business nuances. UPS has hundreds of customers in the industries mentioned above and others.

What If UPS Were a "Full Technology Company"?

What if UPS were not as the CEO described "half a transportation company, half a technology company"? Could it be a full-fledged technology company?

Think of the DIADs going back to 1990 and their huge leverage with the mountain of mobile minutes they procure—UPS could have introduced an iPhone-like device way ahead of Apple. Think of the green innovations—UPS could easily be a cleantech player. Think of the store software—UPS could easily be a software vendor to countless other industries that use franchise models. Think of the various verticals UPS has built niches in.

That's idle thinking. UPS is clearly comfortable in its skin as a dominant logistics provider and where technology fits in that definition. As its jingle goes:

Where technology knows right where everything goes . . . THAT'S LOGISTICS. . . . Bells will ring and ding and ding and ding . . . THAT'S LOGISTICS.