New Ways to Learn
How a fresh take on education is changing our schools — and more

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GE Transportation’s president and CEO talks about moving the world

Sleep Revolution
Sleep industry innovations may hold the answer to a good night’s rest

FROM FEDEX: Ideas and innovations that connect people and possibilities around the world

ACCESS

OUR CONNECTED FUTURE

COVER STORY: Explore the world’s most connected cities
PLUS: How connected cars, schools, architecture, workplaces and more will change the way we live
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A WORLD OF OPPORTUNITY

INNOVATION CAN TAKE ANY SHAPE. It might be in your home, in your car or on your wrist, by way of technologies unfathomable a decade ago but that are now ubiquitous. In other cases, innovation can be nearly invisible, as with the sensors that monitor urban conditions such as traffic, air quality and noise. However innovation arrives, you can be sure it’s making our world more connected — and that it’s gaining momentum every day.

Take Denmark, which is at the leading edge of a movement to harness innovation to improve sustainability, efficiency and quality of life. Copenhagen and Aarhus, Denmark’s second-largest city, have emerged as “living labs,” testing ideas in real time. The rest of the world is watching and learning. Soon, those concepts will be at your own front door.

Exciting changes in the way we connect extend well beyond Denmark. Students in India can easily access a quality education via digital devices. Co-working spaces in Dubai buzz with creative energy. High-tech start-ups promise a new way of life in Nigeria.

This issue of Access covers every one of those stories and the individuals behind them — a group of people who are taking big chances and thinking in often crazy new ways. We call them Young Innovators, and we celebrate the smart solutions and forward-looking spirit they stand for. At FedEx, we value connecting people and possibilities around the world. And Young Innovators — along with all of us — are shaping our collective, connected future.

— RAJ SUBRAMANIAM, Executive Vice President, Marketing and Communications Officer, FedEx Corp.
“TO US, THERE’S NOTHING MORE PERSONAL THAN FOOD, AND IT CONNECTS ALL OF US.”

— Nikhil Arora, Co-Founder, Back to the Roots
A decade ago, Nikhil Arora and Alejandro Velez were college students whose interest was piqued by a class case study about growing mushrooms on spent coffee grounds. Their mushroom farming business morphed into a company that sold mushroom-growing kits and transformed again with the addition of organic, stone-ground breakfast cereals to the product line. Their Oakland, California–based company, Back to the Roots, is working to “Undo Food” (their trademarked phrase) — connecting us to what we eat by showing us where it comes from, processing ingredients minimally and creating a community around growing and eating good, simple food.

Access recently sat down with Arora, one of the company’s co-founders, for an inside look at how this transparency is tracking.

Back to the Roots is using food to connect people in a whole new way. What’s your vision?

These days, whenever there’s a conversation about connectedness, it seems like it’s about hot gadgets like wearables or whatever else is new. But we’re looking back a generation or two to when our grandparents and great-grandparents were growing and making food for their families. To us, there’s nothing more personal than food, and it connects all of us: We all have to put food into our bodies every day, but in so many cases, we have no idea where that food is coming from. We’re trying to change that with products that let people be where food comes from by growing it themselves, or see where it comes from by learning about who grows the ingredients and how the products are made.

Is that what you mean when you talk about achieving “radical transparency” in food?

We try to bake transparency into everything we do. For example, we put our product recipes on our cereal packaging, even though I can’t tell you how many people have told us we are completely crazy to do that. But it’s food from a kitchen, not from a lab, and we want you to see that you could make it yourself if you wanted to. That said, we’re pretty sure you don’t, because it takes hours, and you’re buying it because you want something convenient!

So, we’re transparent about how we make our products. We’re also transparent about our sources of capital — our investors are on our website talking about why they support what we do, and we put the ICA Fund Good Jobs logo on our packaging because we had help from them. It’s important to us to make clear how many people have come together to make this brand what it is. It might take a village to raise a child, but it takes one to raise a company, too.

Connecting with farmers is also really important to you. What’s the thinking there?

As badly as we consumers want to know where our food comes from, farmers want to know just as much that what they’re growing actually turns into something nourishing. The first time our purple-corn farmer, Scott, saw his name and photo on the back of our Organic Purple Corn Flakes, he teared up. He’s been growing organics for 25 years and had never seen himself connected in that way to the product that was made from what he grew. Farmers want to see where their hard work is going just as much as the rest of us.

Back to the Roots had a huge win recently when New York City public school pupils chose your cereal over conventional cereals in a blind taste test. Now, your cereals are on the menu for more than 250,000 students across the city who eat free school breakfast.

That test was so great — it blew up the whole myth about what kids will eat. When you do taste tests where the kids know a product is organic, they’ll automatically go “ewwww!” because they assume it won’t taste as good as processed food. But when you hide the label, they choose what’s good and healthy. Real food tastes good! We’re sharing our cereals and other products with kids all over the country through our “Grow One Give One/Pour It Forward” campaign: Every time a customer buys one of our ready-to-grow or ready-to-eat products and uploads a photo to our website, we’ll donate a product to a classroom of their choice. See, we’re not down on technology — it’s a really good tool for us to use in building connections.
LAGOS, NIGERIA: RISING START-UP STAR

What’s behind Africa’s most valuable start-up economy?

For Emeka Akano, CEO and co-founder of Jara Mobile, the name of the game is more. His app provides an easy way to pay bills and buy data and airtime for your mobile phone — services that are then sponsored by businesses through coupons, loyalty programs and the like. “In short, we’re trying to give consumers and brands everything and more,” Akano says. “We believe in disrupting the way people are thinking about doing routine bill payments in Africa.”

Lagos, Nigeria–based Jara takes its name from the local slang word for “extra,” which has etymological roots in the Yoruba language. But “jara” is also symbolic of Lagos’ tech scene. According to Startup Genome’s 2017 Global Startup Ecosystem Report, Lagos’ start-up economy is valued at $2 billion — the most valuable in Africa.

Pent-up demand is one of the big reasons behind the rapid growth, says Alexandra Novitske, principal investment officer for venture capital firm Singularity Investments. “The explosion of mobile penetration rates is resulting in waves of previously inaccessible consumers coming online,” she says. “This provides opportunities to reach underserved markets — and long-ignored customers mean little brand loyalty and a willingness to adopt new technology.”

It’s the perfect environment for entrepreneurship, something that’s part of Lagos’ DNA, says Toro Orero, curator of SpeedUPAfrica, an organization that hosts start-up boot camps. “You can’t stop Lagosians,” he says.

That spirit makes sense, Akano says. “Most of the developers in Lagos are self-taught,” he says. “This goes to show how determined the young minds can be.”

OVERCOMING OBSTACLES

Still, the young start-up scene faces real challenges. Among them: “Electricity,” says Orero, who notes that many companies get their power from generators because of the lack of a reliable energy grid. Other challenges inherent to the region’s rapid tech rise aren’t as immediately obvious. “Because the commercial environment is still in its infancy, the databases of information on customer behavior, buying patterns, et cetera are lacking,” Novitske says. “This is a barrier to companies trying to operate as a first entrant into a market.”

A similar mindset applies to consumers, who, Akano says, are eager but also wary. “Because you’re not a known brand, getting the trust of consumers at the early stages takes a lot of effort,” he says.

Nevertheless, observers like Startup Genome are predicting continued growth for the Lagos tech scene. Nigerian companies are attracting attention from tech accelerators such as Y Combinator, 500 Startups and Techstars. And in 2016, the Chan Zuckerberg Initiative — a fund started by Facebook founder and CEO Mark Zuckerberg and his wife, Dr. Priscilla Chan — raised $24 million for Andela, a Lagos-based start-up that trains engineers for tech jobs.

In keeping with his mantra for “more,” Akano puts a number on the future. “In five years, we see the Lagos start-up scene doubling in value from its current value of $2 billion to the current global median value of $4.1 billion,” he says.

“IN FIVE YEARS, WE SEE THE LAGOS START-UP SCENE DOUBLING IN VALUE.”

— Emeka Akano, CEO and Co-Founder, Jara Mobile
Making Sense of MIT’s ‘Senseable City’

Q+A The Massachusetts Institute of Technology’s Senseable City Lab, a multidisciplinary research initiative, explores the growing intersection between urban planning and technology. Access connected with Director Carlo Ratti about transparency, innovation and what to expect from the city of the future.

“Smart” is a word people use to describe cities that are connecting people through technology. But you use a spin on the word “sensible.” Why is that?

I’m not a big fan of the expression “smart city” — to me, it puts too much emphasis on technology. Rather, I prefer to use the term “Senseable City” with its double meaning, both “able to sense” and “sensible.” The word “senseable” puts more emphasis on the human, as opposed to technological, side of things. We want to investigate and intervene at the interface between people, technologies and the city — to develop research and applications that empower citizens to make choices that result in a more livable urban condition for all.

That empowerment connects with the idea of transparency, so how transparent will the Senseable City be? Will people be aware of the technology?

If we’re talking about data collection, we should be extremely transparent. But if we talk about the layering of technology on the physical environment, we could embrace Mark Weiser’s ideas. Weiser was the visionary 20th century computer scientist who coined the term “ubiquitous computing.” In his idea, when computing becomes ubiquitous, it can be found everywhere in the space around us and ultimately “recedes into the background of our lives.”

So, as these technologies recede, how could big data and the Internet of Things impact the urban experience?

The impact of the Internet of Things extends to many sectors, but let’s take mobility. Autonomous vehicles, for instance, promise to have a dramatic impact on urban life, because they could blur the distinction between private and public modes of transportation. Your car could give you a lift to work in the morning and then, rather than sitting idle in a parking lot, give a lift to someone else in your family, or to anyone else in your neighborhood, social-media community or city. This is particularly important, as cars are idle 95 percent of the time.

Transportation is a huge part of the urban experience. How about architecture and urban planning itself? Is open source data transforming it?

Open urban data is an old dream of architecture and planning. During the second half of the 20th century, urbanist William H. Whyte used on-site cameras to capture human flow inside New York’s buildings and public spaces. His methods were insightful but labor intensive. Today, with the diffusion of hand-held electronics, data collection is becoming effortless. The knowledge of human movement could radically inform design. Perhaps with better data, the built environment can adapt to us — a living, tailored architecture that is molded on inhabitants.
The future of mobility made big news in April when German industrial giants Bosch and Daimler announced joint plans to develop fully automated, driverless vehicles — potentially as early as 2020. It was just the latest in a string of Internet of Things (IoT) announcements the last two years from FedEx customer Bosch. What began with connecting the company’s own power tools and manufacturing facilities has now expanded to partnerships with dozens of other companies in an effort to connect industries, cars, homes and cities.

**A SMART NEXT STEP**

The developments make sense, considering the company’s product portfolio and expertise. Bosch is the world’s largest supplier of automotive components and one of the world’s largest producers of power tools. It’s also an expert in sensor technology: Every day, its wafer plant in Reutlingen, Germany, produces 4 million microelectromechanical systems (MEMS) sensors for use in monitoring manufacturing facilities and supply chains — a number that’s reached some 7 billion of these sensors since Bosch entered the category 22 years ago. And its manufacturing facilities and supply chains span dozens of countries around the world.

How exactly do these connections work? They start with what the company is calling the Bosch IoT Suite — essentially a software platform — and corresponding Bosch IoT Cloud. Along with IoT-enabled products and services (Bosch itself has targeted all of its electronic categories to be enabled by 2020), the system lets companies connect their products and build a solid IoT infrastructure.

**SMART CITIES AND CARS**

Connected cities and cars offer some of the most tangible examples of how an IoT infrastructure plays into everyday life. Through sensors and software, cities can integrate all of the functions needed for connecting devices, users and services, from power grids (conserving output during downtimes) to traffic signals (optimizing green lights) and streetlights (brightening dim lights only as people or cars appear).

Connected cars work in conjunction with the connected city. Imagine your car — not you — quickly locating empty parking spaces. Or safety sensors that can report sections of icy roads. The benefits are impressive: A study Bosch conducted with consulting firm Prognos in 2016 revealed that IoT-connected safety systems in cars would prevent 260,000 accidents and save nearly 400,000 tons of CO₂ emissions annually (calculated for the year 2025) in the U.S., China and Germany.

Bosch, a 130-year-old German innovator, is entering a new chapter: moving from creating products to connecting them. Here’s how it is changing the way industries operate — and all of us live.
In the post–Arab Spring world, many countries in the Middle East and North Africa are hungry to build economic value and add jobs — but tech entrepreneurs face a few common obstacles, including economies that tend to favor long-established firms over new entities, a shortage of venture capital and banks that require substantial collateral for loans. More and more, start-ups find their footing in co-working spaces. In these spaces, they’re getting the guidance they need to break through bureaucracy and connect not just with funding but with other like-minded entrepreneurs. Here are three standouts.

**CUTTING RED TAPE:**
**AstroLabs; Dubai, United Arab Emirates**
In addition to benefiting from collaboration-friendly space and classes in core skills like analytics and coding, AstroLabs members have access to subsidized licenses that make it easy to set up companies in the world’s largest free-trade zone. As the Middle East’s only tech hub supported by the Google for Entrepreneurs initiative, AstroLabs also has Google’s help in connecting its member entrepreneurs with mentors, networking opportunities and other founders who work in the initiative’s 22 tech hubs worldwide. In early 2017, AstroLabs announced a strategic partnership with IBM Middle East & Africa, which will connect its members with key players in machine learning and the Internet of Things.

**A FOUNDER WHO KNOWS FINANCING:**
**GrEEK Campus, Cairo**
In Cairo, the GrEEK Campus (named for its architecture and for the geeks it works to attract) combines office space for established companies with co-working space for those just starting up — more than 160 new and growing organizations in all. Founder Ahmed el-Alfi also started a regional venture capital firm and an incubator for tech firms, so he knows what entrepreneurs are up against: Egypt comes in at No. 131 on the World Bank’s ranking of 189 countries for their ease of doing business. But el-Alfi also knows that Egypt is ripe for start-up culture to take hold: Sixty percent of its population is under age 30.

**MAKING CONNECTIONS:**
**Cogite; Tunis, Tunisia**
No. 3 on a recent FORBES list of the world’s 10 best co-working spaces, the not-for-profit Cogite opened in 2013. Its founders aim to empower a highly educated but underemployed population (more than a third of jobless youth in Tunisia have university degrees) by helping them build the skills and connections they need to create employment opportunities for themselves and their peers. In its space, budding entrepreneurs can find potential collaborators and access a network of experienced Tunisian founders and funders — trailblazers who can help their mentees navigate the regulations and access capital.

**EGYPT IS RIPE FOR START-UP CULTURE:**
**60% OF ITS POPULATION IS UNDER AGE 30.**
Q+A

As the largest container port in the U.S., the Port of Los Angeles is practically a city unto itself. But with help from teams led by Jamie Miller, senior vice president of GE and president and CEO of GE Transportation, the inner workings of that complex network of containers are more visible to key players than ever before. Access met up with her to see what she’s doing to transport this vast world of transportation systems into the future.

Innovative people and products have made GE a household name. In past interviews, you’ve said the greatest successes come when a company tests the boundaries of technological advances without disregarding the expertise of its employees. Tell us how you’ve done that at GE.

That continues to be especially true for GE today. Technology alone doesn’t drive success — human experience, insight and strategy each are critical to advancing game-changing solutions. Regardless of how advanced technology is or becomes, you can never discount the power of human judgment.

As evidence, consider our Global Performance Optimization Center — GPOC, as we call it. GPOC is the command center for the entire rail industry, where a small, dedicated GE team monitors 2.5 million-plus messages from over 17,000 locomotives for 53 customers in 23 countries every day. Each team member carries huge responsibility to process the messages and determine which require GE or customer attention, and to alert the customer in time to ensure the right guidance is actioned upon to preserve the health of our customers’ fleets.

That said, there’s still often a fear of automation — that it’s bad for the workforce. What do you think about that?

I’ve always said that human intervention and judgment — specifically people understanding how the technology works and how best to implement it in a specific environment — is an ingredient that never can be discounted.

Those who fear automation should look to one of GE’s seven “Brilliant Factories” located around the world, including our Grove City, Pennsylvania, site, where we remanufacture diesel engines for locomotives, marine and stationary power applications. With our Brilliant Factories, we’ve married lean manufacturing with advanced software analytics to truly transform the way we deliver for our customers. There, real-time data-driven analytics, 3-D design and condition-based maintenance are transforming the production process but in a way where machines, data and people are increasingly connecting for better, faster, safer and more reliable performance.

That’s what it means beyond LA. I’ll first share a fun fact: More than 90 percent of global trade moves on the oceans. Now, for consumers, that means most of the goods we use every day touched one of the world’s seaports at some point in time. Ports are often the first node on the shipping supply chain, setting in motion a series of entities across rail, trucking and other handlers to ensure products are delivered on time. Combine that consumer delivery challenge with a new generation of massive container ships and the complexity of handling cargo carried by vessel-sharing alliances, and you have the recipe for delays that impact end-customer satisfaction.

In Los Angeles, we partnered to pilot a first-of-its-kind port information portal, which will give owners and supply chain operators greater line of sight and planning capabilities to more effectively service ultra-large container vessels. This pilot will unlock the power of big data and generate insights to build a smarter, more efficient supply chain moving forward. And it’s a major step toward exploring how a system like this could be developed and implemented for other U.S. ports.

Taking even a quick look at the work you lead is impressive. What advice would you give someone who is starting out in his or her career with the hopes of reaching a leadership level like yours?

I would tell them to be open-minded. My career trajectory has certainly been untraditional. I started out in finance, then served as GE’s chief information officer and now lead our Transportation unit as president and CEO. The key to moving forward is understanding how your skills transfer across roles and organizations. Don’t doubt your potential just because you don’t check off every qualification on a job description.

Earlier this year, GE began running a TV spot that asked “What if Millie Dresselhaus, female scientist, was treated like a celebrity?” Tell us about the buzz it’s received and what it means to you as a woman working in science and engineering.

This initiative is taking off, and it’s easy to understand why. There is a talent crisis for women in STEM (science, technology, engineering and math) roles, as evidenced by the imbalance of women in fields like engineering, manufacturing, IT and product management. This is a problem for industry at large and requires companies to lean in to address it. At GE, we are leaning in by setting a goal to hire 20,000 women to fill STEM roles by 2020 and reach 50:50 representation for all our technical entry-level programs. Inclusion is the only way to innovate. People with a variety of experiences are critical to new ideas and making good ones better.
“Regardless of how advanced technology is or becomes, you can never discount the power of human judgment.”

— Jamie Miller, Senior Vice President of GE and President and CEO of GE Transportation

For the complete interview, go to fedex.com/access.
Technology is rewiring our global infrastructure, often in ways invisible to the naked eye. Two early adopters building connected cities show us what this means for our routines right now — and how it will shape our collective future.

CONNECTIVITY MEANS DIFFERENT THINGS to different people. To one person, it still means a conversation over a cup of coffee, a firm handshake, a spark in one’s eye. To another, it means instant messaging with a friend in India while they play the newest video game or Snapchat. Increasingly, meeting “IRL” isn’t required to have a connection.

Most of the time, though, connectivity remains at its most powerful when it combines both interpretations — an intersection of the virtual and the physical. In a city, this means tying big data together with the beating heart of cultural identity to create a more efficient, enjoyable and sustainable place to live, work and play.

Take Copenhagen. Its physical location on the trade-route crossroads between the North and Baltic seas has made it a strategic connector for over 900 years. Today the city uses technology to continually
innovate the way it connects with its citizens. With a goal of becoming the world’s first CO$_2$-neutral capital by 2025, Copenhagen has mastered the art of balancing efficiency with quality and equality, a mash-up that makes it — and all of Denmark — world-famous for a high standard of living.

On an even more micro level is the city of Aarhus, just three hours west of Copenhagen. Denmark’s second-largest city, it was named the European Capital of Culture and the European Region of Gastronomy for 2017 — a pair of distinctions no other city has earned in the same year. It’s no surprise that a city so invested in the quality of life of its residents is on the leading edge of the connected cities movement that will soon span the globe.

Here’s a glimpse at our connected future — over the course of a single day in these two dynamic cities.
6 A.M.
RISE AND SHINE / AARHUS

Climbing out of bed comes a bit more easily when window shades open automatically and lights turn on and brighten gradually. Such automated features are, perhaps at the most personal level, why intelligent homes are integral to a connected city. Using sensors for lighting, heating/cooling and other systems ensures that energy and other resources are used wisely, too, ultimately contributing to collective sustainability goals. In fact, sensors that control lighting, detect your presence in a room and adjust window shades can help homes save upwards of 60 percent in electricity costs, 45 percent in cooling costs and 25 percent in heating costs.

ABOVE: The Iceberg’s glass balcony walls — which gradually transition from dark aqua to clear as they move upstairs — maximize views of Aarhus and the sea.

LEFT: Large angular windows play off The Iceberg’s architectural shape and maximize light.

RIGHT: Cyclists commute through Nyhavn (New Harbor), a 17th-century canal district in Copenhagen. Two bike counters on nearby streets let city planners know how many people cycle by each day, which helps inform future street-design decisions.
Our work always begins with trying to understand how people live and move and spend time in public space.

— Jeff Risom, Partner and Managing Director, Gehl

8:30 A.M.
MORNING COMMUTE / COPENHAGEN AND AARHUS

Fifty percent of Copenhageners commute by bike every day, and the city’s Dronning Louises Bro, or Queen Louise’s Bridge, is said to be the busiest spot for bicycles in the Western world. A bike counter on the bridge calculates daily traffic in real time; it provided data that recently drove the city to widen the bike lanes there. City planners in Aarhus have tried something else: attaching RFID (radio frequency identification) tags to bikes. The tags trigger sensors that turn traffic lights green — with the hope that riders never stop at a single red light on their way to and from work or school.

WATCH: See a Copenhagen bike counter in action at fedex.com/access.
From left to right, project managers Toni Rubio Soler and Tina Lund Højgaard discuss the ReGen Villages residential project with architects Sinus Lynge and Alexis Anderson at the EFFEKT Architects offices in Copenhagen. RIGHT: Sensors fill the Grundfos Dormitory in Aarhus in an effort to maximize building efficiency.
9:15 A.M.
AT WORK / COPENHAGEN

As with homes, sensors at the workplace adjust light and heating/cooling levels. They can also help buildings adjust to your circadian rhythms (the “body clock” regulating your daily routine), boosting productivity and creativity. At the offices of Copenhagen architectural firm EFFEKT, work on several projects focuses on a different routine entirely: regeneration. Their concepts for new residential developments such as ReGen Villages in the Netherlands (founded by James Ehrlich, a senior technologist at Stanford University and entrepreneur in residence at the Stanford Peace Innovation Lab) and Helsinge Garden City in Denmark bring residents together in producing their own energy and growing their own crops, among other sustainability initiatives. These Internet of Things (IoT)–connected “eco-villages” may someday even sell surplus energy to neighboring homes.

11 A.M.
STUDY BREAK / AARHUS

The 12-story Grundfos Dormitory is home to 200 students — and nearly 2,000 sensors. As the students study, socialize and even sleep, those sensors are gathering data that documents their daily routines along with how the dorm’s systems are performing. It’s not about getting too personal — it’s about learning the best ways to minimize the water and energy students use while maximizing the building’s performance.

“We want to investigate if food can be produced locally within our cities — basically integrated like other technologies are integrated.”
— Sinus Lynge, Director, EFFEKT Architects
It’s easy to peek at the daily specials before even arriving at Copenhagen Street Food, where 39 food stalls, trucks and containers — serving everything from smørrebrød (open-faced rye sandwiches popular in Denmark) to Colombian empanadas — connect with customers via social channels such as Facebook and Instagram. Even though the popular hangout sits on the harbor’s Papirøen, or Paper Island, hopping online is a cinch using one of the city’s countless free Wi-Fi hotspots.
The Center for Innovation at Dokk1 in Aarhus introduces citizens to new technologies such as drones, 3-D printing and a robot named Norma Pepper, pictured here.

Innovators have reinvented the library as a place for books plus family activities, games, cultural events, makers and start-up fairs, political debates and public services. Called Dokk1, the hybrid community space has received high international praise along with a grant from the Bill & Melinda Gates Foundation to develop a “toolkit” with ideas and best practices to help transform libraries around the world. Dokk1 is also designed to introduce citizens to new technologies, including drones (it’s officially the only spot where they can be launched in Aarhus, primarily to monitor events and assist in emergency situations) and a humanoid robot named Norma Pepper (who even has her own Facebook page).

Beneath the surface, quite literally, a robotic parking garage lets you get out of your vehicle so it can be automatically transferred to an empty spot. With room for 1,000 tightly packed vehicles on three levels, it’s the largest completely automated parking facility in Europe.

“DOKK1 IS NOT JUST A GLOBAL BEST PRACTICE OF MODERN LIBRARIES. IT’S THE EMBODIMENT OF CONNECTED LIFE IN THE MODERN AGE.”

— Martin Brynskov, Associate Professor, Interaction Technology, Aarhus University

After driving into a bay, getting out of your car and paying via computer touchscreen, a robotic system parks your car at Dokk1.

WATCH: Take a tour of Dokk1 at fedex.com/access.
By monitoring the usage of parks and other public spaces — installing sensors to calculate foot traffic, for instance — city planners learn more about where people are and how they spend their time, helping inform designs for the future. Sensors can also monitor automobile traffic — including CO₂ emissions in real time and in aggregate, with an aim to reduce levels — plus precipitation and humidity levels, security concerns, and even something as simple as when a trash can is nearly full.

TALLINN, ESTONIA
Don’t let its medieval streets fool you: Fifteen years ago, Tallinn rolled out a free Wi-Fi network, and every resident here (and in all of Estonia) is assigned an 11-digit digital identifier that connects to key aspects of life, such as employment and healthcare. That highly digital mindset drove the early years of Skype — founded in Tallinn in 2003 before being sold to Microsoft.

SONGDO, SOUTH KOREA
This newly built city 40 miles from Seoul boasts 106 buildings and 22 million square feet of LEED-certified space. Besides sensors to monitor climate, energy use and traffic flow, it features a waste system that sucks trash directly from kitchens to a processing center.

THE SF SHIPYARD AND CANDLESTICK POINT, SAN FRANCISCO
A major revitalization of a long-dormant shipyard and the former Candlestick Park stadium site is connecting residential, retail, office and R&D spaces in several cutting-edge ways. One example: a connected parking solution that guides drivers directly to the nearest available space.
“WHAT IS INTERESTING FOR A LIVING LAB IS THAT YOU ACTUALLY BUILD THE SOLUTION IN REAL LIFE. IT’S NOT A POWERPOINT.”

— Kim Brostrøm, Head, DOLL Living Lab

6:15 P.M.
EVENING COMMUTE / COPENHAGEN

The summer sun doesn’t set until 10 p.m., but for much of the year, streetlights help commuters clearly see their way home. At the Danish Outdoor Lighting Lab (DOLL) near Copenhagen, testing is now under way for 80 different lighting systems, including solar- and wind-powered models. And because lampposts are integrated into a city’s infrastructure and are almost everywhere, they’re the ideal spot for sensors and small cameras that monitor traffic jams, street parking availability and emergency situations — all of which DOLL is testing. But perhaps the most welcome test is one that, again, is most critical come winter: sensors in the pavement that monitor icy conditions and whether city crews need to apply more salt.

Danish Outdoor Lighting Lab (DOLL) head Kim Brostrøm monitors parking availability in Copenhagen. DOLL also tests lighting, waste management and environmental conditions.

8:30 P.M.
IN FOR THE NIGHT / AARHUS

At the end of the day, nearly every critical environmental condition is covered in a connected city. This includes noise pollution, something especially important come bedtime, considering research shows that high levels of noise have an adverse effect on your health. In Copenhagen, urban planners monitor noise levels and create a noise map every four years, but sensors now give them the opportunity to take readings in real time. That information can factor into the value of a home — and help reduce noise for a restful night.

WATCH: Explore what makes Copenhagen and Aarhus leading examples of connected cities at fedex.com/access.
Students around the world are experiencing the early stages of an education revolution that’s making lessons more accessible, personalized and relevant to the future. What can people in today’s workforce learn from them?

ACING THE ENTRANCE EXAM for India’s top management schools has never come easily. But a Bangalore engineer-turned-teacher-turned-entrepreneur named Byju Raveendran figured out an engaging way to teach that significantly boosts students’ chances. Barely two years ago, he parlayed his approach into BYJU’s The Learning App. While it still helps students prepare for those entrance exams, it’s turned into so much more: giving students from kindergarten through high school across the country the opportunity to access math and science lessons.

Launched a mere two years ago, BYJU’s has grown to become India’s most popular learning app, downloaded by more than 5 million students and boasting 260,000 subscribers, who spend an average of 40 minutes a day on the app. Its success makes complete sense: India consistently ranks low in global education assessments, in part because of a one-size-fits-all teaching approach that’s necessitated by a high teacher-to-student ratio. Through graphics and videos, BYJU’s personalizes every lesson to a student’s pace and style of learning. Students can also use the app to analyze their strengths and weaknesses, and talk to their teachers.

But students aren’t the only ones who’ve taken interest in the app. Recognizing its enormous potential, the Chan Zuckerberg Initiative (Mark Zuckerberg and his wife, Dr. Priscilla Chan) was among a group of funders who invested $50 million in September 2016, allowing BYJU’s to take on more subjects and reach even more students.

PART OF A DIGITAL REVOLUTION
BYJU’s is one of the latest examples of how online coursework — itself around for a couple of decades — is evolving. More far-reaching examples are cropping up in the form of massive open online courses.

$40 BILLION
The estimated 2017 value of the online education market in India, double the 2015 value
(MOOCs), which provide dramatic new access to digital learning, often for free. The impact of MOOCs is far-reaching: Students in even the most remote parts of developing countries can access learning like never before. They cover virtually every subject, are often created in conjunction with universities and provide an easy "testing ground" before pursuing a full-fledged online degree program. But there’s the catch: MOOCs typically aren’t seen as on par with an online degree.

That, however, is changing. "Digital learning, of which MOOCs are an example, is going to transform education at MIT and elsewhere," says Dr. Sanjay Sarma, vice president of Open Learning and professor at MIT, where 2.5 million students have accessed more than 100 MOOCs. "It’s more compatible with how the brain works because you can go back and re-watch a video of your professor’s lecture as you want." But the idea of free access — or an online certificate for a small fee — is what’s making the biggest difference. “Once you have that content, why not make it available to the rest of the world?” Sarma says.

"ONCE YOU HAVE THAT CONTENT, WHY NOT MAKE IT AVAILABLE TO THE REST OF THE WORLD?"  
— Dr. Sanjay Sarma, Vice President of Open Learning and Professor, MIT, on massive open online courses (MOOCs)

(teaches at the Hasso-Plattner Institute at the University of Potsdam in Germany. As professor and director of the School of Design Thinking, he’s become a top advocate for moving away from the individual learning process at all levels of education. “Anyone who has ever learned in a team — in a collaborative environment — knows that this is actually a much more efficient way of learning,” Weinberg says.

The effort is something he describes as moving from the IQ to the "WeQ." Giving students the opportunity to collaborate, versus compete, with each other helps the learning environment flourish, he says, and it lessens the distinction between school and the workplace, where working as a team tends to be the norm.

In tandem with breaking away from the individual learning process is removing individual incentives — or grades. "This little decision of not giving grades to any individual is one of the most important decisions we’ve made," Weinberg says. Because students are conditioned to receiving grades, he says, it can take a while to adjust to the fact that they’re not being monitored that way. But it’s worth the change. “When you’re measured and you get a grade, you behave differently and don’t allow yourself to come up with a crazy idea,” Weinberg says. “But with no grades, no individual incentives, students start allowing themselves to do incredible things.”

CONNECTING IN NEW WAYS BEYOND DIGITAL

Not every development in connected education depends on digital tools, however. Connecting in person through teamwork and collaboration has provided the foundation to what Ulrich Weinberg
OVERNIGHT SUCCESS

From smart pillows to “snore stoppers,” the path to a good night’s sleep is increasingly connected and high-tech. Surprisingly, though, some of the biggest success stories are taking a fresh look at the basics — and disrupting the sleep industry every step of the way.
IT TOOK NOTHING SHORT OF a “sleep deprivation crisis” for Huffington Post founder and editor in chief Arianna Huffington to step down from her website last year. Her new pursuit — spreading the gospel of health and wellness, including sleep — ramped up with the publication of *The Sleep Revolution: Transforming Your Life, One Night at a Time*, an instant best-seller. The appeal of sleep has never been more apparent or alarming: A 2016 study by RAND Europe — the first to look at the economic impact of sleep deprivation — found that every year, the U.S. loses $411 billion and 1.23 million working days to insufficient sleep. And someone who averages less than six hours of sleep per night has a 10 percent higher mortality risk than someone who sleeps 7–9 hours.

$411 BILLION

How much the U.S. loses in productivity each year due to insufficient sleep

SOURCE: RAND Europe, 2016
We wanted to take what we had learned in software and high-tech, and apply that to an old, traditional industry... that impacted everyone in society.”

— Daehee Park, Co-Founder, Tuft & Needle, shown at the right with fellow Co-Founder JT Marino
Tuft & Needle has also become synonymous with a mattress that comes in a box. How did you arrive at compressing your mattresses for easier shipping?

We didn’t invent the “mattress in a box” category — that method of packaging had been around for several years before we started. Compressing our mattress into a small box — even up to a California king size — helped us ship quickly and cost-effectively to customers nationwide. As we’ve taken this concept mainstream, it’s been incredible for customers receiving an attractive white box with handles on the side, and being able to set the bed up within minutes on their own.

Tell us more about how you’ve iterated the design and engineering to make your mattresses different from others. And how did that approach help fuel your success?

We pioneered the concept of a single mattress designed to work for everyone. Coming from our background in tech, we’ve developed the mattress like we do software. Beginning with solving the pains based on first principles and challenging all assumptions, we’ve constantly iterated on the product based on real-time customer feedback. Using this approach, we’ve established ourselves as an industry leader, ranked as the No. 1 highest-rated mattress on Amazon and also reviewed as the No. 1 “Best Buy” in Consumer Reports. (Editor’s note: Prices range from $400 for a twin mattress to $900 for a California king.)

You describe this single mattress as designed to work for everyone. How would you describe your typical customer? You’d tend to think your approach appeals mostly to millennials.

This is an interesting one, especially coming from software, where you have to home in on a target user and cater the design and the messaging to them. But for mattresses, when we think we understand a very specific customer, the types just continue broadening. The growth we’ve been experiencing has come because our appeal is not to a specific audience or segment demographically speaking. It’s more psychologically to the consumer who is fed up with the existing establishment of the way things are.

A lot of people think we’re just a millennial company, and I think some other brands in our space really cater their messaging toward that. But we try to have universal appeal. When you look at our marketing and our photography and our website, we’re embracing the general population of the U.S. We’ve been very mindful of that with our employees, too. Obviously when we first started, we hired friends. It started with JT’s and my hiring our brothers. But we’ve really tried to diversify our employee base to represent our actual customers — and that’s a wide range. It’s important for us to be a very welcoming brand, so we don’t want to fall into a trap of being an overly cool, hip brand that’s only for young people. That might appeal to a small subset of our customers, but our goal is to grow this company over the long term and become a household brand name in the mattress category. And the way we’re going to do that is by appealing to the masses.

Well, you started to see broad appeal pretty quickly after launching your first mattresses. How did it feel to get your first online customer comments and then to see the reviews start to come in?

Delivering a physical, tangible experience to customers was a whole new uplifting feeling and a sense of a more intimate connection with the end user, as opposed to a more disconnected virtual experience you have when you’re working on a software app. Our product will stay in a customer’s home for several years to come, and they will interact with it for more than a third of their day. With that as context, it was very fulfilling when we saw the first reviews roll in and social media chatter praising our product and customer service.
While some fitness wearables will also track your sleep, sleep tracking is the Beddit dedicated sleep tracker’s only job. It slips undetectably under the bottom sheet and provides a report in the morning on everything from the quantity and quality of your sleep to heart rate and breathing to whether you’re a snorer.

The makers of the ZEEQ raised more than $400,000 on Kickstarter for a smart pillow that tracks tossing and turning, records snoring volume and provides a “SleepScore” via app. Inside the pillow, speakers let you fall asleep to music or podcasts without disturbing your bedmate, and a vibrating insert can serve as your alarm clock or alert you to stop snoring.

Innovations in sleep aids drove the creation of a “Sleep Tech” category at the 2017 Consumer Electronics Show, where the products on offer promised to foster better, deeper, longer sleep. Here are five to sleep on.

**Sleep Tech Top 5**

1. **Beddit Dedicated Sleep Tracker**
   While some fitness wearables will also track your sleep, sleep tracking is the Beddit dedicated sleep tracker’s only job. It slips undetectably under the bottom sheet and provides a report in the morning on everything from the quantity and quality of your sleep to heart rate and breathing to whether you’re a snorer.

2. **ZEEQ Smart Pillow**
   The makers of the ZEEQ raised more than $400,000 on Kickstarter for a smart pillow that tracks tossing and turning, records snoring volume and provides a “SleepScore” via app. Inside the pillow, speakers let you fall asleep to music or podcasts without disturbing your bedmate, and a vibrating insert can serve as your alarm clock or alert you to stop snoring.

Tuft & Needle mattresses are rolled up for easy shipping and delivery.
Early on, you relied heavily on word of mouth and your customers sharing their thoughts. Now you have a marketing campaign with TV spots, billboards and magazine ads in several major cities. Tell us about that.

Although we have more of a marketing budget now to get the word out, this campaign is more educational. It’s what we call “The Truth” and it lets consumers know how this industry works. So, even if you don’t buy from us, we thought it was important to peek behind the curtain to see what’s going on with a lot of mattress companies so that you can make an informed decision and at least know what you’re buying into if you’re choosing to go the more traditional route. But it applies across industries — this is just one example. It’s all about creating a healthy skepticism among consumers so that they can question what they’re buying and dig a little deeper to make sure they’re buying from a company they can really trust.

The idea of healthy skepticism is really interesting.

What other industries do you think this applies to?

When you go to a typical mattress showroom, we’ve heard people compare it to buying a car or going into a jewelry store — places where you’re oftentimes dealing with a salesperson whose incentive is trying to sell you the highest-price product because they’re commission-based. And because they’re only a once-in-a-lifetime or once-in-a-while purchases and they know you’re not going to come back for a long time. Traditional mattress salespeople are not incentivized to create this relationship with you where you develop trust.

Speaking of stores, it looks like you’re giving it a try — with spaces, not surprisingly, that aren’t at all like your typical mattress showroom. Describe what you’re after.

When we were thinking about brick-and-mortar retail, what we were trying to improve upon was not just the status quo in the mattress industry because the bar is set very low. You’re talking about showrooms in strip malls with kind of a low. You’re talking about showrooms in strip malls with nothing plastering the walls. Right now, we’re trying to figure out whether a guided experience or a self-serve model is better, so depending on when you come in, it might be different. We treat the store like a product — there are different versions we’re trying to iterate. It’s still a work in progress. What’s clear is there’s demand for it and it’s adding to our brand experience — it’s a physical manifestation of our brand. It gives us a chance to physically interact with our customers, whereas e-commerce can be cold and feel disconnected no matter how great your design is. So, we like that aspect and we’re very optimistic about it.

How does that innovative spirit take shape at your headquarters and the way you run the business?

The spirit and culture of our company originates from the people we hire. The brand is us, and our company values represent our collective personal values that we live by, not just aspire to. Autonomy is very important to us — we look for self-starters who don’t need to be and don’t want to be micro-managed. We’re at 150 employees now and growing quickly. Although we’ve organically added structure and hierarchy as necessary, we never want to lose our flat mindset and approaching everything with humility, and a lot of that is through not having baggage from the industry. I think that’s worked out well for us, because when it came to our stores and our design and how we’re thinking about that experience, it’s completely different than when you walk into a mattress showroom. For our customers, people are putting it like when they walk into an Apple Store and they’re wowed by that — it’s just different. So, let’s just take San Francisco as an example: We have a built-in coffee bar and a fully trained barista there, and it’s very simple, with nothing plastering the walls. Right now, we’re trying to figure out whether a guided experience or a self-serve model is better, so depending on when you come in, it might be different. We treat the store like a product — there are different versions we’re trying to iterate. It’s still work in progress. What’s clear is there’s demand for it and it’s adding to our brand experience — it’s a physical manifestation of our brand. It gives us a chance to physically interact with our customers, whereas e-commerce can be cold and feel disconnected no matter how great your design is. So, we like that aspect and we’re very optimistic about it.

SMART NORA SNORE STOPPER

The Smart Nora snore stopper hangs out quietly inside your pillow, waiting for the early sounds of snoring. One snort and it gently rustles the pillow to stimulate your over-relaxed throat muscles and return your airway to its normal position — all without waking you up.

SLEEP PHONES MUSICAL HEADBAND

The average earbud wasn’t built for wearing all night. SleepPhones were made to be comfortable for hours of overnight wear: With speakers built into a soft fleece headband, they set you up to listen to streaming music, audiobooks or your favorite sleep sounds — and they’ll block out snoring, if you’re not sleeping with a ZEEQ or Smart Nora user.

SENSORWAKE’SORIA SLEEP ENHANCER

Sensorwake’s Oria “sleep enhancer” emits two distinct, patented scents: one designed to help you fall asleep, the other to help you stay asleep. The creators say they’ve tested the formulas’ effectiveness in a variety of ways, including user sleep diaries and EEGs (short for “electroencephalograms”), tests that detect brain activity.
HOW TO AVOID DIGGING WITH SPOONS

by FREDERICK W. SMITH, Chairman and CEO, FedEx Corp.

Legend has it that well-known 20th-century economist Milton Friedman once visited a canal-building site in China where thousands of people were digging with shovels to complete the project. Friedman asked the foreman why they didn’t bring in heavy equipment to get the job done better and faster. The foreman told him that would put a lot of people out of work. “In that case, why not have them dig with spoons?” Friedman said.

THE CYCLE OF INNOVATION
Despite the many benefits of new technologies, people worry that new inventions and innovation in general will take away more jobs than they create. The fact is that technology is making many existing jobs more efficient and adding jobs to the economy, even as other ones go away. That’s the cycle of innovation, and it’s been going on for centuries.

One of our biggest challenges is that many people today want jobs but only know how to dig with spoons. They’re desperate for training in a variety of fields. And such training can’t come too soon. According to the World Economic Forum, over a third of the core skill sets in most jobs will be replaced with new ones by 2020.

Unfortunately, in the United States at least, our K–12 educational system is not preparing young people for some 5.6 million jobs going unfilled today … some of which may not warrant a college degree but require specific training nonetheless.

As a result, companies, universities, community colleges and government organizations are taking it upon themselves to create training for the jobs they need to fill. Some have developed quite innovative approaches:

- IBM’s Skills Gateway program offers the general public specific learning tracks for technology jobs in areas such as security, the cloud and mobile app development. This approach is just one example of the massive open online courses (MOOCs) movement discussed on page 20.

- By providing free training and support to socially disadvantaged, aspiring agricultural entrepreneurs, FARMroots (a branch of New York City’s sustainability network) is diversifying the farming industry. More than 300 aspiring and experienced farmers have moved through the program and now see farming as a revitalized economic opportunity.

- The Massachusetts Institute of Technology offers a global program that helps regions around the world accelerate economic growth and promote social progress through innovation-driven entrepreneurship. The partner regions join MIT faculty and associated teams to develop a customized regional strategy to build business success.

INNOVATING FOR GOOD
Besides delivering the innovative technology we’ve become known for, FedEx, like these organizations, is intent on innovating for good.
We believe we’re responsible for creating not only business value for our stakeholders but societal value for our world. That’s why we concentrate on innovations that will do the most good and give the most back. To cultivate a more innovative workforce, we’ve developed training opportunities of our own.

Our Employment Pathways program, for example, creates avenues to meaningful employment for underserved populations. For some young people, that path could be training for in-demand jobs, especially in technology and logistics. We support a program at a nearby community college that provides aircraft mechanic training because we and other airlines have a need for those technicians.

Others may have the training but don’t know how to find the opportunities. That’s why we offer programs that connect both veterans and young people to employers seeking talent.

I’m also proud to say that the state of Tennessee, the FedEx home base, was the first to provide tuition-free community college education to high school graduates so that people who want good non-degreed jobs can get the training they need. Other states are beginning to follow suit.

A CONNECTED FUTURE
As human beings we are never more productive than when we connect.

Whether we’re linking to people, products, or ideas, a spark ignites that lights the way to greater creativity. Simply put, connection spurs innovation, and innovation delivers big dividends to humankind.

Long-time business guru Rosabeth Moss Kanter espouses an innovation concept she calls “kaleidoscope thinking.” She described it as shaking up your thinking to find different patterns from the same bits of reality — much as you do when you twist a kaleidoscope to see new patterns.

To encourage kaleidoscope thinking in all realms, FedEx now formally recognizes it through our 2017 FedEx Young Innovators List. On it are not only people but also cities, countries, and big concepts such as space travel and trade. It even includes a car. We hope such recognition inspires everyone to look near and far for new ideas or combinations of existing ones to create a more connected future — one in which our work is more fulfilling, our lives more satisfying, and the possibilities are endless.

Whether we’re linking to people, products, or ideas, a spark ignites that lights the way to greater creativity. Simply put, connection spurs innovation, and innovation delivers big dividends to humankind.

Check out the 2017 FedEx Young Innovators List at fedex.com/access.
We applaud those who push the envelope.
After all, we reinvented it.