THE FUTURE OF LAST-MILE DELIVERY
EXECUTIVE CONFERENCE | OCTOBER 11, 2016
The Value Chain Innovation Initiative at the Stanford Graduate School of Business hosted the Future of Last-Mile Delivery Executive Conference for 100 participants on Tuesday, Oct. 11, 2016. The conference explored the emerging technologies and business models that are addressing the bottleneck of the last mile and are gaining increasing attention as a result of the explosive, double-digit growth of e-commerce in the United States and around the world.

Today’s delivery landscape is made up of both established and emerging players. Traditional delivery providers are evolving to take advantage of new approaches, while emerging technology providers continue to play an increasing role in this space. Delivery drones, robots, autonomous vehicles, and apps are being tested at the last mile, with the goal of bringing more efficiency and cost-effectiveness. In the future, delivery providers may have a growing number of choices to enhance or replace their fleets with these new technologies.

The day’s discussions made clear that customers continue to demand flexible, visible, and fast delivery at a low price, and that technological innovations are transforming the way delivery providers interact with their customers. Given customers’ complex expectations, intense market competition, and the variable profitability of last-mile delivery, it is unclear which technologies, firms, and business models will ultimately gain a successful foothold. While the popular press may lead some to believe that the “Uber-ization of delivery” will eliminate the last-mile problem, conference participants discussed the many complexities and opportunities at the last mile. Weighing the capital needed to deploy various technologies was discussed at length. Participants projected that the next five to 10 years will see many disruptions and new business models. They discussed opportunities to leverage apps, analytics, algorithms, the Internet of Things (IoT), drones, and much more in the near future to protect and potentially expand markets. In the medium to long term, they thought robots and driverless cars might be adopted in specific contexts.

The conference consisted of four panels addressing four different topics, followed by discussions among supply chain executives, entrepreneurs, and academics who shared insights and perspectives on the proliferation of new technologies and business models and their implications on the future of delivery. Speakers used the panel discussions to demonstrate how their respective companies could play a role in changing the last-mile delivery business.
TOPIC 1
THE FUTURE OF MOBILITY

EMERGING TECHNOLOGIES ARE GAINING ACCEPTANCE. EACH OFFERS TARGETED APPLICATIONS IN IMPROVING LAST-MILE DELIVERY IN THE FUTURE.

We are in the midst of major disruptions in last-mile options due in part to emerging technologies that include apps, algorithms, autonomous and modular transport systems, cloud services, drones, delivery robots, Internet of Things, GPS applications, ridesharing, crowdsourcing, and on-demand services such as Uber and Lyft. The panel looked broadly at how changes in mobility are influencing commercial delivery.

Perspectives

SRIDHAR JAGANNATHAN
Chief Technology Officer, NEXT Future Transportation

Sridhar Jagannathan looked at the drawbacks of the personal car compared to on-demand, ride-sharing services. He commented that the car could be considered a “public nuisance” when taking into account the cost, maintenance, travel time, parking, accidents, congestion, and environmental impact. He included electric cars within this argument and discussed how conventional solutions, such as building more infrastructure with more lanes, were not viable. Instead he promoted building autonomous, modular transit, such as the self-driving vehicle pods being developed by NEXT Future Transportation that aim to provide a scalable, customized last-mile solution. The prototypes can transport up to six people and travel alone or connect and detach from other modules while in motion. The NEXT Future Transportation research and development team is working on a scalable hybrid prototype in Berlin and a smaller-scale unit has been shown to officials in Dubai.

PARIMAL KOPARDEKAR
Senior Technologist, Air Transportation System, and Principal Investigator, UAS Traffic Management, NASA

Parimal Kopardekar discussed enabling unmanned aircraft systems (UAS), or drones, as means to deliver goods and services in low-altitude airspace. However, before the deployment of large-scale commercial operations, a safety management system is necessary to prevent unmanned aircrafts from collisions with people, buildings, airplanes, or one another. To address the evolving civilian application for drones, NASA and the Federal Aviation Administration have recognized the need for a UAS traffic management system to control the 2.6 million commercial drones expected to be in use by 2020. Developing a system that enables the aircraft to see and be seen by other aircraft beyond a human operator’s line of sight is one of the biggest challenges of integrating UAS into the national airspace. Finding ways to extend the limited battery lifespan of many drones is also essential for commercial applications to scale.

BALAJI PRABHAKAR
Professor, Electrical Engineering and Computer Science, Stanford University

Balaji Prabhakar discussed the outdated transportation architecture in the U.S. and around the world. Traditional systems such as San Francisco’s BART, MUNI, and Department of Transportation systems are built to spec and built to last, yet there is no relationship between agencies and the many transportation networks. There is also a lack of information flow between demand and supply. He commented that Uber-type models could be seen as “breakthrough disruptions” since they build a relationship between the commuter and the transportation network. Twenty-first-century technologies such as the cloud, big data, and IoT (as a key enabler) are establishing new bridges of information between demand and supply. As the founder of Urban Engines, a transportation data analytics company recently acquired by Google, Prabhakar has leveraged big data for large-scale mobility of people and parcels. The proprietary mapping system developed by Urban Engines shows objects in motion in order to give insight into how people move around in cities, while its commuter app evaluates different modes of transportation, giving users the quickest routes. The technology has applications for e-commerce deliveries as well.

Participants agreed that while there is no one clear direction for last-mile delivery, the myriad emerging new technologies could be considered part of a multi-pronged approach to improve the movement of people and packages. Last-mile goals for retailers and delivery firms include efficiency, cost-effectiveness, and customer satisfaction, among others. Audience discussion focused in part on the challenges of meeting capital requirements for some of the newer technologies that have yet to demonstrate cost-efficiency. The issue of developing economy versus developed economy adoption of new mobility models was also discussed, as was the role government leadership can play with initiatives like Smart City.
TOPIC 2
MACHINE APPLICATIONS

MACHINE AUTOMATION HAS THE POTENTIAL TO REDUCE LABOR, WAREHOUSING, PRODUCTION, AND DISTRIBUTION COSTS INVOLVED IN DELIVERY, IMPROVING THE VALUE PROPOSITION OF LAST-MILE DELIVERY.

Machine applications for delivery include drones, robots, and autonomous vehicles. Assuming that regulations are in place on schedule, the FAA estimates that as many as 7,500 commercial drones could obtain permits to operate by 2018. Given the ability of drones to bypass congestion and infrastructure restrictions, they are well poised to deliver life-saving medicine and other supplies during humanitarian crises and have potential to deliver small commercial packages. Robots offer another remotely operated delivery option, but because they must traverse terrain and infrastructure, they are better suited for small distances. Autonomous vehicles have broader applications.

This panel looked specifically at the potential for drones to be used for humanitarian and commercial purposes, and the novel role robots are playing in the production and delivery of pizza.

Perspectives

JULIA COLLINS
Cofounder and CEO, Zume Pizza

Julia Collins, a Stanford MBA graduate, discussed how her startup, Zume Pizza, is focused on disrupting food delivery. The four big companies in the pizza industry, Domino’s, Pizza Hut, Papa John’s, and Little Caesars, compete on speed, quality, and price. Zume aims to become an alternative, which can be seen as “the Amazon.com of food.” She explained how robots are used to help assemble the pizzas in the Zume factory kitchens. Then, prebaked pizzas are loaded onto a delivery truck filled with more than 50 micro-ovens that switch on to continue baking when the pizzas are en route to their delivery destination. Zume can deliver 288 pizzas per hour during the peak periods of 5 to 8 p.m. while Domino’s can deliver 45 pizzas per hour. The company can deploy its trucks as hubs during peak times, with motorcycles and cars delivering from the trucks. She explained that Zume pizzas are healthier, given the company’s use of locally sourced ingredients and lack of preservatives, and overall quality is higher since the pizzas finish cooking en route, reducing something known as “dwell time” (when food sits en route and becomes soggy and soft). Zume claims its business model is more efficient than traditional pizza delivery models, and the company incurs lower labor and business occupancy costs compared to established pizza companies.

ANDREAS RAPTOPULOS
Cofounder and CEO, Matternet

Andreas Raptopoulos discussed how Matternet, his drone delivery startup, is making good use of its innovative technology. The startup has already conducted medical delivery trials for the World Health Organization, Doctors Without Borders, and UNICEF. Its drone and cloud technology has enabled medical supply deliveries in hard-to-reach areas in the developing world, in countries such as Haiti, Papua New Guinea, and Malawi. He explained how, through these deliveries, it has demonstrated that its aircraft can fly beyond an operator’s line of sight and can perform in inclement weather. Matternet envisions coupling its technology with trucks and/or vans for humanitarian or commercial delivery. Packages inside a van can be coupled with a drone and launched from a rooftop, which can also serve as a landing pad. Matternet drones are designed to swap out batteries without human intervention, addressing the issue of limited battery life. He said that while humanitarian applications have been successful, the company is now seeking to scale e-commerce deliveries.

The panelists agreed that most companies are looking at machine-based automation to eliminate costs in production and delivery and to become more efficient. Both panelists were considering using trucks as moving distribution hubs, signaling an important new method to make delivery even more dynamic. They demonstrated use cases where consumers benefited by obtaining quality products in a cost-effective manner, and discussed their plans for scaling their businesses.
TOPIC 3
ANALYTICS FOR OPTIMIZATION: THE UPS STORY

ANALYTICS IS BECOMING AN INCREASINGLY POWERFUL TOOL TO OPTIMIZE LAST-MILE DELIVERY, WITH THE GREATEST POTENTIAL FOUND IN PRESCRIPTIVE ANALYTICS.

UPS has invested heavily in big data analytics, providing what the company sees as a competitive advantage to deliver cost savings in delivery and customer insights. The company’s advanced routing system, ORION, has enabled UPS to customize delivery routes for speed and efficiency.

Perspectives

JACK LEVIS
Senior Director, Process Management, UPS

Jack Levis discussed the evolution of the ORION logistics system leading up to and since its deployment in 2012. Its proprietary optimization software uses sensors on delivery vehicles to gather data, combining it with algorithms and customized map data to reduce 6 to 8 miles driven per route. Levis discussed the power of reducing one mile per driver per day, which yields up to $50 million in savings per year. Saving one minute per driver per day was calculated to yield up to $14.5 million in cost savings per year. ORION software customizes the most efficient route for each day. It has reduced vehicle emissions by 85,000 metric tons per year and lowered fuel use by 8 million gallons per year.

Levis commented that the company used to be considered a trucking company with technology, but that he now considers UPS to be a technology company with trucks — a shift that can enable it to remain competitive in the evolving last-mile delivery space. The company’s growing focus on prescriptive analytics, which can use data to guide future decisions, promises to deliver even greater cost savings in the future.

The group discussion centered around the opportunity for firms to focus more efforts on predictive and prescriptive analytics. The complexity involved with achieving small efficiencies was discussed, as was the importance that small efficiencies can have when applied on a mass scale.
NEW PLATFORM MODELS AND OTHER TECHNOLOGIES ARE ENABLING THE RETAIL SECTOR TO IMPROVE THE PLACE, PRICE, AND SPEED OF LAST-MILE DELIVERY, AND CAN DRIVE INCREMENTAL SALES.

Platform models that support matching buyers and sellers and delivering to buyers more efficiently are continuing to grow. Conventional retailers and new entrants are experimenting with new platform models. The panel examined new last-mile delivery models being deployed by Walmart, the world’s largest retailer, and how the Google Express platform is improving the delivery experience for customers and generating incremental business for retailers.

SHEKAR NATARAJAN
Vice President, Last-Mile Operations, Decision Sciences and Emerging Sciences, Walmart
Shekar Natarajan shared Walmart’s last-mile vision and goals to develop cost-effective home delivery and operational supply chain improvement by leveraging technologies and partnerships. Walmart’s last-mile vision is “anywhere, anytime.” The company is currently testing drones to improve warehouse inventory management, and plans to use drones for select package delivery in the future. Natarajan spoke about the company’s work related to drones, autonomous ground vehicles, partnerships with ride-sharing platforms, crowdsourcing, and deploying Walmart’s own fleet of couriers.

BRIAN ELLIOTT
General Manager, Google Express
Brian Elliott discussed the growing importance of mobile commerce, which now accounts for more than 50 percent of all e-commerce traffic. Given this trend, the Google Express platform focuses on making it easier for customers to reach retailers via a convenient mobile shopping experience. Google Express includes a reliable and affordable delivery platform for goods that includes a membership program to drive user frequency and loyalty. The company currently has 48 retail partnerships, including Target, Costco, and Walmart. Recently Google Express announced its online delivery service will no longer deliver perishable food and produce since those are the items customers typically prefer to handpick themselves in the store. Google Express scales according to the volume of its goods and is partnering with third-party van delivery services. It sees drones, autonomous cars, and robotic ground vehicles as viable delivery options for the future.

Panelists noted that many challenges of the last mile have been addressed, but the last 100 feet still needs to be addressed (e.g., having automated vehicles or robots deliver a package up stairs or down a winding path to a customer’s door). Additional technologies and new partnerships are expected to address this area.

It was clear from the day’s discussions that various new last-mile technologies and business models hold promise in driving cost savings and incremental business for firms, while delivering benefits such as greater flexibility, speed, sustainability, and/or cost savings to customers. There was consensus that the pace of change in this area will continue to grow.
About Us

The Value Chain Innovation Initiative (VCII) brings together faculty, staff, students, and practitioners to advance the theory and practice of global value chain innovation. We seek to understand the economic and social impacts of the global dynamics and digital communications that are reshaping business, industries, and ecosystems. Our research focuses on solving problems that are highly relevant to the greater global business community.

Our Team

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