



MIT m-Logistics Initiative Developing Next Generation Mobile Logistics Platforms in Resource Constrained Environments

*A CTL-NextLab Initiative that Leverages Smartphone and Cloud Technologies
to Create Self-Provisioning, Low-Overhead Distribution Networks*

I. Overview

To reach consumers in underserved markets, firms often need to build laborious and expensive logistics and distribution infrastructures. Given the difficulties intrinsic to these markets, this cost is unaffordable outright or unsustainable over the course of a normal business cycle, thereby preventing manufacturers and retailers from serving low-income, high volume consumer markets. This is harmful not only to the firms themselves, but to consumers in underserved regions, as it leaves them with scarce options for obtaining the basic products they need on a daily basis.

Based at the MIT Center for Transportation and Logistics (MIT CTL), the mission of the MIT m-Logistics Initiative is to understand the basic commercial processes in resource-constrained environments (pricing, transaction, procurement), and to design and deploy a mobile software platform that can enable Industry Partners to distribute their products to low-income markets with substantially lower overhead.

II. Motivation

Within the next three years another billion people will make regular use of cell phones, continuing the fastest adoption of a new technology in history. By 2012, mobile technologies will be used by five billion people, most of them in underserved regions, thereby unleashing significant opportunities for innovation, not only in mobile phone technologies but also in distribution efficiencies within previously unreachable areas of the world.

The advent of Smartphone and tablet computing platforms has advanced the power and functionality of mobile devices exponentially, to the point that we now carry ubiquitous, always connected handheld personal computers. Global consumer patterns and Moore's Law both predict that these advanced technologies will soon reach a mass scale in developed markets, and quickly thereafter in emerging markets, as has been the case with previous generations of mobile devices.

The opportunity lies in leveraging this widespread adoption and transforming it from a primarily voice-based medium, into an interactive, data intensive platform for real-time personal coordination, collaboration and ultimately logistics-efficient commerce at the individual consumer level. Our hypothesis is that such platform can significantly decrease friction in a) price



information, b) payments, and c) procurement for existing commercial transactions in resource-constrained environments where it is adopted.

III. Research and Development Objectives

1. To study the mechanics of commercial transactions in low-income, high volume markets in general, as well as in a particular geographic location. We'll be analyzing three main variables: a) price information, b) transactions, and c) procurement, all key to decreasing friction in commercial operations of all types
2. To design a next generation mobile logistics platform appropriate to the insights obtained in this study, and to develop it as a collaborative academic endeavor within MIT, with Industry Partnerships, and with local universities in underserved areas
3. To deploy this platform organically in a given test-bed, observing adoption as well as commercial behavior at the individual and group levels, measuring changes in the three main experimental variables
4. To synthesize results into research insights that can be acted on concretely, both academically and commercially

IV. Main Activities

Given the active participation of students from various departments across the Institute, our Initiative's activities are planned in accordance to the MIT academic year. The year of 2011 will be the second year of the m-Logistics Initiative, and the fourth of the NextLab program; we have ample experience running this cycle of activities, having produced 29 projects in 13 countries, and taught almost 150 students from 5 universities. In addition to MIT, we have affiliate labs in Mexico, Trinidad and Tobago, the Philippines, and shortly in Colombia.

The main activities planned for the rest of 2010 and 2011 are the following:

Oct – Dec 2010

- Completion of development (first release) of the m-Logistics platform, as envisioned and designed during 2010; first version of prototype in an Android-Cloud platform
- Drafting of the first version of a white paper on On-Demand Distribution Networks, an original concept currently being developed by the NextLab Program, in collaboration with MIT CTL
- Integration of new Industry Partners and initial collaborations to revise the Initiative's 2011 R&D agenda and the year-long activities that best fit Partner needs and contributions



Jan 2011 (MIT Independent Activities Period)

- Final revisions of R&D agenda and year-long activities; structuring of projects for the Spring NextLab course based on business opportunities identified jointly NextLab-Industry Partners
- Design of summer on-site deployments with our Industry Partners, in their field operations
- Architecture of the next version of the m-Logistics platform, incorporating new modules aligned with the insights and operations of our Industry Partners

Feb – May 2011 (Spring semester)

- Running of the Spring NextLab course live, through distance education video link, and online services platform; scheduling of Industry Partner visits for the semester
- Design and development of the m-Logistics platform
- Annual m-Logistics Event Spring 2010 where all projects are showcased to Industry Partners and the MIT community at large (during last day of class)

Jun 2011

- Preparation for summer pilot deployment in Industry Partners' field operations
- Invitations to employees of Industry Partners for collaborative stays at MIT to work on the Prototype, its Business Case, and the strategies for leveraging MIT's highly developed incubation and entrepreneurship ecosystem to launch Partners project into the real world
- First delivery of NextLab student team Deliverables to Industry Partners (mobile innovation prototype, business case, presentation materials, and online video)

Jul - Aug 2011 (summer)

- Implementation of summer pilot deployment in Industry Partners' field operations
- Research activities to measure and analyze effectiveness of Prototype in the field, and integration of a database with all performance metrics
- Knowledge transfer seminars (re: prototype, business case, pilot deployment, etc.) with Partner's top executives and staff, either at MIT, at Partner's local offices, or videoconference

Sep – Dec 2011 (Fall semester)

- Consolidation of all pilot deployments' databases; individual and aggregate analyses
- Drafting of NextLab Industry Partner Engagement Reports
- Completion of the second release of the m-Logistics platform in the Android-Cloud platform

Jan 2012 (MIT Independent Activities Period)

- Release of latest version of m-Logistics platform for use by Industry Partners
- Official delivery of NextLab Industry Partner Engagement Report
- Possibility of running a month-long custom-made activity at MIT or as an internship at Partners offices or field operations (TBD)



V. Deliverables

Leveraging NextLab's experience in the design and deployment of mobile technologies for resource-constrained environments, in 2010 the MIT m-Logistics Initiative built and tested a set of prototypes that form the basis of a groundbreaking mobile-cloud platform. Initiative deliverables for 2011 are designed to consolidate this platform as a flexible enabler of self-provisioning, low-overhead distribution networks in resource constrained environments. They are:

- A Mobile Innovation Prototype customized to Industry Partners' specific business needs
- A Business Case for the Prototype, emphasizing implementation, scale and profitability for Partner
- A project presentation to be used in the m-Logistics Event Spring 2010 as well as other events in which Industry Partners could present the project
- An online demo video of the Prototype
- An integrated database with all pilot deployment metrics
- Quantitative analysis of each Industry Partner's pilot deployment
- Aggregated quantitative analysis of all pilot deployments
- A NextLab Industry Partner Engagement Report
- The second release of the m-Logistics platform

VI. Industry Partnerships

Industry Partners are an integral part of the m-Logistics Initiative. In 2010, we worked with Estafeta (Mexico's largest courier), Motorola, Google, and Bank of America. During 2011 the m-Logistics Initiative will broaden its partnerships to include consumer-focused companies interested in leveraging mobile phones to reduce the cost of their distribution and retail networks in low-income markets.

Industry Partners of the MIT m-Logistics Initiative for 2011 join by making a two or three year commitment to a mutually agreed contribution to MIT. This includes membership to the MIT Supply Chain Exchange, which provides access to MIT CTL research and reports, and enables interactions with Center faculty, students, and other partner organizations. It also includes access to MIT Global SCALE (Supply Chain And Logistics Excellence) Network, an international alliance of leading edge research and education centers, dedicated to the development and dissemination of



global innovation in supply chain and logistics. SCALE has nodes in North and South America, Europe, and expansion plans into E. Asia and Africa. Members enjoy preferential rates to events, seminars, and executive education courses organized by MIT CTL.

Additionally, Industry Partners will benefit from having one of the modules of the m-Logistics platform branded with their logo and credit (i.e. “sponsored by...”). Their brand and logo will also be included in all mass promotional materials, online properties, and public relations activities launched by the Initiative

VII. Research Team

Jhonatan Rotberg ([contact info: jrotberg@mit.edu](mailto:jrotberg@mit.edu); 617 715-4492; Building E40, room 207)

Rotberg is the founder and the director of MIT's NextLab Program. As a Lecturer at MIT's Engineering Systems Division, he works closely with corporate partners to develop joint MIT-industry programs that spin off high-impact innovation in mobile technologies.

His current focus is on extending engineering systems thinking into the design of mobile platforms that address challenges of global significance. These platforms then become the basis of out-of-the-box innovation within partners' industries, new open-source initiatives, or for-profit startups. A serial entrepreneur, Rotberg is experienced in the original conception and deployment of innovation in communications technologies, and in building commercial ventures in emerging markets. Throughout his career, he has founded and sold various startups in the financial and high-tech sectors.

Rotberg is formerly a Lecturer and the Telmex Visiting Scientist at the MIT Media Lab, where he founded and directed the Next Billion Network. Previous to joining Grupo Carso, Latin America's largest telecoms holding, he spent 7 years in financial consulting and investment banking (Accenture, Baring Securities and Deutsche Bank Securities). A native of Mexico, he is a graduate of Brown University.

Edgar Blanco

Dr. Blanco is a Research Director at the MIT Center for Transportation & Logistics and is the Executive Director of the MIT SCALE Network in Latin America. His current research focus is the design of environmentally efficient supply chains. He also leads research initiatives on supply chain innovations in emerging markets, disruptive mobile technologies in value chains and optimization of humanitarian operations.

Dr. Blanco has over thirteen years of experience in designing and improving logistics and supply chain systems, including the application of operations research techniques, statistical methods, GIS technologies and software solutions to deliver significant savings in business operations. Prior to joining MIT, he was leading the Inventory Optimization practice at Retek (now Oracle Retail). He received his Ph.D. from the School of Industrial and Systems Engineering at the Georgia



Institute of Technology. His educational background includes a B.S. and M.S. in Industrial Engineering from Universidad de los Andes (Bogotá, Colombia) and a M.S. in Operations Research from the Georgia Institute of Technology.

Chris Caplice

Dr. Caplice is the Executive Director for the Center for Transportation & Logistics. In this role he is responsible for the planning and management of the research, education, and corporate outreach for the Center. Prior to this, he served as the Executive Director of the MLOG Program. He is also the founder of the MIT FreightLab - a research initiative that focuses on the way freight transportation is designed, procured, and managed. His primary research is in all aspects of freight transportation to include combinatorial procurement auctions, robust planning, portfolio management, performance metrics, and infrastructure design.

Prior to joining MIT, Dr. Caplice held senior management positions in supply chain consulting, product development, and professional services at several companies including Logistics.com and SABRE. He is also the Chief Scientist for Chainalytics, a leading analytical supply chain consulting firm. In this role he pioneered and leads the Chainalytics Model Based Benchmarking Consortium.

Dr. Caplice received a Ph.D. from MIT in 1996 in Transportation and Logistics Systems. His dissertation on Optimization Based Bidding for transportation was selected as the winner of the Council of Logistics Management (CLM) Doctoral Dissertation Award and received an Honorable Mention in the 1996 Dissertation Award sponsored by the Transportation Science Section of the Institute for Operations Research and the Management Sciences (INFORMS).

Dr. Caplice also served five years in the Army Corps of Engineers, achieving the rank of Captain. His writing has appeared in the Journal of Business Logistics, the International Journal of Logistics Management, and Transportation Research. He obtained a Master of Science in Civil Engineering from the University of Texas at Austin and a Bachelor of Science in Civil Engineering from the Virginia Military Institute (VMI).

Prof. Yossi Sheffi

Prof. Sheffi is a professor of Engineering Systems at the Massachusetts Institute of Technology, where he serves as Director of the MIT Center for Transportation and Logistics. He is an expert in systems optimization; risk analysis and supply chain management and is the author of the bestselling book *The Resilient Enterprise: Overcoming Vulnerability for Competitive Advantage* (MIT Press, 2005).

Under Dr. Sheffi's leadership, the Center has launched many educational, research, and industry/government outreach programs, including the MIT Master of Engineering in Logistics program in 1998 and the MIT-Zaragoza International Logistics Program in Spain in 2003. Outside the institute, Dr. Sheffi has consulted with leading enterprises and founded or co-founded five successful companies: LogiCorp (acquired by Ryder in 1994); PTCG (acquired by Sabre in 1996); e-Chemicals (acquired by AspenTech in 2001); Logistics.com (acquired by Manhattan Associates in 2003), and Syncra Systems (acquired by Retek in 2004).