

Thought Leader Interview: Atefeh Riazi on the Past, Present and Future of MetroCard



By Iver Band
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Background

Atefeh Riazi, currently Assistant Secretary-General and Chief Information Technology Officer at the United Nations, has also led IT at the advertising agency Ogilvy and Mather, the New York City Housing Authority, and the New York City Transit Authority (NYCTA), an agency of the New York State Metropolitan Transportation Authority (MTA). This interview focuses on Ms. Riazi's work at the MTA leading the implementation of MetroCard, a fare collection system that serves 8.5 million daily commuters. MetroCard collects fares on bus and rail transit systems operated by the MTA and other government agencies serving New York City and surrounding counties in New York, New Jersey and Connecticut.

MetroCards are magnetic-stripe cards sold in station booths, vending machines and neighborhood stores, as well as on a roving special-purpose bus and fleet of vans. They are also distributed by employers to their



An obsolete NYCTA metal token.

employees, and by schools to their students. Each time a rider swipes a MetroCard, the turnstile, fare box, or disability gate reads or rewrites its balance on a magnetic stripe, and, within seven hours, sends the transaction to a central database.



Riders can choose from variety of pay-per-ride and unlimited-ride payment schemes, some of which offer discounts.

MetroCard was first implemented in 1993, and fully replaced a fifty-year-old system of metal tokens by 2003. According to the minutes from its February, 2015 board meeting, the MTA plans to introduce contactless payment technology in 2020 that will replace MetroCards by 2022. While no IT system lasts forever, MetroCard offers enduring lessons in the planning and implementation of very large, mission-critical IT projects.

Questions and Answers

EAPJ: Please tell us a bit about your career at the MTA, and how you came to lead the MetroCard project.

AR: I had an amazing sixteen-year career with the MTA. I started as an electrical engineer with the NYCTA, moved to chief of engineering and testing for the fare collection system in 1987, and eventually became the Vice President of the MetroCard department and the CIO. The MetroCard pilot was just starting around 1987 and the team of engineers and designers I had the opportunity to work with were brilliant.

EAPJ: What were the objectives of the MetroCard implementation?

AR: NYCTA was then headed by David Gunn and later Alan Kiepper who were both true innovators and excellent leaders. Both believed in major transformation of NYCTA and truly embraced innovation, technology and modernization.

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Moving to digital cash was something that many other entities had done, so we were frankly behind. Such implementation was not easy as we had to upgrade power and telecom before we could think about digital cash. All systems were over fifty years old including the turnstiles, token booth and money room systems. For a long time, capital investments were not made in the public transit system, especially those portions run by the MTA.

The MetroCard project involved upgrading all these systems along with equipment, buildings, and financial and maintenance capabilities, and performing a major implementation project without impacting the riders. It also required extensive training and change management for thousands of railroad clerks, money room personnel and mechanics. MetroCard drastically changed the NYCTA's structure and it required strong commitment, flexibility and focus from the organization, and true trust on behalf of the riders.

The new medium also required a new sales model. We understood early on that cash sales and management were costly and inefficient, and new sales outlets had to be created. We also needed to make buying a card easy for the bus riders. Therefore, new point-of-sale centers outside the stations were a key part of the new model. Other programs such as online sales, vending machines, credit card purchases, and joint

railroad and subway fares were a key part of the plan. Innovative fare policy options and incentives have helped riders move to monthly and weekly cards, reducing one-time purchases, cutting back lines and reducing costs.

The MetroCard was one of the largest public works projects. Some of the goals of this modernization effort were shifting more people out of their cars and onto public transport, reducing the cost of operations in the face of reduced government subsidies, upgrading fragile systems, reducing fare evasion and fraud, and shortening the long lines that delayed buses and crowded subway stations.

The old system also did not support fare policy changes or provide ridership data for forecasts and decisions on routing and scheduling changes.

EAPJ: What precedents were helpful in planning the project, and what aspects of the project ventured into uncharted territory?

AR: We looked at many other cities such as London, Hong Kong, and Paris, as well as various technologies, to determine the right technology and design for NYC. NYC has one of the largest transport systems in the world and a major infrastructure upgrade requires all the supporting systems to work in harmony. One small problem could delay thousands of riders heading to work and invite severe criticism by the press. Managing such a large initiative while the system was running was complex and challenging.

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Being a New Yorker, anything done to New Yorkers is uncharted territory, due to the scale and unique complexities of the metropolitan area. The MTA moves 8.5 million people a day and we had to make sure the commute was not disrupted. Being the project manager for MetroCard, I learned that New Yorkers may be tough, but they are forgiving. A system this large could not be deployed all at once so some riders were forced to use two fare systems to travel. That was not easy for them.

The project required both the organization and the riders to accept a new fare medium, a new structure and a bit of chaos for a time. The amazing employees of NYCTA and our incredible riders were a key to its adoption and success.

EAPJ: The project involved several agencies within the MTA as well as several external transit agencies and private bus companies. How did you build and maintain alignment among project stakeholders?

AR: There were over a thousand people involved on the project. The external agencies came on after the New York City Transit Authority (NYCTA) was fully deployed, so it was a phased approach. The phased approach helped ensure minimum impact to riders.

There was great partnership with various MTA entities to create joint programs around ticket sales, fare policy initiatives and vending machine designs.

EAPJ: MetroCard is distributed in several different ways, and has an online eFix system for resolving customer issues. How did you determine the diverse needs of MetroCard customers? In what other ways are these needs reflected in the system's features?

AR: Token sales and cash management are very expensive. We wanted our riders to get their MetroCard anywhere and we also wanted a card that did more than get them on a subway. We wanted a card that could be filled automatically with digital cash to be used for a taxi or a sandwich. Tests were done on smart cards that could be issued by a bank so cost of sales and distribution could be shared by many entities and there would be uses beyond public transit.

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We had envisioned moving a good portion of our sales out of the transit network and shifting out of selling, collecting and counting cash. Therefore, we introduced external sale points, mail and online purchases, and joint commuter railroad and transit passes early in the program. Our customers want convenience, including one card in their wallet that does everything. They want their issues resolved quickly and in real time. The foundation of this was set at NYCTA in early nineties. Hopefully, we will move further into digital cash in the coming years where one medium can be used by multiple entities.

EAPJ: MetroCard does not support non-transit purchases today. Why wasn't it implemented initially? Is the technology ready now?

AR: Yes, it does not today, but we tested this concept in 1994 with smart cards. The partnerships with other providers, as well as the point-of-sale devices, for merchants were not ready at that time. Today, mobile technology and digital cash technology will make non-transit purchases a lot easier.

EAPJ: MetroCard is a vast system that must work properly all the time. How did you develop its architecture?

AR: The system is indeed complex. The applications required years of development. All systems are smart and can send status notifications. The applications track sales, usage, and fraud in real time.

It took great minds, wonderful NYCTA employees, incredible partners and vendors and true leadership from senior executives at the NYCTA to design the system and implement it. Years of design and testing went into the system to ensure it is glitch-free. Cubic was the vendor for the system and they did a superb job building the system to meet our requirements. Our engineers were truly brilliant and worked very hard to come up with the architecture.

EAPJ: The MetroCard system was delivered by Cubic Corporation, which went on to implement a very similar system in Chicago. What factors drove the selection of Cubic as a vendor?

AR: Extensive work took place in selection. Both Alta and Cubic systems were tested and both were great companies. Cubic was selected for better meeting requirements. Their system tested well during the pilot.

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EAPJ: How did you manage the cost and quality of the implementation?

We had many oversight groups as well as resident inspectors at the vendor sites testing all systems before they arrived in NY for implementation. The NYCTA president also had daily 7 a.m. meetings to go over the system deployment, including bugs and glitches. That type of leadership, with strong oversight from AT Kearney [a consulting firm that was owned by EDS from 1995-2005], and solid QA [quality assurance] was critical for good deployment.

EAPJ: To what extent have the objectives of MetroCard been fulfilled?

AR: I believe the objectives of MetroCard were met within three years: moving people out of cars to public transit, reduction in costs, reduction in fare evasion, increased revenue, convenience and flexibility in managing fare policy, and most of all, improved customer service.

EAPJ: What opportunities are there for the next-generation contactless system?

AR: The biggest opportunity is for transit companies to accept other cards and modes of payment for use on subways and buses, and to completely get out of ticketing business.

EAPJ: What lessons does MetroCard offer on planning and implementing complex IT projects?

AR: Large capital projects need funding and that is heavily dependent on the political administration believing in rebuilding the country. Unfortunately, much of the country's Infrastructure, from housing to roads, bridges, and public transport have suffered from lack of capital investments. Second, these projects must be done through joint public- private partnerships where both sectors benefit from improving the social fabric of the cities and the country. Third, large capital projects need strong visionary leaders who take risk and believe in transformation and customer service. Fourth, a strong committed and passionate team is necessary. One like the team that I had the honor to work with, the MetroCard team. Fifth, the team must embrace disruption and change. Change starts well, but very soon as the old way of working breaks apart; it loses its momentum. Managing and leading change is critical in any large transformational work. It is never about the technology. It is always about the citizens, the customers and the employees.

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EAPJ: How did you know the old way of working was breaking apart at the MTA?

AR: The high cost of operation, fare evasion and automation; the lack of flexibility in fare policy; and the lack of information about fare operations indicated that the time for change had come, and new innovation was needed.

EAPJ: What other barriers to change did you encounter at the MTA? What did you do about them?

AR: Change barriers are the same in any entity. As the old ways of working break apart, power shifts within the organization. There is learning anxiety about the new technology. Automation reduces layers and processes and it ultimately impacts people. The organization managed this well through communications, training and change management.

EAPJ: How should government work with the private sector on complex projects

involving new technology and business processes?

AR: There is a role for the private sector to contribute to the essential city infrastructures, especially with advancements in technology and automation. Without such partnerships, much of the infrastructure that the private sector depends on will decay, and eventually have a severe impact on the society at large.

About the Interviewer

Iver Band is a practicing enterprise architect and a developer and communicator of enterprise architecture standards and methods. At Cambia Health Solutions, a health insurer and direct health solutions company, he leads a team of architects focused on digital customer experiences. Iver also serves as Director of Enterprise and Solution Architecture for EA Principals, a training and consulting firm, for which he works with clients, develops curriculum materials, and edits EAPJ.org. Iver represents EA Principals in the Open Group, where he is the elected Vice Chair of The ArchiMate Forum.