Executive Summary

We perform a careful analysis of boarding techniques currently practiced in the airline industry, as well as a novel technique not currently in use. The boarding techniques we examine during our study include several variations of a Back-to-Front (passengers with seats towards the back of the plane board first and passengers with seats near the front board last), Outside-In (passengers board window seats first, aisle seats last), Random Assignment (passengers board the plane as they wish and sit in their ticket assigned seat), and a new process we have titled Roller Coaster for its resemblance to the process of boarding similarly named theme park rides. Using computer simulations, we calculate the average amount of time required to board planes of varying sizes and configurations under these different boarding plans. To accurately model the different sizes and shapes of the interior of the planes, we use an Airbus 320 to represent small aircraft, a Boeing 747 to represent midsized aircraft, and an alternate configuration of the Boeing 747 to represent large aircraft.

In our simulations, the Roller Coaster boarding method performs the best and its implementation should be investigated. Our Roller Coaster boarding method works well because the passengers are put in order before they step onto the plane. The Roller Coaster method essentially modifies the Outside-In boarding method. The passengers line up before they board the plane and board the plane by letter group. Passengers will then avoid boarding interferences.

We estimate that with this boarding method, airlines will be able to board smaller planes (162 passengers) in approximately 3 ½ minutes, midsized (288 passengers) planes in approximately 5 ¾ minutes, and large planes (550 passengers) in approximately 10 ½ minutes. These time estimates are only the amount of time it takes to move passengers onto the plane; they are not reflective of the time it takes to order passengers into rollercoaster-type lines before boarding. Because putting passengers into an order takes time, the next step would be to investigate exactly how many resources we would have to devote to implement this plan (e.g., metal bars or chains similar to those used at amusement parks to guide lines). If the ordering process takes a significant amount of time, it may be undesirable to ask passengers to arrive at the gate earlier, or to wait until everyone is in the rollercoaster line before boarding. If both of these results prove cost-effective, we highly recommend using the Roller Coaster method for every different sized plane.

When considering the deboarding process, we consider the common practice in today’s airplanes, which is to allow passengers to deboard at their convenience. Typically passengers are very anxious to get off of the plane. The very moment (or sometimes even slightly before) passengers are given the OK from the pilot and flight crew, they are already unbuckled and ready to start deboarding. It would be a poor customer relations move to even try to tell passengers to sit still and wait for other passengers to get off of the plane first. Further, previous studies have shown that it is generally the boarding process which acts as the primary constraint in decreasing plane turnaround time. Airlines must be seen to be supportive of passenger comfort. Passengers should believe that the airline is there for them and will observe their needs. We do not want to give anyone the feeling of being rushed. From both a customer service perspective and a practicality perspective, our best option regarding deboarding methods is to allow to the passengers to exit the airplane as they please.
Alternatively, should the Roller Coaster method prove unfavorable after research, the Random Assignment and Outside-In seating methods for boarding had the next two fastest times. The amount of time estimated to board the plane with a Random Assignment boarding system is only very slightly faster than the Outside-In boarding system for small and medium planes, while the Outside-In boarding method proved to be the fastest for loading large planes.

Based on our research and customer service knowledge, the optimal policy for the airline is to research the cost and time aspects of Roller Coaster method, and if research proves favorable invoke the Roller Coaster boarding method.