**Q:** How do you define the velocity in congestion situations? (Allan)

**Key Words:** Velocity, Congestion Situations

**A:** We would define that equals to infinity, but we defined congestion state to solve the problem.

**Q:** What do the types of variables mean? (Lyra)

**Key Words:** Types of Variables

**A:** Constant A refers to the static constants that reflect properties of the model; Constant B refers to the variables solely dependent on an aircraft or a strategy; Variables describe properties of passengers, and will vary in accordance with different initial sequences of passengers.

**Q:** Who are backup passengers in your multi-aisle model? Raymond

**Key Words:** Backup Passengers, Multi-Aisle

**A:** Backup passengers are designed to prevent the empty cells caused by seated inner-group passengers from occuring, because they can fill in the blocks soon afterwards and thus ensure the parallelity and efficiency. They are inner-group passengers who board straight after some outer-group passengers.

**Q:** Could you please explain velocity? (Allan)

**Key Words:** Velocity

**A:** (R1) When we consider that the velocity in a specific cell remains constant, then the velocities can be seen as points on the continuous velocity function, as shown on the graph. Considering that the cell is relatively short, there wouldn't be much inaccuracy, thus the assumption is plausible.

**Q:** Why do you take visibility range ? (Raymond)

**Key Words:** Visibility Range, Not in SA

**A:** (R2) We take as the visibility range of passengers. The first reason is that is realistic. And the second is that we need to make sure the time spent in a cell contains interget time steps. So a second should contain at least time steps. If taken as , the basic time step can be taken as , simplifying our calculating procedures.

**Q:** What’s the use of using matrixes to describe passenger states? (Allan)

**Key Words:** Matrix, Passenger States

**A:** (R3) We use matrixes to describe the states of passengers. This is because it can mathematically describe the originally abstract states into the simple three matrixes, making the model easier to understand and the calculation simpler. Besides this, we used a constant transforming matrix to calculate the state matrixes according to the pre-existing ones, ensuring the linearity.

**Q:** What did you do to simplify your model? (Allan)

**Key Words:** Model Simplification

**A:** (R4) We conducted some improvements on our model to make it direct and clear. First, we used multiple variables to describe our model, which prevented interference of irrelevant numeric coefficients. We also avoided excessive intermediate variables with algebraic simplifications in our model. For example, in the final conclusive equation, constants are adopted to replace those invariant values with respect to a specific type of aircraft. Finally, this part lays the foundation for the linear properties that will be extensively utilized in the future.

**Q:** Why is the mathematical part/simplification so important in your model? (Allan)

**Key Words:** Mathematical Part, Simplification, Importance

**A:** (R5) The main work in our first model is mathematical deduction. Indeed, there are multiple purposes for putting emphasis on this part. First, by describing the different situations using formulas, we can make our model accurate and variable-based, which is very important in the modelling process. Also, optimization will also be aided with simple formulas rather than complex computer-based processes. Therefore, we are convinced to say that this deduction process plays a vital role in our model.

**Q:** Why is the calculation of like that? (Raymond)

**Key Words:** Calculation of , Matrix

**A:** (R6) For the calculation of , or number of time steps that passengers are moving, according to the definition of the matrix , we only need to accumulate the elements, thus the formula is correct. This formula can ensure the linearity.

**Q:** Why did you introduce parallelity? (Eason)

**Key Words:** Parallelity

**A:** (R7) Instead of being a concept that just appeared out of nowhere, parallelity has sound foundations which are mainly aided by the linearity of the previous calculations after algebraic simplifications. It also ensures its equivalence with the original time-minimizing task. We know that equivalent conversions are usually made to alter the problem’s external modality but maintain its inherent structure with equivalence, and that’s exactly what parallelity does. It converts the complex multi-variable formula of total time into a simple univariate optimization of parallelity, which significantly eases the burden of exhaustively searching all the cases.

**Q:** What’s the best disembarking strategy? (How is disembarking similar to boarding?) (Raymond)

**Key Words:** Disembarking, Similarity to Boarding

**A:** (R8) In our presentation, we’ve already introduced two aspects of *optimal* – the dissatisfaction index and parallelity. Coincidentally, disembarking can meet both requirements at the same time. We used the adjustment method to achieve this, keeping parallelity at the optimum. Since the first two factors of dissatisfaction remain constant for any optimal scheme for time, we only need to minimize the standard variance of the boarding time of same-row passengers. In the end, we got the optimal disembarking scheme as shown before.

**Q:** Why do you take 1, 250 and 10 as the weights? (Raymond)

**Key Words:** Satisfactory Index, 1, 250 and 10, Not in SA

**A:** (R9) When defining the total dissatisfaction index, we consider three factors: queueing, offering seats and same-row passengers separation. The third factor is that some family or fellow passengers may be split. 1 is for standardization and the other two are to unite the magnitudes and importance, preventing the total index from tending to one of them, thus making the ultimate dissatisfaction index of all passengers linear and plausible.

**Q:** How did you conduct SA? (Eason)

**Key Words:** SA General

**A:** (R10) When analyzing the sensitivity of each plan, we innovatively used goodness of fit as an index, as it can reflect the regularity of the data and thus show the sensitivity. (R11) When generating the data of discompliance index, we used the Sigmoid Model. We use the sigmoid model because it’s commonly used in statistics and its usage can be determined by nature of function. (R12) The result is that Random is far more sensitive than the other two strategies when measuring standard variance and timestep. (R13) When considering the overall time and average, the result is similar. (R14) For queue jumping, we found that both Methods are Sensitive which makes a Big Impact on Total Results, as shown on the graph, the points are irregularly distributed. (R15) In terms of passenger reduction, random boarding is the most sensitive (with furthest distribution of points) while back-to-front is not so sensitive.

**Q:** How did you apply the model to TETA and FW? (Raymond)

**Key Words:** Section Division, TETA, FW

**A:** (R16) For multi-aisle aircrafts as TETA and Flying Wing, we decide to divide them into smaller parts similar to the ordinary one-aisle aircraft because we want to unify our models. To be specific, we divide these aircrafts into smaller blocks according to aisles the seats are near. This is plausible because these aisles don’t intersect with each other, thus passengers in different blocks wouldn’t disturb each other. And for the optimal strategy, it’s obvious that we need to ensure both the efficiency of in-group boarding and between-group sequences. As a result, our work can be reduced to finding a best between-group sequence, as we can use the strategy shown before when deciding in-group sequences.