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Post-sale Asset Marketplace:
The math behind going from concept to core

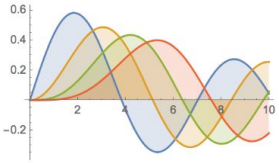
Agifors RM SG Meeting
May 2019

The reason behind it

The airline industry is not immune to errors and randomness factors

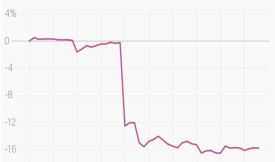
- Changes in PAX behaviour
- New competitors

Error



- Weather conditions
- Irregular operations
- Natural disasters

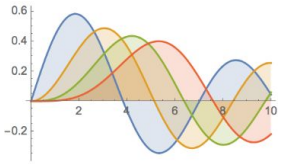
Randomness



The reason behind it

Complex interactions of processes and systems arise to reduce impact

Error



- ➔ Analytics tools
- ➔ Tactical actions

Randomness

- ➔ Compensations
- ➔ Spare aircrafts
- ➔ Itinerary buffers

The reason behind it

Expensive consequences still come out for airlines in three major forms

High-yield spillage

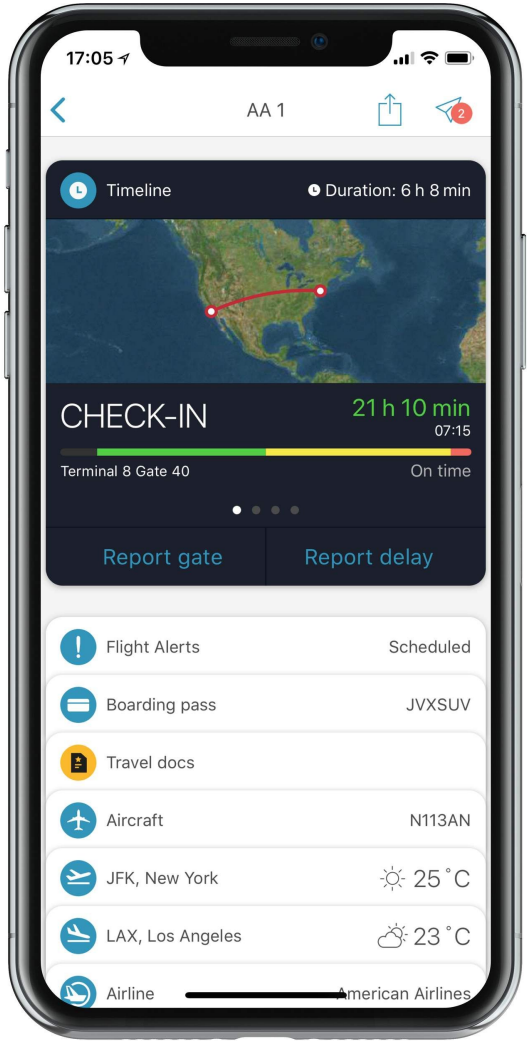
Spoilage

Denied Boarding

New opportunities have arisen

The way we consume has changed rapidly over the past ten years

- Intense use of technology
- Different customer’s expectations
- Personalized experience



Post-sale optimization

How to reduce revenue losses while improving customer experience

Ex-post reoptimization approach allows airlines to:

- Know who their customers are
- Calculate the value of the marketplace of utilized and non-utilized assets
- Optimize assets distribution and offer composition
- Execute automatically and personalized

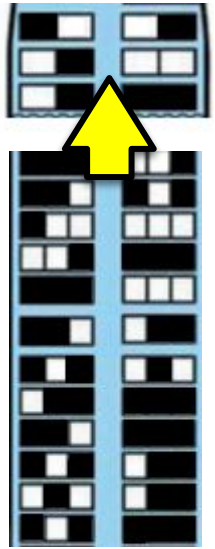
Post-sale optimization

Several options exist in non-optimal scenarios prior to departure

Upgrade

PREMIUM

ECONOMY



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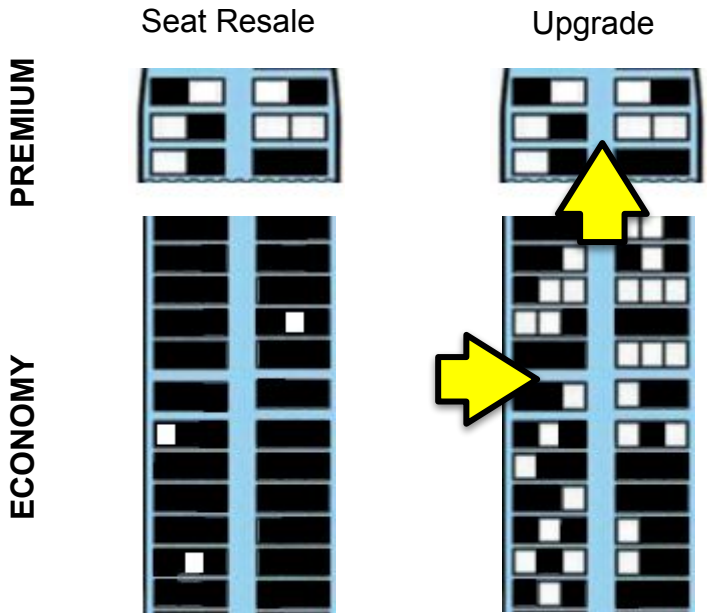

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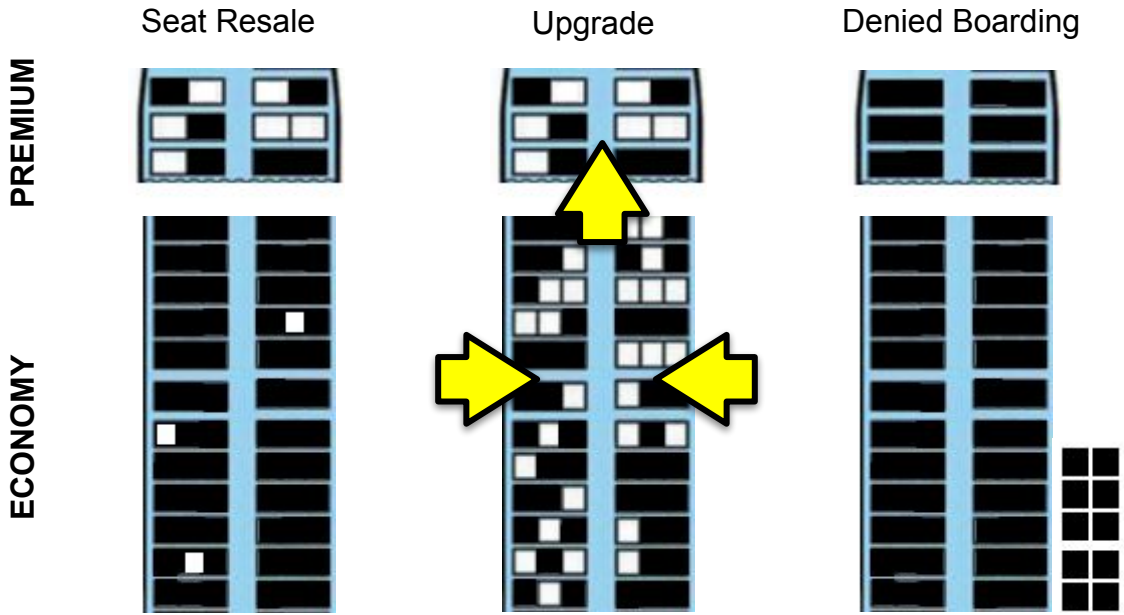

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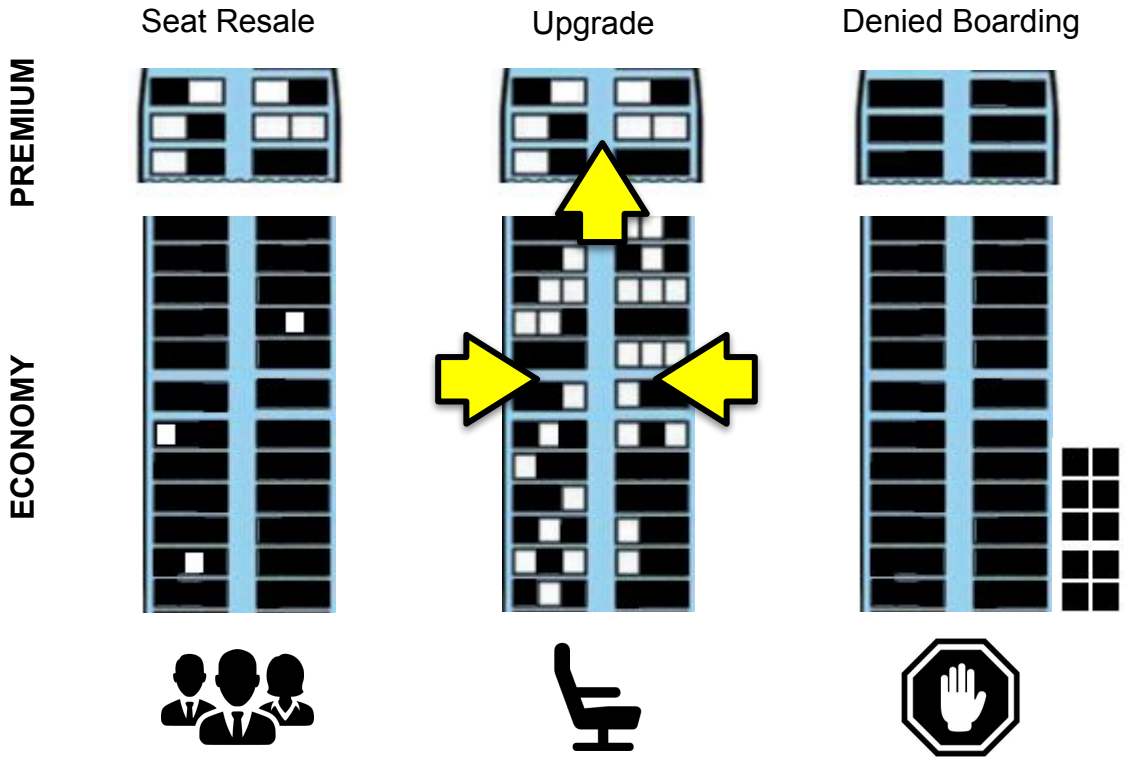

Post-sale optimization

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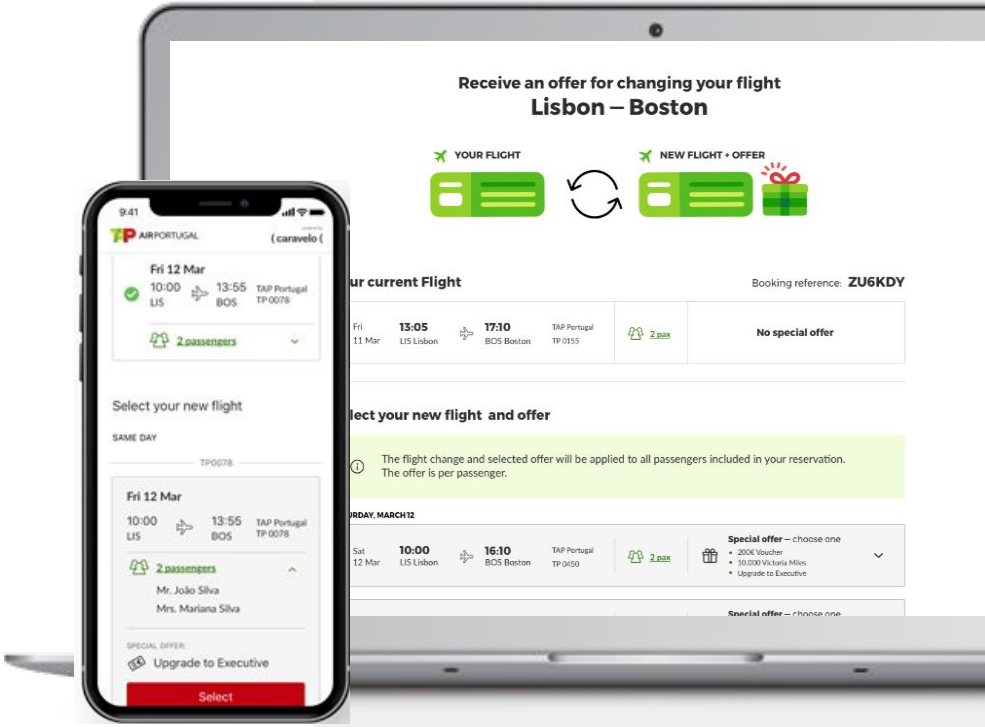
We took action with airline partners most willing to adapt and thrive

ALISEO platform was created to:

- Increase **efficiency**
- Boost **revenues**
- Delight **passengers**



Post-sale optimization

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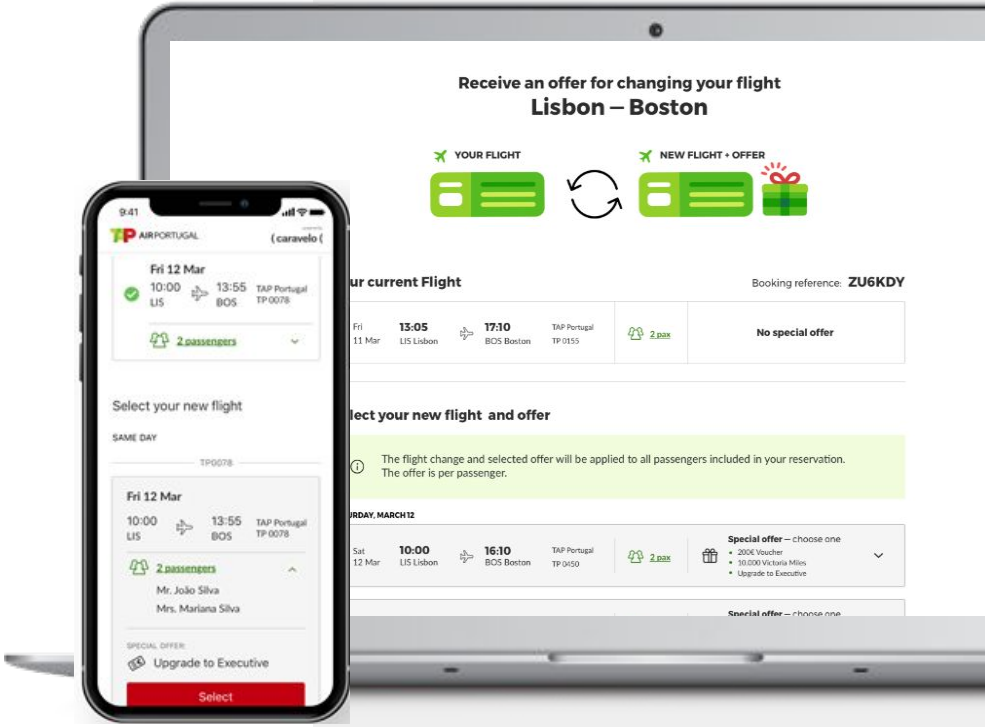
And it performs with elegance:

- Full integration
- Automated execution
- Console for rules management
- Omni-channel experience



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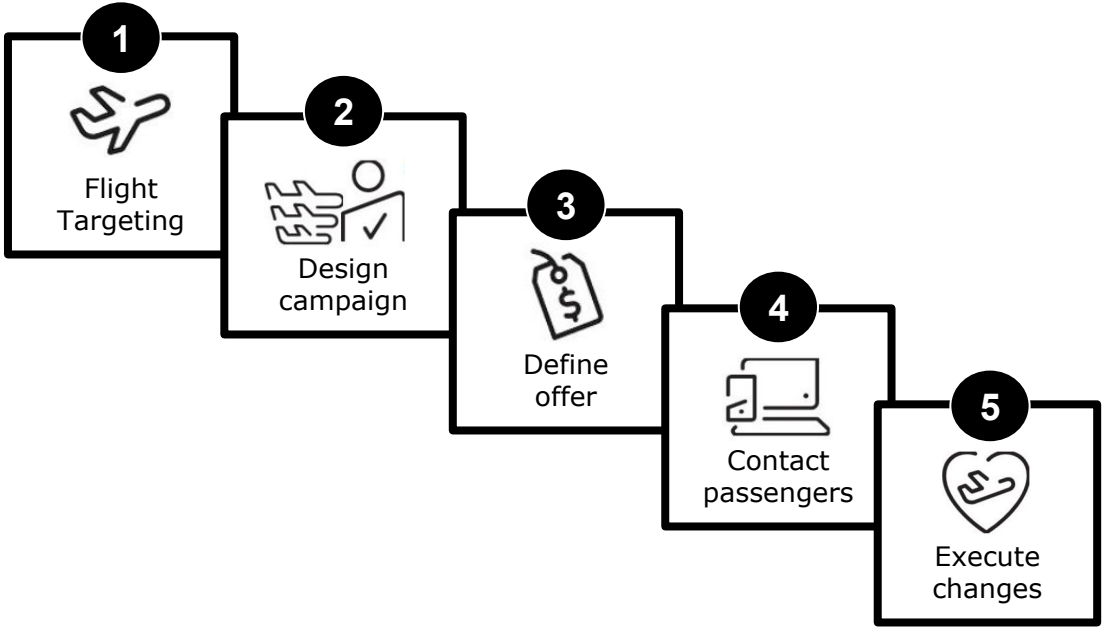

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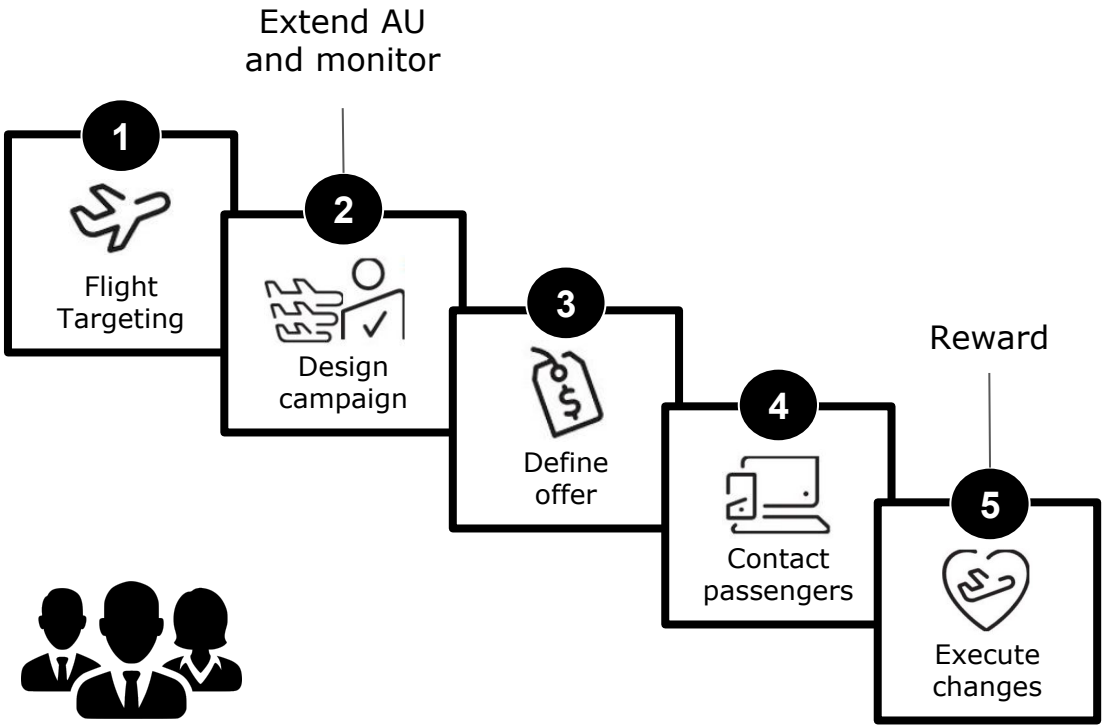

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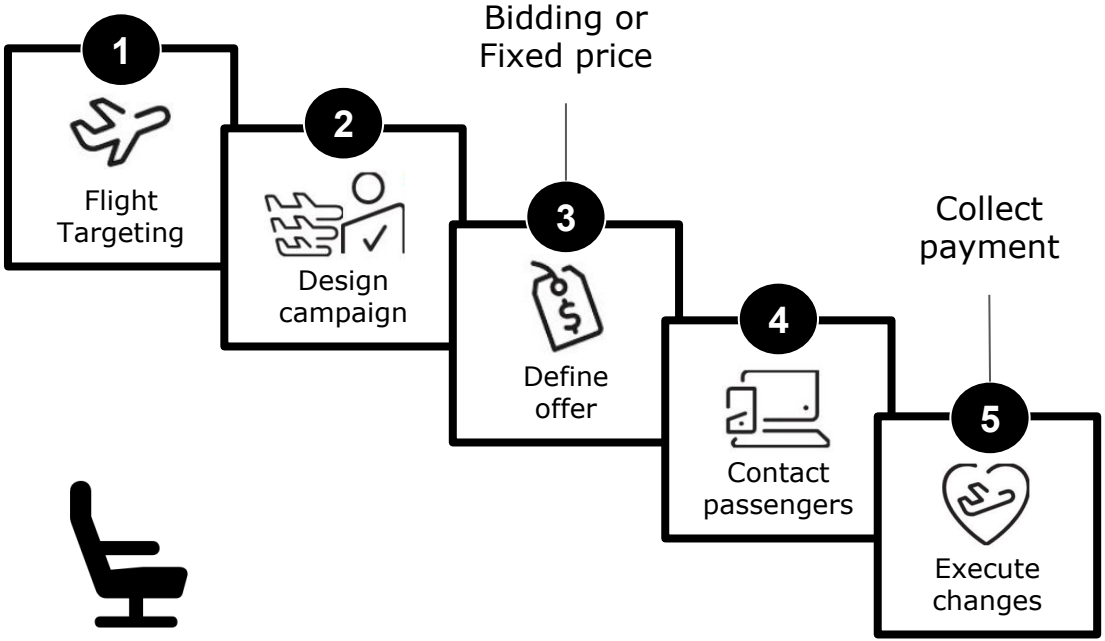

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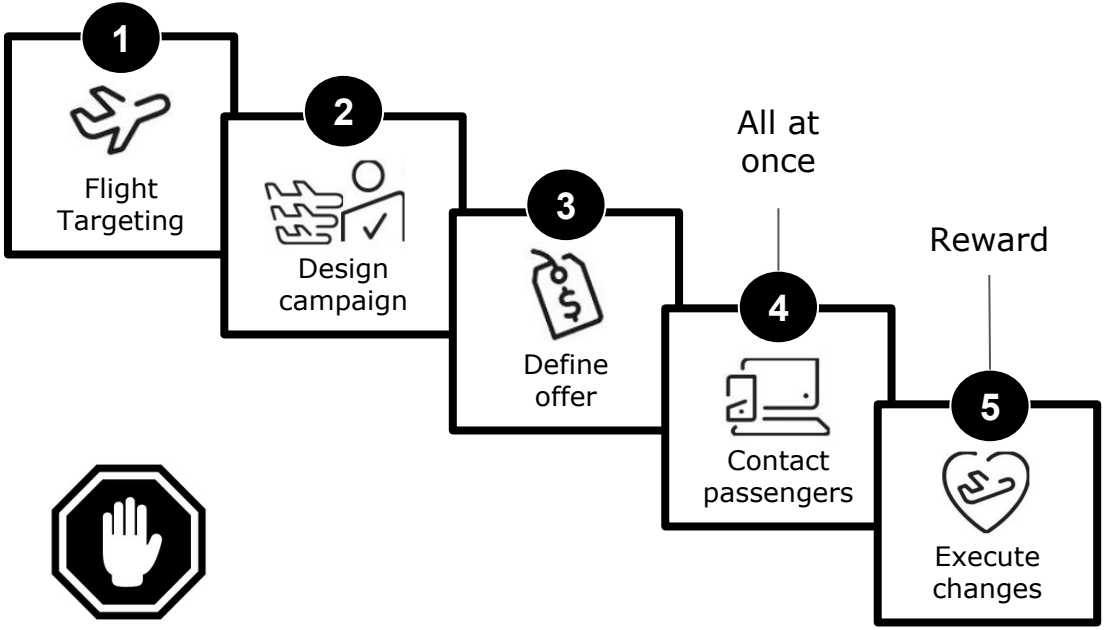


The “Change your Flight” Model

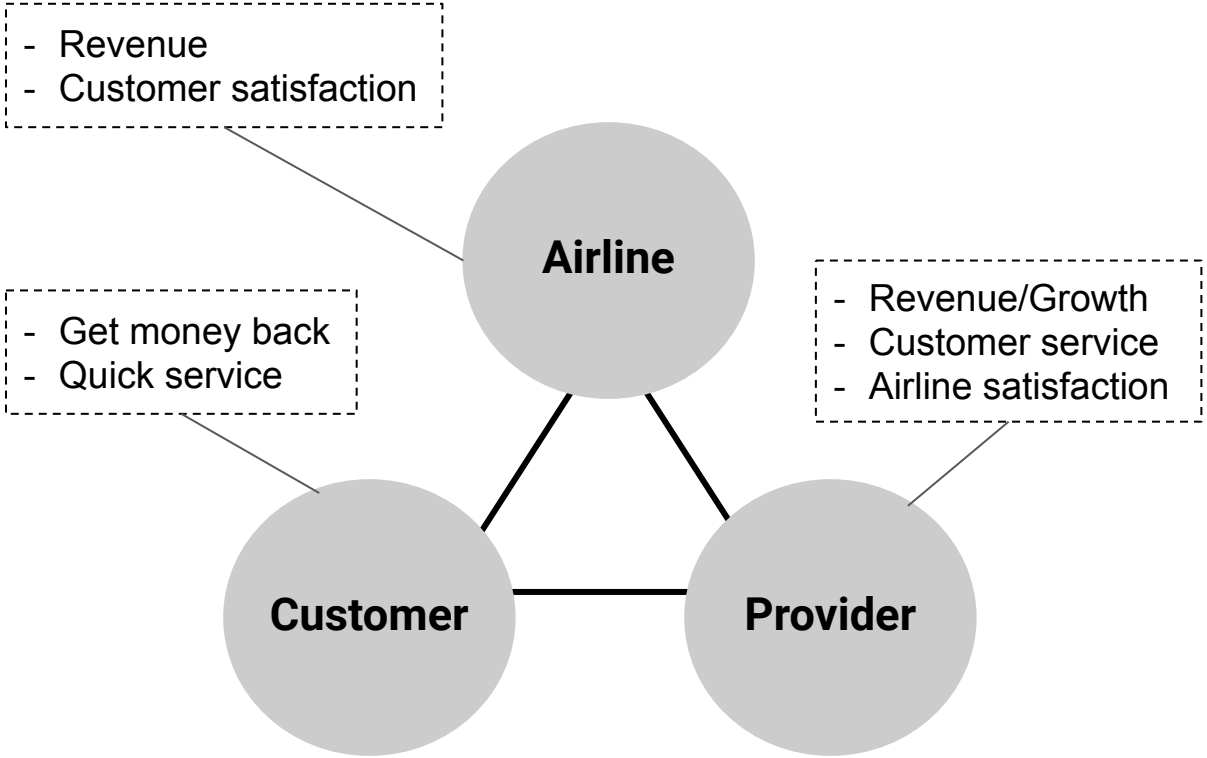
In 2012, Professor Talluri developed our model of “Change your Flight”

- The model covers the operation of the marketplace for couponing customers who bought a ticket but are not able to travel
- The coupons are redeemed for a future flight at the customer’s convenience

Kalyan Talluri
Professor of Operations Management
Director, MSc in Business Analytics

The “Change your Flight” Model

The model considers three players with different objectives



The “Change your Flight” Model

A single multi-objective model behind three modules

- Includes optimization, bid-clearance and recommendation modules
- Satisfy all three parties
- Revenue goals for the airline and provider are similar
  - Revenue sharing agreement
- Customer has a conflicting objective
  - The more he gets back, the happier he feels

From the customer perspective

- Fare paid by customer is sunk cost
  - We consider only the bid as his expectation for recovery
- Other aspects that add to customer satisfaction are not included, as they are assumed to be always optimized
  - Speed of response
  - Design of website, etc.

From the airline perspective

- Airline’s objectives are:
  - Maximize recapture revenue
  - Reduce overbooking risk and increase overbooked revenue

From the provider perspective

- Provider’s objectives are:
  - Maximize revenues on a sharing agreement basis
    - Percentage of the (Future Fare – Coupon Value)
    - Percentage of the benefits associated with overbooking revenue
  - Increase customer satisfaction
    - Adds to word-of-mouth
    - Growth

Overbooking revenue model

- If overbooking limit is *C*, we model the benefit to overbooking as:
  - 0 if the flight does not touch overbooking limit
  - Fare of the Cth customer if it touches the overbooking limit
- Assumptions:
  - Airline does not change its overbooking policy
  - This extra customer was booked solely because of the couponing process

Calculating value

- *F* represents the future fare
- *V* represents the coupon value
- *D* represents demand to come
- *C* is the remaining overbooked capacity
- *r* is the revenue share agreement percentage
- *p* is the probability of the customer to redeem his coupon
  - Estimated based on redemption history
- *q* is the probability that a customer who wants to travel takes our airline
  - Model assumes that if I give a coupon, airline will capture this customer with probability 1 instead of *q*

Estimating value

- Customer’s benefits are:
  - Revenue = $p \times min\{F, V\}$
  - If he travels, he gets a discount of V, or F if F < V
- Airline’s marginal benefits are:
  - Overbooking = $r \times E[F] \times Prob[D > C]$
  - Recapture = $r \times p \times max\{0, F-V\} - p \times q \times F$
- Provider’s benefits are:
  - Overbooking = $(1-r) \times E[F] \times Prob[D > C]$
  - Recapture = $(1-r) \times p \times max\{0, F-V\}$

Total benefit

- The total benefit from issuing a coupon of V is:

  $w_c \times$ *Customer Benefit* $+ w_a \times$ *Airline Benefit* $+ w_{cvo} \times$ *CVO Benefit*

  where weights w_c, w_a, w_{cvo} can be adjusted dynamically to meet a defined target
  - The sum of the weights is 1
  - If we are below target, we increase w_c and if we are above target, we decrease w_c
- V^{max} is calculated as the maximum acceptable coupon given the distribution of the future fares
  - Maximum value of V such that $E_F[TotalBenefit] > 0$

Clearing model

- The customer bids *B*
- For *S* as the set of active bids at the moment:
  - If |S| = 1 and V^{max} > B, accept the bid
  - If |S| = 1 and V^{max} < B, wait (based on time-to-decision rules) and either reject the bid or offer again
  - If |S| > 1, sort by V^{max} – B in decreasing order. Start with the highest customer
  - If a customer accepts, recalculate all V^{max} for the remaining customers in *S*, as the values depend on *C* which has increased by 1 now. Repeat the process.

Make it work.

Then make it better

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