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Would airspace users accept potential delays or reroutings for a discount in route charges? Results of a stated preferences survey

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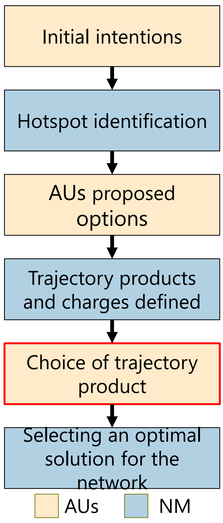
Introduction

1. The proactive involvement of AUs in the ATFCM process would allow them more flexibility to adapt the operations in a more cost/efficient manner and in line with their business-driven schedule priorities.
2. The CADENZA project developed a new concept of operations that modifies the current responsibilities of the main ATFCM stakeholders and the charging scheme.
3. The NM offers a discount on the ANSP charges if an AUs agrees ex ante that a specific flight might be delayed or re-routed within certain margins if this is beneficial from a network perspective.
4. The larger the margins, the higher the discount. However, the NM will only impose the minimum delay or re-routing that is necessary for achieving the network optimum.
5. In order to better understand the determinants of AUs when deciding on trajectory products, and as an input to a choice model, the authors performed a stated preference study.

Framework



Choice model

- It consists of a multinomial logit choice-model based on the cost of each trajectory and on the assumption that the AUs will probably choose the option that minimises the expected sum of charges and potential delay/rerouting costs.
- We assume that AUs would use the quoted charges of trajectory products as signals on the likelihood of being displaced from the initial trajectory:

$$C^z(A^z) = C_{k_0} + \left(1 - \frac{A^z}{A^{z_0}}\right)\left[C^{max}(z) - C_{k_0}\right] + A^z$$

where A^z are the route charges of the trajecotry product z, A^{z_0} are the route charges of the initial trajectory, $C^{max}(z)$ is the cost of the most expensive trajectory in the trajectory product z (without route charges) and C_{k_0} is the cost of the preferred trajectory.

- Each trajectory product will be associated with a probability of being selected:

$$p_z = \frac{e^{u_z}}{\sum_{z'} e^{u^{z'}}}$$

where the utility u_z is defined as:

$$u_z = -C^z(A^z) \cdot \beta$$

- β is a calibration parameter which allows to properly model different AU

Survey design

*The first sub-scenario is defined as:

Time of the day	Critical connections	Crew duty
Morning	No	No

	TP1 (preferred trajectory with no delay)	TP2 (short delay or alternative routing)	TP3 (delays up to 15 minutes)	TP4 (delays up to 30 minutes)
Small discount regime (TP1: 0% / TP2: 5% / TP3: 10% / TP4: 20%)	○	○	○	○
Medium discount regime (TP1: 0% / TP2: 10% / TP3: 20% / TP4: 30%)	○	○	○	○
Large discount regime (TP1: 0% / TP2: 20% / TP3: 30% / TP4: 40%)	○	○	○	○

Results

- The survey was initially distributed to more than 20 organisations
- 16 response from 13 different airlines were collected.

Full Service Carriers – Inbound flight to a hub scenario

	Time: Morning Critical con: No Crew Duty: No	Time: Morning Critical con: Yes Crew Duty: No	Time: Evening Critical con: No Crew Duty: No	Time: Evening Critical con: Yes Crew Duty: No	Time: Evening Critical con: No Crew Duty: Yes	Time: Evening Critical con: Yes Crew Duty: Yes
Small discount regime	TP1 / TP2	TP1	TP1 / TP2 / TP3	TP1	TP1 / TP2	TP1
Medium discount regime	TP1 / TP2 / TP3	TP1 / TP2	TP2 / TP3 / TP4	TP1 / TP2	TP1 / TP3	TP1 / TP2
Large discount regime	TP1 / TP2 / TP3	TP1 / TP2 / TP3	TP2 / TP3 / TP4	TP1 / TP2 / TP3 / TP4	TP1 / TP2 / TP3	TP1 / TP2

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