

Developing a decision-support-tool for an air taxi service in Western Europe

Research proposal



Presentation GARS Conference

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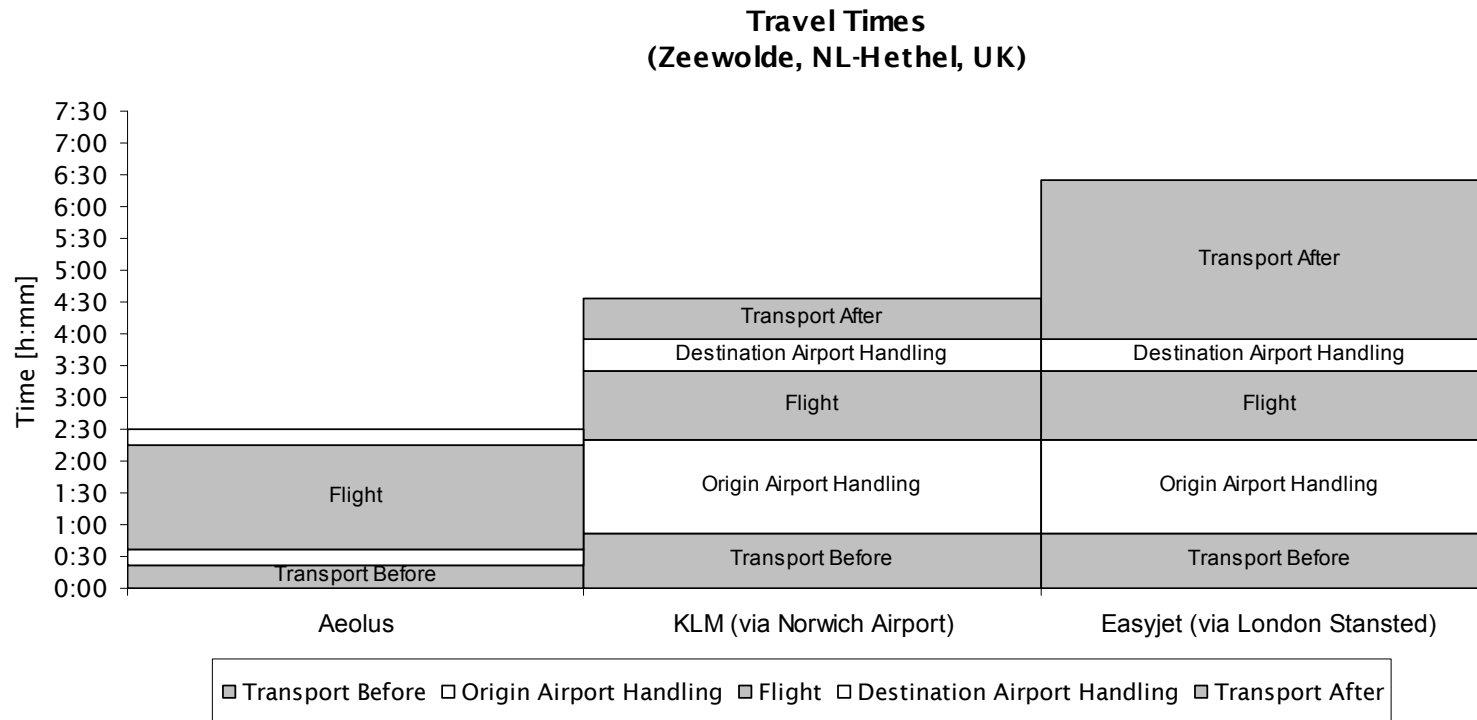
- Introduction
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Introduction

- Business traveler demands efficient flying
 - Difficult due to:
 - *Strict security measurements at airports*
 - *Congestion on the road*
- Aeolus Aviation's solution
 - *Air taxi service*
 - *Focus not on luxury*
 - *Market = middle management costing 150/200 euro/hour*
 - *More focus on costs and travel time*
 - *Improvement of time-efficiency*
 - *Matching demand and capacity*

Introduction

Compared with a KLM flight Aeolus Aviation saves approximately 2 hours of total travel time to Hethel Airport !!



Air taxi service

Definition: Low fare, on demand, point to point, business aviation for distances from 100 – 1000 km

SWOT- analysis

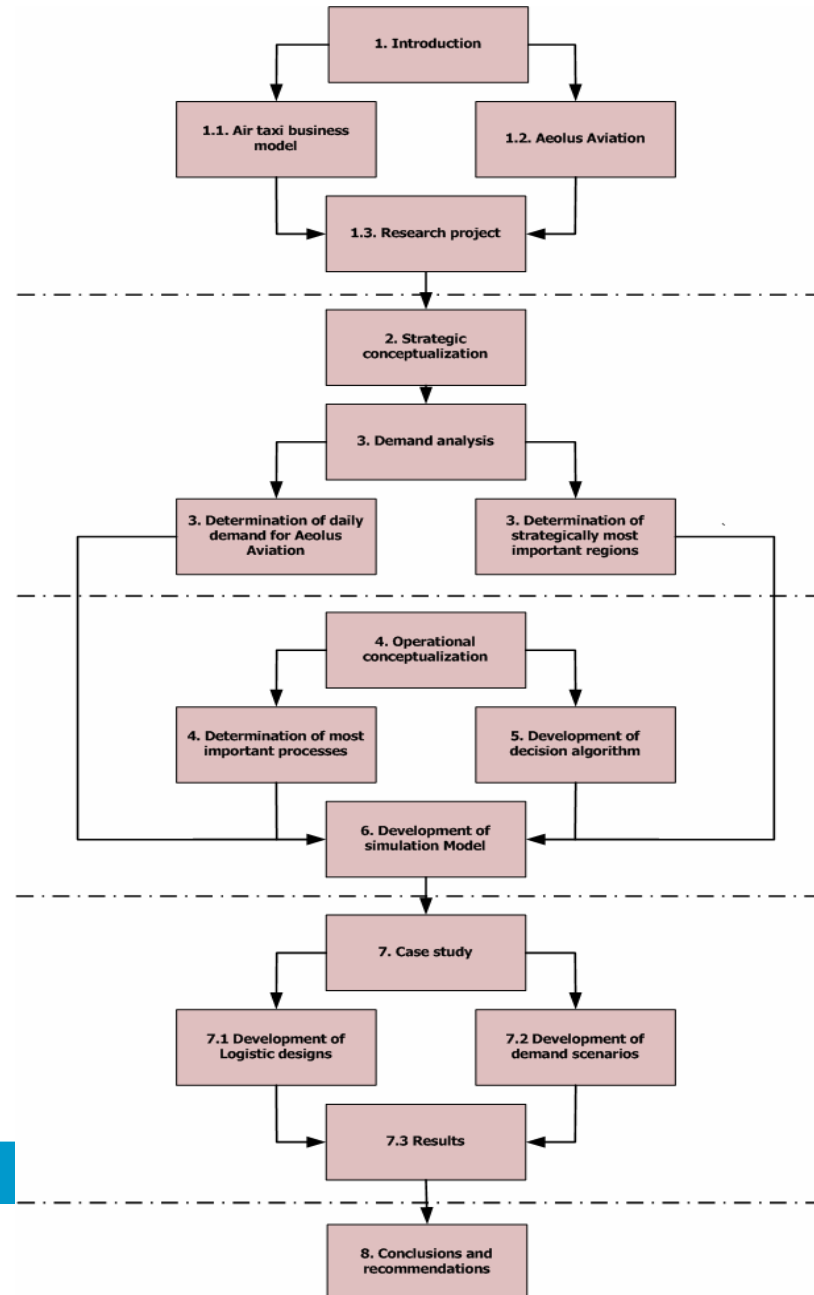
Strengths	Opportunities
Efficient and lower travel time	Lower price for customer
Reliable for customer	Increased airport congestion
Personalized transport	Increased road congestion
	Decreasing strictness regulations
Weaknesses	Threats
Complexity for Aeolus	Congestion in the air
Higher price than scheduled service	Safety problems
Depending on weather/ daylight	Entrance in market of air taxi services by large scheduled airlines
	Forecasted scarcity of pilots

Research project

- Research objectives:
 - *Analyzing the air taxi service of Aeolus Aviation on strategic level*
 - *Developing a tool to analyze logistic concepts of the air taxi service*
 - *Developing a suitable logistic concept for the air taxi service of Aeolus Aviation*
- Main research question:

What decision support tool can be developed to strategically analyze logistic designs of the air taxi service of Aeolus Aviation, taking into account the costs and revenues of air taxi operations?

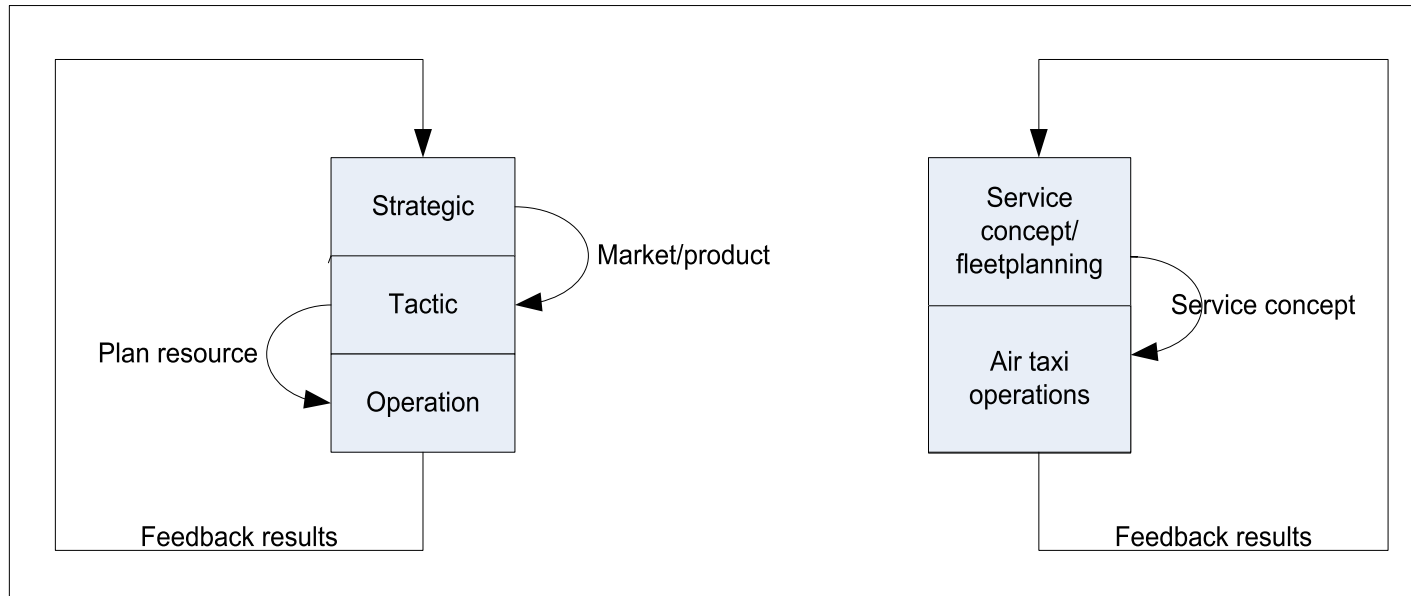
Research approach



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Complexity of air taxi service



No schedule during air taxi service results in two levels:

- Strategic level
- Operational level

Complexity of air taxi service

Strategic complexity

- Demand for air taxi flights of Aeolus Aviation
 - > Based on;
 - *Type of potential customers*
 - *Origin and destination of these potential customers*
 - *GDP of Regions*
 - *Existing routes with highest amount of travelers in Western Europe*
 - *Competition*
 - *Other air taxi companies*
 - *Other airlines*
 - *Other modalities*

Complexity of air taxi service

Strategic complexity

- Service concepts
 - Set of regions and the transport service between these regions
 - > different possibilities, for example
 - *Shuttle service between the regions with highest demand*
 - *Servicing all regions with one or more bases*
 - ***Limiting costs and maximizing revenue***
- Determine price of tickets
 - > different possibilities
 - *Activity based costing*
 - *Fixed costs per hour*

Complexity of air taxi service

Operational complexity

- Crew scheduling
 - > Important:
 - *Amount of hours a pilot is allowed to fly*
 - *Rest periods of pilots*
 - *Home base(s) of pilots*
 - **Limiting costs**
- Fleet of the air taxi of Aeolus Aviation
 - > Important:
 - *Type of aircrafts with specifications (range, speed)*
 - *Amount of aircrafts*
 - *MRO base(s) of the fleet of Aeolus Aviation*
 - **Limiting costs**

Complexity of air taxi service

Operational complexity

- Maintenance scheduling
 - > Important:
 - *Type of aircraft (prop or jet)*
 - *Amount of hours an aircraft has flown*
- Direct operating costs
 - > Important:
 - *Crew costs, based on flight hours*
 - *Aircraft costs;*
 - *Acquisition costs*
 - *Depreciation costs*
 - *Insurance costs*
 - *Fuel costs*
 - *Airport fees*
 - *Third party fees (when door to door service)*

Demand analysis

Analysis of air taxi service on strategic level

- *Defined the environment*
- *Defined 10 regions based on*
 - *GDP*
 - *# scheduled flights*
 - *# business flights*
 - *Questionnaire*
 - *Within operating area*
 - *Accessibility of region by other modes*
 - *Distance to other regions*
- *Focus: Western Europe with a range of 1000 km*
- > *10 regions are input for the simulation tool*

Demand analysis

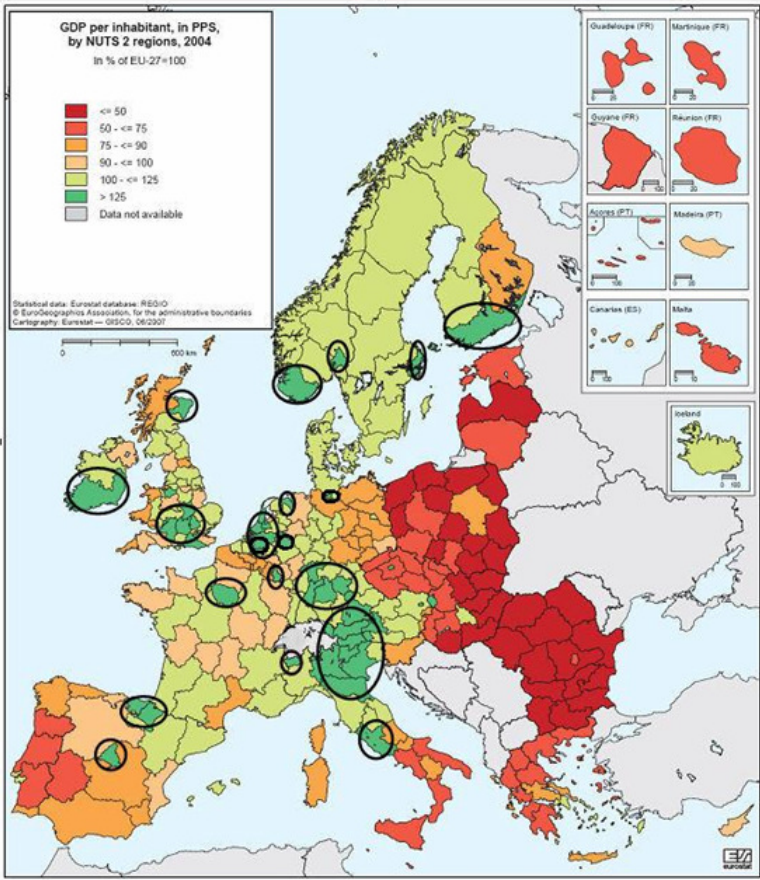
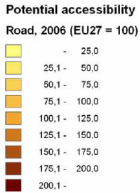
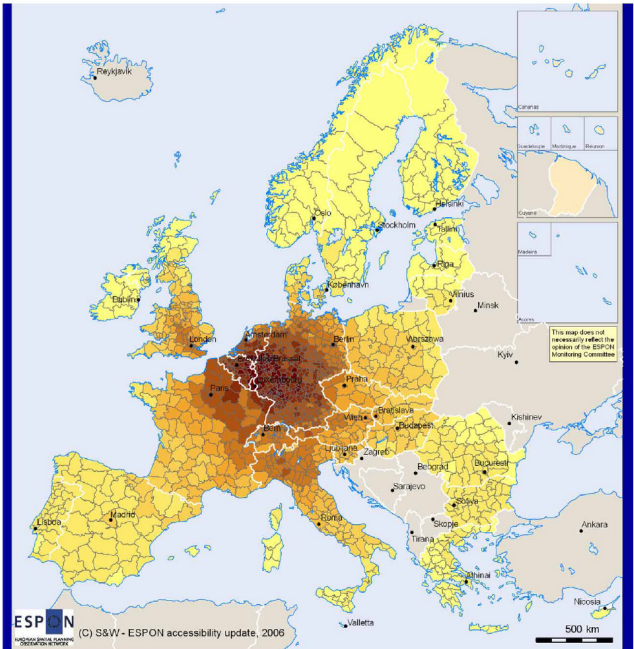


Figure 3: Routes of scheduled flights (EUROCONTROL)

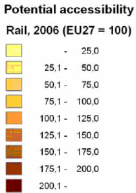
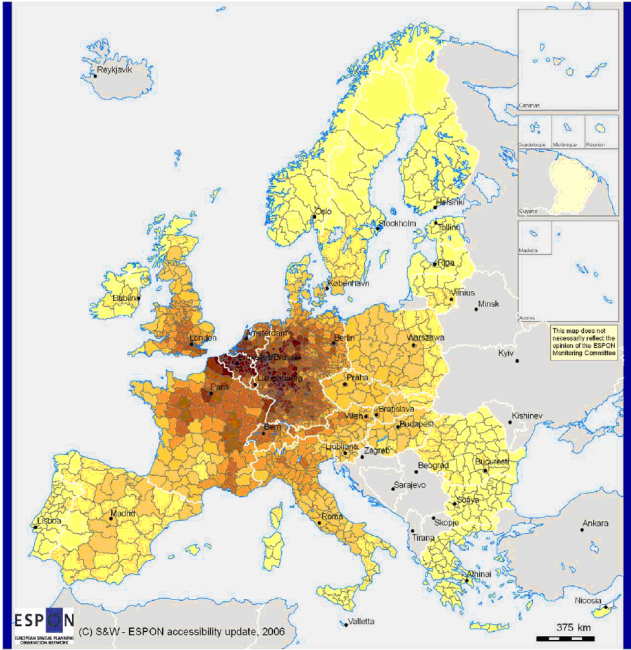


Figure 4: Routes of business aviation (EUROCONTROL)

Demand analysis



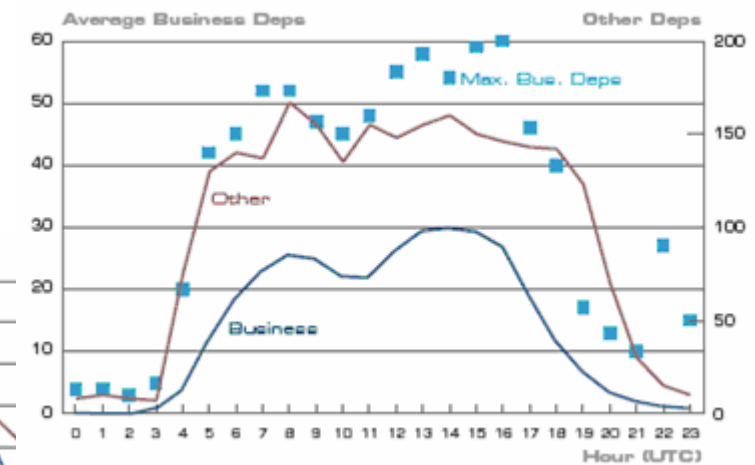
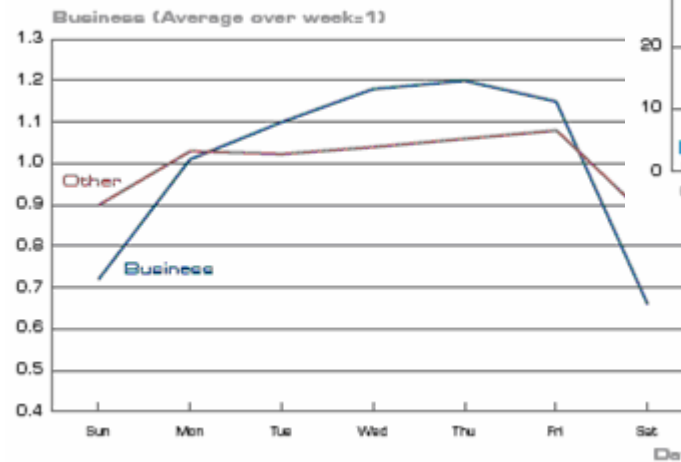
(C) EuroGeographics Association
for the administrative boundaries
Data sources:
RRG GIS Database
S&W Accessibility Model



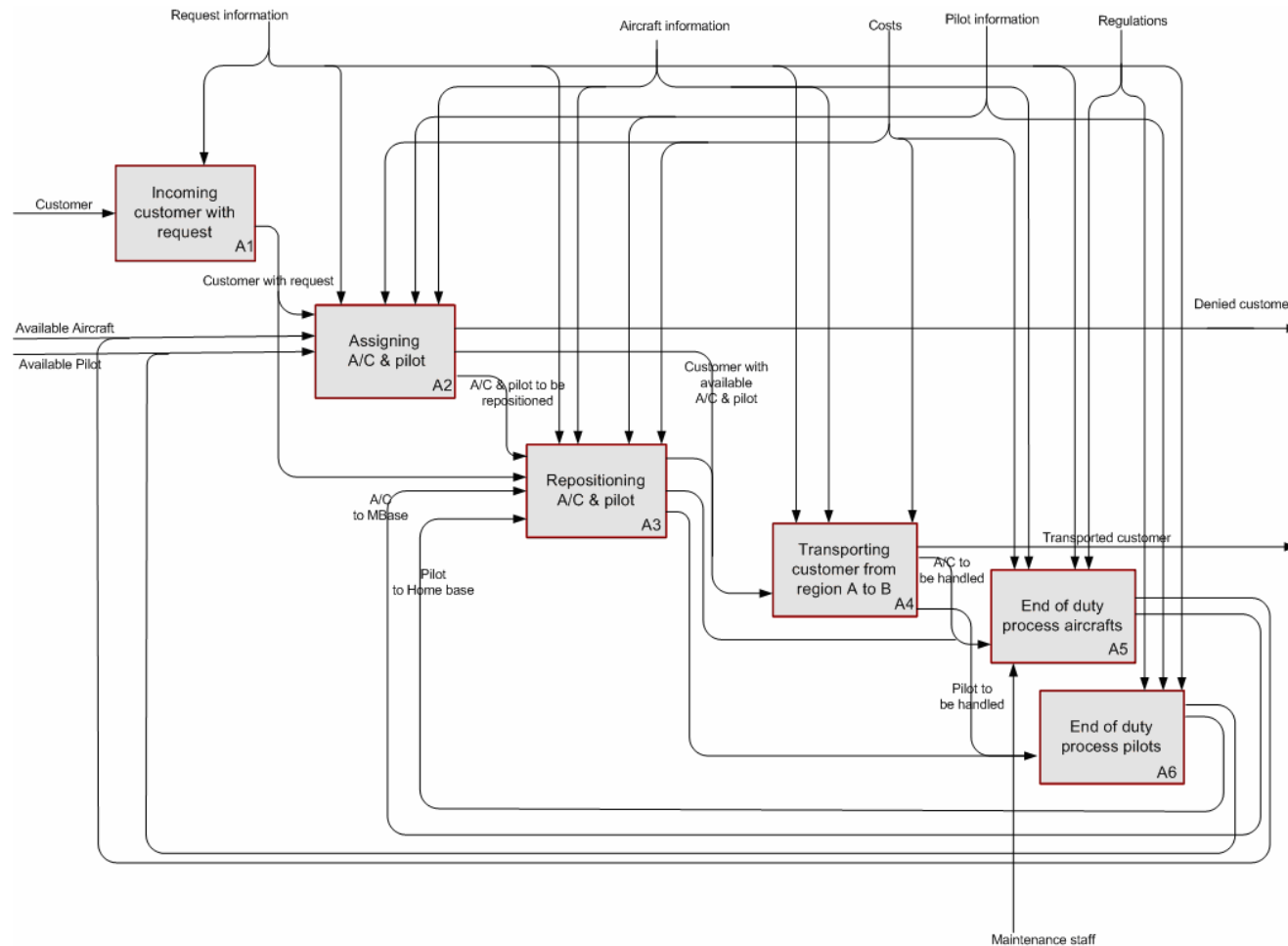
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Demand analysis

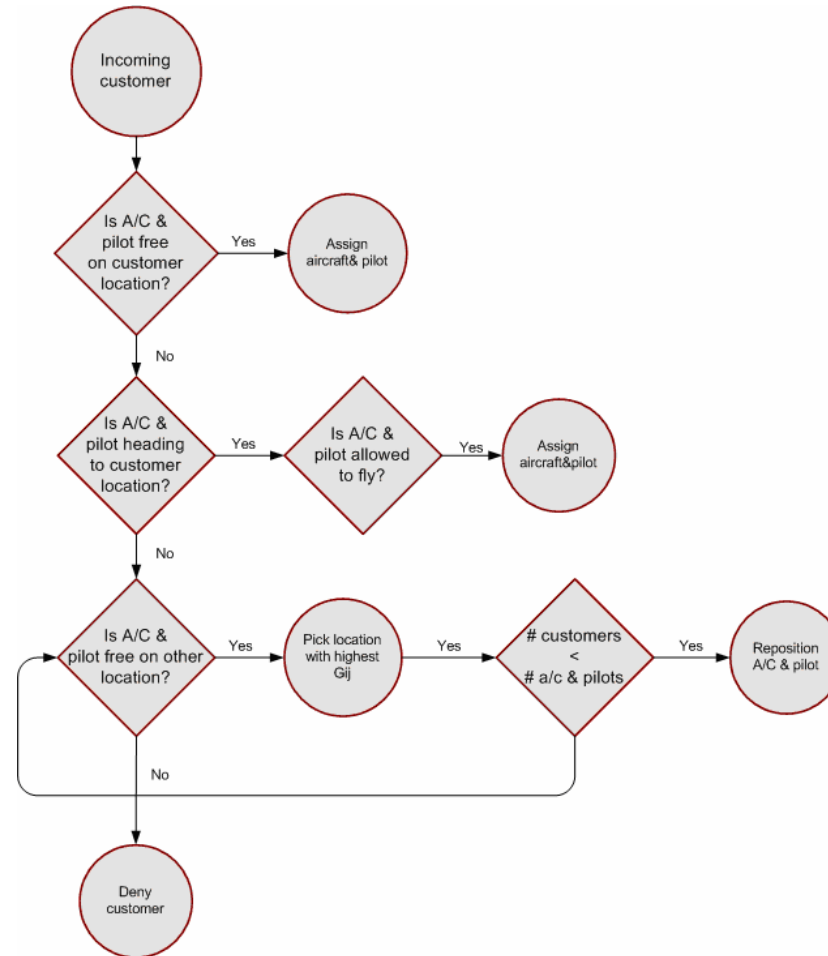
- Multi criteria analysis over the influential demand criteria
- Eurocontrol data
- Seasonality



Operational conceptualization



Simulation

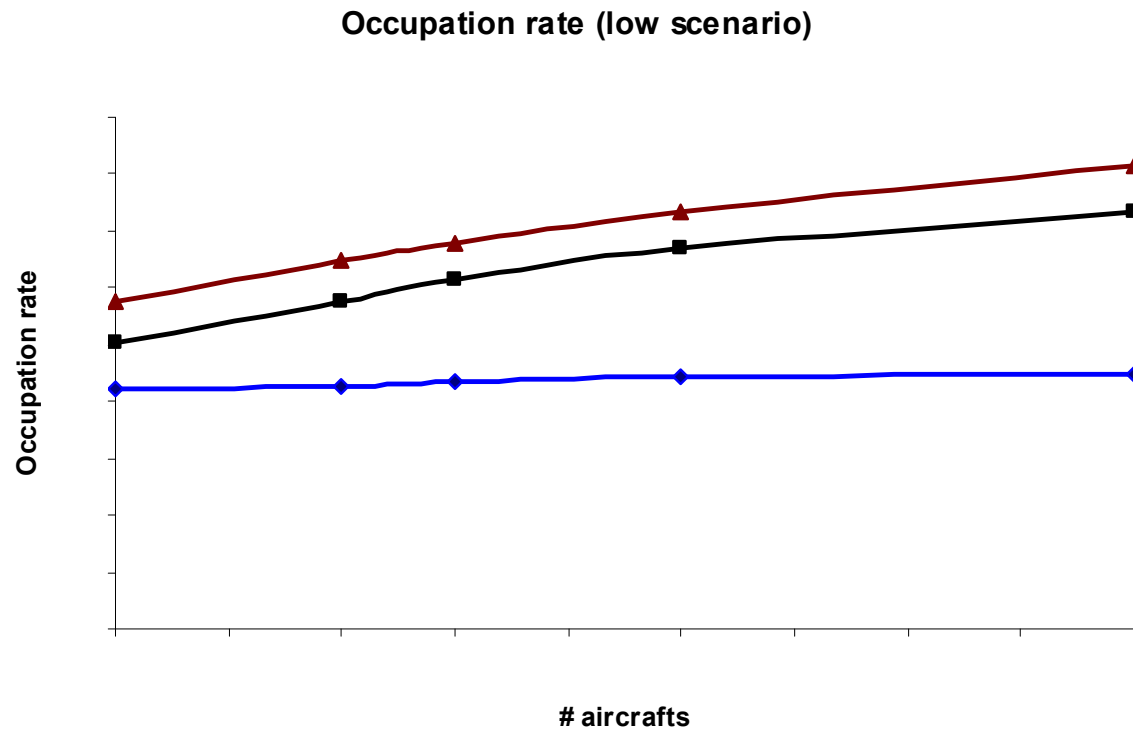


Logistic design

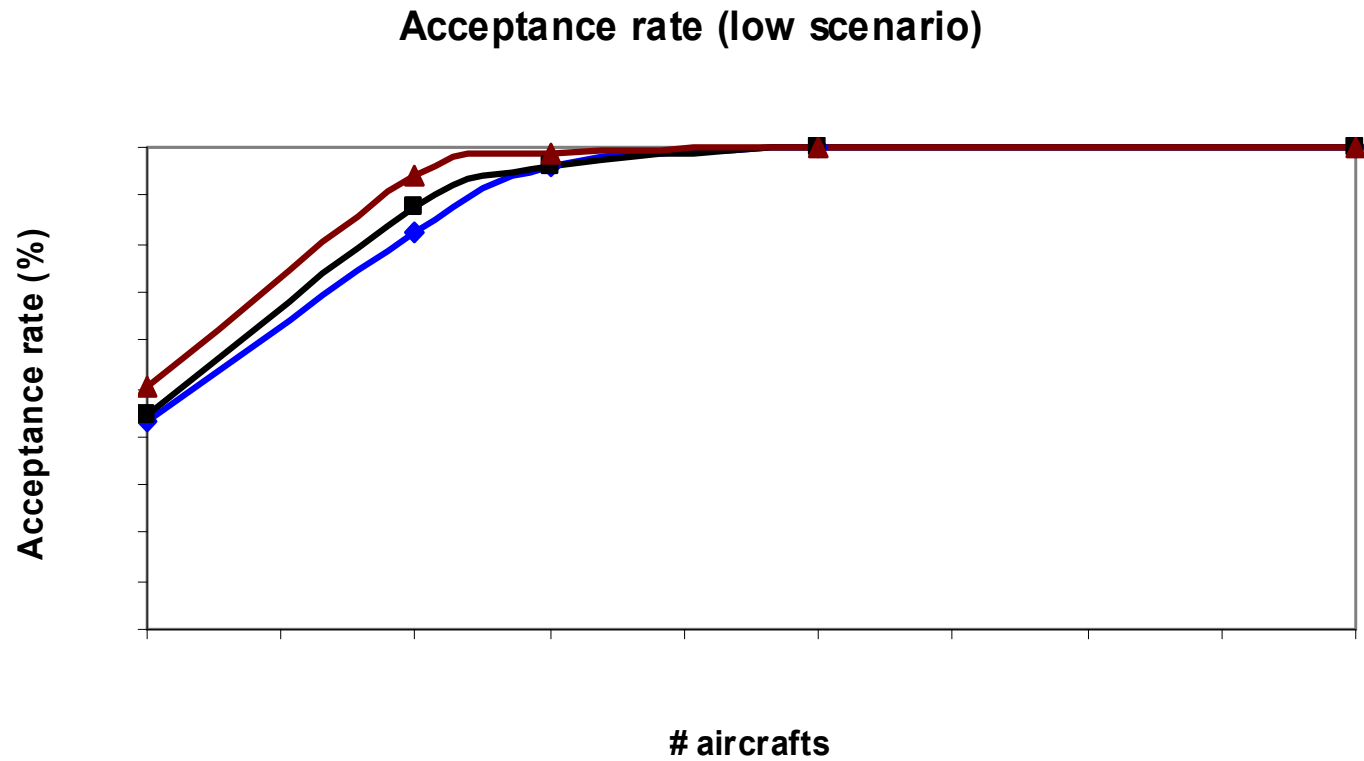
- Single pilot home base design
- Multiple pilot home base design
- Shuttle design

- Three scenarios

Results: occupation rate

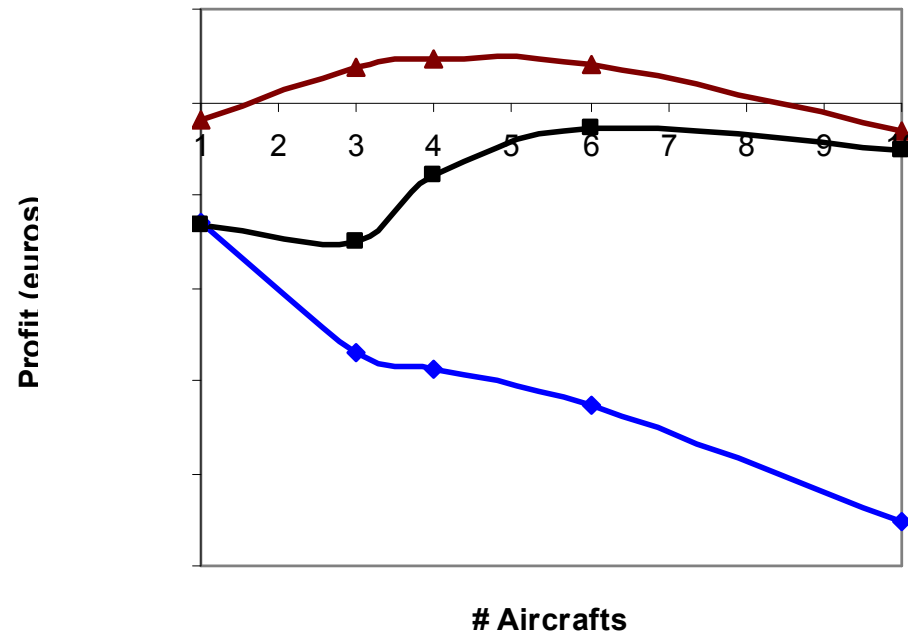


Acceptance rate



Profit

Profit of Aeolus Aviation (low scenario)



Results

Developing a tool to analyze logistic concepts

- SADT -> Structural Analysis and Design Technique
- Decision trees
- - > results in simulation model in ARENA Rockwell (a/c choisen based on gravity model)
- Tool to analyze logistic concepts, for example;
 - Location(s) of MRO bases
 - Location(s) of bases for pilots
 - Variation of amount of aircrafts

Conclusions

- What if scenario
- Include optimization
- Maintenance peaks
- Bound market and create flexibility
- Basis for an on-demand operational system
- Demand forecasting of demand push

Questions?