iFLY

D6.1 "Methodological Framework for Cost-Benefit Analysis"

AUEB-RC/TRANSLOG

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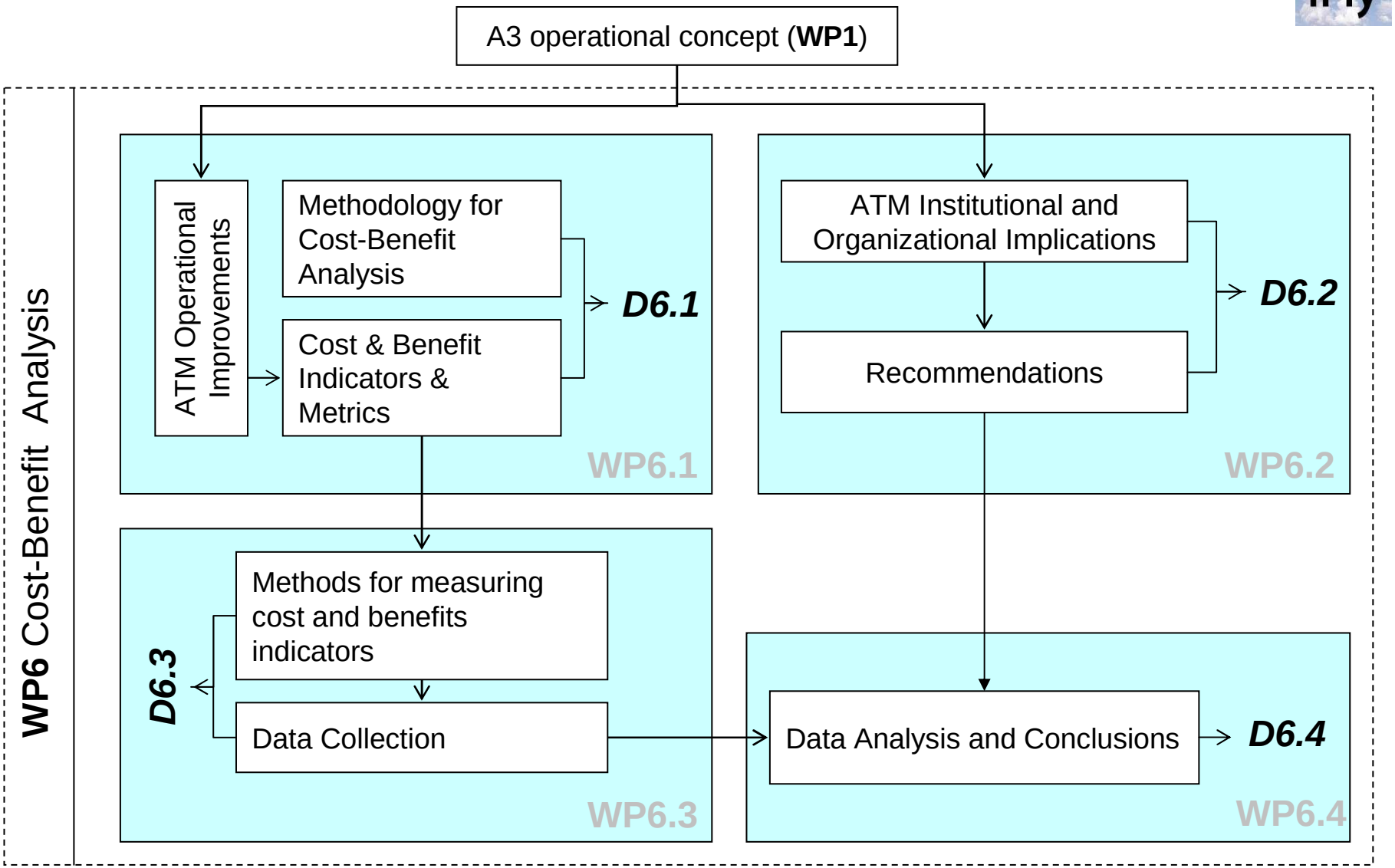
D6.1 Scope & Objectives (1/2)

- Methodological Framework for assessing the economic impacts of the proposed A^3 ConOps

- The assessment methodology should take into account:
  - The objectives and priorities of the involved stakeholders
  - Alternative scenarios representing different achievement levels of the A^3 ConOps
  - Determination of the potential positive (benefits) and negative (costs) impacts of the A^3 operational concept
  - Quantification of the expected financial and operational impacts

(*iFly Techical Annex "Description of Work"*)

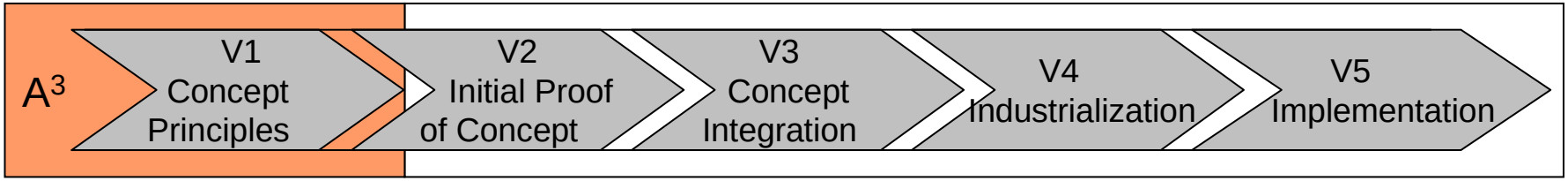
D6.1 Scope & Objectives (2/2)



Relations to the current State-of-the-art (1/3) : *E-OCVM*

- E-OCVM: a broader validation methodology for assessing ATM operational improvements under various levels of maturity

- The E-OCVM recognizes the customisation of the validation methodological steps throughout the following maturity levels of a ConOps:



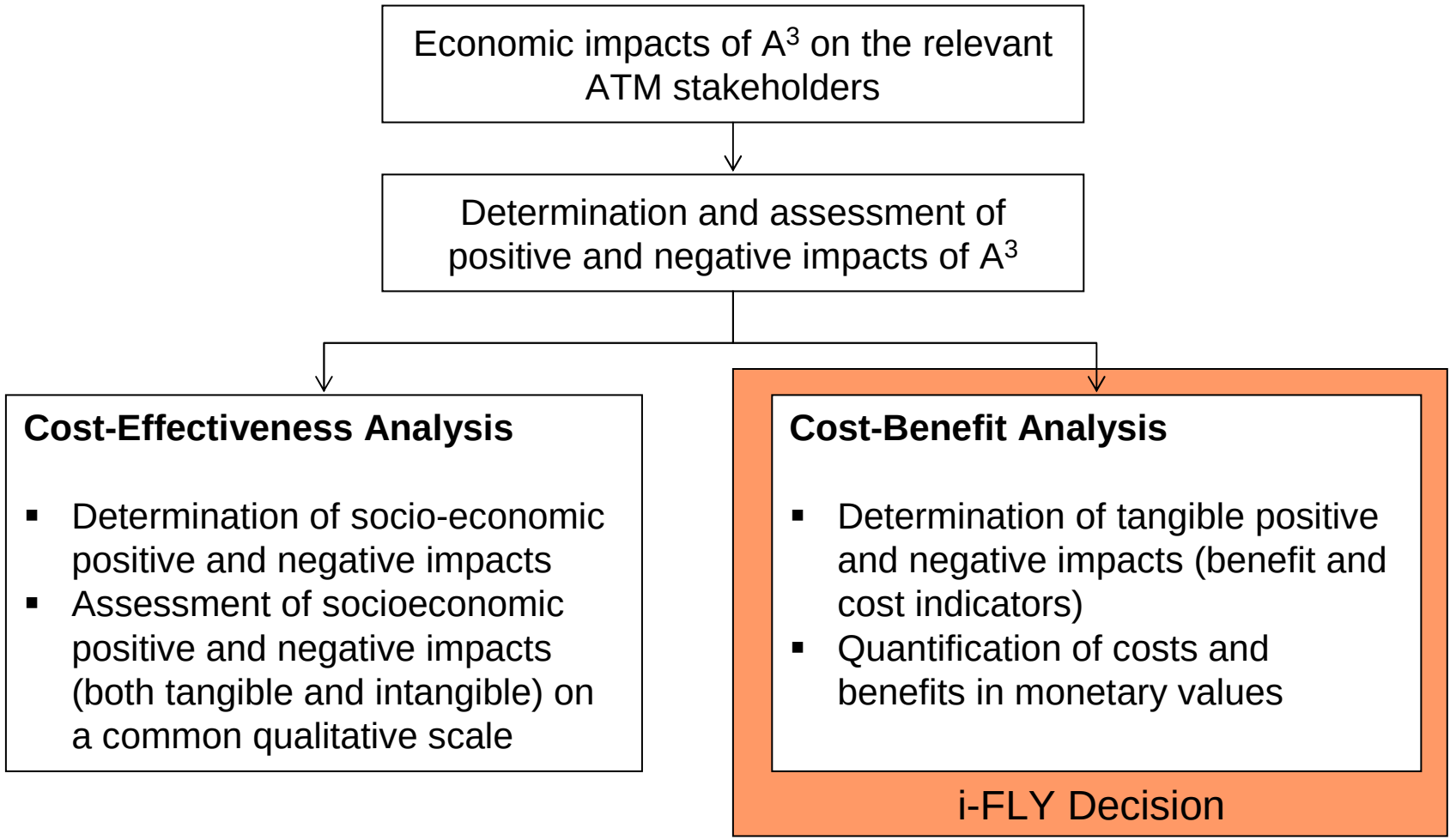
- The E-OCVM includes various validation cases: Environmental, Safety, Technology, Operational, Human Factors, and Business case.

- The assessment of the economic impacts of A3 corresponds to the E-OCVM business case under V1 maturity level

Method of Impact Assessment Vs. Phase of Project Lifecycle

			Phases of the Project Lifecycle					
			ATM Needs V0 Gather and assess ATM Performance Needs	Scope V1 Scope Operational Concept and Develop Validation Plan	Feasibility V2 Iteratively develop and evaluate concept	Integration V3 Build, consolidate and test	Pre-Operational V4 Industrialisa-tion and approval	Operational V5 Implementa-tion
Applicable Impact Assessment Method	Qualitative	Scoring Techniques	✓	✓				
		Cost Effectiveness with Judgemental KPI Values		✓	✓			
		Cost-Benefit with Judgemental KPI Values		✓	✓	✓		
	Quantitative	Cost-Benefit Analysis with Monetary Weights				✓	✓	✓
		Cost-Effectiveness Analysis with Measured KPI Values			✓	✓		

Relations to the current State-of-the-art (2/3): *Cost-Effectiveness vs. Cost Benefit Analysis*



Relations to the current State-of-the-art (3/3): *ATM Cost-Benefit Analysis Methods*

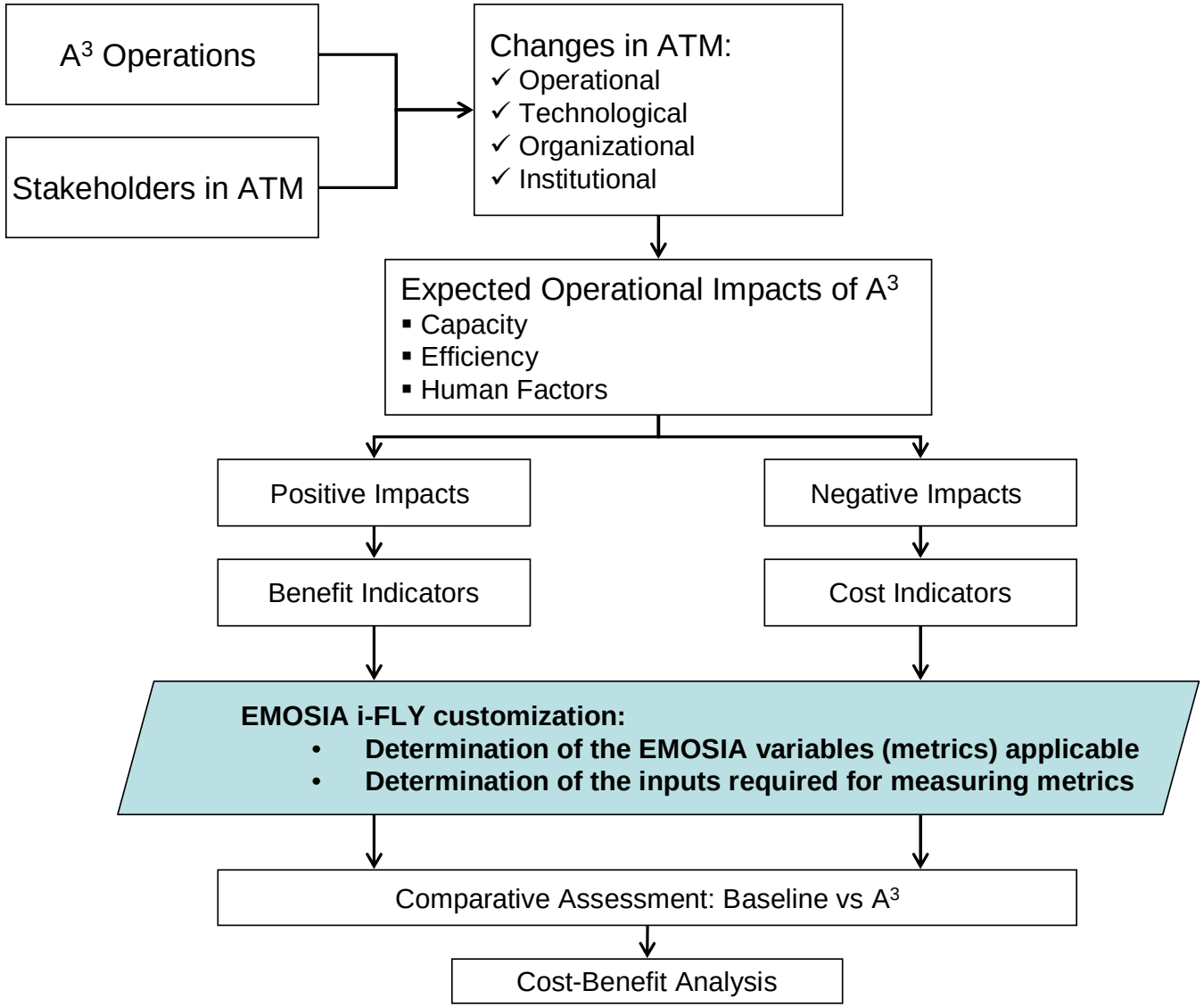
- ATOBIA: CBA-tool designed for assessing Airborne Separation Assurance Systems (ASAS)
- MEDINA: focused on the impacts for the Air Navigation Service Providers
- EMOSIA (European Models for ATM Strategic Investment Analysis): A generic tool for cost-benefit analysis of ATM ConOps

✓ **The EMOSIA toolset is suitable for high level analysis**

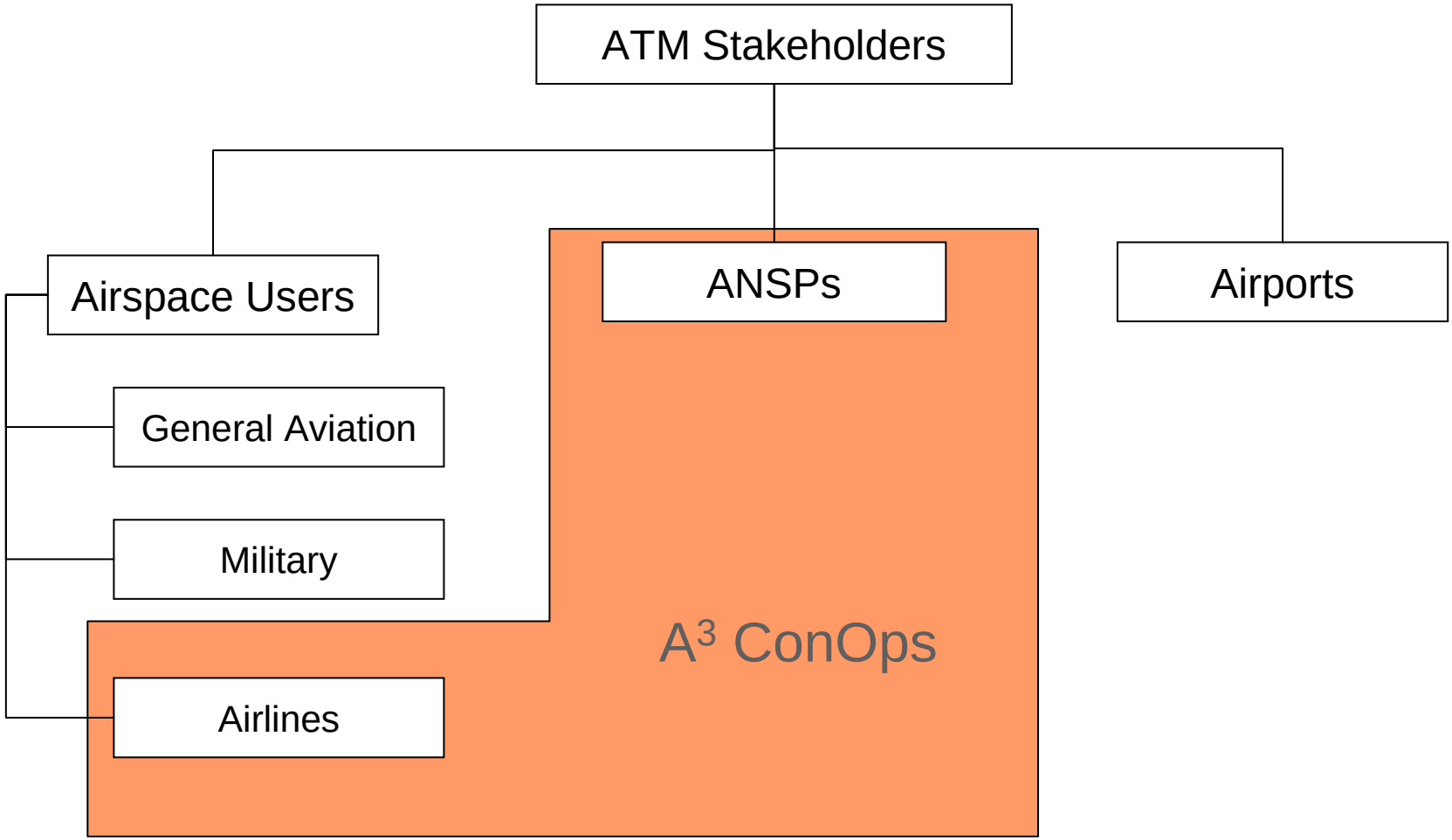
✓ **The EMOSIA approach best addresses the Stakeholders expectations**

(SESAR Definition Phase WP1.4.1/D1 Cost Benefit Modeling)

Results and Knowledge Gained (1/7):
Cost-benefit Analysis Methodology



Results and Knowledge Gained (2/7):
ATM stakeholders in A³ ConOps



Results and Knowledge Gained (3/7): *iFLY CBA methodology Requirements*

- Requirements of the A³ CBA assessment
  - Take into account benefits arising from several operational improvements (i.e., flight inefficiency reduction, en-route delay reduction, en-route ATC charges reduction, ANSPs cost savings)
  - Apply cost-benefit analysis covering the point of view of the ATM stakeholders involved in A³ ConOps
  - Quantify cost and benefit metrics with uncertainty (e.g., flight inefficiency reduction)

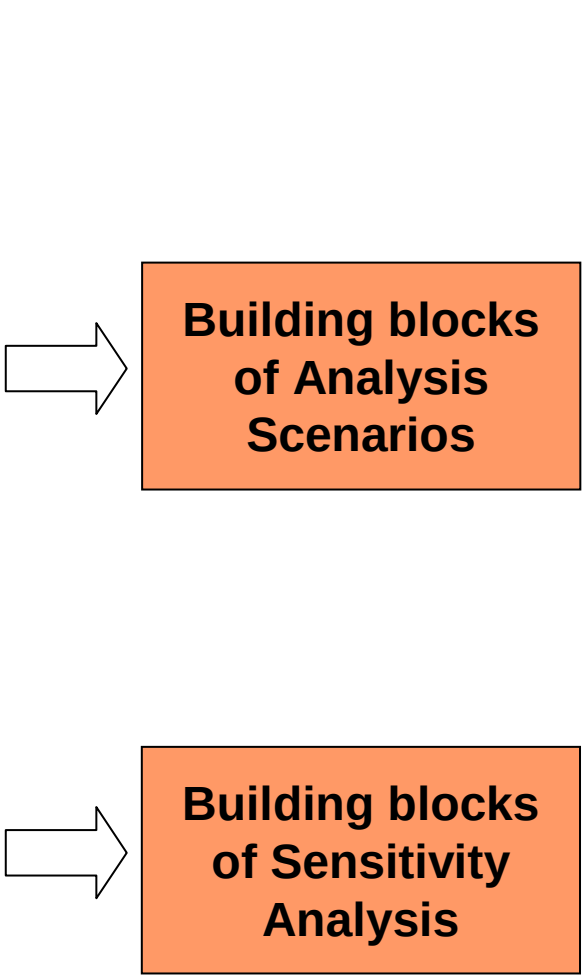
→ The iFLY CBA metrics cover the A³ operational impacts

→ The iFLY CBA treats Airlines and ANSPs separately

→ The iFLY CBA uses:
- Expert judgments and alternative analysis scenarios
- Sensitivity analysis

Results and Knowledge Gained (4/7): *Categories of iFLY CBA Variables*

- Global Variables (*e.g., air traffic growth, discount rate*)
- Time Variables (*e.g., time horizon of the analysis, pre-implementation period, implementation period*)
- Baseline Variables (*e.g. Baseline Annual Flights, Average Flight Length, Aircraft Baseline Number*)
- Cost and Benefit Uncertain Variables (*e.g., flight efficiency gain %, en-route delay reduction %*)



Results and Knowledge Gained (5/7): *Airlines Costs & Benefits*

COSTS

Cost Element	Indicative Metrics	Source of Data
Pre-Implementation Cost	Total Pre-implementation cost (participation/consulting R&D, system validation)	Experts
One-off Implementation Cost	Annual One-Off Implementation Cost in M-Euro (including training, transition management)	Experts
Capital Cost	Forward Fit Cost K-Eu/aircraft	Experts
	Retrofit Cost K-Eu/aircraft	Experts
	Ground Space Cost (including any ground-based systems required for trajectory planning, data link communication with the pilot, SWIM* access)	Experts

BENEFITS

Benefit Element	Indicative Metrics	Source of Data
Flight Inefficiency Reduction	Cost per Flight Min	Standard Inputs for EUROCONTROL Cost Benefits Analyses
	Incremental Efficiency Gain %	Experts
En-route Delay reduction	Cost per Unpredictable Delay Min (EUROCONTROL Standard inputs, 2007)	Standard Inputs for EUROCONTROL Cost Benefits Analyses
	Incremental (en-route) Delay Reduction %	Experts
Cost savings	Annual Service Cost Difference: The annual charges reduction for en-route ATC services	ATM Cost-Effectiveness Benchmarking report (EUROCONTROL)

* System Wide Information Management System

Results and Knowledge Gained (6/7):
ANSPs Costs & Benefits

COSTS

Cost Element	Indicative Metrics	Source of Data
Pre-Implementation Cost	Total Pre-implementation cost (participation/consulting R&D, System validation)	Experts
One-off Implementation Cost	Annual One-Off Implementation Cost in M-Euro (including training, transition management)	Experts
Capital Implementation Cost	Ground-Space Implementation Cost (SWIM access, administration)	Experts

BENEFITS

Benefit Element	Indicative Metrics	Source of Data
Operating Cost Reduction	Operating (non-staff) Cost Avoidance %	Experts, ATM Cost-Effectiveness Benchmarking report (EUROCONTROL)
	Staff Cost Avoidance %	Experts, ATM Cost-Effectiveness Benchmarking report (EUROCONTROL)

Results and Knowledge Gained (7/7):
How to create the Analysis Scenarios

- Specify assumptions regarding the time and global parameters
- Baseline case ("Do Nothing"), taking into account the avionics baseline used by early ADS-B implementations in Europe and USA, (regulated respectively by EC surveillance implementing rule and FAA ADS-B mandate)
- Estimation of the alternative values for the cost (i.e. additional costs) and benefit (cost savings) metrics in the A3 case. Experts will provide three values (pessimistic, moderate , optimistic) for each metric.
- Develop a basic analysis scenario → the cost and benefit metrics will be given the moderate estimated values
- Sensitivity Analysis will involve increasing or decreasing one or more of the cost and benefit metrics

Open Issues/Next Steps

- Definition of analysis scenarios (Task 6.3, D6.3“Report in Data Collection”)
- Customization of EMOSIA spread sheets (Task 6.3, D6.3“Report in Data Collection”)
- Development of Data Collection and Analysis instruments, i.e. questionnaire for collecting estimates for the cost/benefit variables (Task 6.3, D6.3“Report in Data Collection”)
- Identification of Experts involved in the measurement of the cost-benefit analysis variables (Task 6.3, D6.3 “Report in Data Collection”)
- Data Analysis (Task 6.4, D6.4 “Cost-benefit results presentation”)

Points of Alignment with SESAR

- Similar metrics with SESAR CBA for costs and benefits (Deliverable1.4.2-D3, "Consolidate and Update the CBA Model with Data Supporting the Trade-Off and Financial Plans")

- Use SESAR assumptions for the baseline scenario (Deliverable1.4.2-D3, "Consolidate and Update the CBA Model with Data Supporting the Trade-Off and Financial Plans")

- Take into account SESAR developments in specifying the cost-benefit analysis time horizon (Separation modes beyond 2020, SESAR D3 "The ATM Target Concept")

ADS-B Technology

- A surveillance technology that allows pilots and ATC to identify with precision the aircraft position

- ADS-B stands for:
  - Automatic: no operator intervention is needed
  - Dependent: the aircraft determine their position based on a GNSS(Global Navigation Satellite System) constellation
  - Surveillance
  - Broadcast: it broadcasts the position and other data of the aircraft (e.g., speed, heading, altitude) to any other aircraft or ground station.

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