

LMI

ASAC Airline Cost-Benefit Model

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Technology Assessment

Objective

- To create a flexible financial analysis tool to support credible estimates of benefits to airline operators from technological and procedural innovations
- Why?
 - NASA recognizes that technology must demonstrate benefits to users
 - Many existing C-B methodologies/models are not considered credible by the commercial aviation community

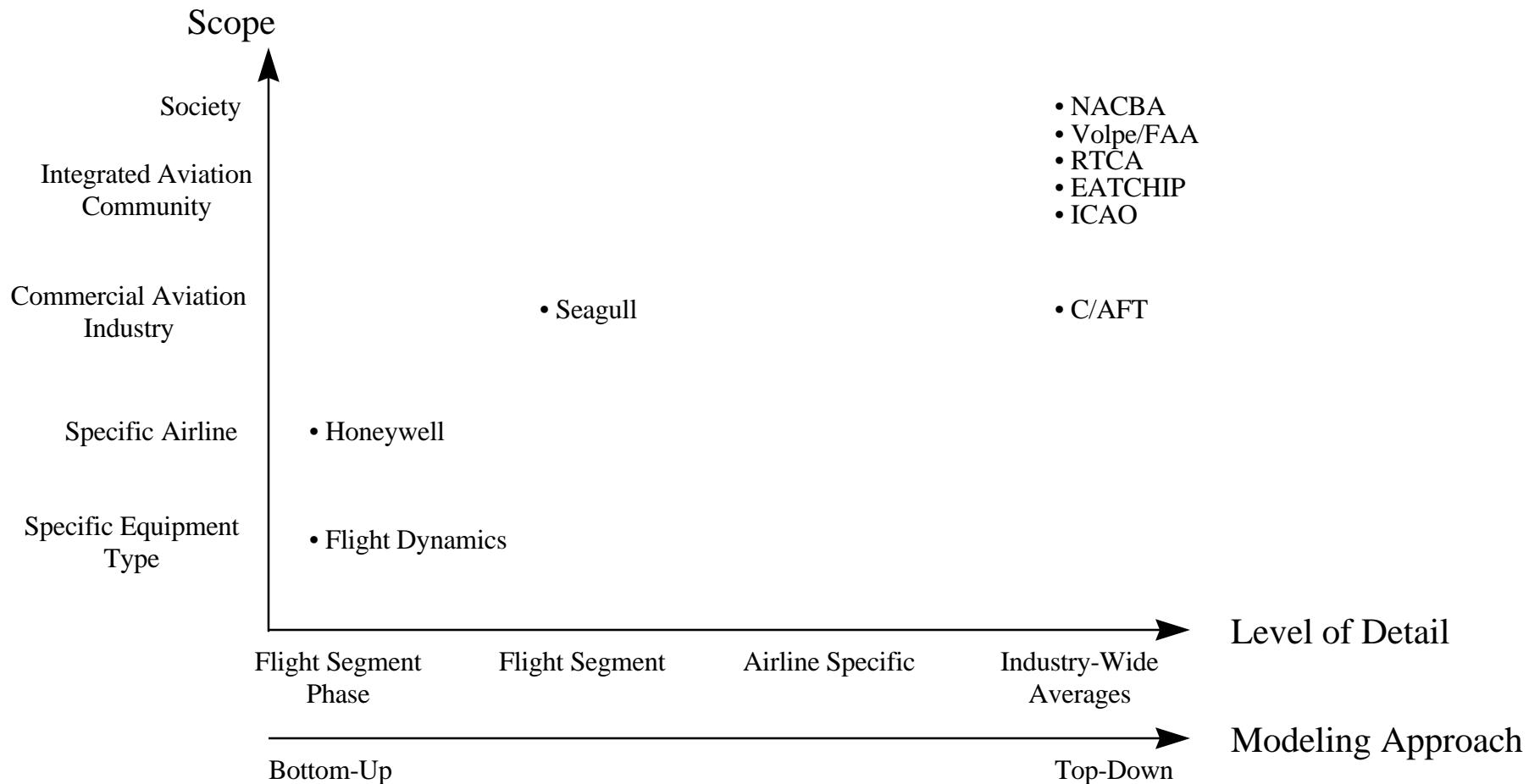
Task Overview

- Phase one (through April): Define user and model requirements
 - Literature review
 - Review of existing C-B models/methodologies
 - Visits with industry representatives
 - Visits with NASA user community
- Phase two (through November): Construct a prototype C-B model
 - Build upon findings of phase one
 - Utilize a spreadsheet environment with simulation tools

Literature Review

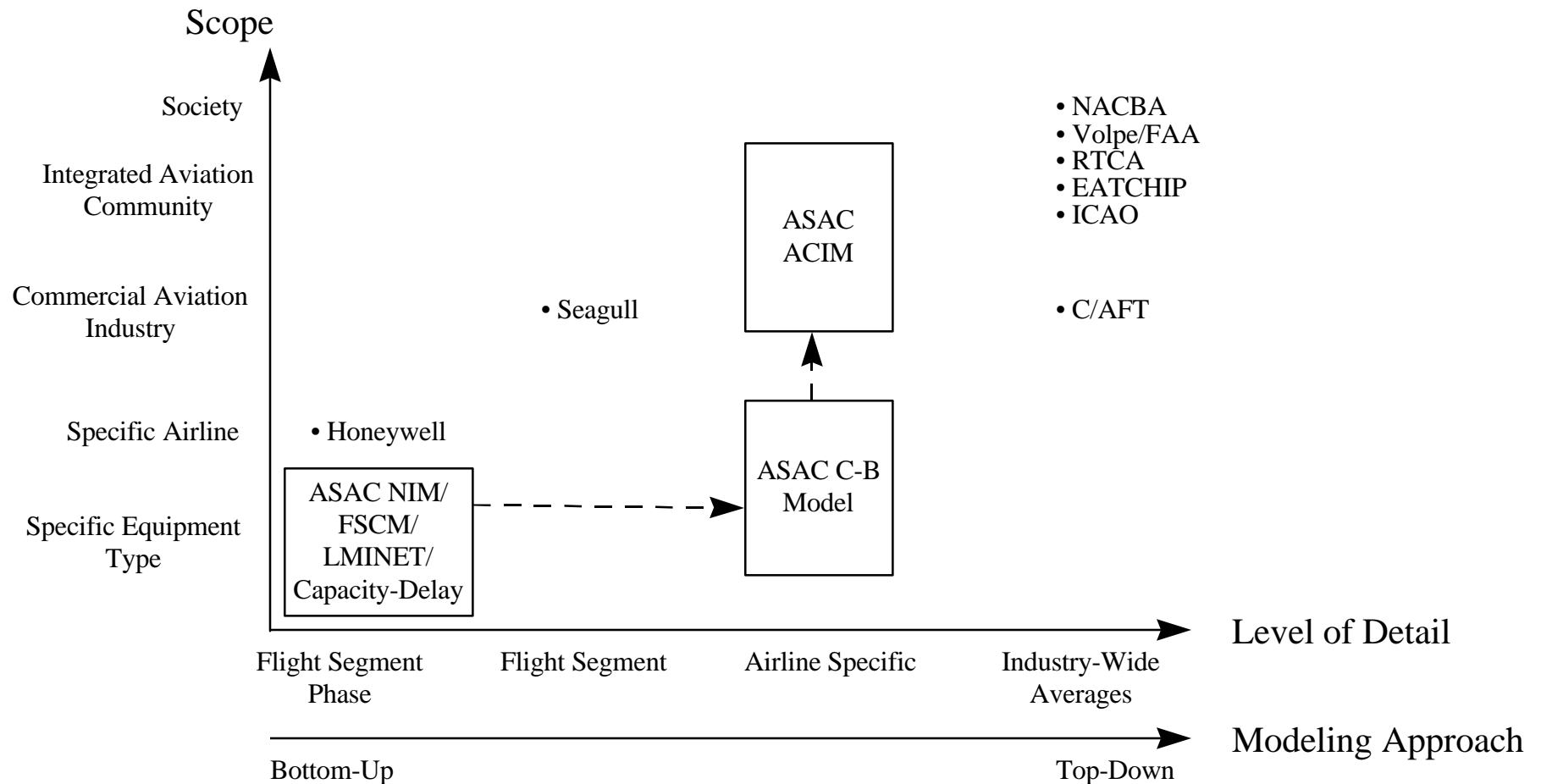
- Review of nine existing C-B methodologies
 - Comprehensive aggregate level methodologies such as EATCHIP, Volpe, or ICAO
 - Highly detailed C-B models such as Honeywell or Flight Dynamics Inc.
- Review of existing approaches to model DOC
- Review of technological and procedural innovations likely to be considered by users
 - NASA Program Elements (AST--AATT)
 - Future NAS architecture

Existing C-B Methodologies



Technology Assessment

ASAC C-B Methodology

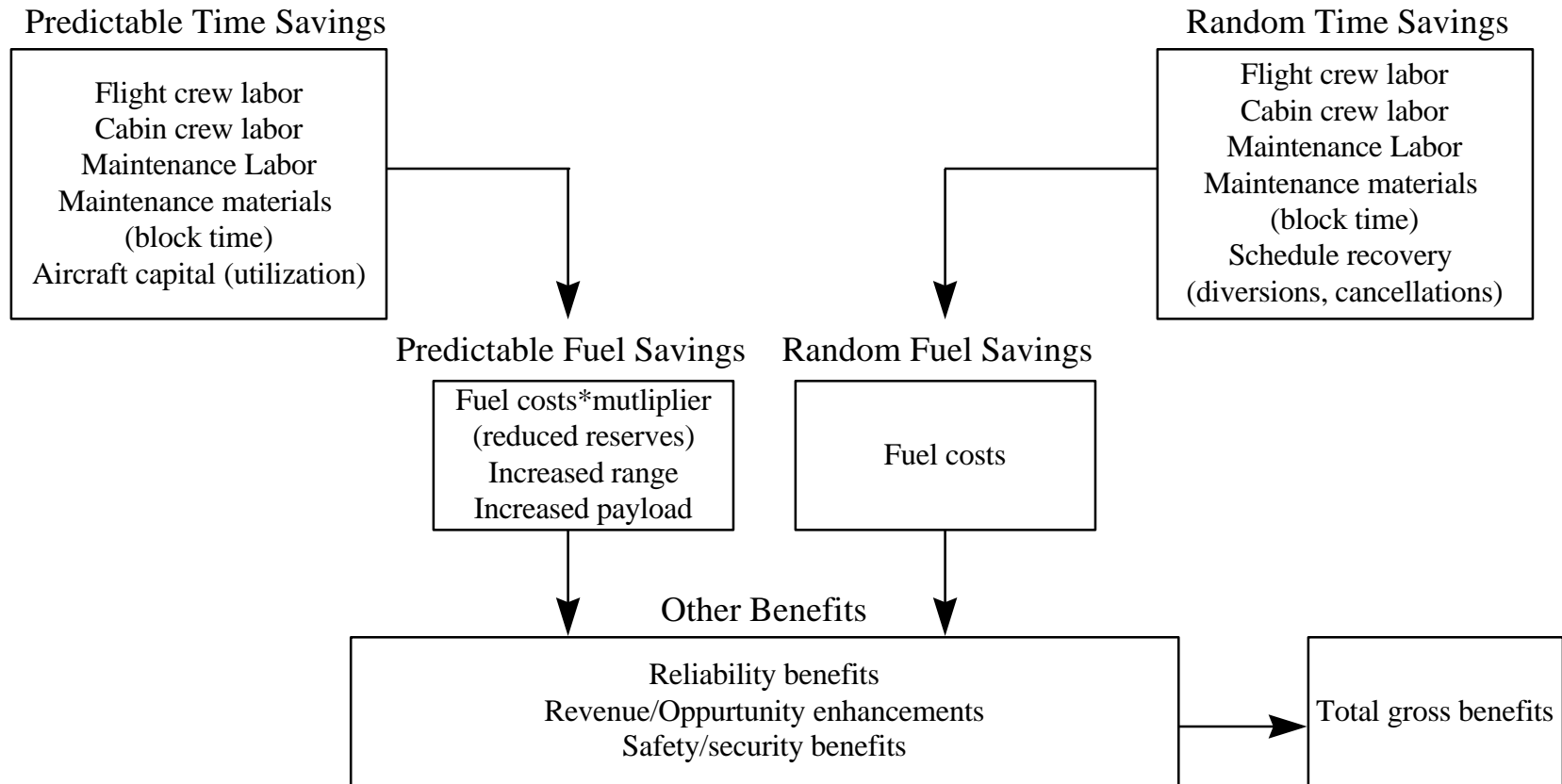


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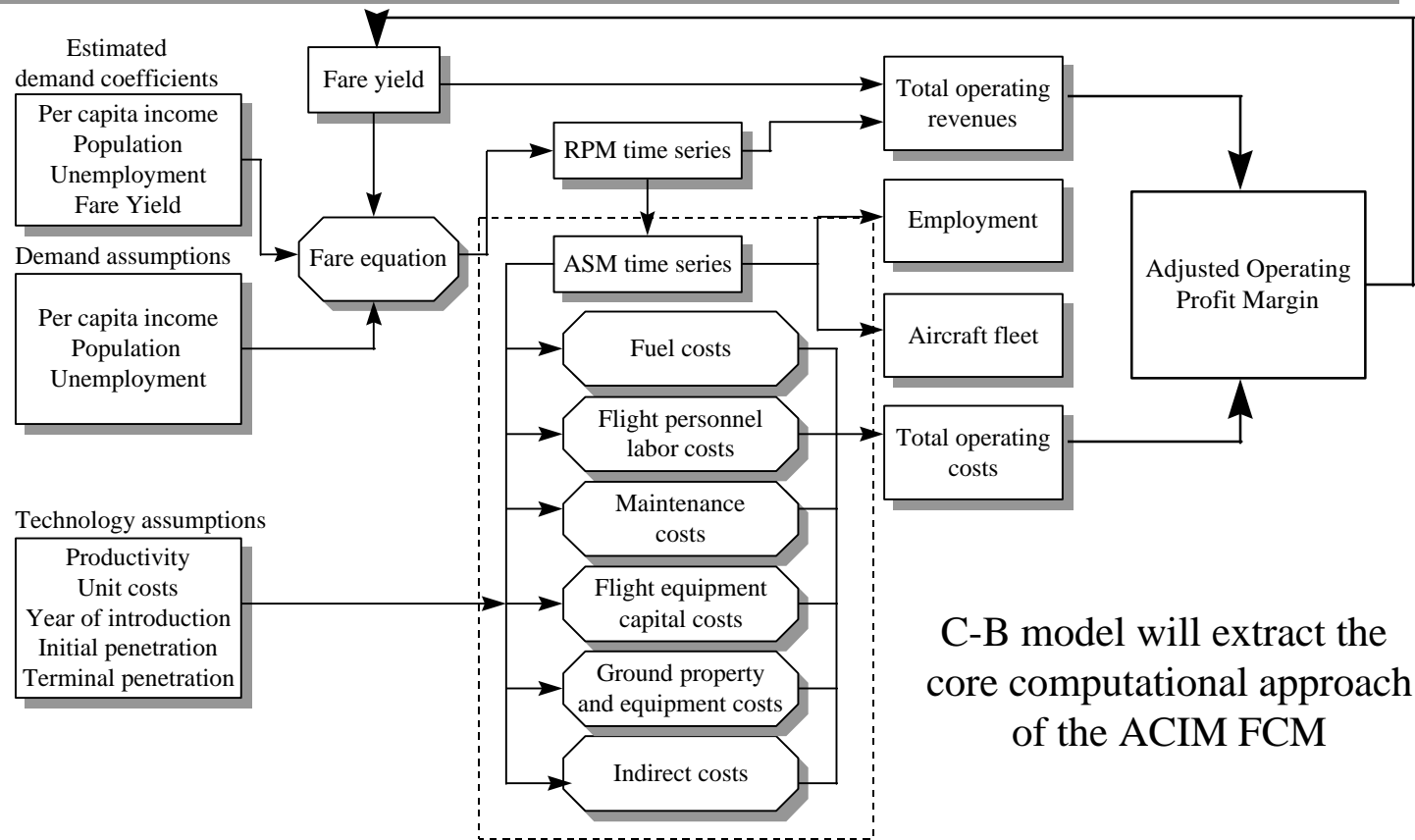
Cost Categories

- Acquisition, maintenance and operation of new equipment (life-cycle approach)
 - Model to include aircraft out-of-service time, inventory costs, facilities and ground support costs
- Decommissioning of older equipment (less salvage value)
- Crew training and deployment
- Changes in ATM service fees
- Procurement of intermediate services such as spectrum access

Benefit Categories



ACIM Functional Cost Module: a previous approach for DOC



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Previous Approach for DOC

$$\text{Fuel costs} = \text{ASM} \times \left(\frac{\text{fuel price / gallon}}{(\text{ASM / block hour}) / (\text{gallons / block hour})} \right)$$

$$\text{Flight personnel costs} = \text{ASM} \times \left(\frac{\text{flight personnel labor rate / block hour}}{\text{ASM / block hour}} \right)$$

$$\text{Maintenance costs} = \text{ASM} \times \left(\frac{(\text{maint. labor} + \text{maint. mat.}) / \text{block hour}}{\text{ASM / block hour}} \right)$$

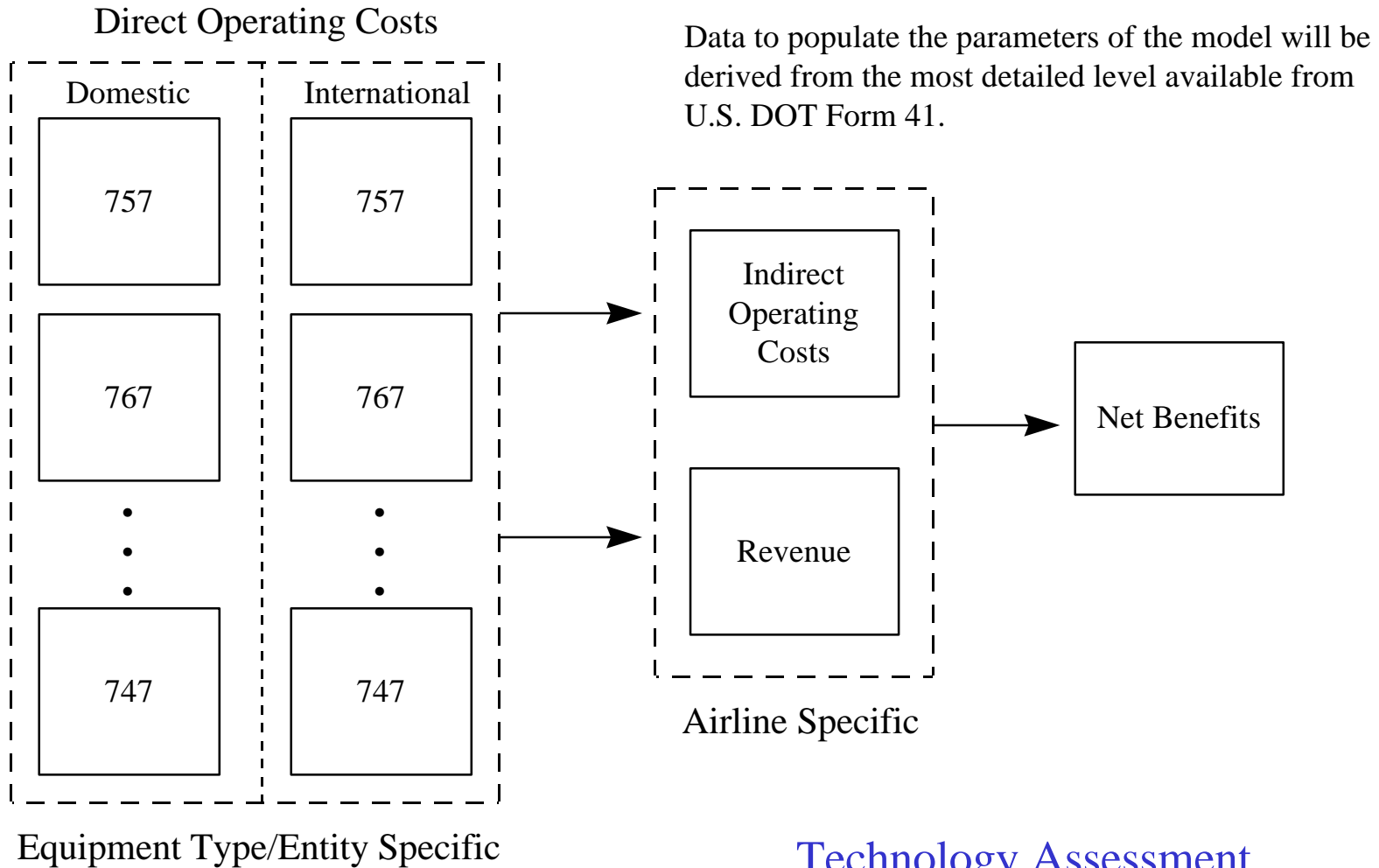
$$\text{Flight equipment capital costs} = \text{ASM} \times \left(\frac{\text{capital costs / aircraft day}}{(\text{ASM / block hour})(\text{block hours / aircraft day})} \right)$$

$$\text{Ground property and equipment costs} = \text{ASM} \times \left(\frac{\text{GP \& E costs}}{\text{ASM}} \right)$$

$$\text{Indirect costs} = \text{ASM} \times \left(\frac{\text{indirect costs}}{\text{ASM}} \right)$$

Technology Assessment

Populating Parameters from Form 41



Desired Features

- Will utilize a life-cycle approach for calculating financial impact of new equipment
- Will distinguish between predictable and non-predictable benefits
- Will account for non-linear relationships between benefit drivers, such such as time savings, and benefit items, such as increased utilization
 - Use of threshold values
- Will attempt to use ATA SPEC 100 maintenance data to more accurately determine maintenance cost drivers
- Will provide an explicit mechanism for sensitivity analysis
 - Provide inputs and outputs as distributions rather than point estimates

Open Questions

- Will results from this approach be considered credible by the commercial aviation industry for the purpose of consensus building?
 - What can be done to improve credibility?
- What is the appropriate baseline?
 - What should changes be measured against?
 - Should we project baseline costs explicitly or just try to measure the delta?
- What other cost-benefit categories should be considered?
- What other features should be incorporated?