

NextGen Stakeholder Valuation

Methodology for Establishing and Synchronizing Business Cases

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Problem Context – Show Me the Money



Stakeholders look at investments from their own viewpoints.

When other stakeholders look at the same investment, they see something different.

How can all the stakeholders in a **joint investment** gain a **common understanding** of the business case?

How can portfolios be structured so all stakeholders are willing to invest?

Institutional Context – Who Decides?



December 10, 2008

The Honorable Nancy Pelosi, Speaker
Office of the Speaker of the House
H-232, U.S. Capitol
Washington, DC 20515

The Honorable Harry Reid, Senate Majority Leader
Office of the Senate Majority Leader
528 Hart Senate Office Building
Washington, DC 20510

The Honorable Mitch McConnell, Senate Minority Leader
Office of the Senate Minority Leader
S-230 Capital Building
Washington, DC 20510

The Honorable John Boehner, House Minority Leader
Office of the House Minority Leader
H-204 Capital Building
Washington, DC 20515

Dear Speaker Pelosi, Leader Reid, Leader McConnell, and Leader Boehner:

As Congress crafts legislation to guide our nation through the current economic downturn, the undersigned associations representing the United States civil aviation industry urge Congress to recognize aviation's unique place in the American economy. Our industry (which includes aircraft, engines and parts manufacturers, airlines, airports, pilots, aircraft owners and the general aviation community) directly and indirectly generates over ten million jobs and \$1.2 trillion in economic activity annually. In 2006, according to the Federal Aviation Administration's recent analysis, that activity represented approximately 5.6

Level 0: Transportation Ecosystem

- Actors: White House, Congress, & Interest Groups
- Decision Makers: Congress & White House
- Decision Bases: Constituent inputs, national priorities

Level 1: Aviation Ecosystem

- Actors: JPDO and Agencies
- Decision Makers: Congress & Departments
- Decision Bases: Constituent inputs, national priorities

Level 2: Industry / Mega-Systems

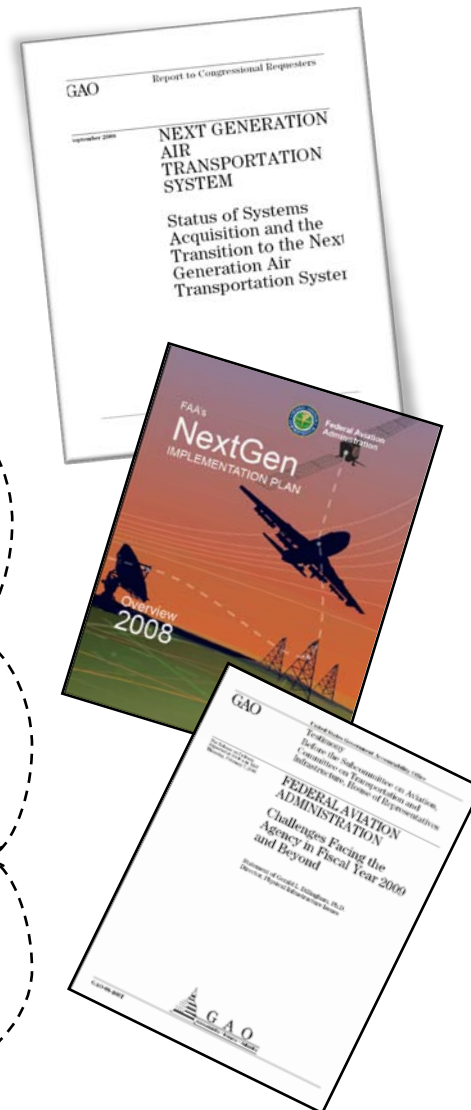
- Actors: Operators, manufacturers, and service providers
- Decision Makers: Investing stakeholders
- Decision Bases: Stakeholder interests and priorities

Level 3: Enterprise / System-of-Systems

- Actors: Programs and institutional constituents [ATO-F/-P]
- Decision Makers: Program managers and executives
- Decision Bases: Enterprise interests and priorities

Level 4: Program / Systems

- Actors: Programs
- Decision Makers: Program managers and staff
- Decision Bases: Program interests and priorities



Prior Efforts – CNS / ATM Focused Team

- **The CNS/ATM Focused Team (C/AFT) is an informal forum, which gathers economic, technical, and operational data that is useful in developing common analytical methodologies.**
 - Both the data and methodologies are made available for use by formally established advisory and decision-making bodies throughout the aviation community responsible for CNS/ATM planning and investment.
- **The C/AFT is led by the airline industry and is comprised of experts and senior representatives of the airlines, air traffic service providers, government agencies, and representatives of the aircraft industry.**
 - The common data and methodologies developed by the C/AFT are widely disseminated and available for use across the aviation community, thereby facilitating greater cooperation and mutual understanding, which facilitates the development of better solutions.

Finding Value – Joint Investment Decisions

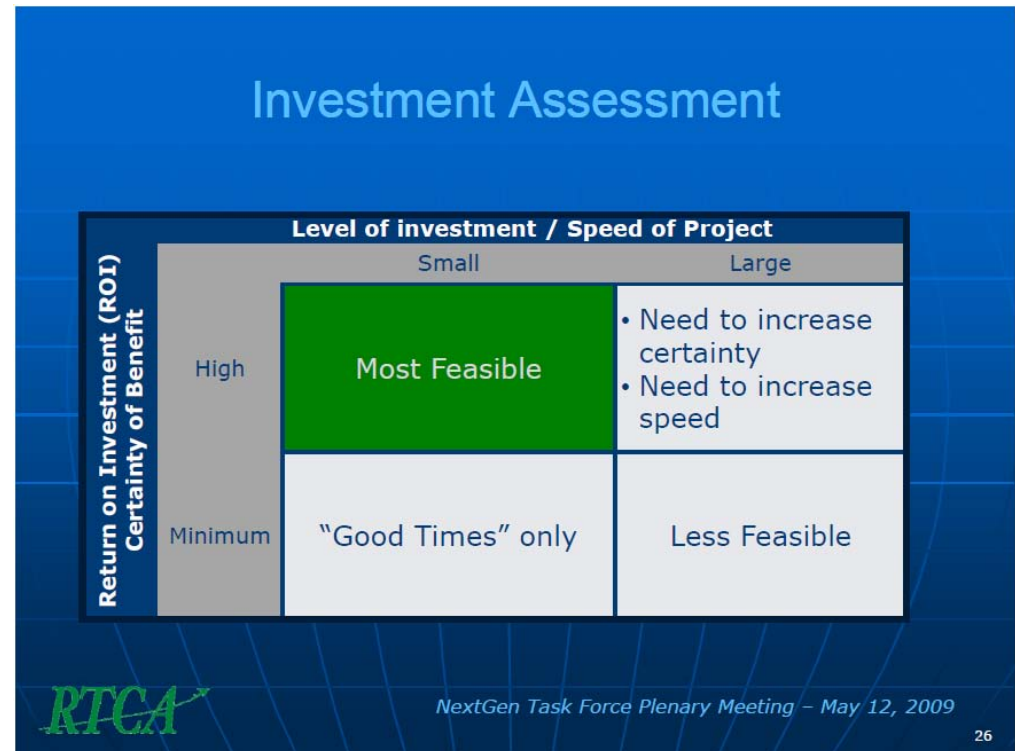
RTCA NextGen Mid-Term Implementation Task Force

Focus:

- Strategies to encourage investment / equipage
- Processes, bundling of capabilities, synergies around large scale activities, business case, innovative financing, cost drivers

Expected Recommendations:

- Agreement on operational capabilities
- Strategies for encouraging equipage
- Business risk mitigation strategies
- Strategies for making business case

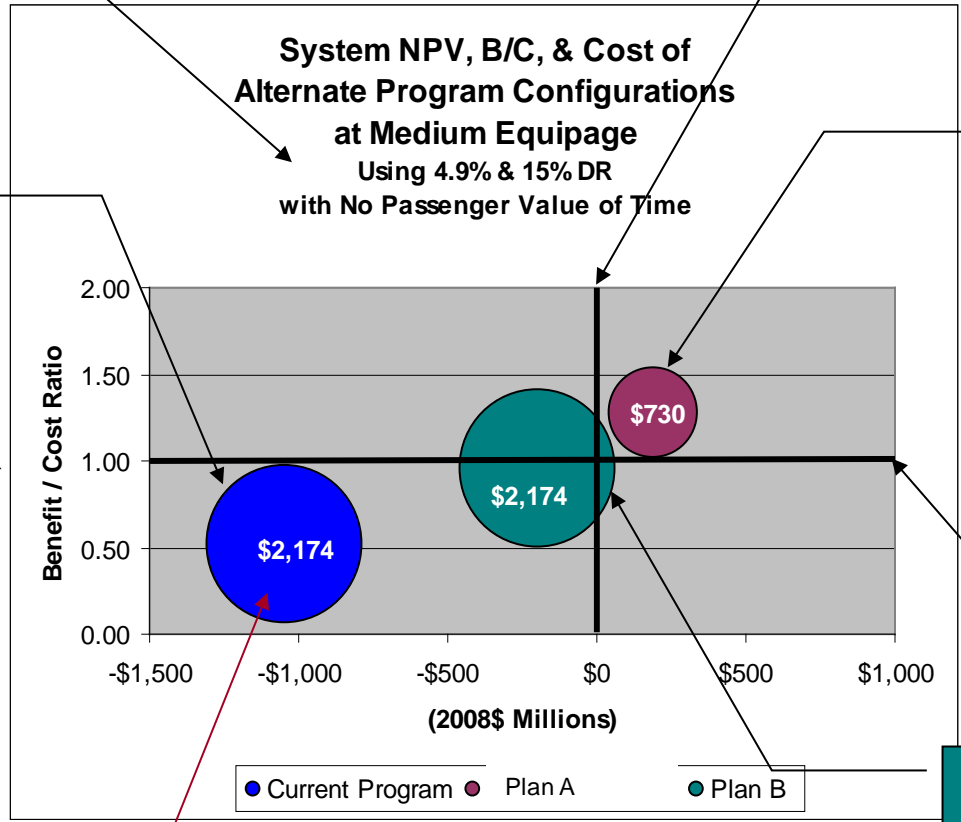
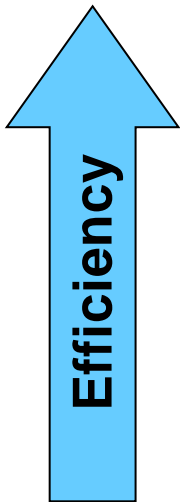


Objective – Making Better Decisions

Example of a program-level analysis – objective is to scale process to portfolio-level analysis

Computed for the medium equipage profile

Current Program has negative value and efficiency



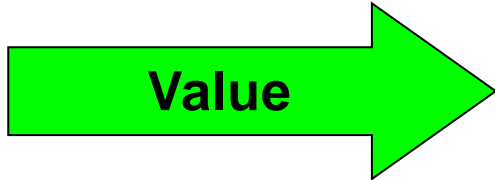
Net present value breakeven

Plan A generates positive value and efficiency at one third the cost of the current program

Cost / benefit breakeven

Plan B also has negative value and efficiency; but is better on both metrics than current program

Present value of ATO and airline Cost



Methodology – Connecting the Dots

Postulate alternate capability portfolios:

- Expected airspace user profiles
- Target airspaces and operations
- Conceptual architectures to deliver capabilities and their costs
- Portfolio operational effects

Apply official data sources:

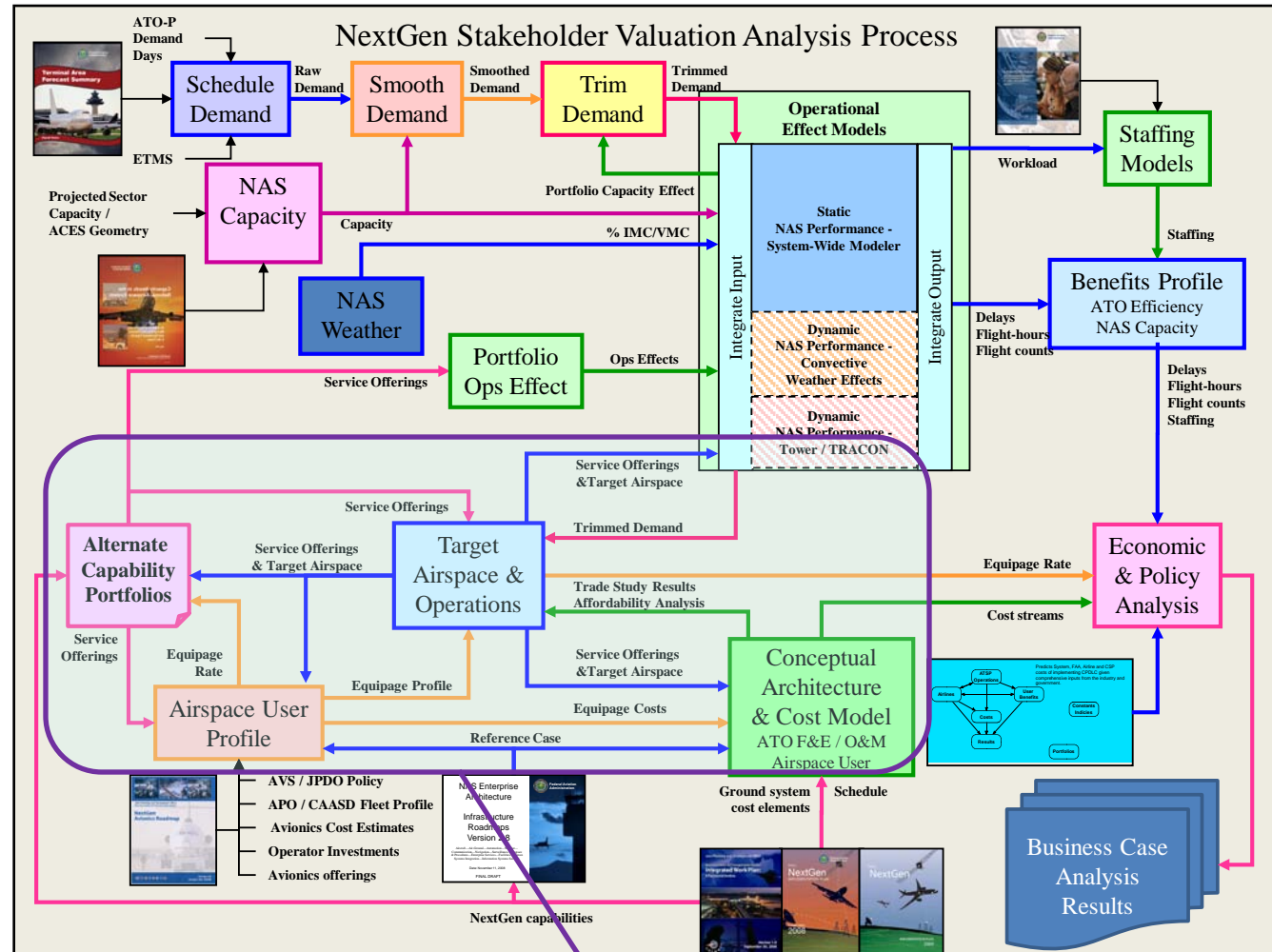
- FAA NextGen Implementation Plan
- JPDO Integrated Work Plan
- JPDO Avionics Roadmap
- FAA NAS Enterprise Architecture
- FAA Capacity Needs of the NAS
- FAA Terminal Area Forecast
- FAA Plan for the Future

Simulate operational effects:

- Interaction of projected demand with capacity effects of alternate capability portfolios
- Collect key metrics

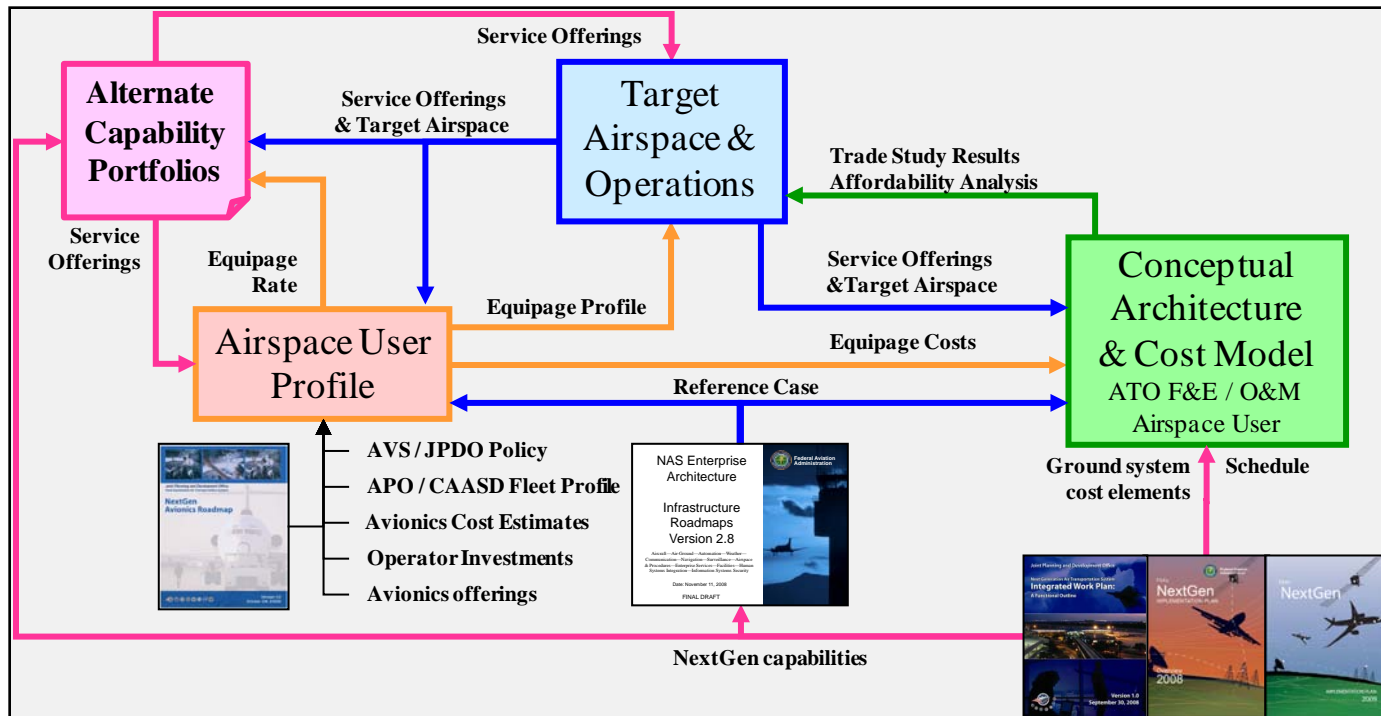
Conduct economic analysis:

- Model the cash flows of investing stakeholders
- Evaluate the economic and policy implications of alternate capability portfolios for a range of stakeholders



Significant recursive analysis is required to find viable solutions

Portfolio Definition – Value & Performance



- The first—and crucial—step in business case analysis is postulating an investment
 - Portfolio needs to address the set of target improvements and the constraints within which the analysis is set
 - Given a target portfolio, capital and operating costs need to be identified

Portfolio of Operational Improvements



Problem	NGOps-1	NGOps-2	NGOps-3	NGOps-4	NGOps-5
Hazard Avoidance & Mitigation		OI-0332 Ground-Based and On-Board Runway Incursion (without alerting)	OI-0332 Ground-Based and On-Board Runway Incursion (with alerting)		
Delegated Separation				OI-0326 Airborne Merging & Spacing - Single Runway plus MMC CAVS OI-0333 Improved Operations to Closely Spaced Parallel Runways	OI-0381 GBAS Precision Approaches & IMC CAVS
Published Routes & Procedures	OI-0343 Reduced Separation - High Density En Route, 3-mile	OI-0325 Time-Based Metering Using RNP and RNAV Route Assignments OI-0330 Time-Based and Metered Routes with OPD (high-density airports) (moderate density) OI-0307 Integrated Arrival / Departure Airspace Management (moderate density)	OI-0339 Integrated Arrival / Departure and Surface Traffic Management		OI-0330 Time-Based and Metered Routes with OPD (high-density airports) [Provides the capability to do OPD at nearly all airports by providing vertical containment and the precise metering in high-density traffic.]
Negotiated Trajectories		OI-0358 Trajectory Flight Data Management	OI-0360 Automation-Assisted Trajectory Negotiation		OI-0369 Automated Negotiation / Separation Management
Air Traffic Management Efficiencies		OI-0352 Automated Clearance Delivery and Frequency Changes			

Portfolio Enablers: Aircraft Systems



Enabler	NGOps-1	NGOps-2	NGOps-3	NGOps-4	NGOps-5
A/G voice (# radios)	VHF DSB AM 25kHz channel spacing (2)				No change modeled [may be FCS]
A/G data (#)	ACARS (1)	Shared ATS / AOC VDL Mode-2 (1)			ATS-specific subnet (2)
Data Link Applications	PDC and FANS	ATN Baseline 1 (CMU or FMS)	ATN Baseline 1 integrated with FMS		SC-214 applications integrated with FMS
Lateral conformance	RNAV-2 En Route RNAV-1 Terminal RNP-.3 Approach	RNAV-2 En Route RNP-1 Terminal RNP-.3 Approach	RNP-2 En Route RNP-1 Terminal RNP-.3 Approach w/ RF leg		RNP-1 En Route RNP-.3 Terminal RNP-.11 Approach
Vertical conformance	Uncoupled VNAV				Coupled VNAV
Speed conformance	Uncoupled auto-throttle, Single RTA, tolerance of +/- 30 seconds				Coupled auto-throttle; multiple RTAs, tolerances of +/- 10 seconds
Missed approach	RNAV-1 equivalent containment		RNP-1 equivalent containment		RNP-.3 equivalent containment
ADS-B In (display)	NA	Non-FFOV [Class 2 EFB] display for surface situational awareness applications		FFOV for ASAS CSPO Applications & IMC CAVS [Class 3 EFB] Non-FFOV for M&S & MMC CAVS	
ADS-B out	DO-260A (as per NPRM)				
Positioning	GPS or DME-DME-IRU		GPS TSO 129a		TSO C145C (SBAS)
TCAS	TCAS Change 7			NextCAS	

Portfolio Enablers: ATM Systems



Enabler	NGOps-1	NGOps-2	NGOps-3	NGOps-4	NGOps-5
En route applications	Conflict probe	Conflict resolution Initial data link apps		Enhanced conflict resolution Sector action list	Automation responsible for separation Adv data link apps
Terminal applications	Enhanced infrastructure and DSTs	Initial data link apps			Adv data link apps
Tower applications	Enhanced infrastructure and DSTs	Advanced surface traffic mgmt applications	Integrated Arrival and Departure		Adv data link apps
TFM applications	Reroute impact assessment	Simple congestion resolution	Complex congestion resolution		
Weather applications	Legacy applications & infrastructure	Enhanced applications	Enhanced infrastructure		
A/G voice network	Switched NVS				IP-addressable NVS
A/G data link subnet	Shared commercial service provider subnet				ATS-specific subnet
G/G data network (SWIM)	Weather and flow	Flight data		Surveillance data	
ADS-B network	Current ADS-B network topology			Additional sites	
Airspace	Big airspace	Initial performance-based airspace	Adv performance-based airspace	Full trajectory-based operations airspace	
Positioning	GPS / DME-DME / IRU				SBAS / GBAS

Conclusions



- **Key conclusions presented in this paper are:**
 - **Building business cases that capture the key characteristics of joint investments—such as NextGen—in a credible and transparent manner that meets the decision making needs of investing stakeholders is a critical step.**
 - **The aviation community has succeeded in achieving this critical step previously in the NAS (C/AFT) and currently in other regions (European Union).**
 - **A methodology can be developed that captures the essential characteristics of NextGen; and, a tool can be developed to evaluate those characteristics in order to generate a viable business case.**

Next Steps



- **The NVS team is continuing its work to refine and apply this methodology in order to evaluate alternate NextGen portfolios. In forthcoming papers, the NVS team will report on:**
 - **Simulation results for alternate portfolios**
 - **Business case analysis modeling approach**
 - **Trade space considerations associated with alternate portfolio configurations**