EAD Portfolio Analysis: Dependency and Diversification in the NGATS Portfolio

Dan Goldner (Ventana Systems, Inc.)
Jack Fearsides (MJF Strategies)
18 July 2006
Attributes of an OI

1. What constraint(s) does the OI address?
   We labeled OIs as having an effect on one or more of the following considerations: noise, emissions, runway capacity, terminal airspace capacity, enroute capacity, oceanic capacity, bad-weather capacity, landside capacity, airport surface capacity, certification capacity, security, safety, cost

2. What R&D activities are required for the OI to be implemented?
   PMD provided us with a list from Ed Koenke et al. of 97 R&D topics distilled out of the Agency Budget Guidance and associated with OIs from an old roadmap. Starting from Koenke’s mapping, JF labeled each OI with one or more of the 97 R&D activities required to produce the OI.

3. Which of the other OIs are prerequisites to the OI?
   Based on the descriptions of each OI from the Roadmap, JF labeled each OI with any other OIs that seemed to be prerequisites.

4. What enabling systems or infrastructure are required?
   These were provided for many OIs in the Roadmap. For the remaining OIs, we assumed “none”.

IMPORTANT NOTE: Our choices for each OI of constraints addressed, R&D tasks required, prerequisite OIs, and enabling infrastructure are our best estimate from the information provided, but we consider them to be PLACEHOLDERS pending a thorough review by the IPTs via PMD.
Noise OIs, R&D

Noise

seg 0 seg 1 seg 2 seg 3 seg 4 seg 5 seg 6 seg 7

oi077 → oi085
rd068 → oi084
oi078 → oi083 → oi088
oi075 → oi076 → oi081
rd056
rd055
rd060
oi082 → oi086 → oi089 → oi090 → oi091
Runway OIs, Platforms, and R&D
Enroute OIs, Platforms and R&D

- CDTI/MMD
- ADS-B
- Data link
- SWIM
- SDN
- SDP

- ERAM
- <oil106>
- <oil107>
- <oil109>
- <oil139>
- rd079
- rd068
- rd055
- oil187
- oil160
- oil123
- oil124
- oil120
- oil137
- oil121
- oil125
- oil126
- oil140
- oil142
- oil122
- oil141
- oil145
- oil127
- oil128
- oil129
- oil130
- oil127
- oil130
- oil130
- oil130
- oil130
- oil130
- oil130
Weather OI’s and Platforms

- Ground vortex sensors
- A/C wx sensors
- Ground wx sensors
- UAT FIS-B
- Space Wx Sensors
- SWIM
- NEXRAD
- A/G datalink
- NEO
- Data link
- Wx NEO Dissemination System
- FIS-B
- NEXRAD

- Weather OI’s and Platforms

- A/C wx sensors
- Ground vortex sensors
- Ground wx sensors
- UAT FIS-B
- Space Wx Sensors
- SWIM
- NEXRAD
- A/G datalink
- NEO
- Data link
- Wx NEO Dissemination System
- FIS-B
- NEXRAD

- Weather
- A/C
- Ground vortex sensors
- A/G datalink
- NEO
- Data link
- Wx NEO Dissemination System
- FIS-B
- NEXRAD

- seg 0
- seg 1
- seg 2
- seg 3
- seg 4
- seg 5
- seg 6
- seg 7

- oi001
- oi002
- oi003
- oi004
- oi005
- oi006
- oi008
- oi009
- oi010
- oi012
- oi013
- oi014
- oi015
- oi016
- oi017
- oi018
- oi019
- oi020
- oi021
- oi022
- oi023
- oi024
- oi025
- oi026
- oi027
- oi028
- oi029
- oi030
- oi031
- oi032
Weather OIs, platforms, and R&D

Ground vortex sensors
- UAT FIS-B
- Ground wx sensors
- Weather
- A/G datalink
- NEO

A/C wx sensors
- Weather OIs, platforms, and R&D
- FIS-B

Space Wx Sensors
- Weather OIs, platforms, and R&D

Data link

NEXRAD

SWIM

Weather OIs, platforms, and R&D

UAT FIS-B

Ground wx sensors

Weather

A/G datalink

NEO

FIS-B

Wx NEO Dissemination System

Data link
Similar structures (not shown) exist for:

- Terminal
- Landside (people, baggage, cargo)
- Surface Movement of Aircraft (taxiing etc)
- Oceanic
- Certification
- Security
- Safety
This model estimates capacity as a function of the % complete and the success of R&D, platform, and OI tasks and the % of the fleet equipped for each platform.
Task Completion

- Fraction planned benefit expected
- Fraction task complete
- Spending
- Burn rate
- Planned duration
- Benefit vs completion Pareto

**Current task is active**

<table>
<thead>
<tr>
<th>Task ID</th>
<th>Start Year</th>
<th>Completion Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>oil03</td>
<td>2006</td>
<td>2011</td>
</tr>
<tr>
<td>oil18</td>
<td>2016</td>
<td>2020</td>
</tr>
<tr>
<td>oil19</td>
<td>2016</td>
<td>2020</td>
</tr>
<tr>
<td>oil149</td>
<td>2016</td>
<td>2020</td>
</tr>
<tr>
<td>oil152</td>
<td>2016</td>
<td>2020</td>
</tr>
<tr>
<td>oil161</td>
<td>2016</td>
<td>2020</td>
</tr>
<tr>
<td>oil163</td>
<td>2016</td>
<td>2020</td>
</tr>
<tr>
<td>oil168</td>
<td>2016</td>
<td>2020</td>
</tr>
</tbody>
</table>

Time (fy):

- 2006
- 2009
- 2012
- 2015
- 2018
- 2021
- 2024

Copyright © 2006 Ventana Systems, Inc.
OI Effectiveness

OI162 realized benefit (with prereqs)

rd072 realized benefit
dmnl
rd078 realized benefit
dmnl
rd079 realized benefit
dmnl
ADS-B realized benefit
dmnl
CDTI/MMD realized benefit
dmnl
oi167 realized benefit
dmnl
oi162 realized benefit
dmnl

Copyright © 2006 Ventana Systems, Inc.
Magnitude of Potential Constraint Change

- Starting value for noise, emissions, runway and enroute from Constraints Analysis 3/06
- Starting value for other constraints unknown, TBD (constraints analysis)
- Ending values unknown, TBD (portfolio analysis)
Overall Capacity

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1,000</td>
</tr>
<tr>
<td>2009</td>
<td>1,500</td>
</tr>
<tr>
<td>2012</td>
<td>2,000</td>
</tr>
<tr>
<td>2015</td>
<td>2,500</td>
</tr>
<tr>
<td>2018</td>
<td>3,000</td>
</tr>
<tr>
<td>2021</td>
<td>3,500</td>
</tr>
<tr>
<td>2024</td>
<td>4,000</td>
</tr>
</tbody>
</table>

Constraint levels:
- Emissions: 1
- Enroute: 2
- Landside: 3
- Noise: 4
- Runway: 5
- Surface: 6
- Terminal: 7
- Weather: 8

Copyright © 2006 Ventana Systems, Inc.
Model also calculates consumer surplus and NPV.
"... gang aft agley"

1. Assumed PDF of Intrinsic Task Success

2. Resulting Fractions Benefits Realized

3. Resulting Capacity PDF (rpm/yr)

3. NPV through 2025 (M$)
Success in one constraint does not make up for failure in another.