ETM Operator Data Needs

Moderator: Jaewoo Jung

Questions:

What types of data do ETM operators need and for what purpose (e.g., conflict resolution)?

From where would this data be sourced and what are some potential methods for exchanging it?

Standardization of data exchange is critical to the extent possible. How can we standardize the data and its exchange?

Top 3 Outcomes:

1. ETM operators need the following types of data
   - Mission profile, for business-level negotiation
   - Operational intent, for deciding ways to resolve conflict (e.g., ETAM, like NOTAM)
   - Contingency information
   - Airspace constraints

2. ETM operators could get the needed data and exchange data in a similar way to UTM (e.g., ETM Service Supplier like USS)
   - The use of open-source weather should be fine but there may be a need to identify ones that were used for trajectory forecasting/operational intent 4D volume building

3. Standardized data should have the following attributes
   - Open format for data exchange and interoperability
   - Automated data integrity checking and ingestion
   - Use of definitive application programming interfaces (APIs)
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| What is purpose of the operational intent (OI)? What functions will the operational intent need to support?  
• To generate accurate intent conflict probability that Cooperative Operating Practices (COPs) can rely on?  
• To minimize the 4D intent volume within which the operation is expected to occur?  
• Is time-efficiency in calculating the intent conflict probability important?  
• To integrate with flight-plan-based operations (transit from/to class A)? |
| What information should the operational intent include?  
• Basic intent model parameters (e.g. for the flight-plan-based intent model needs 4d waypoints, flight modes, wind uncertainty, and vehicle trajectory performance)  
• The pre-defined agreement (for COPs attribute 2), negotiation protocols (for COPs attribute 3), and off-nominal procedures includes as well? |
| What are the considerations for determining look-ahead horizons and update intervals for the operational intent?  
• Should its duration covers the entire mission to cover long-horizon decision making (e.g. demand & capacity balancing)?  
• How frequent should the operators update the operational intent?  
• Should the operators who update their intent more frequently have some priority? |
| How should we standardize the operational intent model?  
• Inputs (wind data, intent model data)?  
• Intent modeling method and intent conflict probability calculation?  
• Update rate and look ahead time (gaming if not the same update rate, more frequent more efficiency)?  
• Outputs? |
### Top 3 Outcomes (examples for now):

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<td><strong>1.</strong></td>
<td>What is purpose of the operational intent (OI)? What functions will the operational intent need to support?&lt;br&gt;• Challenges in current operations: See and Avoid requirements for sunglider; various procedures at difference centers&lt;br&gt;• Sharing operational intent is critical for ETM&lt;br&gt;• Effective way to coordinate with others and needed for planning and intent deconfliction</td>
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<td><strong>2.</strong></td>
<td>The operational intent data requirement should include:&lt;br&gt;• Basic intent model parameters (e.g. for the flight-plan-based intent model needs 4d waypoints, flight modes, wind uncertainty, and vehicle trajectory performance, mission type)&lt;br&gt;• The pre-defined agreement (for COPs attribute 2), negotiation protocols (for COPs attribute 3), and off-nominal procedures includes</td>
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<td><strong>3.</strong></td>
<td>How should we standardize the operational intent model?&lt;br&gt;• Inputs: wind data source(nowcast, forecast, intent model data&lt;br&gt;• Intent modeling method and intent conflict probability calculation&lt;br&gt;• Update rate and look ahead time&lt;br&gt;• Output data format</td>
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ETM Services and Architecture
Moderator: Jeff Homola

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<td>What core service functions do ETM operators need to support high altitude operations?</td>
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<td>What additional services may be needed?</td>
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<td>How might an ETM architecture integrate with the NAS and its associated air traffic services?</td>
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Services should contribute to creating a “known environment” for operators
• Deconfliction & planning, strategic & tactic (but not too tactical)
• Provide and share trajectory prediction (operational intent), [be aware of proprietary information; Have a platform to communicate with other is big interest; collaborative approach will be the best;
• NOTAM about airspace activities and restriction (some non-cooperative vehicles are not visible to others?!)]
• Weather information would be helpful (may not be core services?!)
• Providing intent-conflict-free operational plans (conflict detection and deconfliction) to the operator is needed
• Negotiation service (vehicle maneuverability info; rules, agreements, negotiation through COPs)
• Need to balance what information is shared with business/proprietary aspect of operators
ETM Services and Architecture
Moderator: Jeff Homola

Top Outcomes

A weather service and the associated information on atmosphere and wind is very important to the planning and operations in Upper Class E
- Desire to have collaborative/contributory sharing of data amongst operators in real time
- Need to drive further research and understanding of the weather environment in the stratosphere

Contingency management service to aid in the detection and alerting of situations to others that may be impacted in the airspace and for air traffic services.
- Need to provide situation awareness as early as possible
- Need a means to communicate situation, impact, and plans to others

Integration with the NAS:
- Minimize touchpoints
- ETM services need to provide predictability for air traffic services (i.e., how quickly can a situation be known and able to be acted upon)
- Flexible floor aspect of ETM concept to follow after further refinement of cooperative aspect of ETM
Considerations for Global Operations
Moderator: Faisal Omar

Questions:

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<tr>
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<td>If you operate outside the US, how is the airspace structure the same and/or different from that of the US?</td>
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<td>Have you operated across multiple Flight Information Regions (FIRs) and/or Civil Aviation Authorities (CAAs)? What are some considerations or best practices for managing the transition?</td>
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<td>With what Air Navigation Service Providers do high altitude operators interact (or expect to interact) outside the US? What is the nature of the interactions (e.g., what services do you receive from these ANSPs)?</td>
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<td>How do you see the weather services being provided inflight to operators between the different regions?</td>
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Top 3 Outcomes:

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<td>• Better understanding of the airspace structure/FIR and cost around the world.</td>
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<td>• Equipment and weather requirement across the different regions</td>
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<td>2.</td>
<td>Security (i.e., DOD/DHS) needs to be a focus.</td>
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<td>3.</td>
<td>Regulation for upper airspace at the different regions.</td>
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