A Framework for the Development of ATM-Weather Integration

Building on the Original ATM-Weather Integration Concept Diagram

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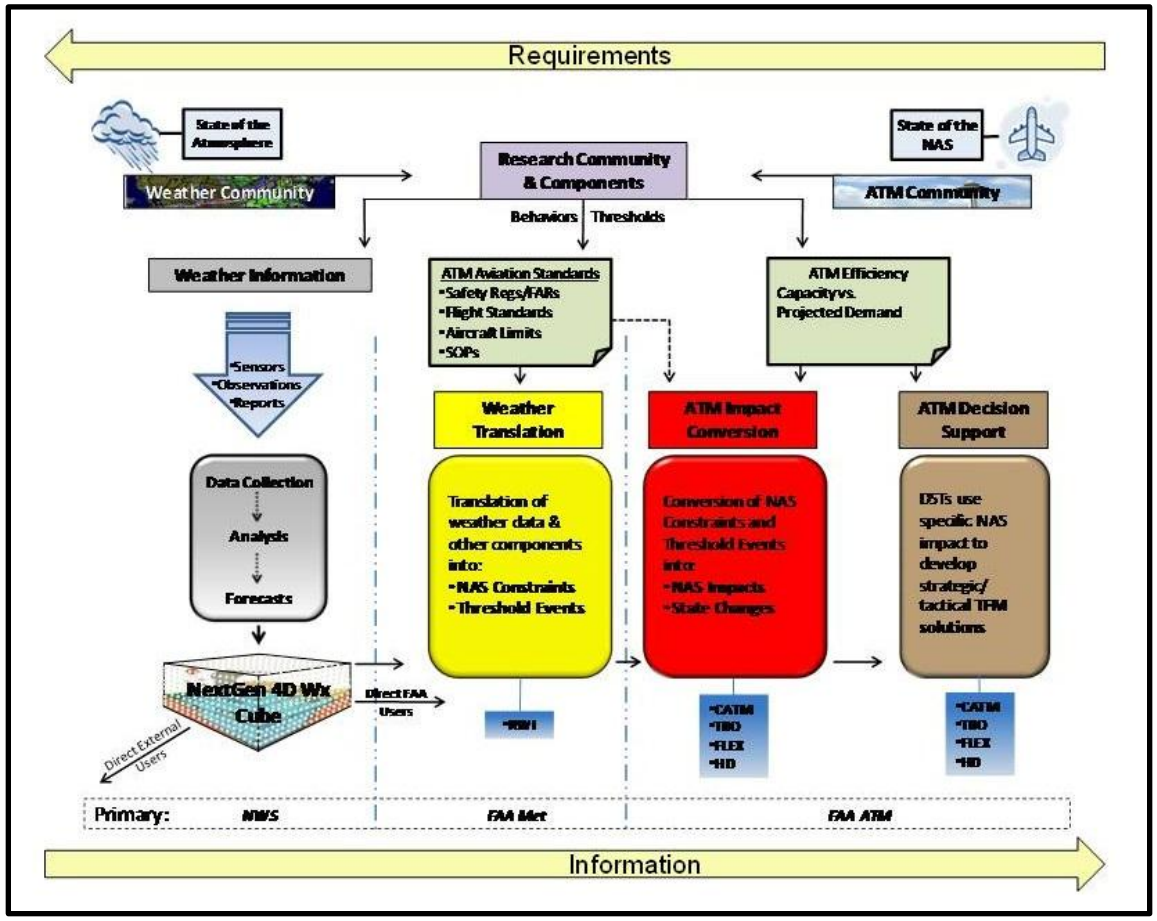
Background—Initial ATM-Weather Integration Diagram

- **The initial ATM-Weather Integration concept diagram was developed in 2010 and covered a narrow scope of functions and responsibility**



Motivation and Strategy

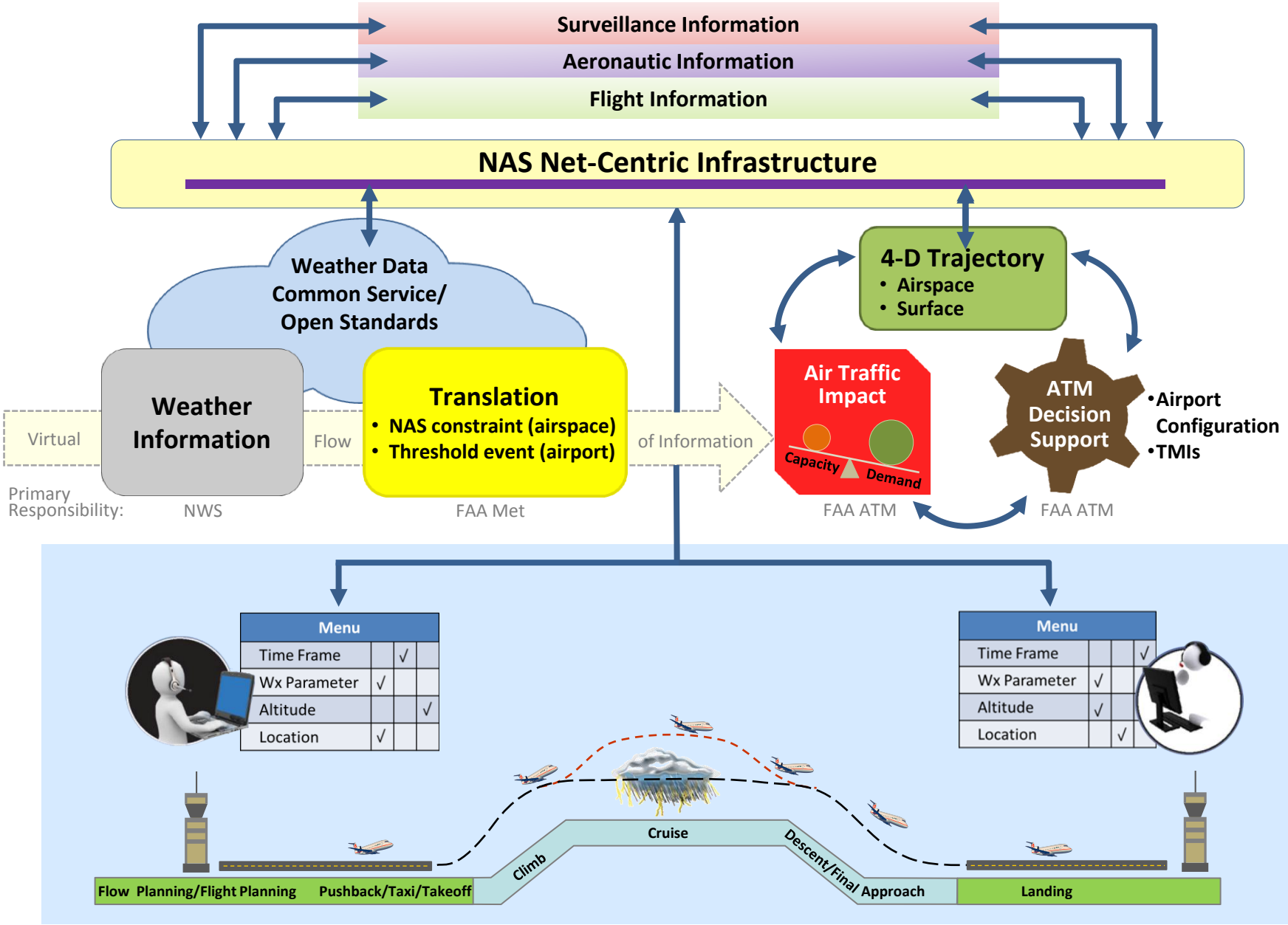
- Increased level of comprehension of ATM-Weather Integration since 2010
- However, still an incomplete understanding of many core ATM-Weather Integration functions and components
- A wider/system view is needed to facilitate broader understanding and continued evolution and discussion of ATM-Weather Integration
- Visual representations work well to generate discussion - “a picture’s worth a thousand words”

Creating a Framework for the Development of ATM-Weather Integration

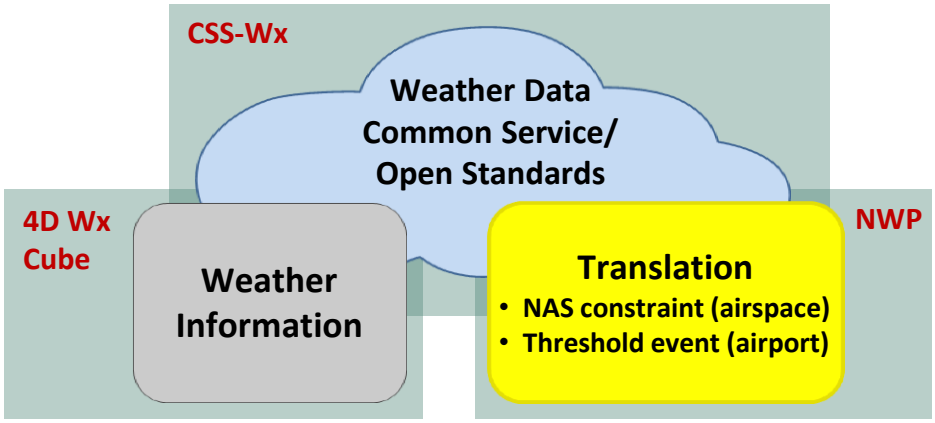
Framework Design Considerations

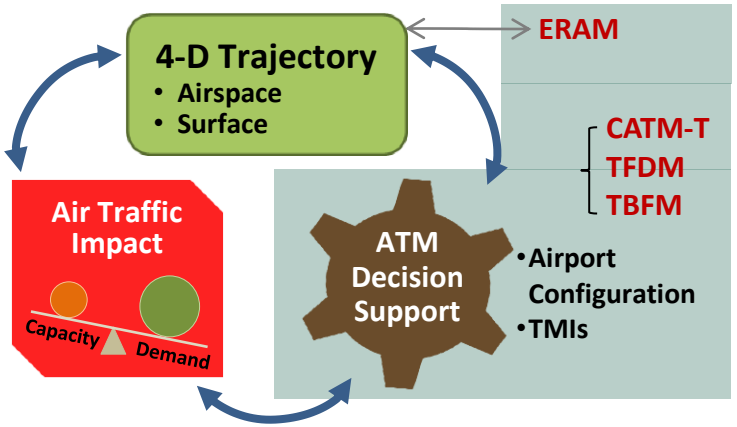
- **Echo the four ATM-Weather Integration functions in the 2010 diagram**
- **Focus on four-dimensional flight trajectory (4DT) – the impact of weather applied Gate-to-Gate**
- **Highlight the support to National Airspace System (NAS) operations**
- **Highlight key weather integration touch-points with external systems**
- **Include additional details necessary to facilitate the discussion and understanding of these cross-system interactions**

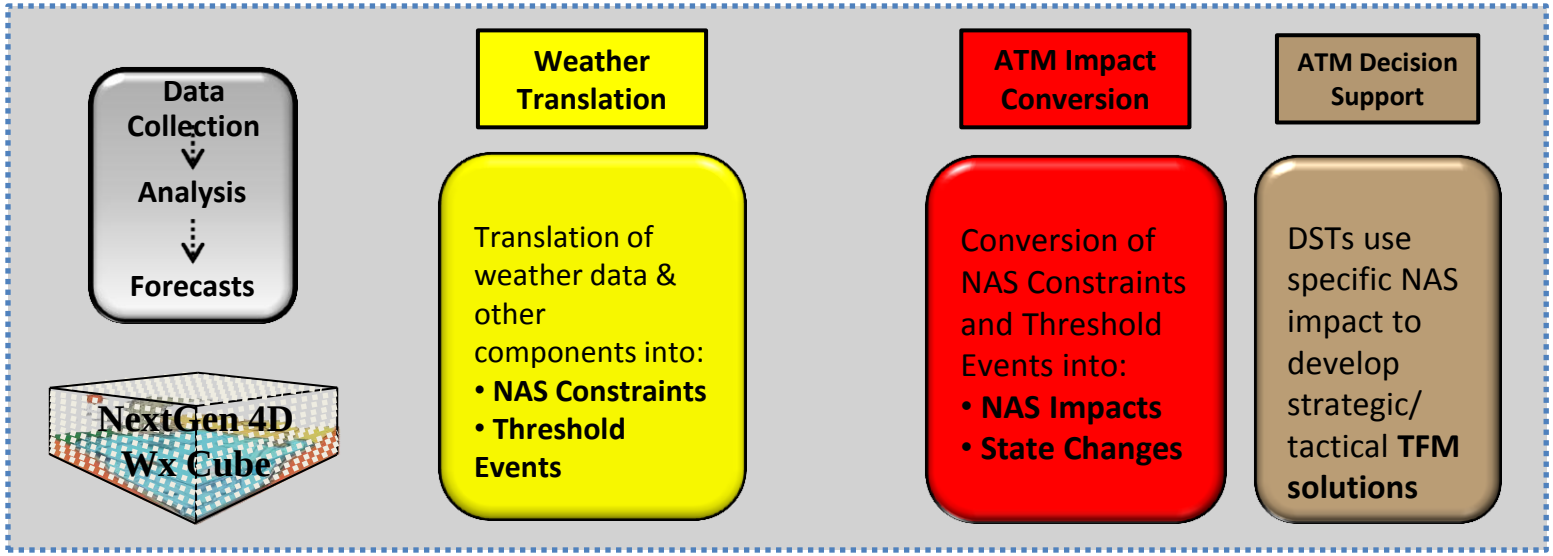
ATM-Weather Integration Development Framework



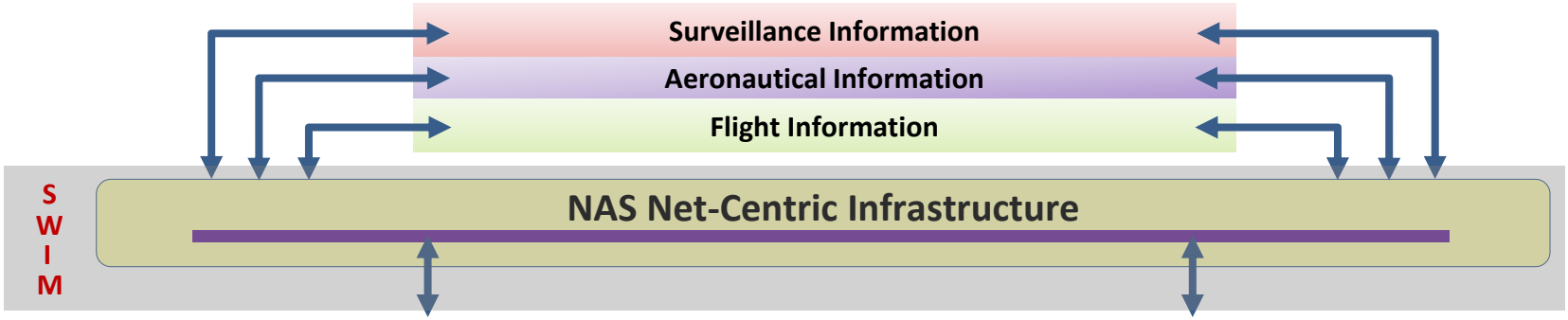
Alignment with Current ATM-Weather Integration Diagram







NAS Common Services and ATM-Weather Integration

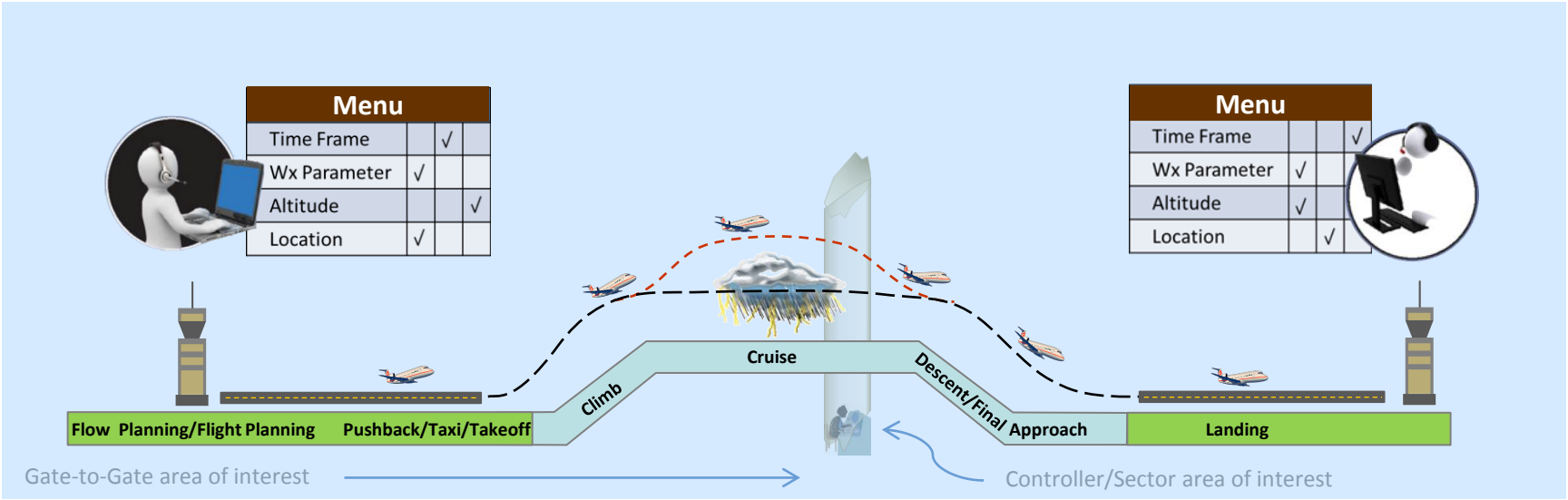


For DSTs to make the best possible recommendations they need information from several different sources – this information will be provided via one of the specified Common Services:

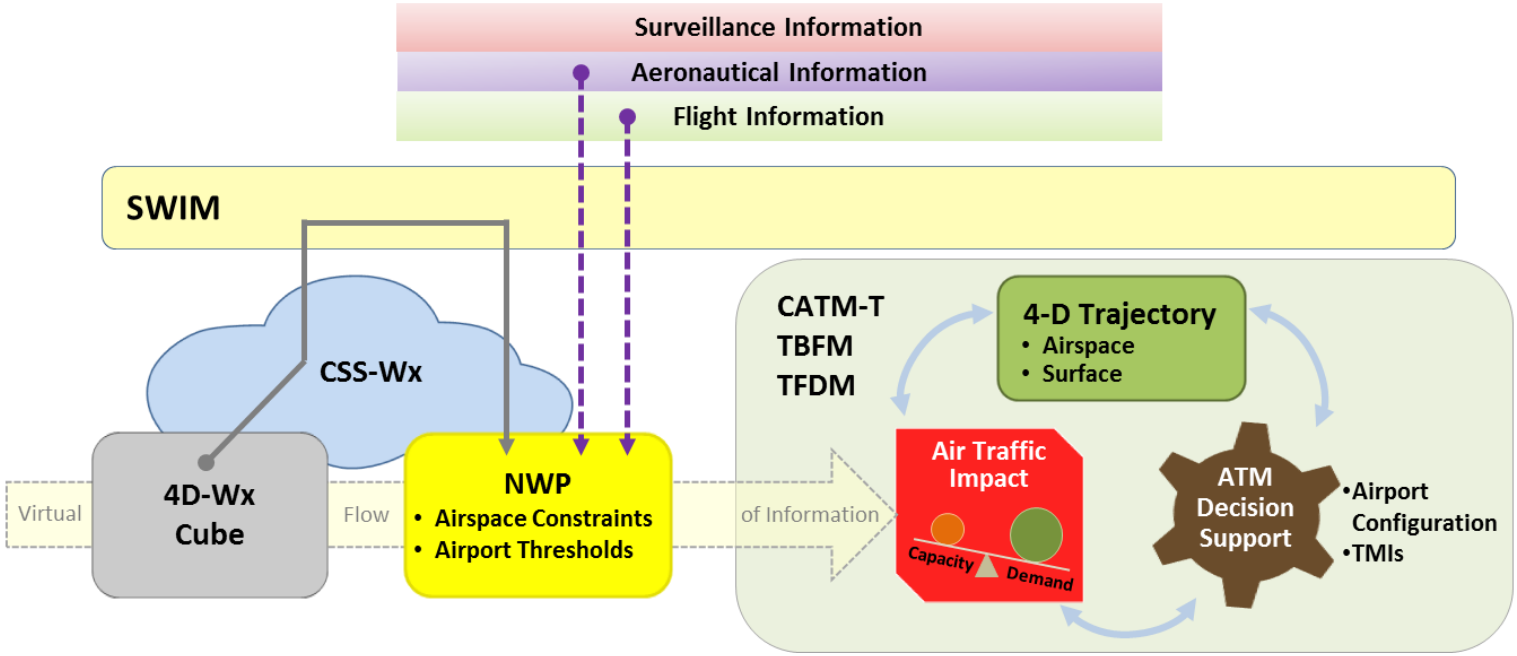
- **Flight Information**
  - **E.g., Crew Qualifications, Aircraft Equipage and Performance**
- **Aeronautical Information**
  - **E.g., Special Activity Airspace, Airport Status, and ARR/DEP rates**
- **Surveillance Information**
  - **E.g., ASDE-X, ADS-B, Radar**

ATM-Weather Integration and Operational Decision Making

- Operational view as it relates to the weather integration process
- Area of interest: Gate-to-gate vs. a slice of airspace or time
- Different decisions require different weather information
- Benefits of translated weather as a common service:
  - Common information provided to all subscribers (SAS/COP)
  - User subscriptions to targeted weather minimizes data size

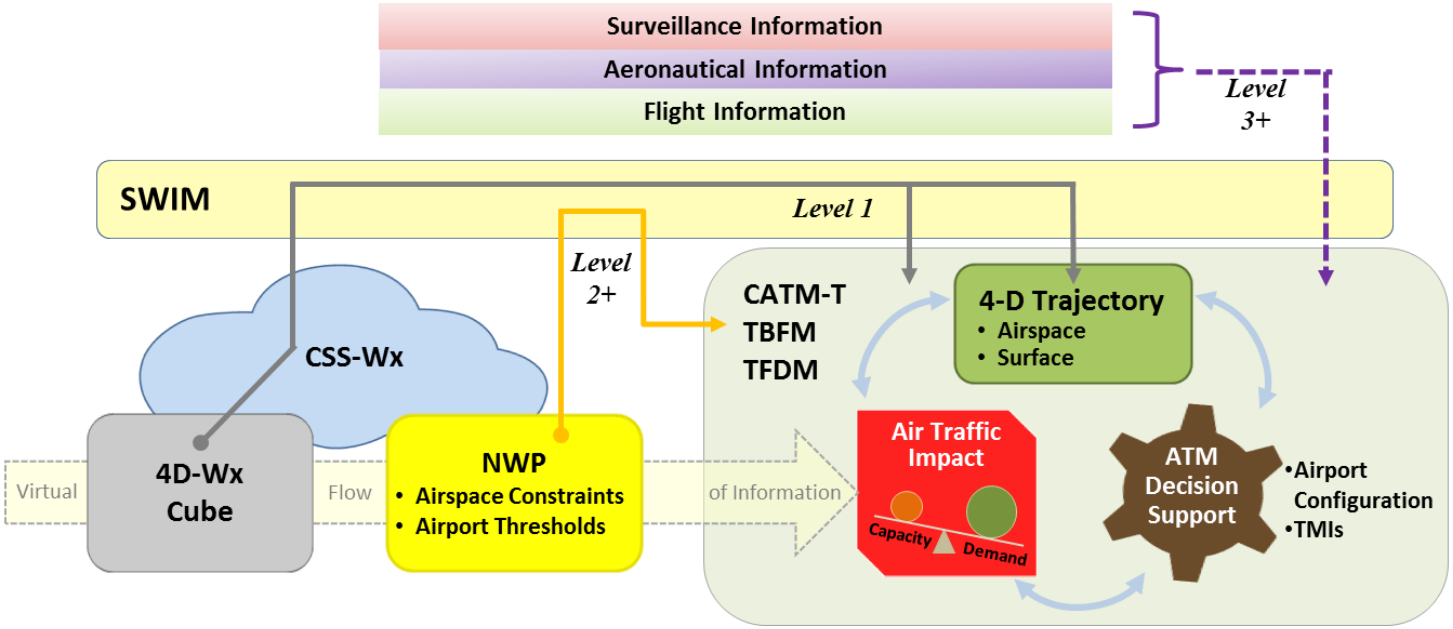


Example of Weather Information Flow for Translation



- Common service data such as historical traffic, airspace alerts, and runway configuration thresholds could be used to further refine airspace constraints and airport threshold events
- Aeronautical and Flight Information are not currently considered in Translation (dashed purple lines)

Example of Weather Information Flow for ATM Systems



- **Level 3 and above systems will need Surveillance, Aeronautical, and Flight information to determine impact**
- **Additional information (i.e., crew and aircraft capabilities, TMIs, and surveillance data) will help define both impacts and solutions**

Terminal Airspace Reconfiguration Example

ATCSCC Traffic Management Specialist Point of View

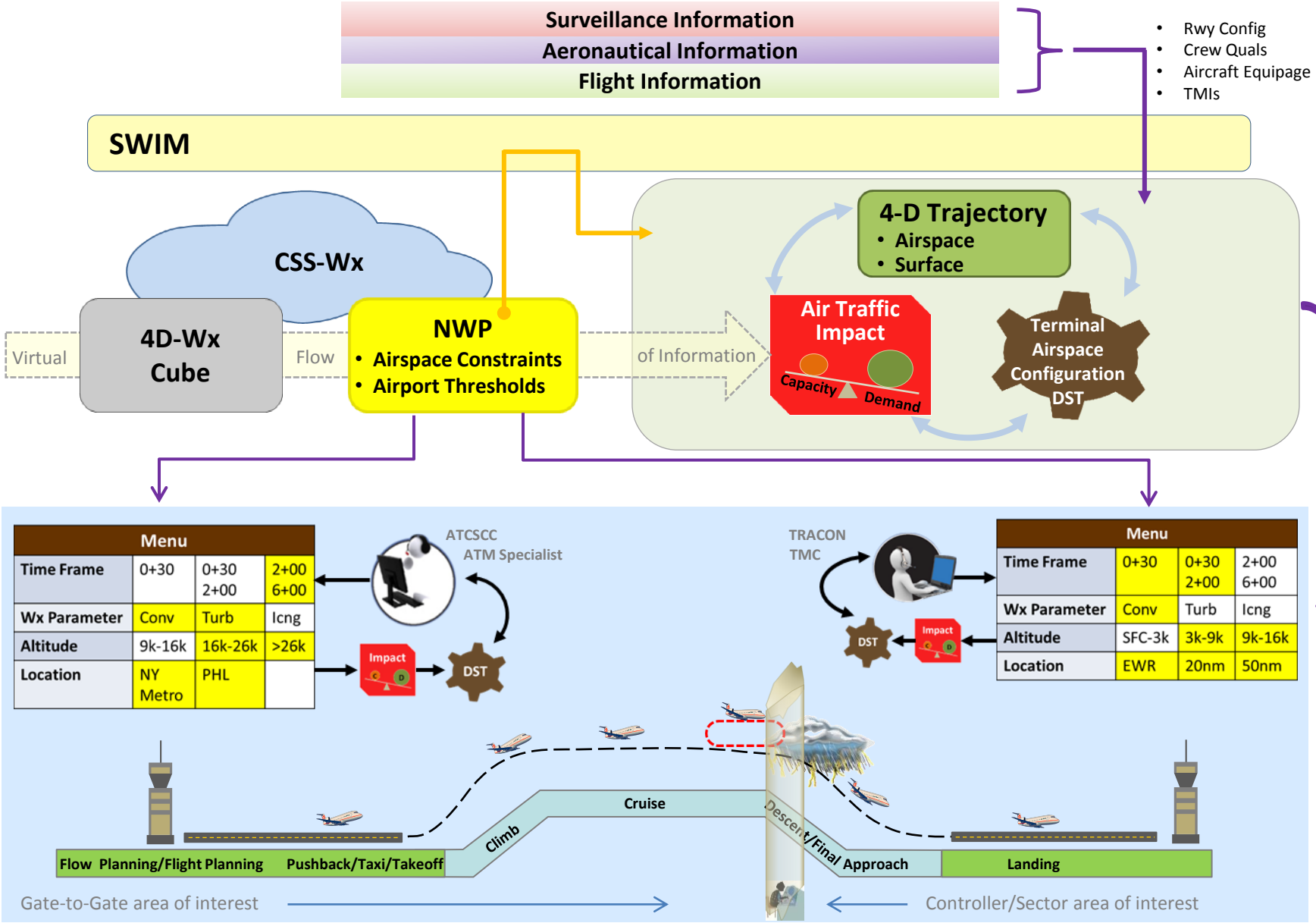
Example Decision

- **Will convective activity be a factor in the terminal airspace around Airport X or Metroplex Y today?**

Required Information (ATM-Weather Integration Level)

- **4-8 hour translated weather constraint forecast for convection in the terminal area with probability of occurrence (Level 2).**
- **Flight-by-flight impact calculations for the aircraft scheduled to operate into and out of the affected airport during the weather-impacted hours (Level 3).**
- **If demand and capacity are imbalanced; alternative airspace configurations to counteract the forecast convective weather constraint, and updated airport capacities associated with recommended TMIs (Level 4).**

Terminal Airspace Reconfiguration Example cont.



Summary

- We must understand how weather integration fits within the larger context of NextGen Enterprise Architecture
- The Devil is in the details!
  - How will additional Common Service data elements be applied to Translation, Impact, and Decision Support?
  - Single Translation source for surface threshold events?
  - Should a Weather Conflict Detection Service be developed?
  - Should a Weather Conflict Resolution Service be developed?
- Discussion and exploration must continue
- Utilizing weather information to determine ATM impact and subsequent problem resolution is a process that must be shared by the weather and ATM communities

Questions?