



The Operational Challenge

Pilots Inside the Environmental Architecture

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The Global Imperative

Projected Growth

➤ Traffic Numbers

- 28,600 aircraft by 2026 (Boeing 2007 forecast)
- China total fleet by 2026: 4,470 (Boeing 2007 forecast)
- Southwest Asia (includes India) total fleet by 2026: 1,260 (Boeing 2007 forecast)
- U.S. – almost 50% increase to 5,750 passenger aircraft between 2020 – 2025 (David Bonds)
- Europe: total fleet by 2026 7,660 aircraft (Boeing 2007 forecast)

**A DAY IN THE LIFE OF
AIR TRAFFIC OVER
THE CONTINENTAL U. S.**

ANIMATION CREATED USING

**FUTURE ATM CONCEPTS
EVALUATION TOOL
(FACET)**

**FOR
AVIATION SYSTEMS DIVISION
(AF)
NASA AMES RESEARCH CENTER**

Maintaining the Safety Margins.....

➤ 20% Rise in Traffic
Causes 140% increase
In runway incursion potential



Transport Canada

Aspirational Goals

- **ATA** – 30% Fuel Efficiency Improvement by 2025
- **IATA** – Trajectory toward carbon-neutral growth and carbon-free technology in 50 years
- **ACARE** -- Reduce fuel consumption and CO₂ emissions by a further 50%

Pilots Fly It

➤ SESAR == NEXTGEN == SESAR == NEXTGEN

- RNP - Single Engine Taxi
- RVSM - Meters == Feet
- RNAV - ETA/RTA
- Tailored Arrivals - RSAT
- ADS-B - SOIA
- ASDE-X - MARPS
- CDA - TMA
- EDA - CPDLC
- TASAT - FANS
- CDAP - X Y Z

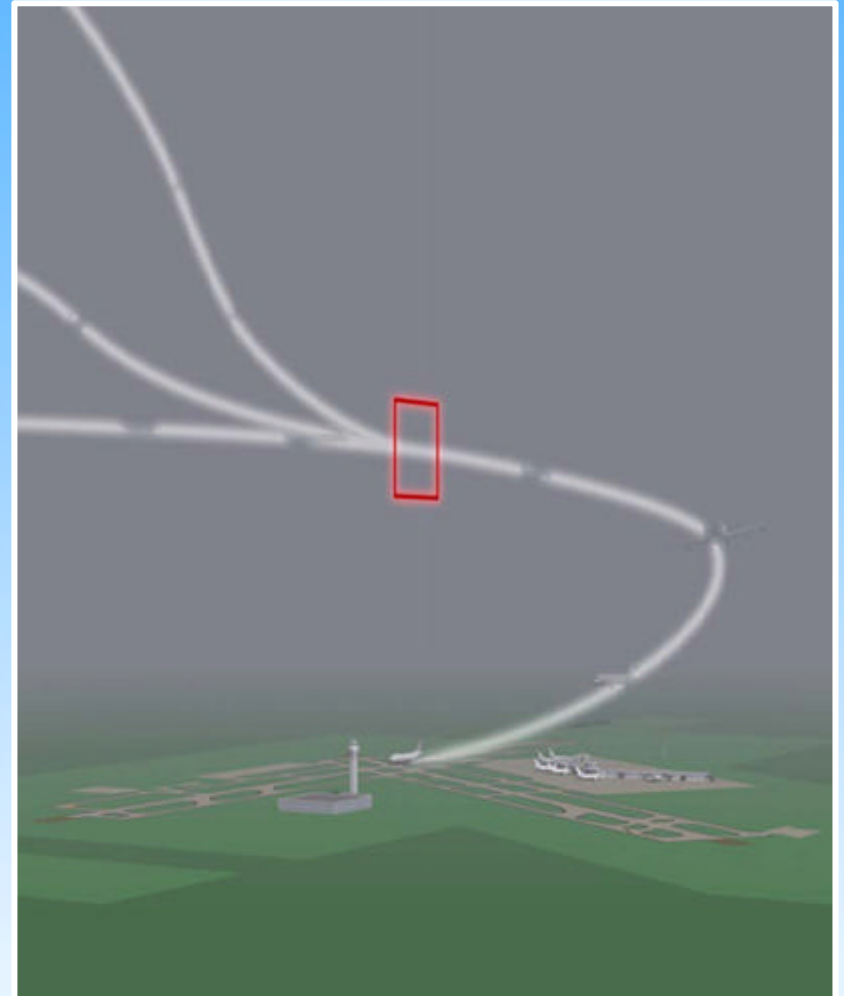
Whether capacity, economic or emissions driven, airspace must be integrated in order to maintain safety

The Need for ATM Improvement: NEXTGEN=SESAR Integration

- **Aspirational Goals** – Achievable with collaborative, industry wide effort
- **Technology** – new and existing
- **Operational Measures** – Development of worldwide SARPS, procedural design, testing charting, training, implementation by pilots in current fleets; must maintain safety standards!

Operational Measures – Global Standardization

- CDA's
- Optimized Descents
- RNAV/RNP
- ADS-B in and out
- RVSM
- Steeper than Normal Approach
- Deeper Cutbacks
- Single-engine taxi



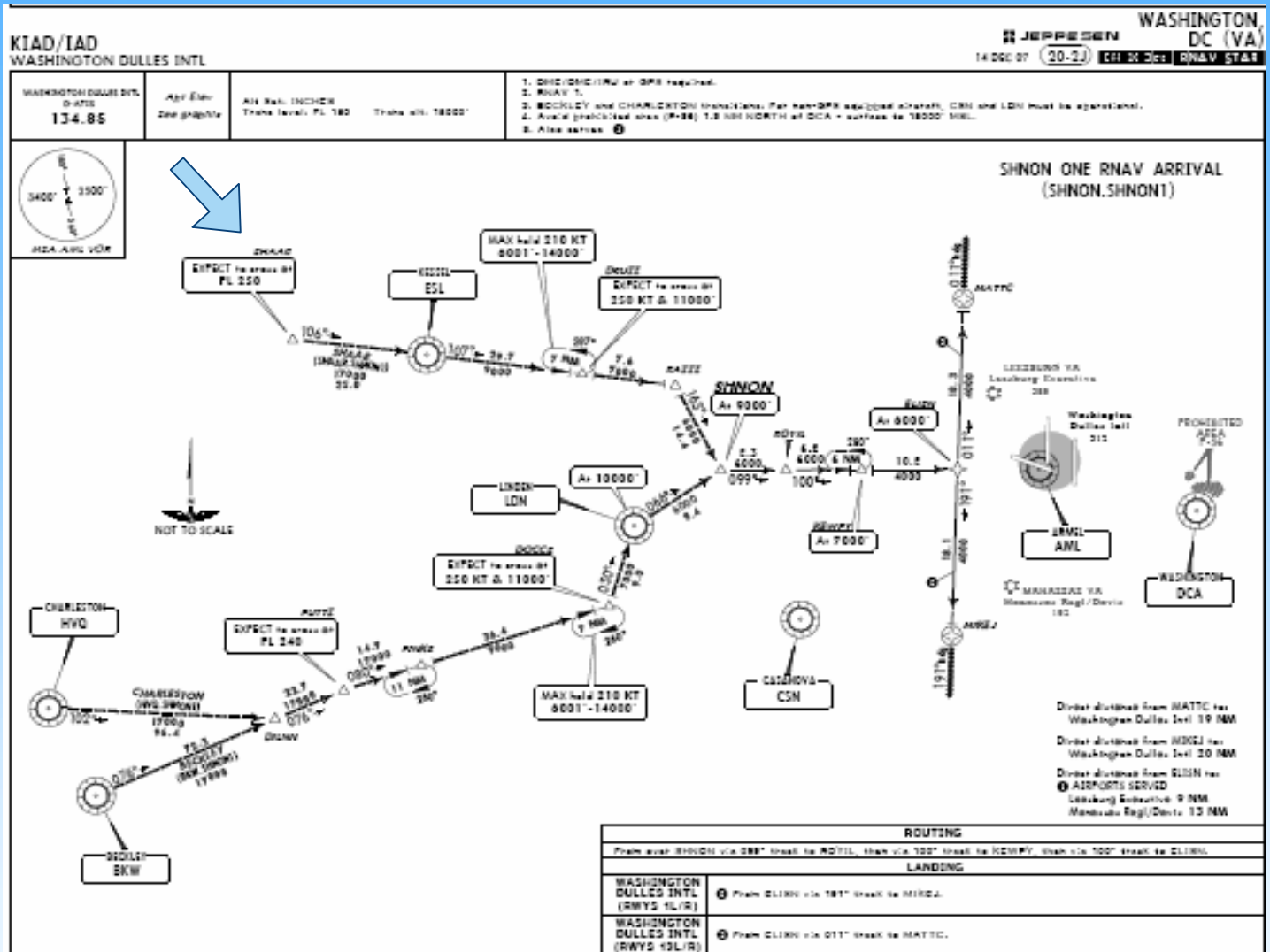
Technology -- Flight Management Systems

➤ Human Factors

- Human – Automation Interface
- Cumbersome Programming – easy to miss a step, hard and time-consuming to reprogram with revised clearance
- Unreliable path predictions – different speeds project different flight paths and descent points
- Unintended consequences



Stakeholder Input

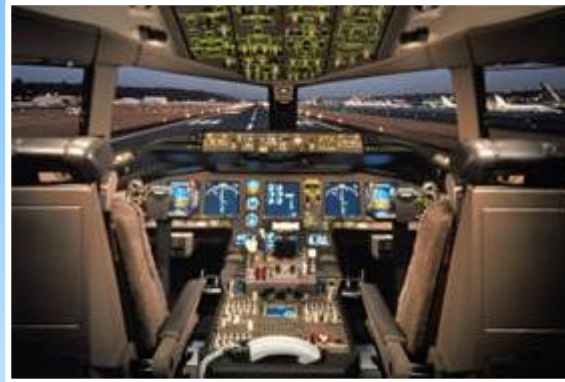


Strategic Lateral Offset



Center of the Architecture

Where technology and operational measures come together.....





The view from the cockpit.....

THANK YOU!

Questions??