



International Civil Aviation Organization

SIP/2012/ASBU/Dakar-WP/25

# Trajectory-Based Operations(TBO)

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Workshop on preparations for ANConf/12 – ASBU methodology  
(Dakar, 16-20 July 2012)

# OVERVIEW

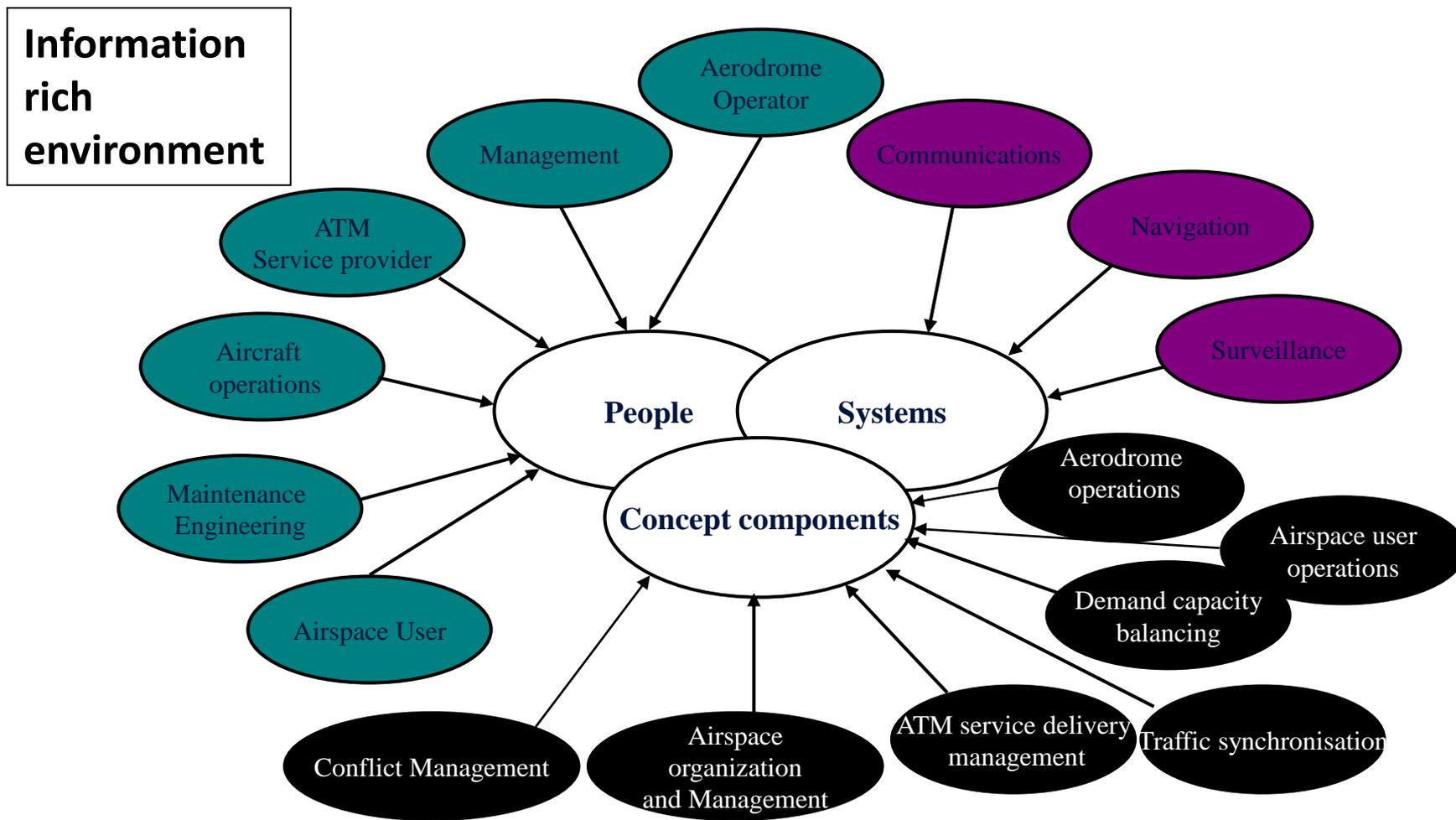
- Context
- Baseline
- Concept
- Applicability
- Capabilities
- Why TBO
- Procedures
- Checklist
- Dependencies



# Context

- **Traffic Synchronisation**
- **CM and DCB integrated**
- **Organized flow of traffic**
- **Flexible capacity management**
- **Adjustments in capacity to variations in demand**
- **Delegation of separation to flight deck reducing ground system workload**
- **Information rich environment.**

# Baseline

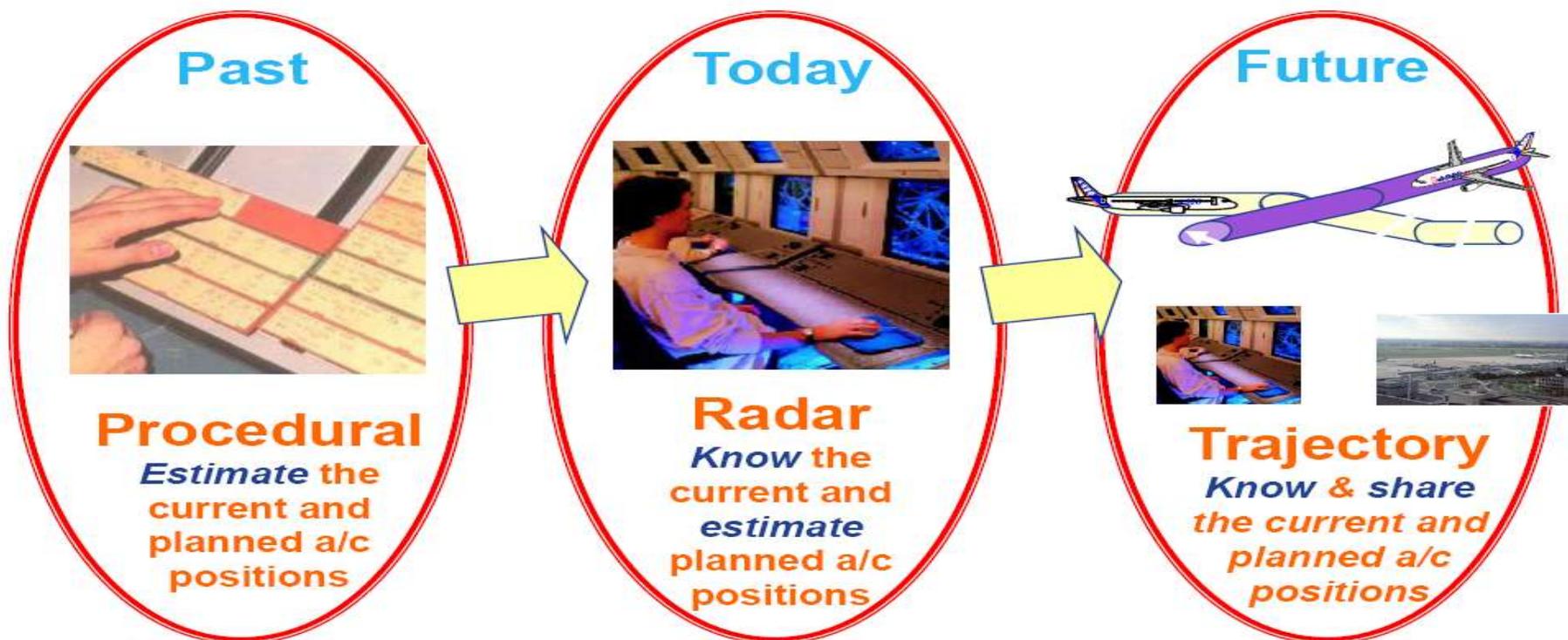


# Baseline

- **Shared four-dimensional trajectory**
- **Up-to-date information system wide**
- **Decision support tools**
- **Global ATM decision-making**
- **Procedures and automation capabilities, both ground-based and aircraft-based**
- **Accurate trajectories to benefit the system.**

# Concept

## The Paradigm Shift



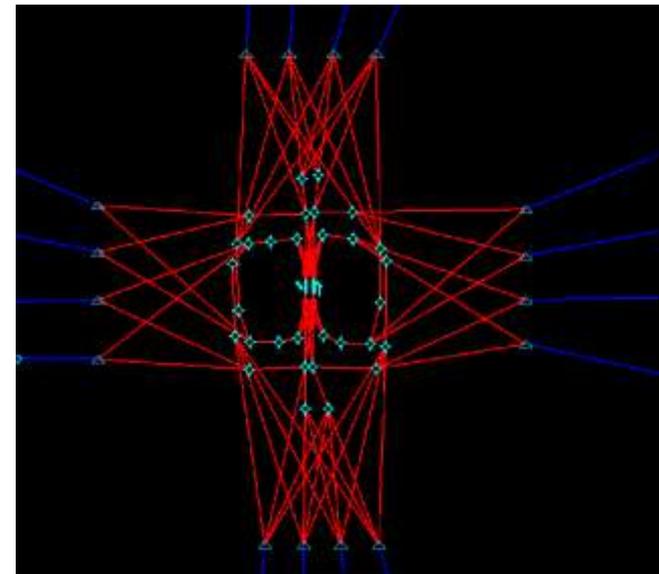
# Concept

- **4 dimensional continuum flight path based on points in time from gate-to-gate**
- **Ability of cockpit automation to fly the aircraft more precisely and predictably reduces routine tasks of controllers.**



# Applicability

- **Air traffic flow planning**
- **En-route operations**
- **Terminal operations (arrival/departure)**
  - aircraft equipage is assumed in the areas of:
    - ADS-B/CDTI
    - data communication and advanced navigation capabilities.

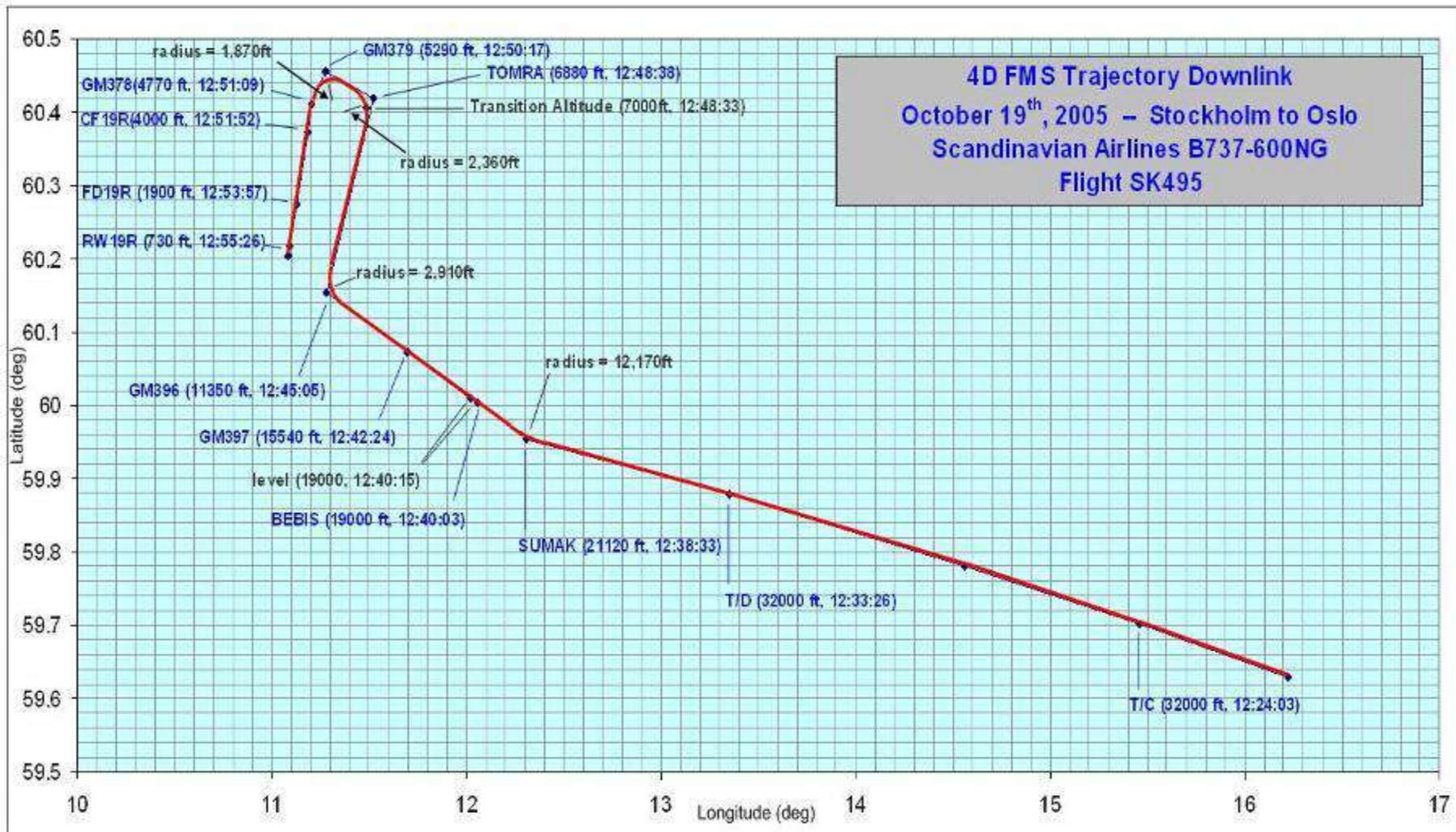


# Capabilities

- **Advance Aircraft Capabilities**
- **Problem Detection and Resolution**
- **Traffic Flow Management and Time-Based Metering**

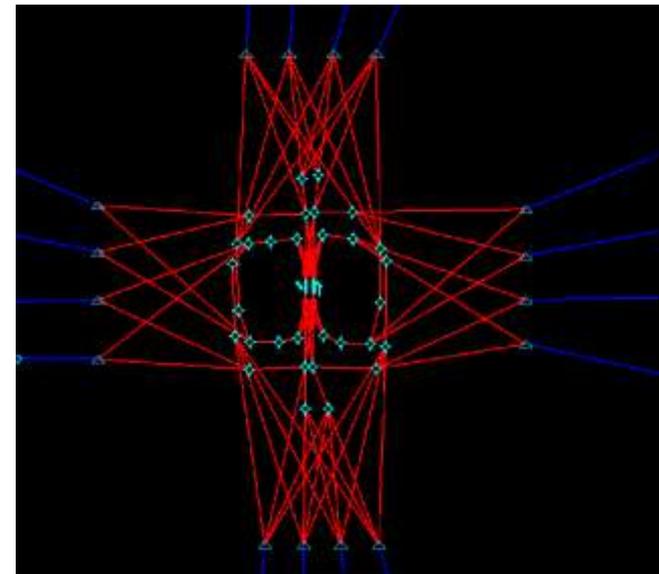


# Capabilities



# Why TBO

- **Greater capacity**
- **Better efficiency**
- **Improved safety**
- **Reduced fuel burn and CO2 emissions**



# Why TBO

- **Increased flexibility**
- **Better predictability**
- **Leverages the best of the ground automation and the performance of the aircraft.**

# Procedures

- **Use of ADS-B/CDTI**
- **Other cockpit capabilities to support aircraft avoidance**
- **Is still a research topic and will necessitate procedures development**
- **Including the roles of ANSPs**

# Procedures

- **Decision support automation**
- **Automation-to-automation negotiation**
- **Information on accurate trajectory**

# Procedures

- **Human Factor Considerations**
- **Training and Qualifications Requirements**
- **Regulatory/Standardisation needs and Approval Plan (Air & Ground).**

# Checklist

- **Standards Readiness** - **2025**
- **Avionics Availability** - **2028**
- **Ground Systems Availability** - **2028**
- **Procedures available** - **2028**
- **Operations Approval** - **2028**

# Main dependencies

- **Data Link En-Route**
- **Free routing**
- **FF-ICE**
- **Traffic Synchronization..**

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