Surface Collaborative Decision Making System
Functional Requirements

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Version	**Date**	**Author's Initials**	**Description of Change**
.1	April 30, 2009		This is the final version that will be submitted to the CSG. It is the product of several iterations made between January 7 and April 28, 2009.

1. Background

1.1 Background

Problem to be solved: The Surface Collaborative Decision Making (CDM) System sub-team (SCT) has been tasked to leverage the findings of the previous Surface Management Working Group (SMWG) and the EuroControl and Eurocae WG69 'Airport CDM' policies and define requirements which support a prototype initial 'Surface CDM' solution at a selected airport. The following task has been defined as the success criteria for the SCT:

– Develop a written description of base requirements and processes which would support a prototype Surface CDM System (SCS). The system will provide pertinent surface CDM data to the Traffic Flow Management System (TFMS) at a single airport.

Description of the new functionality: The SCS will collect or receive data from multiple data sources (such as TFMS, Traffic Management Advisor (TMA), Surface Movement Event Extractor (SMEE), EnRoute Automation Modernization (ERAM)) and combine and process that data to provide both descriptive and predictive information about current and future airport surface traffic situation and flows. The SCS will present this information to the users by means of a web-based set of displays.

Benefits: The SCS will provide traffic managers with improved situational awareness of the airport surface. The SCS will also provide decision support functionality that will improve traffic managers' and national Airspace System (NAS) Operators' ability to effectively manage airport surface operations.

Additional comments: None

1.2 Overview

Conceptually, Surface CDM is built of elements aiming to achieve the overall objectives for improved system efficiency and improved predictability. Its primary implementation is targeted at the airport surface environment through the introduction of operational procedures and automated processes. Surface CDM accounts not only for the surface movement of aircraft, but also enhances the overall predictability of the NAS and increases operational efficiency by providing a key element of surface operations information that is currently lacking in the overall strategic planning of daily operations. The overall monitoring and prediction of the NAS is an extremely large and complex task. Attempts to model the whole system have suffered from an inability to produce highly accurate traffic predictions. In order to accurately predict departure times, there are key milestones that must be considered. Conceptually, these are a flight's arrival time, taxi time to its gate/stand, turnaround time, time it leaves the departure gate/stand, and the taxi time (including deicing and departure queues). Utilizing available surface data can dramatically heighten situational awareness between all stakeholders. For example, if the current time is 1200 and a flight has a predicted departure time of 1215 but the flight has not yet physically arrived, it is intuitively known that the flight will not make its predicted departure time, but without updated Departure Planning Information (DPI) the system will incorrectly model this flight. All downstream predictions will be off no matter how accurate the trajectory modeling.

Surface CDM will enable Information Sharing to occur in a more organized and process-oriented manner. Information sharing among system stakeholders is essential in as much as it creates the foundation for common situational awareness. Providing a common situational awareness based on information sharing of all the airport partners can significantly improve operational efficiency in two ways for this initial phase of development. First, providing visual overviews of an airport through graphical, tabular and alert displays will accurately represent the current surface situation. Examples include the real time location of a flight (at the gate/stand, taxiing), the total time it has been on the ground, and its position in a departure queue. The second way is by using surface data to improve departure time modeling. Surface data can be used to produce more realistic taxi times. The concept of Variable Taxi Time (VTT) can replace the more traditional static taxi time or historic ground time methods. The sooner a system is presented with updated DPI (for example updated predicted departure times), the more accurate all future predictions and the more realistic the data used by the Traffic Management Unit's modeling systems will be.

1.3 Scope

The SCT is expected to complete the task of defining functional requirements for the prototype SCS no later than April 30, 2009.

2. Definitions

2.1 Acronyms

ACID	Aircraft ID
ANSP	Air Navigation Service Providers
ARMT	Airport Resource Management Tool
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCSCC	Air Traffic Control System Command Center
ATCT	Air Traffic Control Tower
CDM	Collaborative Decision Making
CDR	Coded Departure Route
CIWS	Corridor Integrated Weather System
DFM	Departure Flow Management
DPI	Departure Planning Information

DSP	Departure Spacing Program
EDC	EnRoute Departure Capability
EDCT	Expected Departure Clearance Time
EFSTS	Electronic Flight Strip Transfer System
EOBT	Estimated Off Block Time
ERAM	EnRoute Automation Modernization
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
IFR	Instrument Flight Rules
ITWS	Integrated Terminal Weather System
METAR	Aviation Routine Weather Report
MIT	Miles-in-Trail
NTML	National Traffic Management Log
PDC	Pre-Departure Clearance
RVR	Runway Visual Range
SCS	Surface CDM System
SCT	Surface CDM System sub-team
SMEE	Surface Movement Event Extractor
SMWG	Surface Management Work Group
TAF	Terminal Aerodrome Forecast
TDLS	Terminal Data Link System
TFMS	Traffic Flow Management System
TMA	Traffic Management Advisor
TMI	Traffic Management Initiative
TMU	Traffic Management Unit
TRACON	Terminal Radar Approach Control
VTT	Variable Taxi Time

3. Functional Requirements

3.1 Function to Receive and/or Distribute Data Elements

The SCS shall be capable of interfacing with existing systems to receive and/or distribute the data elements listed below. The data may be derived from the following general sources:

- Adaptation Data – This data describes the layout of the airport. It includes runways, taxiways, ramps, gates/stands among other items.

- Surface Surveillance Data –Data received would include real-time position information of aircraft and surface vehicles in both movement and non-movement areas. Sources include FAA and commercial systems.

- TFMS Data – Data received from TFMS would include flight plan information, takeoff time (DZ message), Traffic Management Initiative (TMI) data, etc. The data sent to TFMS would include predicted taxi time, wheels off time, etc.

- TMA Data – Data received from TMA would include arrival time estimates at arrival fixes and runway thresholds, and Identification of arrival runway assigned to the arriving aircraft.

- Weather Data – Data received would include Integrated Terminal Weather System (ITWS) data, and possibly Aviation Routine Weather Report (METAR), Corridor Integrated Weather System (CIWS), wind direction and velocity reports, Runway Visual Range (RVR), and Terminal Aerodrome Forecast (TAF) data.

- NAS Operator Supplied Data – The data received would include estimated gate/stand time, boarding time, target off block time, flight prioritization, etc.

- Other data – This could include data from airport authority, etc.

3.1.1 Flight Plan Data Elements

3.1.1.1 ACID

3.1.1.2 Beacon

3.1.1.3 Aircraft Type / Equipment Suffix

3.1.1.4 Airspeed

3.1.1.5 Departure Airport

3.1.1.6 Departure Time

3.1.1.7 Cruising Altitude

3.1.1.8 Requested Altitude

3.1.1.9 Route of Flight

3.1.1.10 Remarks

Data Source(s): TFMS, Operator

Definition: Data contained in fields 2-11 in an aircraft's flight plan.

3.1.2 Additional Data Elements

3.1.2.1 Aircraft Number

Data Source(s): Operator

Definition: Aircraft tail number.

3.1.2.2 Aircraft Position on Airport Surface

Data Source(s): Surface Surveillance

Definition: The real-time physical position of the aircraft on the airport surface.

3.1.2.3 Traffic Management Initiative (TMI) Data

Data Source(s): TFMS, National Traffic Management Log (NTML), Departure Flow Management (DFM) / EnRoute Departure Capability (EDC), TMA

Definition: Data on traffic management initiatives. Examples include Expected Departure Clearance Time (EDCT), Miles-in-Trail (MIT) restrictions on arrivals, departures, flow control advisories, ground stops at airports and first departure fix, etc.

3.1.2.4 Flight Status

Data Source(s): Operator

Definition: Information on the status of a flight. For example: active, proposed, and cancelled.

3.1.2.5 Airport Time of Arrival

Sub-Categories: Estimated, Actual

Data Source(s):

- Estimated: TFMS, TMA
- Actual: Surface Surveillance, Operator

Definition:

- Estimated: Estimated "wheels on" time
- Actual: Actual "wheels on" time

3.1.2.6 Gate / Stand Time of Arrival

Sub-Categories: Estimated, Actual

Data Source(s):

- Estimated: Surface Surveillance, Operator
- Actual: Surface Surveillance, Operator

Definition:

- Estimated: Estimated time of arrival at gate/stand ("in" time)
- Actual: Actual time of arrival at gate/stand ("in" time)

3.1.2.7 Predicted Runway

Data Source(s): Air Traffic Control Tower (ATCT), Airport Resource Management Tool (ARMT), Departure Spacing Program (DSP), TMA

Definition: Probable arrival/departure runway.

3.1.2.8 Gate / Stand Assignment

Data Source(s): Operator

Definition: Most recent gate/stand assigned by the operator, including arrival gate/stand information.

3.1.2.9 Arrival Gate/Stand Delay

Data Source(s): Operator

Definition: Time waiting for an arrival gate/stand.

3.1.2.10 Requested Runway

Data Source(s): Operator

Definition: Runway request made out of operational necessity.

3.1.2.11 Flight Priority

Data Source(s): Operator

Definition: Indication of an operator's flight prioritization between multiple aircraft.

3.1.2.12 Pre-Departure Clearance (PDC)

Data Source(s): Terminal Data Link System (TDLS)

Definition: Automated Instrument Flight Rules (IFR) clearance delivery between Air Navigation Service Providers (ANSP). This data element enhances DPI.

3.1.2.13 Routing Capabilities

Data Source(s): Operator

Definition: Alternate departure routes aircraft is capable of taking if needed.

3.1.2.14 Off Block Time

Sub-Categories: Scheduled, Estimated, Target, Actual

Data Source(s):

For all sub-categories of off block time, the data shall be sent from the following sources via automated processes:

- Scheduled: Operator
- Estimated: Operator, Airport Operator
- Target: Operator, Airport Operator
- Actual: Surface Surveillance, Operator, Airport Operator

Definition:

- Scheduled: The time that an aircraft is scheduled to depart from its gate/stand.
- Estimated: Operator's flight plan Estimated Off Block Time (EOBT), adjusted by delay events. The estimated time at which the aircraft will start movement associated with departure
- Target: The time that an Operator or Ground Handler estimates that an aircraft will be ready, all doors closed, boarding bridge removed, push back vehicle available and ready to start up / push back immediately upon reception of clearance.
- Actual: Time the aircraft pushes back and vacates the gate/stand.

3.1.2.15 Spot Information

Sub-Categories: Scheduled, Estimated, Actual

Data Source(s):

- Scheduled: Operator
- Estimated: Operator
- Actual: Surface Surveillance

Definition:

- Scheduled: Time at which aircraft is scheduled to reach demarcation point between movement and non-movement area. This is calculated as the off block time plus an estimated taxi time from block to spot.
- Estimated: Time at which aircraft is estimated to reach demarcation point between movement and non-movement area. This is calculated as the off block time plus an estimated taxi time from block to spot.
- Actual: Actual time at which aircraft reaches demarcation point between movement and non-movement area.

3.1.2.16 Taxi Data

Data Source(s): Surface Surveillance, Surface System

Definition: A time which constitutes any combination of "out to spot to off" for departures and "on to in" for arrivals. This includes static taxi time for aircraft as well as historical trends.

3.1.2.17 Takeoff Time

Sub-Categories: Predicted, Actual

Data Source(s):

- Predicted: TFMS, SCS

- Actual: Operator, Surveillance, Electronic Flight Strip Transfer System (EFSTS), TFMS

Definition:

- Predicted: The predicted "wheels off" time.

- Actual: Actual "wheels off" time.

3.2 Organization, Processing, and Display Functions

This section and its subsections describe the tasks that need to be performed by the SCS. It organizes the tasks into a set of functions that the SCS carries-out. The major functions are as follows:

- Combine and process flight data

- Provide a visual overview display of the airport

- Provide situational displays and associated user interfaces

- Provide service of modeled OFF times

- Provide data integrity

- Data archiving, retrieval, analysis and playback capability

3.2.1 Combine and Process Flight Data

This section lists and describes the basic information that the SCS determines from the input data and then makes available to the user through the SCS displays.

Each individual component of this information is not necessarily displayed directly to the user; rather the SCS combines this information into a set of useful displays, those displays are what the user views.

The SCS shall process the data it collects, thereby generating both descriptive and predictive information about current and expected airport surface traffic situation and flows.

This information shall include for each flight handled by the airport, the expected or predicted values for the quantities.

This information shall be produced at frequent, near real-time intervals of TBD time.

The frequency of update for each element of information is TBD.

3.2.1.1 Identification of arrival runway assigned to the arriving aircraft

3.2.1.2 Arrival times of inbound flights at the runway inbound threshold

3.2.1.3 Positions of arriving aircraft as it approaches the airport

3.2.1.4 Positions of aircraft as it travels on the surface of the airport from the arrival runway threshold to the boarding gate/stand

3.2.1.5 Identification of gate/stand assigned for unboarding

3.2.1.6 Taxi time from the runway inbound threshold to the assigned gate/stand

3.2.1.7 Turn-around time

3.2.1.8   Identification of gate/stand assigned for departure

3.2.1.9   Time to travel from arrival gate/stand to departure gate/stand

If the aircraft is assigned to depart from the same gate/stand used for arrival, there will be no travel time from the arrival gate/stand to the departure gate/stand, or position messages marking this travel.

3.2.1.10   Positions of aircraft as it travels from unboarding gate/stand to boarding gate/stand

3.2.1.11   Latest estimated and actual gate/stand pushback time

3.2.1.12   Identification of departure runway assigned to the aircraft

3.2.1.13   Identification of aircraft that have pushed back and since returned to a gate/stand without departing.

3.2.1.14   Irregular operation times associated with departure events such as ground stops or de-icing

3.2.1.15   Unimpeded taxi-time to the runway outbound threshold

3.2.1.16   Taxi time delays

3.2.1.17   Time of starting take-off

3.2.1.18   Latest estimated and actual wheels-off time

3.2.1.19   Final runway-specific departure lineup order

3.2.1.20   Positions of the airborne departing aircraft as it leaves the runway/airport

- Based on the arrival and departure data elements exchanged, the SCS shall calculate the projected airport throughput rates.
- The SCS shall estimate departure delay time due to irregular operations such as de-icing.

3.2.2   Provide a Visual Overview Display of the Airport

This visual display will be at the heart of the SCS. It will provide a top down view of the airport elements (runways, taxiways, ramps, gates/stands, possibly structures, and other elements). This overview will provide a context for displaying situational information about surface traffic at the airport.

3.2.2.1   Organize Airport Adaptation Data to Support the Visual Overview

One of the groups of data collected is data that describes the layout of the airport. This data shall be organized to support the drawing of a detailed visual overview of the airport. It is expected that this function of mapping the adaptation data to a visual overview will need be executed infrequently.

Airport adaptation data shall be used to support a detailed visual overview of the airport.

The visual overview shall be updated whenever adaptation data changes would affect the overview.

3.2.2.2   Characteristics of the Visual Overview

The visual overview shall:

- Display the name and location of the airport.
- Show all of the runways, hold bars, taxiways, ramps, gates/stands, and other fixed elements at the airport.
- Display the runway configuration and the names of (at least) the active runways.
- Mark unavailable runways, taxiways, etc. in a distinctive manner, e.g. colored red.
- Be updated when the physical details of the airport are changed.
- Be drawn to scale.

3.2.2.3   Provide a User Interface to the Visual Overview

(Note that this interface is to the overview itself, not to the situational displays that will be superimposed on the overview or shown around it.)

The user shall be given the capability to:

- Move the focus to any point on the overview
- Zoom in or out (magnification TBD) on whatever region is under focus
- Rotate the display, by any angle, to the user's preferred perspective
- Create multiple instances of the overview in separate windows

3.2.3   Provide Situational Displays and Associated User Interfaces

Many of these displays are superimposed on the Visual Overview. Others may be posted around the overview. The situational displays provide information about surface data to the user. The user interface allows the user to control which items of information are presented and in which formats.

The presentation of information to the users shall be by means of a web-based graphical display. The user shall control the displays by means of mouse actions and brief keyboard entries in conjunction with web-based graphical displays.

The following items shall be displayed to the user by default; but the user interface shall allow the user to choose to either show or hide the display of each of these items.

- An indication of the runway configuration and the names of the active runways shall be superimposed on the visual overview of the airport
- An icon to represent each aircraft on the visual overview of the airport
- An icon to represent each non-aircraft vehicle on the visual overview of the airport
- An indication for each gate/stand as to whether it is occupied or vacant
- A data tag associated with each aircraft icon on the visual overview
- Timelines that illustrate pending flight arrivals and departures,
- Weather display
- Gate/stand status display
- Tabular data display
- Alerts to the user

It is TBD whether all of the items, by default, should be displayed on one screen or if multiple screens should be used to hold the full set of items.

3.2.3.1   Mark the Name of the Runway Configuration, and the Names of the Active Runways, on the Visual Overview of the Airport

3.2.3.2   Draw an Icon, on the Visual Overview, to Represent Each Aircraft Near or on the Airport Surface

For each flight (airborne and shortly to arrive on the surface, or airborne shortly after departure), the SCS shall draw an icon and properly position it on the visual overview of the airport.

The user interface shall provide a method for searching and identifying an icon that represents a specified ACID.

The user interface shall provide a method for searching and identifying all the icons that fit into a specified class; where the class may be defined as an aircraft type, an air carrier, or a destination airport.

At least five distinct icon types shall be available for representing different aircraft types:

- Small

- Large

- Heavy

- Super-Heavy

- Helicopter

Each aircraft icon shall have a recognizable nose and tail.

Each icon's nose shall point in the direction of most recent motion of the aircraft.

Each flight's icon shall be repositioned (at an interval of TBD seconds) when the aircraft moves and changes its position by more than TBD meters.

Each icon shall be colored to indicate the flight's status:

- An aircraft currently airborne but about to land shall have its icon colored TBD

- An aircraft arrived but not yet at a gate/stand shall have its icon colored TBD

- An aircraft parked shall have its icon colored TBD

- An aircraft that is moving from an arrival gate/stand to a departure gate/stand shall have its icon colored TBD

- An aircraft that has left its gate/stand but has not yet departed shall have its icon colored TBD

- An aircraft that has achieved wheels-off shall have its icon colored TBD

The information represented by the icon coloring shall also be displayed as a part of the aircraft's data tag (data tags described later in this document.)

3.2.3.3   Draw an Icon, on the Visual Overview, to Represent Each Non-Aircraft Vehicle on the Airport Surface

For each vehicle on the airport surface, the SCS shall draw an icon and properly position it on the visual overview of the airport. The icons that are displayed will be configurable by the user.

Each vehicle's icon shall be repositioned (at an interval of TBD seconds) when the vehicle moves and changes its position by more than TBD meters.

The user shall be able to select to show or hide the icons representing non-aircraft vehicles.

3.2.3.4   Mark Each Boarding Gate/Stand with an Indication of Vacant or Occupied

Every gate/stand shall be displayed on the visual overview of the airport.

Every gate/stand's display shall indicate whether the gate/stand is occupied or vacant. Active aircraft icons positioned at the gate/stand on the surface graphical display will indicate gate/stand occupation for actual aircraft. For scheduled aircraft that are to be serviced at the gate/stand, when the aircraft has not yet arrived at the gate/stand, a means of displaying this information on the display is required. One possible method is to have an aircraft type icon with different shading to indicate that this is not a real target, or an aircraft ID that appears without an icon located near the gate/stand location on the display.

3.2.3.5   Position a Data Tag Associated With Each Aircraft Icon

Each aircraft icon displayed on the visual overview of the airport shall have a small block of text drawn with it that provides key data about the aircraft. This textual data block attached to an aircraft is called a "data tag"

The data tag shall include the aircraft's ACID and aircraft type.

For aircraft on the surface, and not at a gate/stand, the data tag shall include the number of minutes the aircraft has been on the surface.

- For departing aircraft this number of minutes shall be counted from leaving the gate/stand
- For arriving aircraft this number of minutes shall be counted from wheels-on

Additionally, a departing aircraft shall have in its data tag: the departure fix, the destination airport, and the flight plan Field 10.

Within TBD seconds of wheels-off, a departing aircraft data tag shall show the aircraft altitude.

An arriving aircraft shall have in its data tag the arrival fix and the origin airport

While arriving aircraft remain airborne, their data tag shall have the aircraft altitude.

The user interface shall allow the user to turn on or off the display of tags for all flights.

The user interface shall allow the user to perform some mouse action to toggle individual aircraft tags on or off.

The user interface shall allow the user to elect to hide the display of data tags for any specified aircraft. It shall also allow the user to show the tags only for aircraft that the user specifies.

The user interface shall allow the user to hide the display of specific fields (such as the flight plan Field 10) of the data tags from all aircraft, from a selected list of aircraft, or for all but a selected list of aircraft.

The user interface shall allow any data tag to be dragged to a new position and connected to its icon by a line. (This is intended to allow the user to separate overlapping data tags, or move tags that obscure icons or other features the user wants to view.)

3.2.3.6 Timelines that Illustrate Pending Flight Arrivals and Departures

Timelines of arriving and departing aircraft shall be drawn as part of the user interface. These are intended to be distinct from the visual overview of the airport.

The user interface shall allow the user to hide any or all of the timelines.

There shall be a timeline for each active arrival runway and departure runway.

There shall be a timeline for each active arrival fix and departure fix.

Timelines shall have minute marks.

Aircraft ACIDs shall be displayed at their runway ETA (or ETD) minute mark on the timeline associated with its arrival (or departure) runway.

Aircraft ACIDs shall be displayed at their arrival fix ETA (or ETD) minute mark on the timeline associated with its arrival (or departure) fix.

3.2.3.7 Weather Display

The SCS shall be capable of interfacing with and display data from the following systems:

- ITWS
- METAR
- TAF

- CIWS
- RVR

3.2.3.8 Tabular Data Display

The tabular display shall provide:

- Name of the runway configuration
- Number of flights that have left gate/stand but not yet departed, and have been in this intermediate state for more than TBD minutes
- Number of flights with reportable delay
- Recent average taxi time
- Number of flights currently taxiing inbound
- Number of flights currently taxiing outbound
- Number of flights parked at gates/stands
- Numbers of gates/stands occupied and vacant
- Number and order of flights in final lineup order for runway departure

3.2.3.9 Alerts to User

Alerts shall be presented for certain key events. (The alerted items are all items that have already been described; they are alerted because some of their properties/values exceed some limits.)

The user shall be allowed to select which alerts are to be displayed.

The user shall be allowed to set thresholds for those alerts that are based on exceeding a threshold.

The alert shall be of a form that is a significant change from what is shown when there is no alert, so that the alerted data attracts attention to itself.

The alerted items shall include the following:

- An aircraft enters a runway or taxiway that it is not planned to enter
- An aircraft enters a runway that it is not allowed to enter at this time
- An aircraft deviates from its predicted path on the airport surface by more than xx meters
- The ACIDs of any flights that have spent a very long time (TBD minutes) on the surface and not at a gate/stand.
- An aircraft that has pushed back and has since returned to the gate/stand without departing.
- A taxiing flight has become subject to a ReRoute.

A possible mechanism for the above alerts would be to blink the aircraft icon, but no specific mechanism is required by this document.

3.2.4 Provide Service of Modeled OFF Times

The OFF time estimates of the SCS shall be provided in a message to TFMS for each departing aircraft.

The reason for this requirement is that TFMS makes OFF time estimates on the basis of historical data, but has no mechanism to update those estimates to take account of recent and current surface traffic and flows. TFMS' estimates of OFF time are relatively static. But the SCS does monitor surface traffic, has up-to-date estimates of OFF times and could provide its OFF estimates to TFMS to supplement TFMS' relatively static estimates with these more dynamic estimates.

3.2.5 Provide Data Integrity

3.2.5.1 Data accuracy requirements shall be TBD

3.2.5.2 The frequency at which individual data elements must be updated shall be TBD

3.2.6 Data Archiving, Retrieval, Analysis and Playback Capability

- The SCS shall archive data sufficient to operate a playback capability.

- The SCS shall have a playback capability

- The SCS shall have the capability to retrieve and analyze historical data.

- The SCS shall provide reports for supporting historical analysis of surface operations.

- The SCS shall provide detailed reports on an individual aircraft that contains the event times from "out to off" and "on to in".

The SCS shall provide historical reports that encompass a set of user selectable criteria such as but not limited to: day/time durations, departure, arrival, runway, surface events (gate/stand, runway, lineup, departure/arrival, gate-hold). Note: the surface events are the times in/out of each event, destination airport, total surface encountered delay, departure fix, etc. Historical reports should contain the group of individual aircraft meeting the selection criteria and a summary of counts as required.   These reports shall be generated in a manner that will support the ingest of this raw data into an analyst's outboard common tools such as Microsoft Excel etc.

4. Impacted Users / Facilities / Organizations

4.1 Summary of Impacted Organizations and Facilities

4.1.1 FAA

4.1.1.1 ATCT

A SCS utilized in concert with Terminal Radar Approach Control (TRACON), Air Route Traffic Control Center (ARTCC), Air Traffic Control System Command Center (ATCSCC), NAS operators, and Airport Aurthority would provide benefits in the following areas:

(1) Decrease delays to the airlines by more effectively sequencing aircraft in the departure queues.

(2) Decrease the necessary communication with NAS operators by providing real-time position, status, and intent of aircraft.

(3) Decrease the necessary communication with TRACON, ARTCC, and ATCSCC because the SCS will already have flow programs integrated within the system.

(4) Decrease frequency congestion, as the ground controller will know pertinent gate/stand information, aircraft priority, and first departure fix for efficient departure sequencing.

(5) A SCS would be an essential tool for ATCT TMUs because this "one stop" display will aid in minimizing delays and increasing efficiency for air traffic and NAS operators.

4.1.1.2 TRACON

Increased situational awareness of airport surface activity permits TRACON personnel the ability to anticipate high volume operations and preemptively manage sector operations in order to reduce departure delays due to oversaturation, as well as provide sector staffing in accordance with traffic demand

Availability of a SCS would allow TRACON personnel to effectively predict, adjust, and manage the spacing and sequencing of arrivals based on observed airport activity and capacity constraint without the extensive verbal coordination that currently exists.

The SCS would reduce verbal coordination between the tower, Enroute, and traffic management facilities, provide more rapid delivery of information, and maintain the integrity of information through shared situational awareness.

4.1.1.3   ARTCC

The SCS will heighten situational awareness between an ARTCC and its underlying facilities and NAS operators. It would also:

(1) Provide a "heads-up" display to monitor real-time constraints and assist in planning future events

(2) Reduce coordination and communication time between facilities and NAS operators

(3) Assist to create a "seamless" NAS operation from wheels off to wheels on by planning for long range airport acceptance.

4.1.1.4   ATCSCC

The SCS will greatly improve the ATCSCC's situational awareness with field facilities and NAS operators. This increase in situational awareness will result in a collaborative view of the airport surface area and reduce communication time. This will allow traffic management to focus on prioritizing their work based on real-time information regarding airport constraints and aircraft throughput.

From a planning standpoint, the SCS will assist in evaluating surface constraints with respect to avoiding gridlock scenarios. The SCS could be referred to during winter and severe weather events with planning telcon participants to aid in demonstrating the larger picture to manage events and develop exit strategies.

During severe weather, having real time airport line-up with departure fixes (and possible Coded Departure Routes (CDRs)) will facilitate the reroute process and reduce Facility/NAS Operator coordination and delays.

4.1.2   NAS Operator

A SCS will provide the NAS operator with situational awareness of operations on an airport surface. Awareness of precise location of an aircraft as well as its intent and status will enable more efficient/reduced taxi-in and taxi-out operations on the NAS operator's ramp area and also reduce coordination time with ATC. More efficient taxi operations reduce fuel burn and emissions on the airport surface.

The SCS would facilitate faster and more accurate information flow that would enable the NAS operator to manage their airport operations more efficiently, especially during irregular operations such as aircraft deicing. The SCS would also be used as a planning tool, especially during severe weather events.

The archiving and playback capability of the SCS would enable the NAS operator to perform post-operational analysis to identify systemic problems, make operational changes and measure the impact of the changes.

4.1.3   Airport Operator

The SCS will provide the airport operator the ability to quickly identify aircraft on the surface of the airfield. It will improve safety by enabling rescue vehicles to find aircraft in distress.

The SCS will allow for post-analysis of snow removal to improve future operations, and allow for enhanced awareness and improved safety in low visibility conditions.

The SCS will also allow airport operations staff to make real-time decisions on maintenance issues and reduce impact to the aircraft operators.

The SCS will also reduce coordination between the control tower and airport operations as shared situational awareness will be improved, and data will be readily available to the airport staff.

An SCS system can aid in itinerant billing systems as well as assist pavement management systems to improve long-term maintenance procedures.

5. References

1. December 10, 2007, "The Surface Management Work Group Working Report Version 5"

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