CDRL 5
Potential Impacts of Future ATM Activities upon the CE Detailed Descriptions And DAG-TM Concept

1. Purpose

The purpose of this CDRL is to report on the results of a review of the potential impacts of future ATM activities in the CE detailed descriptions and the DAG-TM concept. This review included an analysis of FAA, NASA, and Eurocontrol ATM efforts.

2. Approach

2.1 Previous Analyses

Much of the underlying analysis required for this task was performed by SRC under RTO 42, "AATT Operations Concept for ATM (Year 2001 Update)". Under RTO 42 (and its predecessor RTOs), numerous FAA, Eurocontrol, NASA, FAA, and SRC documents were reviewed and operational needs statements (ONS) were extracted. The ONS were statements of needs that must be satisfied by the various concepts described. The documents reviewed are listed in Appendix 1.

The 824 unique ONS thus identified were grouped under 9 categories, corresponding to the services being provided by ATC. The categories used, called Enhancement Areas, were:

1. Flight Planning
2. Separation Assurance
3. Situational Awareness and Advisory
4. Navigation and Landing
5. Traffic Management - Strategic Flow
6. Traffic Management - Synchronization
7. Airspace Management
8. Emergency and Alerting
9. Infrastructure/Information Management

Next, 155 projects (applications) were identified that are being planned or pursued by FAA and NASA. These represent the current "plan" that NASA and FAA are pursuing to satisfy future operational needs. These applications were also grouped into the same Enhancement Areas. Some projects covered more than one Enhancement Area.

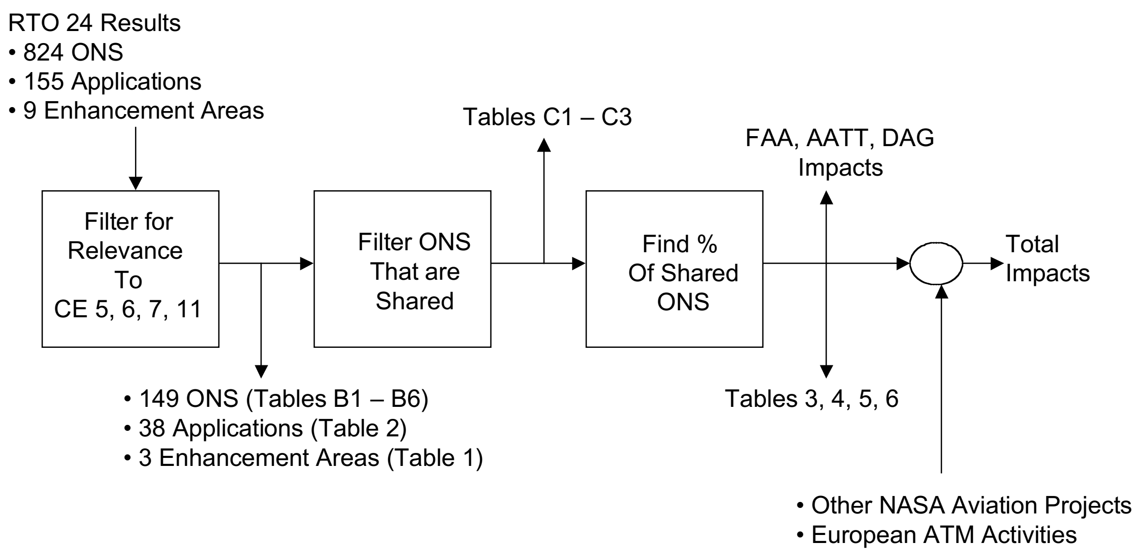
The final step in the RTO 42 analysis was to use a "panel of experts" to judge which ONS would be satisfied if a particular application is implemented. In some cases the application fully satisfied a particular ONS and was categorized as A1. In other cases, the application only partially satisfied the ONS and was categorized as A2 (these categories are used in subsequent tables).

With this analysis completed in RTO 42, we then extracted and analyzed the results that dealt with 4 specific applications, namely CEs 5, 6, 7, and 11.

2.2 Approach to Assess the Impact of FAA and NASA AATT Activities on CEs.

The approach followed is depicted in Figure 1.

Figure 1. Approach to Assess Impacts on CEs



The outputs of RTO 42 were filtered to select only those that were relevant to the analysis of CEs 5, 6, 7, and 11. The ONS for these 4 CEs fell within three Enhancement Areas, and two of the CEs (CE 5 and CE 6) satisfied ONS that were in two different Enhancement Areas. This can be seen in Table 1 below.

Table 1. Enhancement Areas of Each Studied Concept Element

Enhancement Area	Concept Element			
	CE 5	CE 6	CE 7	CE 11
Flight Planning	X			
Separation Assurance	X	X		
Traffic Management Sync		X	X	X

We then identified all applications (a.k.a. projects) that deal in some way with these three Enhancement Areas. This was done by analyzing the ONS to Application matrices contained in Volume 2 of OPSCON 2001. Under each Enhancement Area, only a subset of projects satisfied the same Operational Need Statements as the CEs. The projects in each Enhancement Area that share ONS with CE 5, 6, 7, and 11 are shown in Table 2. The specific ONS that each project satisfied is shown in Tables B1 - B6 in Appendix B.

Table 2 Projects that Share ONS with CE 5, 6, 7, 11

Flight Planning Enhancement Area Applications	
DAG CE.1	NAS-Constraint Considerations for Schedule/Flight Optimization
DAG CE.5	Free Maneuvering for User-Preferred Local TFM Conformance / AATT AOP
Traffic Management Synchronization Enhancement Area Applications	
AATT aFAST	Active Final Approach Spacing Tool / FAA ASD
AATT CAP	Collaborative Arrival Planner
AATT D2	Direct-to / FAA ASD – Direct-To-Routing
AATT EDA	En Route and Descent Advisor / FAA ASD – Descent Advisor (NASA Demo)
AATT EDP	Expedite Departure Path / FAA ASD - EDP
AATT McTMA	Multi-center Traffic Management Advisor / FAA ASD–TMA-Multi Center
AATT pFAST	Passive Final Approach Spacing Tool / FFPI pFAST / FAA ASD – pFAST
AATT SMA	Surface Movement Advisor
AATT SMS	Surface Management System / FAA ASD – SMS / FAA ASD – Enhanced SMS
AATT TMA	Traffic Management Advisor / FFPI TMA / FAA ASD – TMA-Single Center
AATT	Arrival, Surface, and Departure Interoperability
DAG CE.2	Intelligent Routing for Efficient Pushback Times and Taxi
DAG CE.3	Free Maneuvering for User Preferred Departures
DAG CE.4	Trajectory Negotiation for User Preferred Departures
DAG CE.6	Trajectory Negotiation for User-preferred Local TFM Conformance
DAG CE.7	Collaboration for Mitigating Local TFM Constraints due to Weather, SUA, Complexity
DAG CE.8	Collaboration for User-Preferred Arrival Metering
DAG CE.11	Self Spacing for Merging and In-Trail Separation
DAG CE.12	Trajectory Exchange for Merging and In-Trail Separation
DAG CE.14	Intelligent Routing for Efficient Active-Runway Crossing and Taxi
SF-21 E3A1	Enhanced Visual Approaches
SF-21 E3A2	Approach Spacing
SF-21 E3A4	Departure Spacing/Clearance
FFP1 SMA	Initial SMA / FAA ASD – SMA / FAA ASD
Separation Assurance Enhancement Area Applications	
DAG CE.5	Free Maneuvering for User-preferred Separation Assurance / AATT AOP Trajectory
DAG CE.6	Negotiation for User-preferred Separation Assurance
DAG CE.9	Free Maneuvering for Weather Avoidance
DAG CE.10	Trajectory Negotiation for Weather Avoidance
DAG CE.13	Airborne CD&R for Closely Spaced Approaches
SF-21 E4A1	Enhanced Visual Acquisition of Other Traffic for See-and-Avoid
SF-21 E4A2	Conflict Detection
SF-21 E4A3	Conflict Resolution
SF-21 E8A1	Center Situational Awareness with ADS-B
SF-21 E9A1	Radar Augmentation with ADS-B to Support Mixed Equipage in the Terminal Airspace
SF-21 E9A2	Radar Augmentation with ADS-B to Support Mixed Equipage in the En-route Airspace
SF-21 E9A3	Reduced Separation Standards with ADS-B
FFP1 CP	Conflict Probe (URET) / FAA ASD – URET CCLD / FAA ASD – Conflict Probe
FAA ASD	Shared Responsibility for En Route Horizontal Separation

2.3 Results of Analysis of Shared ONS and CEs

Based upon an analysis of Tables C-1 through C-3, the following applications share one or more ONS in the noted Enhancement Areas. The results of that analysis are given in Table 3, 4 and 5. The % column indicates the % of total shared ONS by each project.

Table 3. Flight Planning Shared ONS

Flight Planning Enhancement Area			
CE 5 has 17 shared ONS and shares	17 ONS with	CE 1	100%

Table 4. Traffic Management Shared ONS

Traffic Management Enhancement Area			
CE 6 has 45 shared ONS and shares	39 ONS with	CE 8	87%
	27 ONS with	CE 7	60%
	24 ONS with	CE 12	53%
	19 ONS with	CE 11	42%
	17 ONS with	AATT/EDA	38%
	12 ONS with	AATT/TMA	27%
	9 ONS with	CE 3	20%
	9 ONS with	AATT/D2	20%
	8 ONS with	AATT EDP	18%
	8 ONS with	AATT/McTMA	18%
	8 ONS with	CE 4	18%
	7 ONS with	AATT/pFAST	16%
	7 ONS with	AATT/CAP	16%
	7 ONS with	SF 21 Approach Spacing	16%
	7 ONS with	SF 21 Departure Spacing/Clearance	16%
	5 ONS with	SF 21 Trajectory Exchange for Merging and in Trail Separation	11%
	2 ONS with	AATT/SMA	4%
	2 ONS with	AATT/Arrival, Surface and Departure Interoperability	4%
	2 ONS with	AATT/FAST	4%
	1 ONS with	FFP1 Surface Movement Advisor	2%
	1 ONS with	CE 14 Intelligent Routing for Efficient Active Runway Crossing/Taxi	2%
CE 7 has 42 shared ONS and shares	27 ONS with	CE 6	64%
	25 ONS with	CE 8	60%
	18 ONS with	AATT/EDA	43%
	13 ONS with	CE 12	31%
	12 ONS with	AATT/pFAST	29%
	12 ONS with	AATT/TMA	29%
	11 ONS with	AATT/CAP	26%
	11 ONS with	AATT/D2	26%
	8 ONS with	AATT EDP	19%
	8 ONS with	AATT/McTMA	19%
	7 ONS with	CE 11	17%
	4 ONS with	AATT/FAST	10%
	4 ONS with	AATT/SMA	10%
	3 ONS with	CE 3	7%
	2 ONS with	AATT/Arrival, Surface and Departure Interoperability	5%
	2 ONS with	CE 4	5%

		2 ONS with FFP1 Surface Movement Advisor 1 ONS with CE 2 1 ONS with AATTSMS 1 ONS with CE 14 Intelligent Routing Efficient Runway Cross/Taxi	5% 2% 2% 2%
CE 11 has 24 shared ONS and shares	23 ONS with 19 ONS with 18 ONS with 7 ONS with 7 ONS with 7 ONS with 7 ONS with 6 ONS with 6 ONS with 6 ONS with 5 ONS with 4 ONS with 3 ONS with 3 ONS with 3 ONS with 2 ONS with 1 ONS with 1 ONS with	CE 8 CE 6 CE 12 AATT/TMA CE 7 SF 21 Approach Spacing SF 21 Departure Spacing/Clearance SF 21 Trajectory Exchange for Merging and in Trail Separation CE 3 CE 4 AATT/EDA AATT/pFAST CE 14 Intelligent Routing Efficient Active Runway Crossing /Taxi AATT /FAST AATT/McTMA AATT EDP AATT/D2 AATT/Arrival, Surface and Departure Interoperability	96% 79% 75% 29% 29% 29% 29% 25% 25% 25% 21% 17% 13% 13% 13% 8% 4% 4%

Table 5. Separation Assurance Shared ONS

Separation Assurance Enhancement Area			
E 5 has 41 shared ONS and shares	16 ONS with 11 ONS with 9 ONS with 8 ONS with 7 ONS with 6 ONS with 6 ONS with 5 ONS with 4 ONS with 3 ONS with 2 ONS with 2 ONS with	CE 6 CE 9 FAA ASD Shared Responsibility for En Route Hor Separation CE 10 SF 21 Enhanced Visual Acquisition of Other Traffic SF 21 Conflict Detection SF 21 Conflict Resolutions SF 21 Reduced Separation Standards with ADS B SF 21 Radar Augmentation with ADS B in En Route SF 21 Center Situational Awareness with ADS B CE 13 SF 21 Radar Augmentation with ADS B in Terminal	39% 27% 22% 20% 17% 15% 15% 12% 10% 7% 5% 5%
CE 6 has 36 shared ONS and shares	16 ONS with 14 ONS with 9 ONS with 6 ONS with 5 ONS with 5 ONS with 5 ONS with 5 ONS with 4 ONS with 4 ONS with 4 ONS with 4 ONS with	CE 5 FAA ASD Shared Responsibility for En Route Hor Separation CE 10 CE 9 SF 21 Radar Augmentation with ADS B in En Route SF 21 Conflict Detection SF 21 Conflict Resolutions CE 13 SF 21 Enhanced Visual Acquisition of Other Traffic SF 21 Center Situational Awareness with ADS B SF 21 Radar Augmentation with ADS B in Terminal SF 21 Reduced Separation Standards with ADS B	44% 39% 25% 17% 14% 14% 14% 14% 11% 11% 11% 11%

The table below has extracted all CEs that share over 30% of the ONS in a particular Enhancement Area.

Table 6. CEs with Over 30% Shared ONS

CE	ONS shared with	Application	In Enhancement Area
5	17	CE.1	Flight Planning
	16	CE 6	Separation Assurance
6	39	CE.8	Traffic Management Synchronization
	27	CE.7	Traffic Management Synchronization
	24	CE.12	Traffic Management Synchronization
	19	CE.11	Traffic Management Synchronization
	17	AATT/EDA	Traffic Management Synchronization
	16	CE 5	Separation Assurance
	14	ASD Shared Resp	Separation Assurance
7	27	CE 6	Traffic Management Synchronization
	25	CE 8	Traffic Management Synchronization
	18	AATT/EDA	Traffic Management Synchronization
	13	CE 12	Traffic Management Synchronization
11	23	CE 8	Traffic Management Synchronization
	19	CE 6	Traffic Management Synchronization
	18	CE 12	Traffic Management Synchronization

It is significant to note that except for one FAA application, all of the applications that share ONS with CE 5, 6, 7, and 11 are NASA projects, and within that subset, all but one are DAG TM projects. This should make coordination and tech transfer of results between the CEs and other applications relatively straightforward. However, even for those projects with a small percentage of shared ONS, DAG TM research managers should review the all projects that share ONS with their CEs to ensure maximum use of their results in the relevant CE of DAG CM.

2.4 Impact of Other NASA Aviation Activities on CEs

Three other NASA aviation program were examined for potential impact upon the CEs. These were the NASA Aviation System Capacity Program (under which the AATT Project falls), the NASA Aviation Safety Program, and the NASA Small Aircraft Transportation System (SATS) Project. From this examination, the following activities seem to be most relevant to the CE 5, 6, 7, and 11 activities.

Aviation System Capacity (ASC) Program

The ASC Program has three components:

(1) Short Haul Civil Tilt Rotor
(2) Terminal Area Productivity
(3) AATT

The project (other than AATT which was treated above) that has activity relevant to the CEs is the Terminal Area Productivity Project. That project's objective is to enable safe clear-weather airport capacity in instrument weather conditions. Sub objectives include increasing single-runway throughput by 12 to 15% and reducing lateral spacing below 3400 feet on parallel runways. This is being demonstrated under the Airborne Information for Lateral Spacing (AILS) project. CE 11, Self Spacing for Merging & In-Trail Separation, is clearly related to this project and results of AILS should be carefully reviewed for applicability to CE 11.

Aviation Safety Program

The Aviation Safety Program has 6 projects:

(1) Aviation System Monitoring and Modeling
(2) System-Wise Accident Prevention
(3) Single Aircraft Accident Prevention
(4) Weather Accident Prevention
(5) Accident Mitigation
(6) Synthetic Vision

The Synthetic Vision project is exploring, among other things, ways to improve flight deck situational awareness, including the presence of other aircraft, through the use of accurate navigation coupled with an accurate terrain/obstacle database, ADS B for sensing other aircraft, and multifunction cockpit displays. Many of these technologies are similar to those required by CE 11, so the results of the Synthetic Vision project should be carefully reviewed for applicability to CE 11.

Small Aircraft Transport System (SATS) Program

The SATS Program is a new start in FY 2001 and is aimed at opening up the nation's general aviation airports to a new breed of easy-to-fly aircraft operating in a nearly automatic air traffic control system. The project involves experimentation and demonstrations of infrastructure and vehicle technologies over the 2001-2005 time frame. Although the program is still in its early definition stages, it appears that it will pursue improved cockpit automation and displays, similar to those being pursued by the Synthetic Vision project, except presumably at a lower cost. These activities are of interest to CE 11. The other aspect of SATS that may be relevant to the other CEs is the work on more automated air traffic control, and delegation of more responsibility and authority to the flight deck. These technologies are of interest to CE 5, 6, 7, and 11 and should be followed.

A summary of potential impacts of other NASA aviation projects on CE 5, 6, 7, and 11 are shown in Table 7.

Table 7. Impacts of Other NASA Projects on CEs

Project	Program	Affected CEs
AILS	Aviation System Capacity	CE 11
Synthetic Vision	Aviation Safety	CE 11
Improved Cockpit Automation Automated ATC Delegation to Flight Deck	Small Aircraft Transport System	CE 5, 6, 7, 11

2.5 Impact of European ATM Activities

The Netherlands Research Lab (NLR) has been working on short-term conflict detection and resolution (CD&R) for many years. NASA Langley Research Center has specifically incorporated much of their work into the CD&R research agendas for DAG. However, NLR continues to pursue CD&R research, both in support of NASA and other European clients, so its results should be carefully tracked and evaluated for applicability to all DAG elements.

In addition, many European and other foreign agencies are evaluating the technical and operational feasibility and benefits of ADS-B as an improved surveillance system to support a wide range of applications, including airborne CD&R. Those evaluations should be carefully tracked and evaluated for applicability to all DAG elements.

Appendix A
Source Documents for Operational Need Statements

1. FAA - *ATS Concept of Operations for the National Airspace System in 2005 – Narrative*
2. FAA - *Addendum 1: Operational Tasks and Scenarios*
3. FAA - *National Airspace System Architecture, Version 4.0*
4. RTCA - *A Joint Government/Industry Operational Concept for the Evolution of Free Flight*
5. FAA - *Safe Flight 21 Functional Specification*
6. FAA - *ATS Concept of Operations for the National Airspace System for the Mature State of Free Flight*
7. FAA - *Air Traffic Service Performance Plan for Fiscal Years 1998-2000*
8. Eurocontrol - *Air Traffic Management Strategy for 2000+ (Volume 2)*
9. NASA - *Concept Definition of Distributed Air/Ground Traffic Management (DAG-TM)*
10. SRC - *Constrained En Route Airspace Problems (RTO-7)*
11. SRC - *Multi-Facility TMA Requirements for Philadelphia Installation (RTO-16)*
12. SRC - Assessment of Research and Development Efforts Supporting Future Operational Concepts for the National Airspace (RTO-23)
13. SRC - Operational Concept-2000 (RTO-35)

Appendix B
Operational Needs Statements Satisfied by DAG Concept Elements

Table B-1 shows the Flight Planning operational needs statements which are satisfied by the DAG CE.5 – Free Maneuvering for User-preferred Local TFM Conformance / AOP – Dynamic Route Planner application.

Table B-1 DAG CE.5 – Free Maneuvering for User-preferred Local TFM Conformance / AOP – Dynamic Route Planner

ONS #	ONS Text	Category
1_386	... 4D weather information (winds, temperature, turbulence, storm cells, icing, etc), combined with analysis of trajectory predictions to determine the flights that are possibly affected, will allow users (FD / AOC) to more effectively plan and re-plan various flight operations.	A2: Requires 4D weather
1_422	The most obvious user benefit is a reduction in the per-flight direct operating cost that every user operating under IFR can obtain through real-time optimization of their flight trajectory.	A1
2_100	By the year 2000, users with properly equipped aircraft are able to file user-preferred routes from departure airport Standard Instrument Departure to arrival airport Standard Terminal Arrival Route or from airport-to-airport.	A1
2_105	Aircraft equipped with "self-contained" navigation may file for user-selected waypoints independent of airways and NAVAIDs.	A1
2_110	All users can evaluate their planned flight against system constraints such as hazardous weather, Special Use Airspace, flow restrictions (airspace facility demands), and infrastructure outages in advance of the flight.	A1
2_115	The advance knowledge of conditions along the proposed route allows the flight planner to anticipate possible reroutes that may be needed after departure.	A1
2_130	Operators equipped with data-link are able to load a data-linked flight plan directly into the FMS.	A2: Requires data link
2_135	By the year 2000 GA users are able to probe flight plans against system constraints.	A1
2_150	significant changes in the planning data available to users, and in the flight plan itself. ... planners and service providers have automated access this information from the continuously and automatically updated NAS-wide information system.	A2: Requires NAS WIS
2_160 2_280	today's flight plan is replaced by a flight profile. This profile can be as simple as the user's preferred path, or as detailed as a time-based trajectory that includes the user's preferred path and preferred climb and descent profiles.	A2: Requires flight profile
2_165	The flight profile is a part of a larger data set called the flight object. This is a data set which is available throughout the duration of the flight, both to the user and to service providers across the NAS.	A2: Requires flight profile
2_175	For a flight operating under instrument flight rules (IFR), the flight object can be a much larger data set, including a preferred trajectory coordinated individually by the user, and supplemental information such as the aircraft's current weight, position, runway preference, or gate assignment	A2: Requires flight object
2_180	Flight object information can be updated by the user or service provider throughout the flight.	A1
2_185	flight plan process currently used by service providers will be enhanced to provide a collaborative interaction with the user. This interaction will create dynamic, event-driven user-preferred trajectories for individual flights.	A1
2_210	Accept and accommodate flight plans for user-preferred routes from departure airport Standard Instrument Departure (SID) to arrival airport Standard Terminal Arrival Route (STAR) - airport-to-airport.	A1
2_245	Provide voice and electronic messaging support to users for clarification of flight planning information.	A1
2_255	Prepare and file a flight plan with the service provider.	A1
2_260	If user has AOC or AOC-like capability, perform a probe for active or scheduled SUA, weather, and airspace and flow restrictions in preparing a flight plan.	A1
2_270	The flight planning process by 2005 will be based upon the enhancement of the near-term systems capabilities resulting from the "real time" sharing of information regarding the NAS and system demand.	A2: Requires NAS WIS
2_285	flight profile ... This action initiates the automatic creation of a flight plan that contains either the user's preferred route of flight or a more detailed time-based flight trajectory.	A1
2_290	For all users, an enhanced flight plan is available that provides a much larger data set, including preferred trajectory, aircraft weight, runway preference for departure and arrival, gate assignment, and cross-border issues for international flights.	A2: Requires flight profile
2_300	By 2005 the flight planner will interact with the NAS-wide information system to create a flight profile.	A2:

ONS #	ONS Text	Category
	This action initiates the automatic generation of a flight object containing either the user's preferred flight path or a more detailed time-based flight trajectory.	Requires flight profile
2_305	As conditions change during the planning phase, or during the flight, the planner continues to access the NAS-wide information system to determine the impact of the changes on the flight.	A2: Requires NAS WIS
2_315	Information such as runway preferences and aircraft weight, or information to support flight following can be added during the planning phase or during the flight.	A1
2_320	As the planner interactively generates the flight profile, information regarding current and predicted weather conditions, traffic density, restrictions and status of SUAs is available	A1
2_325	When the profile is filed, it is automatically checked against these conditions and any static constraints such as terrain and infrastructure advisories.	A1
2_330	Potential problems are automatically displayed to the planner for reconciliation. Upon filing, the flight object is updated as necessary, along with all affected projections of NAS demand.	A1
2_360	As conditions change during the planning phase or during the flight, the user is able to interactively determine the impact of the changes on the flight and modify the flight plan as necessary	A1
2_405	Interactive flight planning capabilities will have been fully implemented.	A1
2_425 2_415	Interactive flight planning is available for pilots of properly equipped aircraft to aid in filing airport-to-airport flight plans with user-preferred routings.	A1
2_430	The DoD user has real-time interactive flight planning capabilities, which enable more effective flight planning with respect to NAS resources.	A1
2_455	Interactive flight planning information is available to all GA pilots.	A1
3_185	continuous updating of the flight object improves real-time planning for both the user and the service provider. ... improves the effectiveness of ongoing traffic management initiatives and the collaborative decision making	A1
3_205 4_285 5_335 6_220	Approve or deny proposed flight plan changes, except those needed for cockpit self-separation when that responsibility has been transferred to the flight deck.	A1
4_280	Status information concerning the NAS infrastructure components that support arrival and departure operations is shared with the flight deck.	A2: Requires NAS WIS
5_490	Updated charts, current weather, SUA status, and other required data will be up-linked (or data-loaded) to the cockpit allowing for better strategic and tactical route and altitude planning. Data link will also allow the aircraft crews and the service provider specialists to see the same weather and alerts.	A2: Requires data link
5_870	Routes are probed for flow constraints prior to filing, resulting in fewer reroutes.	A1
5_875	FMS equipage, including coupled navigation capabilities, also allow for more efficient flight planning by the AOC.	A1
6_150	reduced separation minima and dynamic management of route structures will help the user formulate and request a preferred flight profile.	A2: requires reduced separation minima and dynamic route management
7_175	users will be better able to plan their flight ... and to minimize congestion or possible delays due to the ... information made available by the NAS-wide information system.	A2: Requires NAS WIS
7_575	User flexibility is significantly expanded by advance information about demand and capacity. ... revising their plans in a timely manner.	A2: Requires advance information about demand and capacity

Table B-2 shows the Separation Assurance operational needs statements which are satisfied by the DAG CE.5 – Free Maneuvering for User-preferred Local TFM Conformance / AOP – Dynamic Route Planner application.

Table B-2 DAG CE.5 - Free Maneuvering for User-preferred Separation Assurance / AOP - Hazard Avoidance System

ONS #	ONS Text	Category
1_225 5_135	Separation assurance remains the responsibility of the service provider. However, that responsibility is shifted to the flight deck for specific operations.	A1
1_235	ADS-A A different form of ADS, designed to support oceanic aeronautical operations, based on one-to-one communications between aircraft providing ADS information & a ground facility requiring receipt of ADS reports.	A2: Requires ADS-A
1_238	Retransmit position reports from all pertinent aircraft from the traffic information service back to the cockpit.	A1
1_330	avoidance of convective weather will be greatly improved as the weather tools are integrated with the decision support tools.	A1
1_360	Assure that users maintain required separation, based on pre-defined separation standards, except for specific operations when responsibility is shifted to the flight deck.	A1
1_375 4_370	Through a data link to the properly equipped cockpit, provide users- routine communications- updated charts, current weather, SUA status, and other data- basic flight information services, including forecast weather, NOTAMs, and hazardous weather warnings- airport information, including Runway Visual Range (RVR), braking action and surface condition reports, runway availability, and wake turbulence and wind shear advisories - clearances and frequency changes in the form of pre-defined messages.	A2: Requires data link
1_395 3_265	Assign cockpit self-separation responsibility to flight crews "when operationally advantageous".	A1
1_405	Provide self-separation between the user aircraft and other aircraft, terrain, and obstacles for specific operations when responsibility is shifted to the flight deck from the service provider.	A1
1_440 5_515	Air safety has been increased through the implementation of conflict detection and resolution tools, the inclusion of the flight deck in some separation decision-making, and greatly enhanced weather detection and reporting capabilities.	A1
4_220	Satellite-based position data, broadcast by properly equipped aircraft, are used in cockpit traffic displays to increase the pilots' situation awareness for aircraft-to-aircraft separation. These avionics allow an increasingly frequent transfer of responsibility for separation assurance to the flight deck for some types of operations.	A2: Requires GPS
4_221	The rules, procedures, and training for these types of shared separation assurance need definition	A1
4_310 4_350	When appropriate in low-density areas, clear properly-equipped aircraft for free maneuvering.	A1
4_311	Properly equipped aircraft are given authority to maneuver as necessary to avoid weather cells, or to follow such aircraft using self-spacing procedures.	A1
4_470 5_555 6_345	separation assurance has undergone changes in the following areas: aircraft-to-aircraft separation, aircraft-to-airspace and aircraft-to-terrain/obstruction separation, and departure and arrival planning services.	A1
4_485	The increased use of this distributed responsibility is made feasible through improved traffic displays on the flight deck, combined with appropriate rules, procedures, and training to support the new roles and responsibilities of the users and service providers.	A1
4_770 5_355	Free maneuvering operations in low-density areas is being performed.	A1
4_775	High density areas still require the oversight from ATC for sequencing and primary separation assurance	A1
4_780 5_810B	in the denser environments some cockpit self-separation is assigned to the flight crew by ATC when operationally advantageous.	A1
4_795	all DoD NAS users are equipped with augmented satellite-based navigation aids, data link, ground proximity warning systems (GPWS), cockpit display of traffic and weather information and on-board collision avoidance.	A1
5_140 1_265	improved situation awareness in the cockpit, enabled by the CDTI display and improved navigation precision, allows some separation tasks to be performed by the flight crew	A1
5_235 5_440	Additional intent and aircraft performance data is provided to decision support systems, thus improving the accuracy of trajectory predictions. This information is combined and presented on the service provider's display.	A1
5_295	Improved decision support tools for conflict detection, resolution, and flow management allow increased accommodation of user-preferred trajectories, schedules, and flight sequences.	A1
5_360 6_230	When operationally advantageous in high-density areas, clear properly equipped aircraft for cockpit self-separation.	A1
5_415	Develop reduced or time-based separation standards, based on technology and aircraft capability, to increase system capacity and safety.	A1

ONS #	ONS Text	Category
5_430	The use of satellite-based navigation and surveillance data will not only increase on-board capabilities ranging from cockpit traffic and enhanced collision avoidance logic, but will also be used by ground-system automation for enhanced conflict probe and alerting.	A1
5_520 5_580	Improving the provider's ability to identify conflicts will also reduce the number of occasions when there is intervention, allowing the user to fly the trajectory proposed with higher frequency.	A1
5_545a	separation assurance services are provided in the en route area	A1
5_550	As in the departure and arrival operations, increased decision support allows significant improvement in en route separation assurance.	A1
5_560	there will be improved coordination between the service provider and the flight deck to aid the flight in weather avoidance.	A1
5_565	improved information available from common weather sources, service providers will be more effective in controlling aircraft in airspace that contains hazardous weather and in providing weather advisories to pilots.	A1
5_571a	Users assume responsibility for separation in low-density airspace, provided they are suitably equipped.	A1
5_575	Decision support systems will assist in conflict detection and the development of conflict resolutions.	A1
5_785	Airlines and high-end GA frequently perform free maneuvering operations in low density areas	A1
5_790	high density areas still require the oversight from ATC for sequencing and primary separation assurance.	A1
5_845	In en route airspace, the use of moving maps for CFIT avoidance, CDTI, and weather depiction has begun, albeit, the user application stressed may be different.	A1
6_155	Most aircraft navigate using a global satellite navigation system whose improved accuracy will generate the required safety for reduced separation standards.	A2: requires GPS
6_285	Perform some separation and merging activities that were previously performed by the service provider.	A1
6_290 6_320	Provide increased position awareness of aircraft for monitoring and separation of flight progression through automatic dependent surveillance.	A1
6_470	Cockpit self separation provides immediate situation assessment, communications (i.e., air to air), and decision making.	A1
6_475	This tighter cockpit self separation decision/control loop could allow greatly reduced separation standards	A1
6_520	Use of cockpit self-separation and free maneuvering operations are being performed in more complex situations, such as merging.	A1

Table B-3 shows the Separation Assurance operational needs statements which are satisfied by the DAG CE.6 - Trajectory Negotiation for User-preferred Separation Assurance application.

Table B-3 DAG CE.6 - Trajectory Negotiation for User-preferred Separation Assurance

ONS #	ONS Text	Category
1_235	ADS-B enables positive control in non-radar environments.	A1
1_365	Standards may vary depending on equipage and the quality of positional data for individual flights.	A2: equipage & high quality of position data required
1_375 4_370	Through a data link to the properly equipped cockpit, provide users- routine communications- updated charts, current weather, SUA status, and other data- basic flight information services, including forecast weather, NOTAMs, and hazardous weather warnings- airport information, including Runway Visual Range (RVR), braking action and surface condition reports, runway availability, and wake turbulence and wind shear advisories - clearances and frequency changes in the form of pre-defined messages.	A1
1_435	Controller workload under peak traffic remains equivalent to the workload controllers absorbed in the 1990s under lighter traffic demand. This increased ATC efficiency has been achieved through the implementation of decision support systems for traffic management and control, dynamic alteration of airspace boundaries, reduced vertical separation minima, improved air/ground communications and coordination, and enhanced ground/ground coordination aids.	A1
1_437	User-Air Traffic Service Provider exchange of state and intent data will improve the accuracy of, and consistency between, FMS and ground-based trajectory predictions.	A2: Requires data link
1_438	Before changing a flight's trajectory, the controller must ensure not only that the revised trajectory is free of conflicts, but that the transition to that trajectory is also conflict free. The system therefore provides a 'trial plan' conflict probe for testing alternative trajectories.	A1
1_440 5_515	Air safety has been increased through the implementation of conflict detection and resolution tools, the inclusion of the flight deck in some separation decision-making, and greatly enhanced weather detection and reporting capabilities.	A2: Requires weather detection and reporting
4_110	Improved navigation precision, coupled with changes in service provider separation procedures allow an improved ability to accommodate user-preferred arrival/departure routes, climb/descent profiles, and runway assignment.	A2: requires improved navigation precision
4_251b	This includes access to better information regarding the kind & amount of traffic coming into a terminal	A1

ONS #	ONS Text	Category
	area. It also includes improved capability for conflict alert and for automated coordination between service providers within the terminal area and in neighboring facilities.	
4_475	visual separation by pilots in terminal areas is expanded by 2005 to allow all-weather pilot separation when deemed appropriate by the service provider.	A1
4_485	The increased use of this distributed responsibility is made feasible through improved traffic displays on the flight deck, combined with appropriate rules, procedures, and training to support the new roles and responsibilities of the users and service providers.	A1
4_490	To assure aircraft separation, service providers use improved tools and displays.	A1
4_515	Aircraft-to-airspace and aircraft-to-terrain separation will remain the service provider’s responsibility	A1
4_520	the service provider maintains separation between controlled aircraft and active SUAs, and between controlled aircraft and terrain/obstructions.	A1
4_775	High density areas still require the oversight from ATC for sequencing and primary separation assurance	A1
5_210	Decision support systems such as the conflict probe assist the provider in developing safe and effective traffic solutions.	A1
5_235 5_440	Additional intent and aircraft performance data is provided to decision support systems, thus improving the accuracy of trajectory predictions. This information is combined and presented on the service provider’s display.	A2: Requires data link
5_240 5_445	Since there are different separation standards depending on the flight’s equipage and the quality of the positional data, service provider displays indicate the quality of the resulting aircraft positions and the appropriate equipage information.	A1
5_295	Improved decision support tools for conflict detection, resolution, and flow management allow increased accommodation of user-preferred trajectories, schedules, and flight sequences.	A1
5_315 5_470	Structured routes are the exception rather than the rule, and exist only when required to meet continuous high density, to provide for the avoidance of terrain and active SUAs, and to facilitate the transition between areas with differing separation standards.	A1
5_420	user intent and aircraft performance data to decision support systems, thus improving the accuracy of ground-based trajectory predictions.	A1
5_430	The use of satellite-based navigation and surveillance data will not only increase on-board capabilities ranging from cockpit traffic and enhanced collision avoidance logic, but will also be used by ground-system automation for enhanced conflict probe and alerting.	A1
5_520 5_580	Improving the provider’s ability to identify conflicts will also reduce the number of occasions when there is intervention, allowing the user to fly the trajectory proposed with higher frequency.	A1
5_550	As in the departure and arrival operations, increased decision support allows significant improvement in en route separation assurance.	A1
5_560	there will be improved coordination between the service provider and the flight deck to aid the flight in weather avoidance.	A1
5_565	improved information available from common weather sources, service providers will be more effective in controlling aircraft in airspace that contains hazardous weather and in providing weather advisories to pilots.	A3: Requires weather sources
5_575	Decision support systems will assist in conflict detection and the development of conflict resolutions.	A1
5_605	Service providers will continue to be responsible for maintaining separation between aircraft and certain types of airspace (specifically, active special use and adjacent controlled airspace), terrain, and obstructions	A1
5_615	When flights are in close proximity to the newly activated SUA, the provider will use aircraft-to-aircraft conflict detection tools as aids to prevent them from entering the restricted airspace. Both earlier intervention and the closer-proximity resolution activities result in more efficient routing of aircraft	A1
5_790	High density areas still require the oversight from ATC for sequencing and primary separation assurance.	A1
5_805	Use of the ground based conflict probe has been modified to allow for airborne procedures to resolve most conflicts, thus allowing maximum routing flexibility with the least restrictions.	A1
5_845	In en route airspace, the use of moving maps for CFIT avoidance, CDTI, and weather depiction has begun, albeit, the user application stressed may be different.	A1
6_155	Most aircraft navigate using a global satellite navigation system whose improved accuracy will generate the required safety for reduced separation standards.	A2: requires improved satellite based navigation system
6_380	The pilot’s ability to support climbs, descents, crossing and merging routes is supplemented by the service provider’s conflict probe decision support system.	A1
6_415b 6_455b	Service providers, aided by supporting automation and electronic visual displays, are able to acquire and view timely and reliable flight information to dynamically address necessary changes to the trajectories.	A1
6_460 6_370	pilots may coordinate with service providers for clearance to conduct specified cockpit self-separation operations. ... the pilot’s view of nearby traffic supplements the service provider’s big picture of longer term traffic flow.	A1

Table B-4 shows the Traffic Management Synchronization operational needs statements which are satisfied by the DAG CE.6 - Trajectory Negotiation for User-Preferred Local TFM Conformance application.

Table B-4 DAG CE.6 - Trajectory Negotiation for User-Preferred Local TFM Conformance

ONS #	ONS Text	Category
1_422	The most obvious user benefit is a reduction in the per-flight direct operating cost that every user operating under IFR can obtain through real-time optimization of their flight trajectory.	A1
3_185	continuous updating of the flight object improves real-time planning for both the user and the service provider. ... improves the effectiveness of ongoing traffic management initiatives and the collaborative decision making	A1
4_311	Properly equipped aircraft are given authority to maneuver as necessary to avoid weather cells, or to follow such aircraft using self-spacing procedures.	A1
4_315 3_225	When appropriate, clear properly-equipped aircraft to self-separate and maintain sequence (“station-keeping”).	A1
4_316	Appropriately equipped aircraft are given clearance to merge with another arrival stream, and/or maintain in-trail separation relative to a leading aircraft.	A1
4_450	more effective collaborative decision making, with the AOCs collaborating with ATM in deciding TFM initiatives which are then data linked to the pilots and service providers.	A1
4_585	On final approach, the service provider may give the pilot responsibility for station keeping to maintain the required sequence and spacing to the runway.	A1
4_646	To enhance operations during peak capacity periods, arrival operations are enhanced by taking advantage of aircraft FMS to enable Required Time of Arrivals (RTAs) at designated approach points.	A1
4_755	the pilot will be able to select which route he wishes to follow.	A1
4_765	pilots ... fly to meet required times of arrival	A1
4_770 5_355	Free maneuvering operations in low density areas is being performed.	A1
4_775	High density areas still require the oversight from ATC for sequencing and primary separation assurance	A1
5_115	The use of en route airborne holding has been reduced with the implementation of other procedures that improve traffic flow patterns and make maximum use of available terminal capacity	A1
5_125	By the year 2000, ATC considers AOC and flight deck preferences while assigning routes and controlling aircraft.	A1
5_145	These metering and merging separation procedures could provide the crew the flexibility to more efficiently manage their flight with respect to aircraft performance, crew preferences, and ATC considerations by allowing aircraft to stay on the cleared route in cases were ATC would otherwise have to vector the aircraft to achieve the desired spacing.	A1
5_200	remain at that altitude until the point is reached from which an optimum descent profile should commence.	A1
5_210	Decision support systems such as the conflict probe assist the provider in developing safe and effective traffic solutions.	A1
5_235 5_440	Additional intent and aircraft performance data is provided to decision support systems, thus improving the accuracy of trajectory predictions. This information is combined and presented on the service provider’s display.	A1
5_295	Improved decision support tools for conflict detection, resolution, and flow management allow increased accommodation of user-preferred trajectories, schedules, and flight sequences.	A1
5_345	When appropriate, use a “metering spacing technique” to provide the user the flexibility to efficiently manage a flight.	A1
5_400	Perform some spacing activities that were previously performed by the service provider. These activities will be performed for metering or merging purposes. (Flight Deck)	A1
5_420	user intent and aircraft performance data to decision support systems, thus improving the accuracy of ground-based trajectory predictions.	A1
5_450	Reduced or time-based separation standards will be developed based on technology and aircraft capability, further increasing system capacity and safety.	A1
5_510	Cockpit technology improvements will allow more user-preferred routings, SID to STAR or from airport-to-airport.	A1
5_530	This will facilitate more effective collaborative decision making, allowing users to collaborate with ATM in deciding TFM initiatives.	A1
5_545b	traffic management services are provided in the en route area	A1
5_575	Decision support systems will assist in conflict detection and the development of conflict resolutions.	A1
5_685	The service provider will also be involved in the coordination of modified flight trajectories for active flights.	A1
5_695	This will allow earlier and immediate coordination with either the pilot or the airline operations center to	A1

ONS #	ONS Text	Category
	provide adjustments with minimal intervention and movement.	
5_700	Traffic flow service providers will work with the service provider in active communication with the pilot to re-plan the flight trajectory.	A1
5_710	increased information exchange between the en route, arrival, departure and surface decision support tools will enable better coordination of cross-facility traffic flows with fewer constraints. These improved capabilities will also allow for greater accommodation of user requests, including carrier preferences on the sequencing of their arrival aircraft.	A1
5_740	Modified routes can be developed collaboratively between the AOC and the service provider and then data linked to the cockpit and downstream ATC facilities.	A1
5_790	high density areas still require the oversight from ATC for sequencing and primary separation assurance.	A1
6_285	Perform some separation and merging activities that were previously performed by the service provider.	A1
6_300	Provide additional user intent and aircraft performance data to decision support systems, thus improving the accuracy of ground-based trajectory predictions.	A1
6_380	The pilot's ability to support climbs, descents, crossing and merging routes is supplemented by the service provider's conflict probe decision support system.	A1
6_415b 6_455b	Service providers, aided by supporting automation and electronic visual displays, are able to acquire and view timely and reliable flight information to dynamically address necessary changes to the trajectories.	A1
6_460 6_370	pilots may coordinate with service providers for clearance to conduct specified cockpit self-separation operations. ... the pilot's view of nearby traffic supplements the service provider's big picture of longer term traffic flow.	A1
6_465 6_375 6_240	Pilots may obtain approval for special maneuvers such as reduced separation in-trail climb, in-trail descent, lead climb, lead descent, limited duration, station keeping as well as lateral passing maneuvers	A1
6_525b	ATC oversight is still required for sequencing, but collaborative decision making has greatly increased among the service provider, AOC, and the aircraft.	A1
7_125	This approach is commonly referred to as "control by time of arrival" ... Under this approach, both GA and DoD users would be able to make more effective use of NAS resources during reduced capacity conditions.	A1
7_295	Adhere to allocated arrival times assigned by the service provider. In some instances, international flights are excepted from this responsibility.	A1
7_300	Using increased knowledge of the intent of traffic flow initiatives, arrange user resources to help solve traffic flow problems.	A1
7_474	Cumulative delay data ...enables ...controllers to allocate discretionary tasktime to coordinate expedited trajectories for flights that have absorbed delay, rather than for flights that have not been delayed.	A1
7_650	Increasingly, national and local TFM service providers adapt to an environment of increased user flexibility, collaborative partnership, and information sharing among themselves and with the airspace users	A1

Table B-5 shows the Traffic Management Synchronization operational needs statements which are satisfied by the DAG CE.7 - Collaboration for Mitigating Local TFM Constraints due to Weather, SUA, Complexity application.

Table B-5 DAG CE.7 - Collaboration for Mitigating Local TFM Constraints due to Weather, SUA, Complexity

ONS #	ONS Text	Categorization
1_220 5_270	These tools (automated coordination) reduce the burden of routine tasks while increasing the provider's ability to evaluate traffic situations and plan the appropriate response. This increases productivity and provides greater flexibility to user operations, which is especially important given the potential for reduced vertical separation minima and increased traffic density.	A1
1_375 4_370	Through a data link to the properly equipped cockpit, provide users- routine communications- updated charts, current weather, SUA status, and other data- basic flight information services, including forecast weather, NOTAMs, and hazardous weather warnings- airport information, including Runway Visual Range (RVR), braking action and surface condition reports, runway availability, and wake turbulence and wind shear advisories - clearances and frequency changes in the form of pre-defined messages.	A1
1_422	The most obvious user benefit is a reduction in the per-flight direct operating cost that every user operating under IFR can obtain through real-time optimization of their flight trajectory.	A1
1_435	Controller workload under peak traffic remains equivalent to the workload controllers absorbed in the 1990s under lighter traffic demand. This increased ATC efficiency has been achieved through the implementation of decision support systems for traffic management and control, dynamic alteration of airspace boundaries, reduced vertical separation minima, improved air/ground communications and coordination, and enhanced ground/ground coordination aids.	A1
1_438	Before changing a flight's trajectory, the controller must ensure not only that the revised trajectory is free of conflicts, but that the transition to that trajectory is also conflict free. The system therefore provides a 'trial plan' conflict probe for testing alternative trajectories.	A1
2_195	Real-time trajectory updates reflect more realistic departure times, resulting in more accurate traffic load predictions, and increased flexibility due to the imposition of fewer restrictions.	A1
3_185	continuous updating of the flight object improves real-time planning for both the user and the service provider. ... improves the effectiveness of ongoing traffic management initiatives and the collaborative decision making	A1
3_220 3_635	Through the system, provide access to –Automated Terminal Information System (ATIS) and other airport environmental information, including RVR, braking action and surface condition reports, and current precipitation, runway availability, and wake turbulence and wind shear advisories- arrival, departure, taxi schedules, and taxi routes- airborne and surface surveillance information- flight information and pilot reports- weather information, including current weather maps- clearance delivery and taxi instructions- traffic management initiatives.	A1
4_450	more effective collaborative decision making, with the AOCs collaborating with ATM in deciding TFM initiatives which are then data linked to the pilots and service providers.	A1
4_541	Information outputs make all relevant flight object data available to the operational position (ATC, TM, and FAS)	A1
4_600	service providers utilize the decision support systems to monitor traffic flows, NAS performance, and weather.	A1
4_755	the pilot will be able to select which route he wishes to follow.	A1
4_765	pilots ... fly to meet required times of arrival	A1
4_770 5_355	Free maneuvering operations in low density areas is being performed.	A1
4_775	High density areas still require the oversight from ATC for sequencing and primary separation assurance	A1
5_125	By the year 2000, ATC considers AOC and flight deck preferences while assigning routes and controlling aircraft.	A1
5_145	These metering and merging separation procedures could provide the crew the flexibility to more efficiently manage their flight with respect to aircraft performance, crew preferences, and ATC considerations by allowing aircraft to stay on the cleared route in cases were ATC would otherwise have to vector the aircraft to achieve the desired spacing.	A1
5_210	Decision support systems such as the conflict probe assist the provider in developing safe and effective traffic solutions.	A1
5_235 5_440	Additional intent and aircraft performance data is provided to decision support systems, thus improving the accuracy of trajectory predictions. This information is combined and presented on the service provider's display.	A1
5_295	Improved decision support tools for conflict detection, resolution, and flow management allow increased accommodation of user-preferred trajectories, schedules, and flight sequences.	A1
5_330	The NAS-wide information system is continually updated with changes in airspace and route structures, and with the positions and predicted time-based trajectories of the traffic.	A1
5_420	user intent and aircraft performance data to decision support systems, thus improving the accuracy of	A1

ONS #	ONS Text	Categorization
	ground-based trajectory predictions.	
5_510	Cockpit technology improvements will allow more user-preferred routings, SID to STAR or from airport-to-airport.	A1
5_530	This will facilitate more effective collaborative decision making, allowing users to collaborate with ATM in deciding TFM initiatives.	A1
5_545b	traffic management services are provided in the en route area	A1
5_575	Decision support systems will assist in conflict detection and the development of conflict resolutions.	A1
5_620	Decision support tools will also help service providers to collaborate with users when SUA restrictions are later removed or changed.	A1
5_640	The profile is produced through improved information sharing, collaborative decision making, and the projection of flows based on weather and wind patterns.	A1
5_670	The traffic flow service provider will have the same automation tools as those providing separation assurance.	A1
5_685	The service provider will also be involved in the coordination of modified flight trajectories for active flights.	A1
5_695	This will allow earlier and immediate coordination with either the pilot or the airline operations center to provide adjustments with minimal intervention and movement.	A1
5_700	Traffic flow service providers will work with the service provider in active communication with the pilot to re-plan the flight trajectory.	A1
5_740	Modified routes can be developed collaboratively between the AOC and the service provider and then data linked to the cockpit and downstream ATC facilities.	A1
5_790	high density areas still require the oversight from ATC for sequencing and primary separation assurance.	A1
6_205	Rapid delivery of clearances by the service providers, and responses by the flight deck, are achieved through increasingly common use of data link.	A1
6_300	Provide additional user intent and aircraft performance data to decision support systems, thus improving the accuracy of ground-based trajectory predictions.	A1
6_430	The service provider has access to the NAS-wide information system as well as projected demand for the day.	A1
6_415b 6_455b	Service providers, aided by supporting automation and electronic visual displays, are able to acquire and view timely and reliable flight information to dynamically address necessary changes to the trajectories.	A1
6_525b	ATC oversight is still required for sequencing, but collaborative decision making has greatly increased among the service provider, AOC, and the aircraft.	A1
7_160	Through collaborative decision making, future service providers will focus on providing the best, seamless service to all users.	A1
7_300	Using increased knowledge of the intent of traffic flow initiatives, arrange user resources to help solve traffic flow problems.	A1
7_474	Cumulative delay data ...enables ...controllers to allocate discretionary tasktime to coordinate expedited trajectories for flights that have absorbed delay, rather than for flights that have not been delayed.	A1
7_650	Increasingly, national and local TFM service providers adapt to an environment of increased user flexibility, collaborative partnership, and information sharing among themselves and with the airspace users	A1
7_655	in a severe weather situation, increased collaboration among users and service providers enables shared decisions on how to avoid the severe weather and deal with the resultant short-term capacity shortage	A1

Table B-6 shows the Traffic Management Synchronization operational needs statements which are satisfied by the DAG CE.11 - Self Spacing for Merging & In-Trail Separation application.

Table B-6 DAG CE.11 - Self Spacing for Merging & In-Trail Separation

ONS #	ONS Text	Category
1_375 4_370	Through a data link to the properly equipped cockpit, provide users- routine communications- updated charts, current weather, SUA status, and other data- basic flight information services, including forecast weather, NOTAMs, and hazardous weather warnings- airport information, including Runway Visual Range (RVR), braking action and surface condition reports, runway availability, and wake turbulence and wind shear advisories - clearances and frequency changes in the form of pre-defined messages.	A1
4_311	Properly equipped aircraft are given authority to maneuver as necessary to avoid weather cells, or to follow such aircraft using self-spacing procedures.	A1
4_315 3_225	When appropriate, clear properly-equipped aircraft to self-separate and maintain sequence ("station-keeping").	A1
4_316	Appropriately equipped aircraft are given clearance to merge with another arrival stream, and/or maintain in-trail separation relative to a leading aircraft.	A1
4_355	Use collision avoidance and escape guidance logic, real-time wake turbulence prediction, and flight deck situation awareness to perform simultaneous approaches to closely spaced runways in Instrument Meteorological Conditions (IMC).	A1
4_555	Arrival operations also benefit from these tools, {tools that provide more efficient airport surface operations, improved real time assessment of traffic activity in departure and en route airspace, and expanded usage of flexible routes based on RNAV, satellite navigation, and FMS.}	A1
4_575	In the final portion of the arrival phase, decision support systems facilitate the use of time-based metering to maximize airspace and airport capacity.	A1
4_585	On final approach, the service provider may give the pilot responsibility for station keeping to maintain the required sequence and spacing to the runway.	A1
4_646	To enhance operations during peak capacity periods, arrival operations are enhanced by taking advantage of aircraft FMS to enable Required Time of Arrivals (RTAs) at designated approach points.	A1
4_755	the pilot will be able to select which route he wishes to follow.	A1
4_765	pilots ... fly to meet required times of arrival	A1
4_770 5_355	Free maneuvering operations in low density areas is being performed.	A1
5_115	The use of en route airborne holding has been reduced with the implementation of other procedures that improve traffic flow patterns and make maximum use of available terminal capacity	A1
5_145	These metering and merging separation procedures could provide the crew the flexibility to more efficiently manage their flight with respect to aircraft performance, crew preferences, and ATC considerations by allowing aircraft to stay on the cleared route in cases were ATC would otherwise have to vector the aircraft to achieve the desired spacing.	A1
5_200	remain at that altitude until the point is reached from which an optimum descent profile should commence.	A1
5_345	When appropriate, use a "metering spacing technique" to provide the user the flexibility to efficiently manage a flight.	A1
5_400	Perform some spacing activities that were previously performed by the service provider. These activities will be performed for metering or merging purposes. (Flight Deck)	A1
5_450	Reduced or time-based separation standards will be developed based on technology and aircraft capability, further increasing system capacity and safety.	A1
5_575	Decision support systems will assist in conflict detection and the development of conflict resolutions.	A1
5_685	The service provider will also be involved in the coordination of modified flight trajectories for active flights.	A1
5_885	While vectoring of aircraft is a high workload for both controllers and pilots, only one clearance is given for this metering spacing technique	A1
6_285	Perform some separation and merging activities that were previously performed by the service provider.	A1
6_460 6_370	pilots may coordinate with service providers for clearance to conduct specified cockpit self-separation operations. ... the pilot's view of nearby traffic supplements the service provider's big picture of longer term traffic flow.	A1
6_465 6_375 6_240	Pilots may obtain approval for special maneuvers such as reduced separation in-trail climb, in-trail descent, lead climb, lead descent, limited duration, station keeping as well as lateral passing maneuvers	A1