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BOEING.COM/COMMERCIAL/
AEROMAGAZINE

Lifecycle Solutions

**Reducing
Smoke and
Burning
Odor Events**

Flight Crew
Response to
In-Flight Smoke,
Fire, or Fumes

Integrated IT
for Improved
Airplane Support

E-Enabled
Capabilities of the
787 Dreamliner

AERO

AERO

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AERO

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AERO Online

www.boeing.com/commercial/aeromagazine

AERO magazine is published quarterly by Boeing Commercial Airplanes and is distributed at no cost to operators of Boeing commercial airplanes. *AERO* provides operators with supplemental technical information to promote continuous safety and efficiency in their daily fleet operations.

The Boeing Company supports operators during the life of each Boeing commercial airplane. Support includes stationing Field Service representatives in more than 60 countries, furnishing spare parts and engineering support, training flight crews and maintenance personnel, and providing operations and maintenance publications.

Boeing continually communicates with operators through such vehicles as technical meetings, service letters, and service bulletins. This assists operators in addressing regulatory requirements and Air Transport Association specifications.

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Print copies of *AERO* are not available by subscription, but the publication may be viewed on the Web at www.boeing.com/commercial/aeromagazine.

Please send address changes to me.boeing@boeing.com. Please send all other communications to *AERO* Magazine, Boeing Commercial Airplanes, P.O. Box 3707, MC 21-72, Seattle, Washington, 98124-2207, USA.
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AERO is printed on Forest Stewardship Council Certified paper containing 10% post-consumer waste.



Lifecycle Solutions for Lifetime Relationships



LOU MANCINI

Vice President and General Manager
Boeing Commercial Aviation Services

Last November, I had the pleasure of meeting with some of you, our valued customers, at a Boeing Customer Support Executive Symposium in Long Beach, California. We hold these symposiums every year in different regions of the world. It is our chance, as the leaders of Boeing Commercial Aviation Services, to talk to our airline customers about issues affecting the industry and the continued safe and efficient operation of the in-service Boeing fleet.

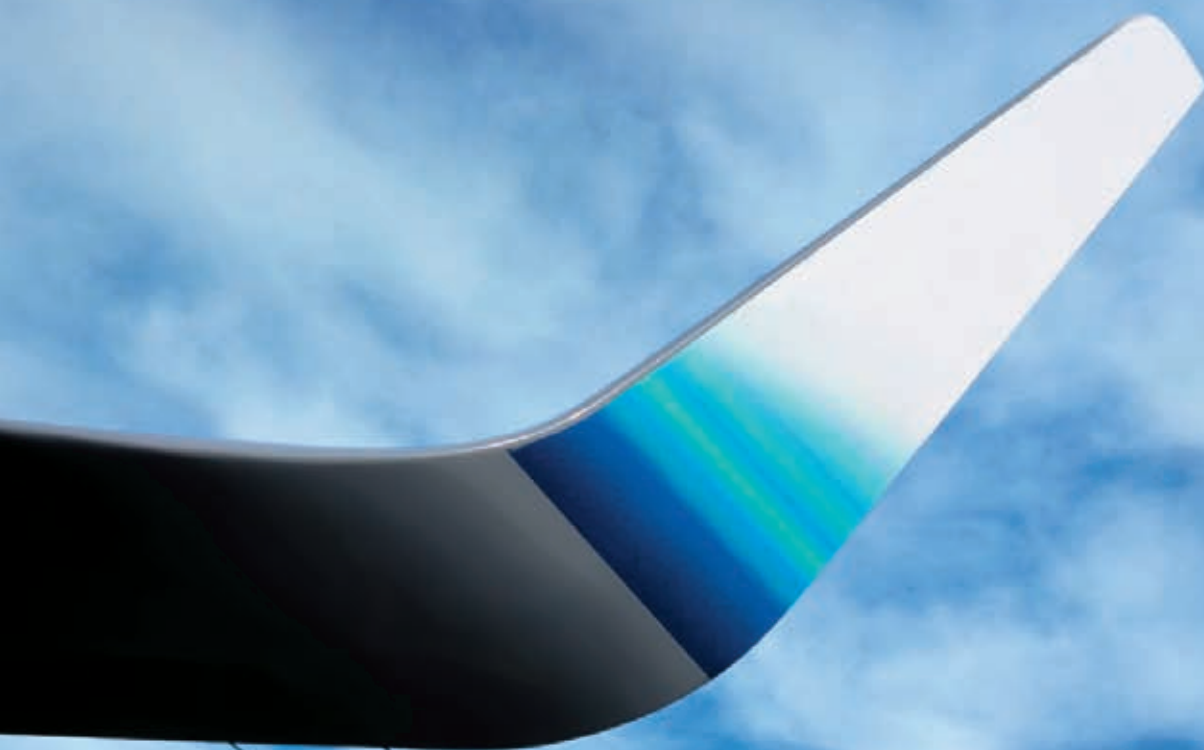
At the November meeting, I reiterated our commitment to providing aftermarket products and support that maximize the value of your Boeing fleet over its entire lifecycle. These “Lifecycle Solutions” represent a 20- to 30-year commitment that begins with the acquisition of an airplane and continues throughout its operation, maintenance, and modification, and doesn’t end until the airplane is eventually transitioned out of service.

Lifecycle Solutions center around five capabilities to help you be successful: customer support, materials optimization, operational performance, training, and fleet enhancements.

Customer Support

Customer support spans all the services that we provide as part of your purchase of a Boeing airplane. But it goes beyond the maintenance and flight documents, the Web portal MyBoeingFleet.com, and field support. It’s about helping you day in and day out to get the most of your asset in terms of reliability, availability, and, of course, safety. It includes our Operations Center, which is a 24-hour-a-day operation, available seven days a week to answer your urgent service requests.

Blended winglets offer customers operational benefits, such as more efficient flight characteristics in cruise and during takeoff and climbout, which translate into additional range with the same fuel and payload. (Blended Winglet™ technology is provided by Aviation Partners Boeing—a joint venture of Aviation Partners, Inc., and The Boeing Company.)



Boeing's "Lifecycle Solutions" represent a 20- to 30-year commitment to the customer that begins with the acquisition of an airplane and continues throughout its operation, maintenance, and modification, and doesn't end until the airplane is eventually transitioned out of service.



Customer Support

Materials Optimization

Operational Performance

Training

Fleet Enhancements

LIFECYCLE SOLUTIONS FOR IMPROVED OPERATIONAL AND ENVIRONMENTAL PERFORMANCE

Materials Optimization

Materials optimization is about providing you with the right spare part at the right place at the right time. We do that through quick transactions or long-term supply management agreements, such as the Landing Gear Exchange, Component Services Program, and Integrated Materials Management. Our goal is to help you reduce your inventory and logistics footprint so that you can operate more efficiently and competitively.

Operational Performance

We also offer commercial products in the areas of flight, maintenance, and engineering to help you optimize the efficiency of your Boeing asset. These products include Airplane Health Management, Electronic Flight Bag, Maintenance Performance Toolbox, Required Navigation Performance,

flight planning, and crew scheduling. Many of these solutions have a positive effect on the environment.

Training

To ensure that you are qualified and ready to operate your Boeing fleet, we provide world-class flight and maintenance training. We view training as integral to all we do, which is why we recently centralized our training units within Boeing Commercial Airplanes to serve you even better.

Fleet Enhancements

Another way to boost the productivity and value of your Boeing fleet is by taking advantage of modifications, retrofits, and upgrades. These include Boeing Converted Freighters, blended winglets, new-look interiors, the 777 Performance Improvement Package, and carbon brake retrofits.

Whether you choose one or a combination of our Lifecycle Solutions, our focus is on helping you get the maximum value from your Boeing investment throughout its entire lifecycle. It's part of our decades-long commitment to you when you buy a Boeing airplane.

LOU MANCINI

Vice President and General Manager
Boeing Commercial Aviation Services



Model-specific service letters present root causes and potential solutions for the most common SBO events.

Reducing Smoke and Burning Odor Events

At the recommendation of operators, Boeing has undertaken studies of smoke and burning odor (SBO) events occurring on airplanes. The studies provide fleetwide information so that operators can take steps to reduce SBO events.

By **James A. Holley**, Service Engineer

Although most SBO events in the pressurized area of an airplane are resolved and rarely affect continued safe flight, landing, or egress, they are always significant issues with operational consequences. These consequences can include flight cancellations, flight schedule disruptions, air turnbacks, and airplane diversions. SBO events can also result in declared emergencies, airport emergency equipment responses, airplane evacuations, accommodations for displaced passengers, diminished goodwill, and extensive unscheduled maintenance following non-normal procedures, such as overweight landing inspection, recharging of oxygen, and repacking of escape slides.

In an effort to provide information that can help operators take steps to reduce SBO events, Boeing launched a series of ongoing studies of these events on Next-Generation 737, 747, 757, 767, and 777 airplane models. This article explains the scope of the studies and describes how the analysis is conducted, how the results are communicated, and how the results may be used. It also describes the use of an oil leak detection kit to assist ground crews in isolating the source of odors and provides an overview of appropriate flight crew response to SBO events.

SBO STUDIES INITIATED IN 2004

Since 2004, Boeing has been examining events in which human senses detect a condition inside the pressurized area of an airplane that may result in a conclusion that there is a potentially dangerous ignition source or atmospheric contamination present that needs immediate corrective action. The studies exclude human visual or aural detection of automated alarms.

Figure 1: Service letters on SBO events

MODEL	SERVICE LETTER
737	737-SL-00-023-A
747	747-SL-00-023-A
757	757-SL-00-018-A
767	767-SL-00-019-A
777	777-SL-00-012-A

The SBO studies are ongoing investigations involving the models cited on the previous page, with reports released at least annually through updated model-specific service letters titled “Smoke and Burning Odor (SBO) Event Summary” (Air Transport Association of America [ATA] Chapter 0000-80). The reports address all SBO events reported to Boeing for the period identified in the service letter (see fig. 1).

ROOT CAUSES OF SBO EVENTS

SBO events were analyzed to determine the root cause for each event. Root cause was identified (when possible) down to the component level. Available potential corrective or preventive actions were correlated to the root causes and included in the service letters. Only the top root causes that account for approximately 30 percent of all the reported SBO events are correlated to corrective or preventive action.

The results of the studies were provided to operators in service letters that graphically show the predominant root causes (identified by root cause code [RCC] and description), as well as the occurrence count of the SBO event (see fig. 2).

Because not all SBO events are reported to Boeing, the number of occurrences in figure 2 should be treated on a relative basis. Each root cause is further broken down by an operational impact category, such as delay, diversion, or airplane on ground. Only the predominant root causes are shown in the chart. As a result, not all operational impact categories appear in figure 2. Also, events of undetermined root causes are excluded.

SUGGESTED OPERATOR ACTION

Operators can use the data provided in the associated service letters to initiate action at their discretion to reduce the occurrences of SBO events.

The information provided in the service letters is intended for maintenance operations. Flight crew response to in-flight smoke, fire, and fumes is addressed separately in the accompanying article “Flight Crew Response to In-Flight Smoke, Fire, or Fumes” on page 11.

IDENTIFICATION OF ODOR SOURCE

Most operators would like to locate and stop the cause of the odor, which is often reported as an oil smell or aerosol odor. It can be difficult to identify the odor source, and troubleshooting can result in long

Service letters addressing the issue of SBO events can be accessed through the Web portal MyBoeingFleet.com. Note: McDonnell-Douglas models are not included in the SBO study; however, similar service letters have been published for these models and are referred to as “smoke in the cabin.”

airplane downtime and unnecessary engine or auxiliary power unit (APU) changes.

In response, Boeing has developed an oil detection kit that can be used to quickly identify the source of oil leaks or aerosol odors. The kit includes a bleed air sampler and portable infrared spectrometer. Ground crews connect the air sampler to the 3-inch pneumatic ground cart connector and run engine or APU bleed air through the sampler for 10 minutes. The spectrometer and a laptop computer are used to analyze the sample. The kit’s software alerts the user when the sample matches a known contaminant, such as oil or hydraulic fluid.

The oil detection kit works for all Boeing models except the 787 and on all McDonnell-Douglas airplanes. The kit may be ordered online at the Web portal MyBoeingFleet.com by requesting part number J21009.

SUMMARY

SBO events can result in expensive operational interruptions. Boeing publishes the most significant root causes for SBO events and correlates these to potential corrective or preventive action in model-specific service letters.


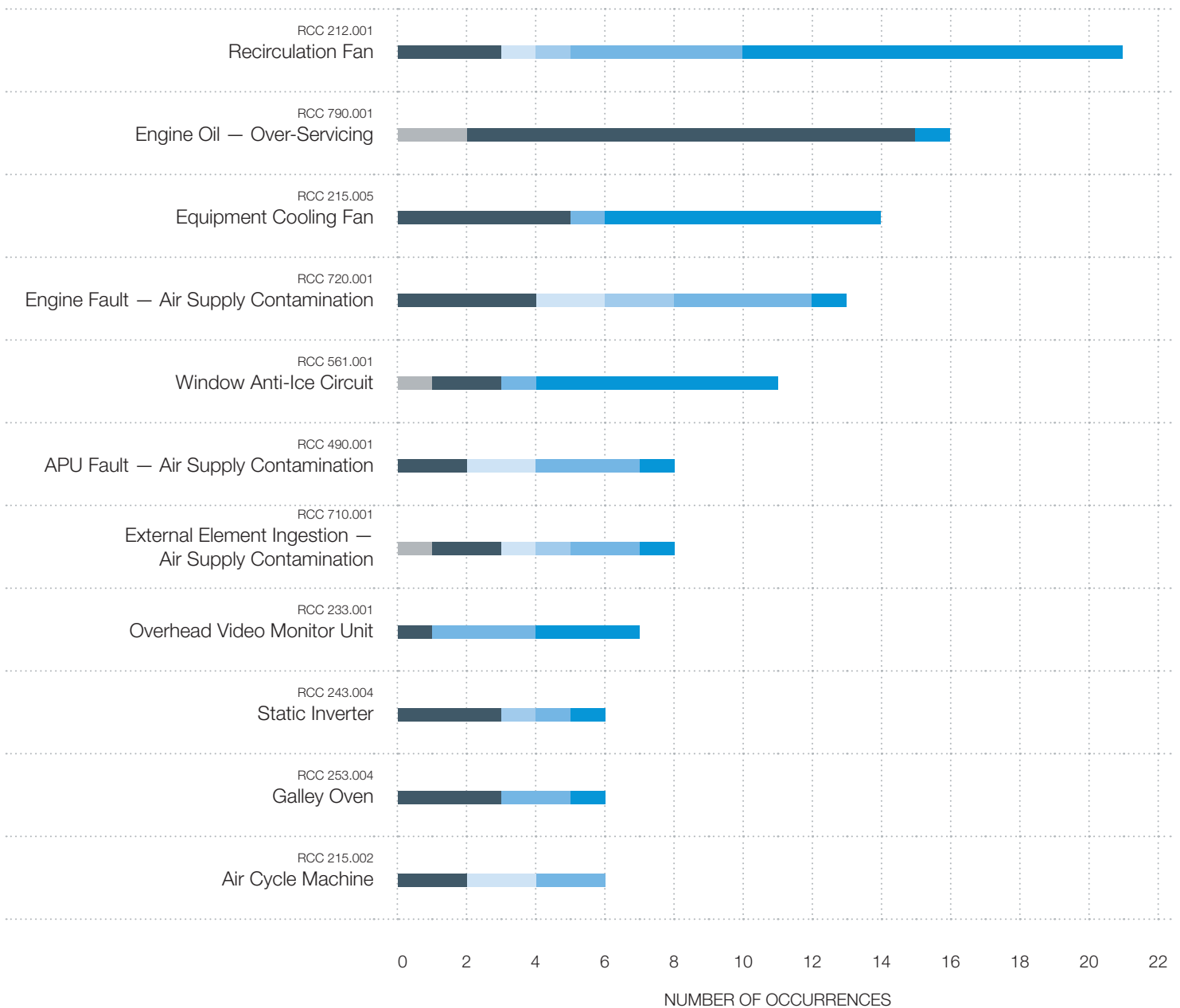
For more information, please contact James Holley at james.a.holley@boeing.com. 

Figure 2: Study results for a given airplane model

Root cause codes (RCCs) and operational impacts of SBO events reported for the 757, July 2004 – August 2008.

- Undetermined
- Minimal Interruption
- Delay
- Cancellation/Out of Service
- Air Turnback
- Diversion
- Airplane on Ground





Flight crews worldwide now have a single integrated checklist that can be used for all non-alerted events.

Flight Crew Response to In-Flight Smoke, Fire, or Fumes

Smoke, fire, or fume (SFF) events can occur suddenly in commercial airplanes. Yet information about the source of the event may be vague, incomplete, inaccurate, or contradictory. Additionally, there is a wide range of possible sources and situations.

By William A. McKenzie, Flight Crew Procedures Manager

Historically, airlines have provided flight crews with checklists to help them identify and deal with smoke, fire, and fumes. Until recently, manufacturer and airline checklists varied in format and content. In response to this situation, Boeing worked together with airlines, pilots, and other manufacturers to develop a philosophy and a checklist template to standardize and optimize flight crew responses to non-alerted SFF events (i.e., events not announced to the flight crew by onboard detection systems).

These efforts have produced a set of new, industry standard procedures that:

- Define a common approach for manufacturers and airlines to take when developing checklists.

- Define a common set of actions for pilots to expect across multiple models.
- Create an SFF checklist template that addresses key issues that were widely divergent in the industry.

PROVIDING THE BEST POSSIBLE CREW GUIDANCE

The objective of the checklist template is to provide the best possible crew guidance for managing in-flight SFF events while acknowledging that every SFF situation is different.

As a result, flight crews worldwide now have a single integrated checklist that can be used across all non-alerted SFF events

(see fig. 1). The guidance provided by the new template addresses:

- SFF source identification.
- Actions to perform regardless of source.
- Crew communication.
- Timing for diversion and landing initiation.
- Smoke or fumes removal.
- Additional actions to perform if smoke persists.
- Loss of capability and operational consequences.

Figure 1: Smoke, fire, or fumes (SFF) checklist template

Boeing used this template to develop new SFF checklists for all passenger models of the 737, 747, 757, 767, and 777 airplanes and is in the process of developing and evaluating similar checklists for the MD-80, MD-90, 717, MD-10, and MD-11 airplanes. The template is designed to be used by all manufacturers and operators to standardize and optimize flight crew responses to non-alerted SFF events.

STEP	ACTION	RESPONSE
1	Diversion may be required.	
2	Oxygen masks (if required)	On, 100%
3	Smoke goggles (if required)	On
4	Crew and cabin communications	Establish
5	Manufacturer's initial steps	Accomplish
Anytime smoke or fumes become the greatest threat, accomplish separate <i>Smoke or Fumes Removal Checklist</i>.		
6	Source is immediately obvious and can be extinguished quickly: If YES → go to Step 7. If NO → go to Step 9.	
7	Extinguish the source. If possible, remove power from affected equipment by switch or circuit breaker on the flight deck or in the cabin.	
8	Source is visually confirmed to be extinguished: If YES → consider reversing manufacturer's initial steps. Go to Step 17. If NO → go to Step 9.	
9	Remaining minimal essential manufacturer's action steps [These are steps that do not meet the "initial steps" criteria but are probable sources.]	Accomplish
10	Initiate a diversion to the nearest suitable airport while continuing the checklist.	
Warning: If the smoke/fire/fumes situation becomes unmanageable, consider an immediate landing.		
11	Landing is imminent: If YES → go to Step 16. If NO → go to Step 12.	
12	"X" system actions [These are further actions to control/extinguish source.] If dissipating, go to Step 16.	Accomplish
13	"Y" system actions [These are further actions to control/extinguish source.] If dissipating, go to Step 16.	Accomplish
14	"Z" system actions [These are further actions to control/extinguish source.] If dissipating, go to Step 16.	Accomplish
15	SFF continues after all system-related steps are accomplished: Consider landing immediately. Go to Step 16.	
16	Review Operational Considerations.	
17	Accomplish <i>Smoke or Fumes Removal Checklist</i> , if required.	
18	Checklist complete.	

INDUSTRY CONSENSUS REGARDING SFF EVENTS

The Flight Safety Foundation sponsored this international industry initiative to improve checklist procedures for airline pilots confronting smoke, fire, or fumes. It also published the *Smoke/Fire/Fumes Philosophy and Definitions*, which was used to construct the SFF checklist template. Here are the key components of this philosophy.

General

- The entire crew must be part of the solution.
- For any smoke event, time is critical.
- The SFF checklist template:
 - Does not replace alerted checklists (e.g., cargo smoke) or address multiple events.
 - Includes considerations to support decisions for immediate landing (e.g., overweight landing, tailwind landing, ditching, forced off-airport landing).
 - Systematically identifies and eliminates an unknown SFF source.
- At the beginning of an SFF event, the crew should consider all of the following:
 - Protecting themselves (e.g., oxygen masks, smoke goggles).
 - Communication (e.g., crew, air traffic control).
 - Diversion.
 - Assessing the SFF situation and available resources.

Source elimination

- It should be assumed pilots may not always be able to accurately identify the smoke source due to ambiguous cues.
- It should be assumed alerted-smoke-event checklists have been accomplished but the smoke's source may not have been eliminated.
- Rapid extinguishing or elimination of the source is the key to preventing escalation of the event.

- Manufacturer's initial steps that remove the most probable smoke or fume sources and reduce risk must be immediately available to the crew. These steps are developed by the manufacturer and typically have the pilot turn off components or systems having the highest probability of addressing a smoke/fire/fume source. These steps should be determined by model-specific historical data or analysis.
- Initial steps for source elimination:
 - Should be quick, simple, and reversible.
 - Will not make the situation worse or inhibit further assessment of the situation.
 - Do not require analysis by the crew.

Timing for diversion/landing

- Crews should anticipate diversion as soon as an SFF event occurs and should be reminded in the checklist to consider a diversion.
- After the initial steps, the checklist should direct diversion unless the SFF source is positively identified, confirmed to be extinguished, and smoke or fumes are dissipating.
- The crew should consider an immediate landing anytime the situation cannot be controlled.

Smoke or fumes removal

- The decision to remove smoke or fumes must be made based upon the threat being presented to the passengers or crew.
- Crews should accomplish procedures in the *Smoke or Fumes Removal Checklist* only after the fire has been extinguished or if the smoke or fumes present the greatest threat.
- The crew should be directed to return to the *Smoke/Fire/Fumes Checklist* after smoke/fumes removal if the *Smoke/Fire/Fumes Checklist* was not completed.

Additional steps for source elimination

- Additional steps aimed at source identification and elimination:
 - Are subsequent to the manufacturer's initial steps and the diversion decision.
 - Are accomplished as time and conditions permit, and should not delay landing.
 - Are based on model-specific historical data or analysis.


CHECKLISTS FOR BOEING AIRPLANES

Boeing has used this new template to develop a combined checklist that addresses electrical smoke, air-conditioning smoke, cabin smoke, and fumes.

In 2007, Boeing published new Airplane Flight Manual and Quick Reference Handbook checklists for all passenger models of the 737, 747, 757, 767, and 777. Boeing is in the process of developing and evaluating similar checklists for the MD-80, MD-90, 717, MD-10, and MD-11 airplanes.

SUMMARY

By working through a logical checklist, flight crews can better isolate the cause of SFF events and take appropriate action.

For more information, please contact Bill McKenzie at william.a.mckenzie@boeing.com. 



Boeing has developed a number of e-Enabled solutions that help airlines improve their performance and enhance operational efficiencies.

Integrated IT for Improved Airplane Support

By **Robert Rencher**, Senior Systems Engineer, Associate Technical Fellow

Airlines throughout the world are expanding their use of information technology (IT) within their maintenance, engineering, and flight operations organizations. The use of IT to integrate airline systems is called “e-Enabling.” E-Enabling offers a number of potential benefits, including greater efficiency and improved airline operations. Boeing offers several e-Enabled tools and services, as well as the expertise and guidance to help airlines implement and integrate e-Enabled systems.

As airlines continue to look for efficiencies in every aspect of their operations, e-Enabling is being implemented at an increasing pace. A well-designed information systems architecture is the foundation for an e-Enabled airline. This systems architecture enables the airline to efficiently implement and maintain integrated business systems. The results are a substantial improvement in technical dispatch reliability and a reduction in maintenance and operations costs. A key value is the integrated business process flows and the availability of timely information for improved decision support and performance support.

E-Enabled IT systems can take many forms, from replacing printed manuals and other documents with electronic versions to gathering and evaluating in-flight data on the real-time flying condition of airplanes. This article discusses the key elements of an e-Enabled strategy, some of the e-Enabled tools and services available from Boeing, Boeing’s e-Enabled system integration capabilities, and two methodologies for assessing airlines’ readiness for e-Enabling.

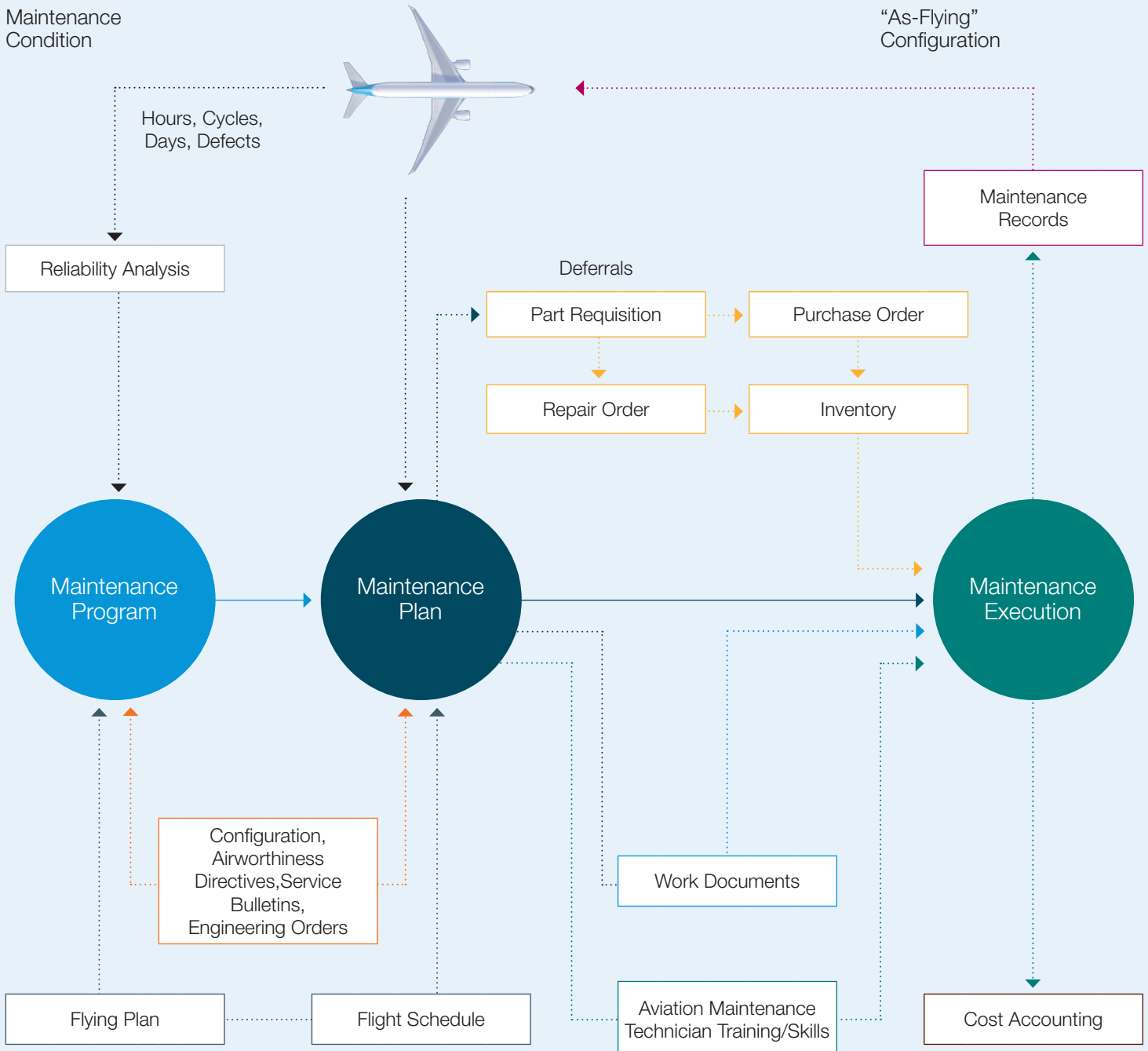
KEY ELEMENTS OF AN E-ENABLED STRATEGY

The e-Enabled environment creates opportunities to establish new business processes, many of which will become operationally critical to the airline. As a result, it is important to have an overall strategy in place to guide e-Enabling efforts. Boeing has identified these key elements of any e-Enabled strategy:

- Define and support an enterprise systems architecture as a method to review and simplify business processes prior to automation.

Figure 1: Elements of real-time visibility into airline operations

Operational efficiency requires system integration throughout an airline's operations. The e-Enabled system environment integrates this real-time data with the airline's maintenance planning systems. The operation of Boeing airplanes creates real-time performance data that is directed to an airline's maintenance planning system and reliability system. This integration event enables just-in-time adjustments to planning, record management, and airline cost accounting with the objective of maintaining an "as-flying" airplane configuration.



- Materials Management
- Engineering
- Records Management
- Finance
- Reliability Program
- Task Management

- Establish information management practices to achieve higher levels of system integration.
- Identify integration objectives for organizational, process information, and IT systems.
- Incorporate historical system use and planning information to establish business function baselines and to project future system utilization.
- Deliver value through reduced operating costs, higher efficiency and safety, better airplane and fleet utilization, and improved passenger experience.
- Integrate air and ground information systems to achieve optimal operational efficiency.
- Establish an IT infrastructure that supports the operational objectives of the airline.

E-ENABLED TOOLS AND SERVICES

Boeing developed a number of e-Enabled solutions that help airlines improve their performance and enhance operational efficiencies. Many of these solutions are designed to help airlines achieve real-time visibility into all of their operations, including airplanes in flight (see fig. 1).

Maintenance Performance Toolbox. This electronic performance support system provides operators with up-to-date fleet maintenance information using intelligent documents and visual navigation methods. It allows airline operators to streamline the

management and distribution of technical information, including just-in-time training at the point of use. Toolbox is designed for use by technical operations staff responsible for airplane system troubleshooting, structural repair record management, parts management, task card management, content authoring, and training. Toolbox is an online subscription service delivered via the Web portal MyBoeingFleet.com and is built on an industry-standard Java 2 Platform, Enterprise Edition, architecture to ensure maximum security, availability, reliability, and scalability. (See “Maintenance Performance Toolbox,” *AERO* first-quarter 2007.)

Airplane Health Management (AHM). This online decision support tool, accessible via MyBoeingFleet.com, allows real-time monitoring of airplanes during flight. When faults occur, AHM presents the operator with probable causes and recommended actions, including fix effectiveness information based on historical data for the operator and the fleet. When an airplane arrives at the gate, maintenance crews can be ready with the parts and information to quickly make any necessary repairs and avoid costly delays, cancellations, or air turnbacks. AHM also enables operators to identify recurring faults and trends, allowing airlines to proactively plan future maintenance. (See “Remote Management of Real-Time Airplane Data,” *AERO* third-quarter 2007.)

Electronic Flight Bag (EFB). The EFB is a general purpose computing platform on the flight deck integrated with avionics and communications. EFB software applications calculate performance figures, display charts, improve taxi positional awareness, provide video flight deck entry surveillance, and allow electronic access to documents. It is designed to help airlines reduce costs, improve taxiway and flight deck safety, and establish convenient access to digital documents. A software development kit allows for the development of airline-specific EFB applications. (See “Electronic Flight Bag,” *AERO* second-quarter 2008.)

Electronic Log Book. This application, which resides both on the airplane and on multiple ground components, connects the airplane systems to the airline IT infrastructure, providing data to the multiple departments and allowing them to collaborate on resolving pilot reports. This capability helps the airline schedule the airplane operation so that reported faults can be resolved during a time when the airplane is available, reducing costs. It also allows the implementation of airborne and ground applications that will enable the airline to operate more efficiently as a business. (See “Electronic Flight Bag,” *AERO* second-quarter 2008.)

E-Enabled IT systems can take many forms, from replacing printed manuals and other documents with electronic versions to gathering and evaluating in-flight data on the real-time flying condition of airplanes.

E-ENABLED SYSTEM INTEGRATION CAPABILITIES

While e-Enabling offers airlines many benefits, it also presents challenges in terms of integrating the technology into existing operations.

The e-Enabled environment includes diverse system types, information sources, data types, and different owners. The data originates with different systems within the airline's operational areas, and it is shared within the airline and with airline partners, suppliers, and Boeing. The diversity in data types and origins creates challenges for integration, protection, and lifecycle management (see fig. 2). Figure 2 represents a conceptual depiction of information origination and utilization within the e-Enabled information architecture.

Airplane information originates with Boeing and the suppliers to Boeing. The Boeing data domain is established as the baseline data set using the e-Enabled information architecture. This baseline includes data from the supplier data domain and design/manufacturing data from the Boeing data domain. As the airplane enters service, the airline is provided this baseline data set, which is included in the airline customer data domain. The airplane onboard data domain collects airplane operational data for real-time processing and analysis, and it is transmitted to the customer data domain for operational analysis and planning. The maintenance, repair, and overhaul (MRO) shop data

domain includes the maintenance planning data and a record of the maintenance work performed. The MRO data is provided to the airlines to be included in the airline data domain. The e-Enabled information architecture is designed to include data from all data domains.

The information lifecycle facilitates the management of data from airplane design, through the airplane's operational life to final disposal of the airplane. Information protection ensures that proper information access controls are defined, regulatory requirements for data retention are in place, and license restrictions are being followed. Information management provides the guidelines for data stewardship, governance, and quality assurance.

E-ENABLED SYSTEM IMPLEMENTATION

To determine an airline's ability to add e-Enabled capabilities to its operations, it is important to examine the following five areas:

- **Strategy Integration:** Enterprise business strategy is a vision and method to achieve an important business objective. Effective strategy is appropriate, clearly defined, well communicated, and regularly updated.
- **Organization Integration:** Organizational integration is a means to streamline the decision-making structure and functions of the business units—reducing cost and increasing value. Knowledge is shared between organizations,

contributing to efficient, adaptive, and timely decision making.

- **Process Integration:** Business process integration is the barometer for value-added work. When business process analysis and improvement activities are guided by strategic principles from the business function leaders, work processes, tasks, and information requirements mesh smoothly.
- **Information Integration:** Information integration is the use of a smaller set of data, information, and knowledge elements to produce a result of much greater value. A key measure is how efficiently information is reused across business functions, work processes, and technical systems: the less redundancy and rework, the higher the capability.
- **Systems Integration:** This area focuses on the capability of an airline's IT team to establish and manage systems. "Systems" refers to the set of information systems, applications, and data that support the enterprise business functions and work processes.
Boeing offers business process lean analysis and design services that facilitate improvement to these five integration areas. These airline capability level (ACL) process modeling reviews may encompass airport ground, schedule planning, flight operations, operations control, facilities, supply chain, logistics, maintenance and engineering, and information technology.

Figure 2: Overview of e-Enabled information architecture

One of the key challenges in an e-Enabled environment is integrating and managing a variety of information from a number of diverse sources.

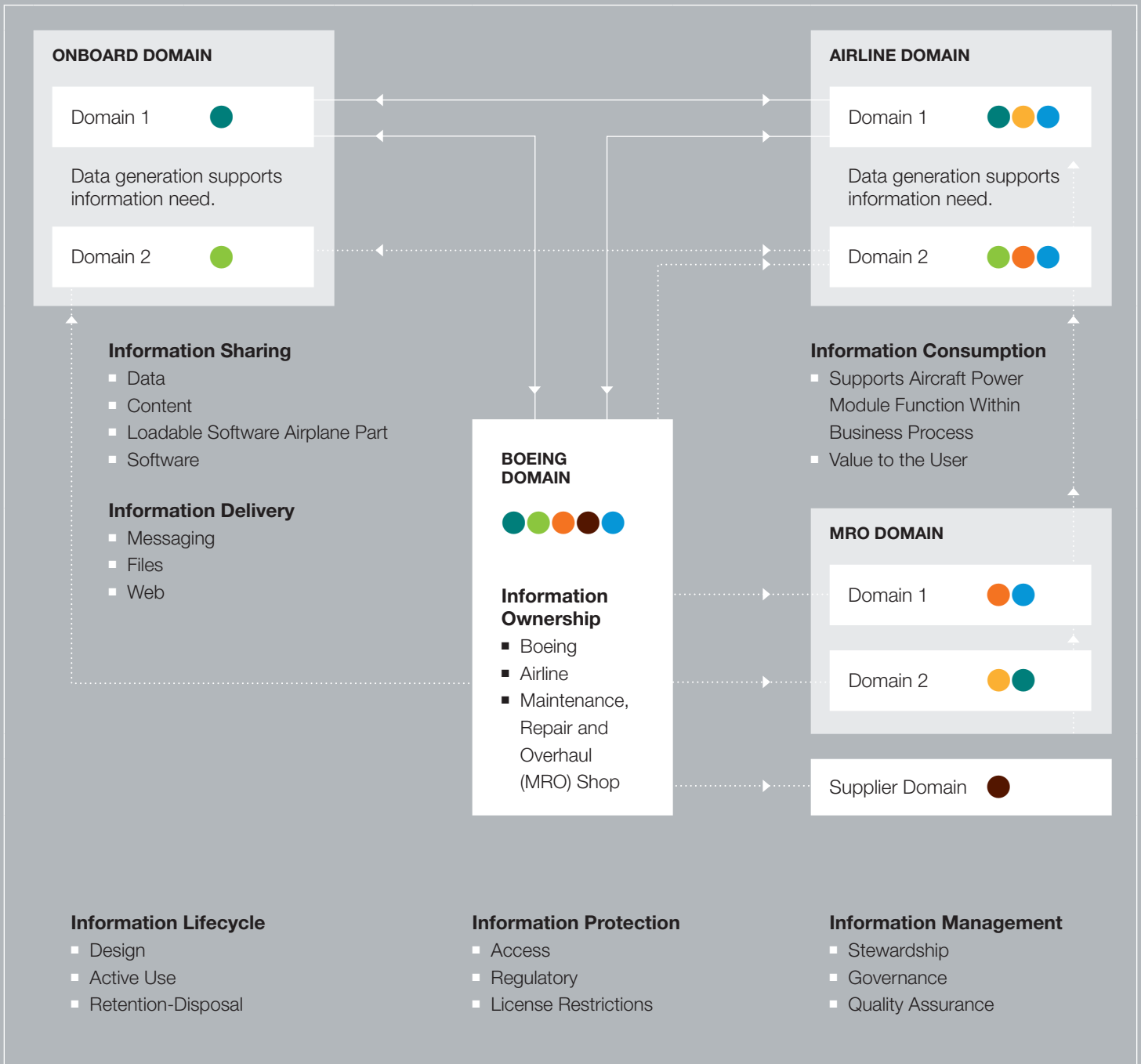


Figure 3: Overview of ACL self-assessment

The ACL self-assessment can help an airline define goals and develop a roadmap for e-Enabled capability improvement.

—	Never	Often	Always
—	1 2 3 4 5 6 7		
—	1 2 3 4 5 6 7		
—	1 2 3 4 5 6 7		
—	1 2 3 4 5 6 7		

Gather Results →

	—	—	—	—	—
5				×	
4					×
3		×			
2			×		
1	×				

Analysis

ACL Self-Assessment Tool

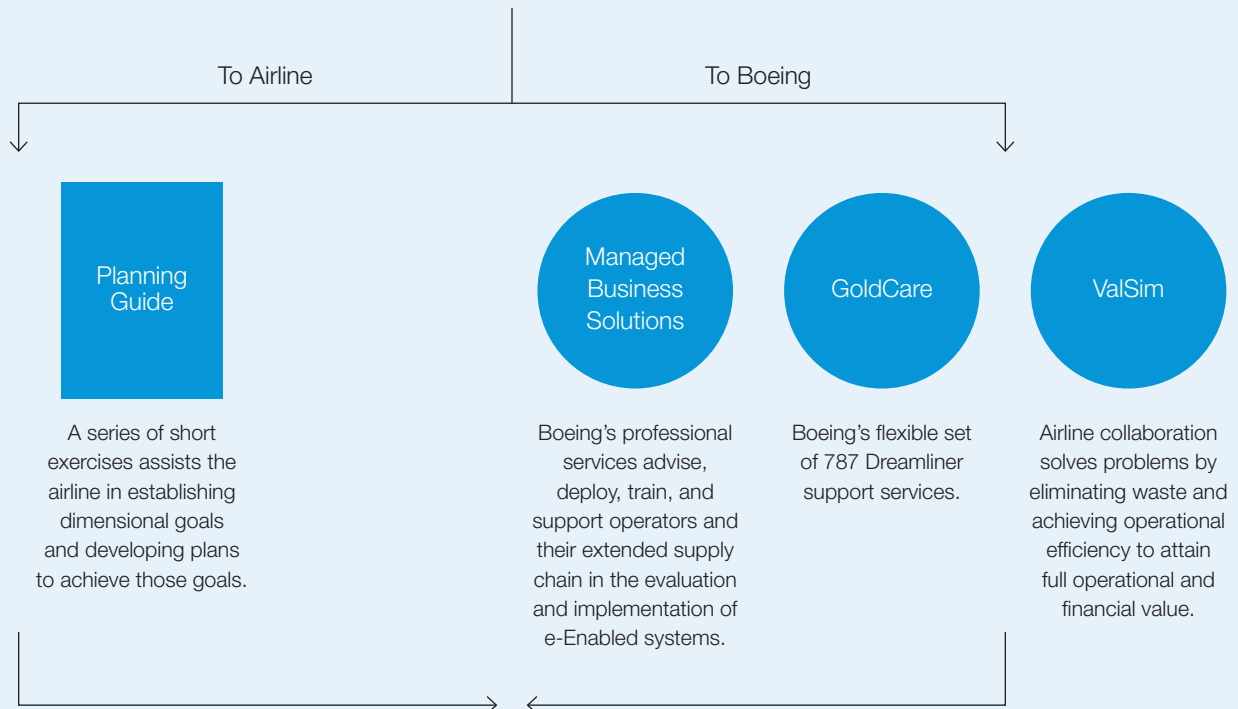
This survey instrument is designed for airline executives and senior management. Rating questions and open-ended questions are used to collect survey responses.

Scoring Matrices

The scoring matrices represent the survey results for airline function and enterprise dimension capability.

Capability Comparative Analysis

The data enables a comparative analysis of an airline's enterprise capabilities (strengths/weaknesses). An airline's goals for each dimension are represented from the planning guide.



Survey

A survey summary document provides the airline respondents with a customized summary of their ACL survey results.

Planning Guide

A series of short exercises assists the airline in establishing dimensional goals and developing plans to achieve those goals.

Managed Business Solutions

Boeing's professional services advise, deploy, train, and support operators and their extended supply chain in the evaluation and implementation of e-Enabled systems.

GoldCare

Boeing's flexible set of 787 Dreamliner support services.

ValSim

Airline collaboration solves problems by eliminating waste and achieving operational efficiency to attain full operational and financial value.

By using the ACL self-assessment process and tool set, an airline can define goals and establish a roadmap for capability improvement, allowing it to translate IT availability and performance into competitive advantage, increased profits, and safety.

AIRLINE CAPABILITY LEVEL SELF-ASSESSMENT

To assess their ability to use e-Enabled products and information, airlines need to benchmark their enterprise strategy, process, and information integration capability levels against those of industry leaders. ACL process modeling reviews, developed by Boeing, can help airlines in this assessment. The reviews encompass airport ground, schedule planning, flight operations, operations control, facilities, supply chain, logistics, maintenance, engineering, and IT.

By using the ACL self-assessment process and tool set, an airline can define goals and establish a roadmap for capability improvement, allowing it to translate IT availability and performance into competitive advantage, increased profits, and safety (see fig. 3).

The ACL approach uses a survey, self-administered by airline executives, and applies the results through a series of planning guide exercises to provide an understanding of current and future capability needs. The airline can use this information to begin planning to resolve gaps between its present capability level and the level it would like to achieve.

The results and conclusions provide the starting point for a discussion of current capability levels across the enterprise and key airline functions.

E-ENABLED BUSINESS SYSTEMS ASSESSMENT

Boeing offers optional e-Enabled Business Systems Assessment services to prepare for the implementation of e-Enabled products and services. This e-Enabled assessment follows an airline's participation in the ACL survey. When assessing an airline's ability to add e-Enabled capabilities to its operations, Boeing will cooperatively examine:

- **Business Enterprise Architecture:** The airline's business structure and business methods in support of using e-Enabled systems.
- **Rationalization of Business Systems to Information Technology Systems:** The airline's methods and process to transform its business systems to IT systems requirements.
- **Information System:** The airline's ability to provide the required information systems to achieve optimal use and performance of the e-Enabled products.


- **Airline Risk:** The airline's ability to identify and prepare a plan to resolve business operational deficiencies and IT systems interruptions.

During the e-Enabled assessment, Boeing's airline and IT subject matter experts visit airline facilities to evaluate the airline's business methods, systems integration, technical infrastructure, and IT performance capabilities.

The goal of the assessment is for the airline to gain an understanding of its current business systems and IT systems capabilities, as well as the actions necessary to prepare for and improve e-Enabled product usage. With this knowledge, the airline can develop and implement a plan to resolve any issues in order to take full advantage of e-Enabled products and services.

SUMMARY

Boeing offers an industrywide perspective on integration of IT systems, supplemented with proven methodologies, to assist airlines with IT strategy and goals to help them take advantage of the benefits offered by e-Enabled services.

For more information, please contact Robert Rencher at robert.j.rencher@boeing.com. 

E-Enabled Capabilities of the 787 Dreamliner

By **Kevin Gosling**, Manager, 787 e-Enabling Implementation and Deployment

The 787 Dreamliner, the world's first e-Enabled commercial airplane, combines the power of integrated information and communications systems to drive operational efficiency, enhance revenue, and streamline airplane maintenance.

The e-Enabled tools on the 787 will be a dramatic change from any other commercial airplane previously operated (see fig. 1). These tools promise to change the flow of information and create a new level of situational awareness that airlines can use to improve operations. At the same time, the extensive e-Enabling on the 787 increases the need for network connectivity, hardware and software improvements, and systems management practices (see fig. 2).

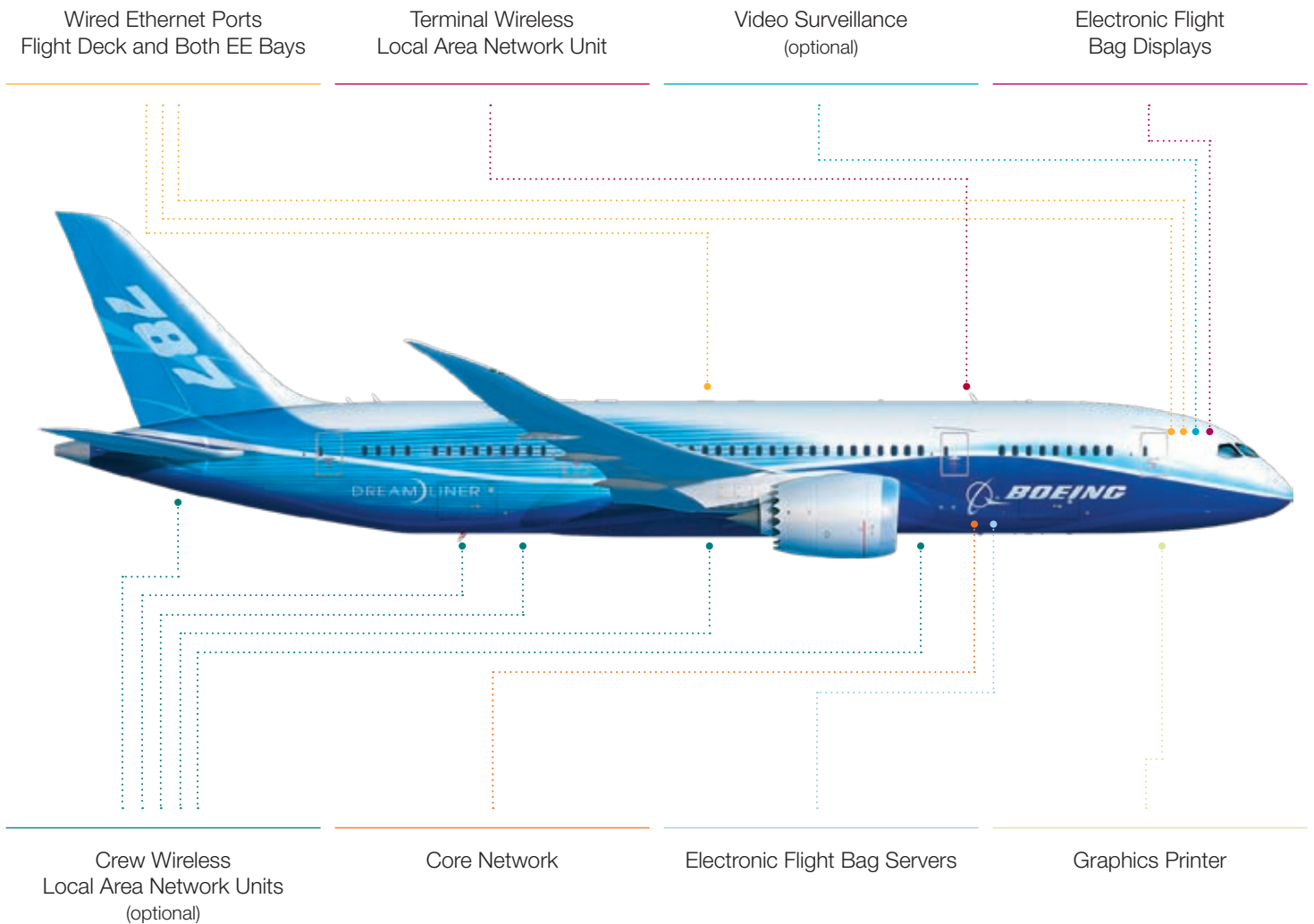
BENEFITS OF 787 E-ENABLED CAPABILITIES

Airlines benefit from the e-Enabling features of the 787 in a number of ways:

- E-Enabling eliminates time-consuming and awkward physical software data-loading via wireless data distribution and medialess software loading.
- It provides flight operations and maintenance personnel with data in digital formats to streamline the updating process, reduce errors, and eliminate the costs associated with shipping, handling, revising, and maintaining paper documents.
- It ensures compliance with new U.S. Federal Aviation Administration security requirements within heavily networked airplane environments.
- It enables near real-time data transactions both on- and off-board the airplane and provides the ability to access much of this data during flight to enable airlines to make timelier, informed maintenance and other operational decisions.
- It allows airlines to easily customize many aspects of their airplanes to fit their specific operations; for example, fuel can be displayed in pounds or kilograms.

Figure 1: 787 e-Enabling equipment locations

The 787 incorporates a number of e-Enabled systems, many of which are being implemented for the first time on a commercial airplane.



IMPROVED MAINTENANCE EFFICIENCY

The e-Enabling equipment on the 787 will be highly integrated with the onboard maintenance, data-load, and crew information systems, offering airlines opportunities to reduce maintenance costs. Airlines have the option to include a wireless network for maintenance access, enabling airline back-office teams to remotely deploy software, parts, data, charts, and manuals to airplanes with minimal hands-on mechanic involvement.

Airline engineers and maintenance planners will be able to directly receive large data files from every airplane in the fleet without having to send the mechanic out to download or retrieve discs.

Also, maintenance laptops will save airlines time and give them access to quality information faster than in today's environment. Mechanics will use these portable computers to access onboard maintenance data, initiate tests, and review maintenance documents.

TRAINING EFFECTIVENESS

Because the 787 is e-Enabled, Boeing is focused on providing training via the Web portal MyBoeingFleet.com at the point of use. Boeing is targeting a Web-managed, distance-learning capability that brings training to the trainee in a paperless training environment.

Figure 2: E-Enabled airplane systems

In order to prepare for the new 787 e-Enabled airborne systems, airlines will set up interfacing e-Enabled systems on the ground with Boeing assistance.

Communications

- Terminal Wireless Local Area Network Unit (Basic)
- Crew Wireless Local Area Network Units (Optional)
- Aircraft Communications Addressing and Reporting System (ACARS) and Very High Frequency (VHF) Data Link Mode 2 (Basic)
- Provisions for Broadband Satellite Communications

Advanced Technology Flight Deck

- Fewer Line Replaceable Units
- More Software
- Upgradeable
- Configurable

Class 3 Electronic Flight Bag Applications (Basic)

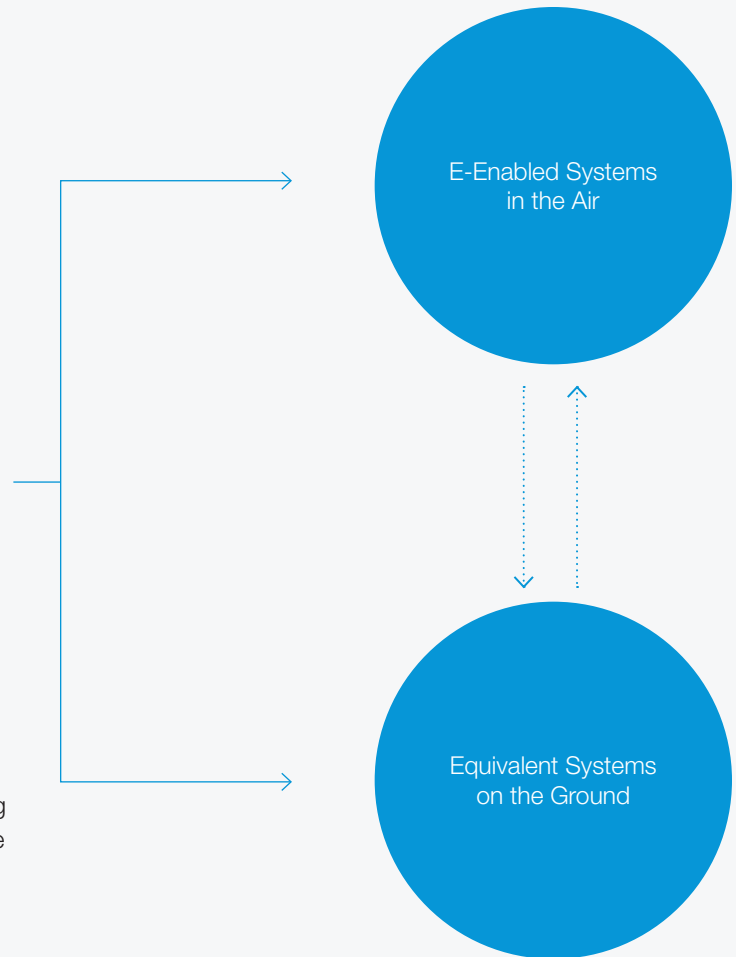
- Electronic Logbook
- Onboard Performance Tool
- Electronic Document Browser

Video Surveillance (Optional)

Wireless Capabilities

- Wireless Software (Loadable Software Airplane Part) Staging
- Wireless Downlinks (e.g., Engine Health Monitoring, Airplane Condition Monitoring, Continuous Parameter Logging, Configuration Management, etc.)
- Wireless Maintenance Access

Core Network (Basic)



Enhanced technical data for flight training will include linkable features in the flight crew operating manual and flight crew training manual. The ground systems also provide mechanics access to near real-time maintenance information via MyBoeingFleet.com, or cached locally on a maintenance laptop.


ENTRY INTO SERVICE

Airlines interested in implementing full utilization of the e-Enabled capabilities should start the integration into their ground

operations centers about six to nine months before entering service with new 787 airplanes. Boeing will send a deployment team to the airline's location to install, test, and verify the e-Enabled environment; provide assistance in connecting to a wired or wireless system; demonstrate ground-based systems; test wireless connections; and review network security.

SUMMARY

The e-Enabled tools on board the 787 will provide flight crews, cabin crews, and ground personnel with quicker access to quality information. In order to prepare for the new 787 e-Enabled airborne systems, airlines will set up equivalent e-Enabled systems on the ground with Boeing assistance. The resulting e-Enabled airline will be more capable of more efficient operations and enhanced revenue.

For more information, please contact Kevin Gosling at kevin.l.gosling@boeing.com. 



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