



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

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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.

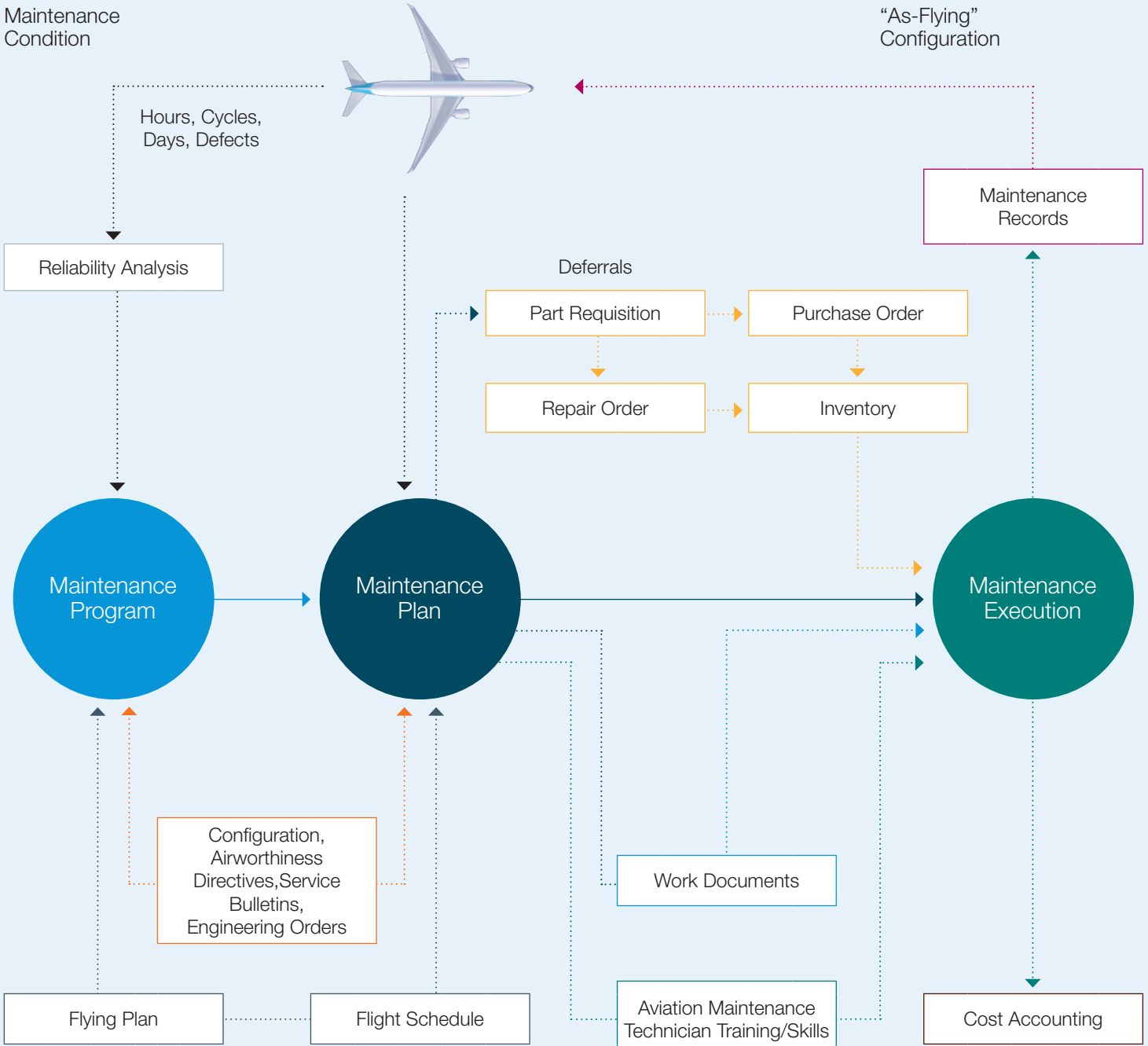
KEY ELEMENTS OF AN E-ENABLED STRATEGY

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.)

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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.

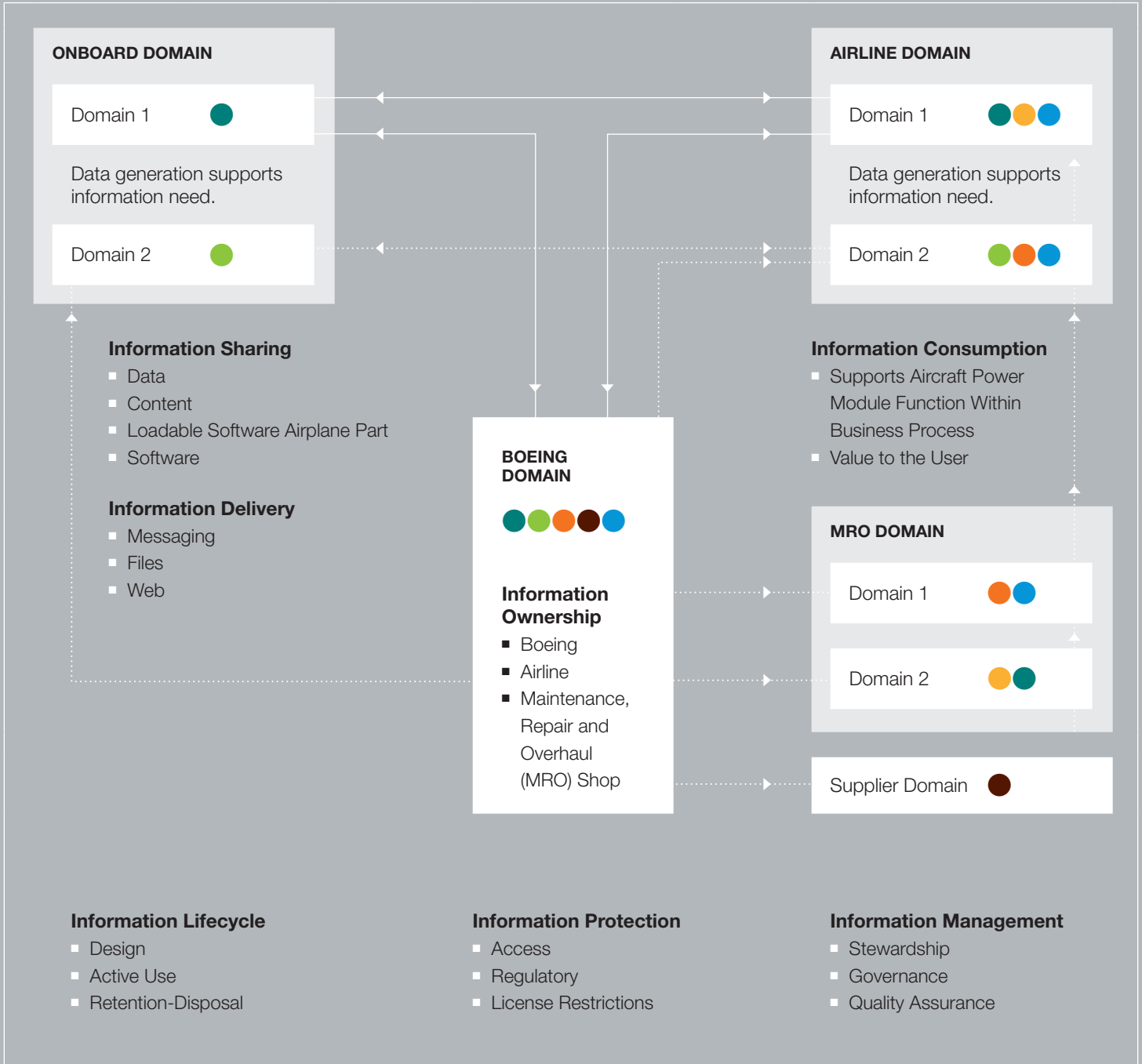


Figure 3: Overview of ACL self-assessment

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

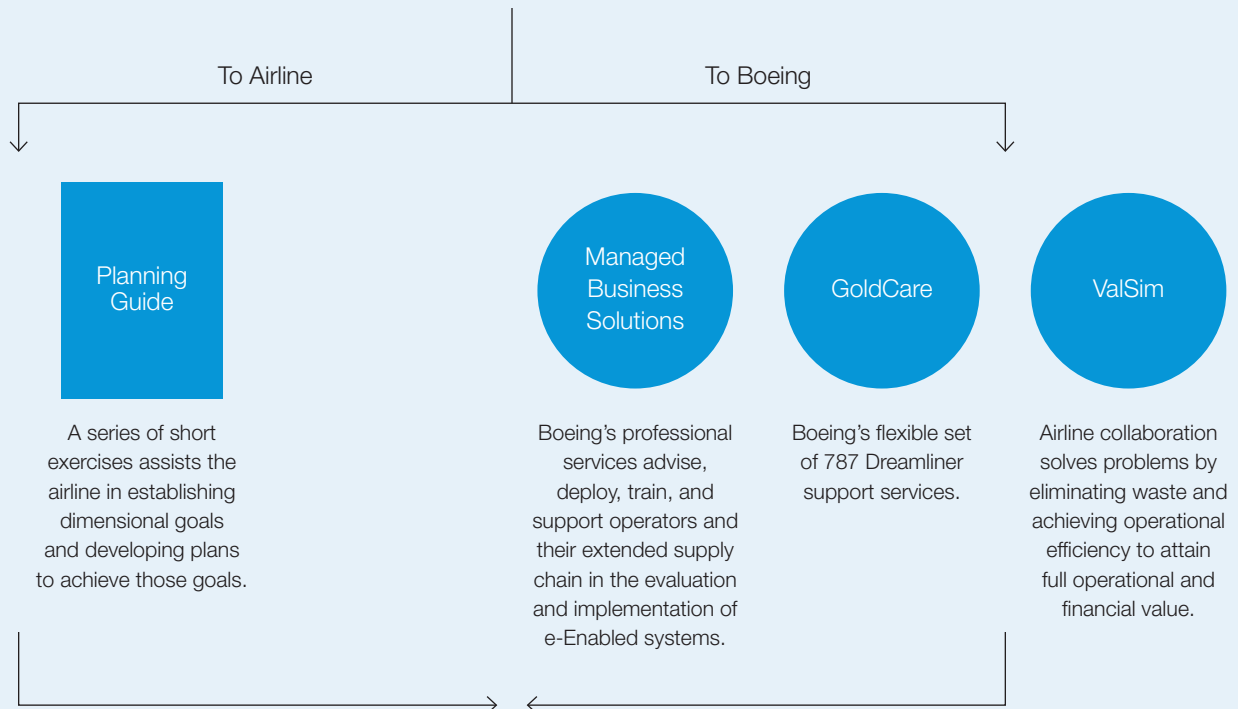
This survey instrument is designed for airline executives and senior management. Rating questions and open-ended questions are used to collect survey responses.

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.

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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.

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