



Commercial Aviation Services

BOEING COMMERCIAL AIRPLANES



The Health of your Aircraft – tools to keep your airline from “flat-lining”

Lean Flight Initiative
April 2008

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Commercial
Aviation Services

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Agenda

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- Lean Defined
 - Value added vs non-value added
 - Identifying waste
 - Medical Analogy
- Tools for your aircraft
 - Airplane Enterprise Integration – e-Enable
 - Where to start
 - Value
- Summary

What is Lean?

Lean is a business philosophy about reducing waste and focusing on value in your business



Define Value-Added VS. Non-Value-Added

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Identify and eliminate non-value-added activities

All Activities

Value-Added Activities

Changes the fit, form or function of the product.

Non-Value-Added Activities

Consume resources, but does not directly contribute to the product.

Activities which do not add value yet are:

Necessary

Activities which do not add value and are:

Unnecessary

Identifying Waste: The 7 Wastes

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Wastes	Definition
Overproduction	Generating more information and products than needed
Transportation	Movement of products and information that does not add value
Motion	Movement of people that does not add value
Waiting	Idle time created when material, information, people or equipment is not ready
Processing	Efforts that create no value from the end-users viewpoint
Inventory	More information and/or material on hand than the end-user needs right now
Defects	Work that contains errors, rework, mistakes or lacks something necessary

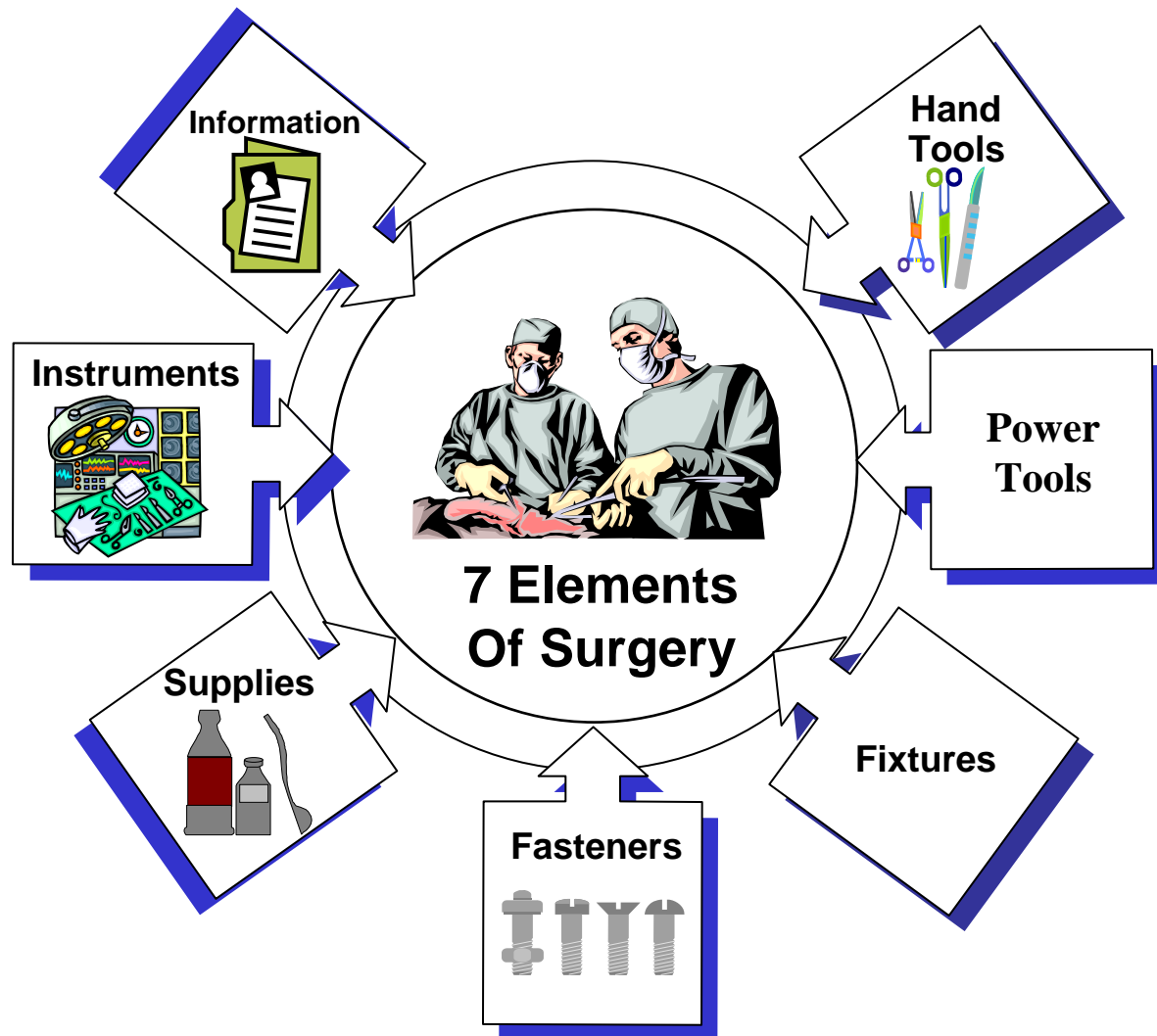
Treat the Technician Like a Surgeon

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Point-of-Use Strategy as the 7 Elements of Surgery

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Tools in Medicine

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- **Small Field X-Ray Units**
 - Image injuries and trauma closer in space and time to the point of injury.
 - Enables better diagnoses and triage.

- **Digital Radiography Technology**
 - Images available in seconds
 - Can be read by Doctors anywhere in the world

- **Teleradiology**
 - Requires less time, staffing and storage space of information.

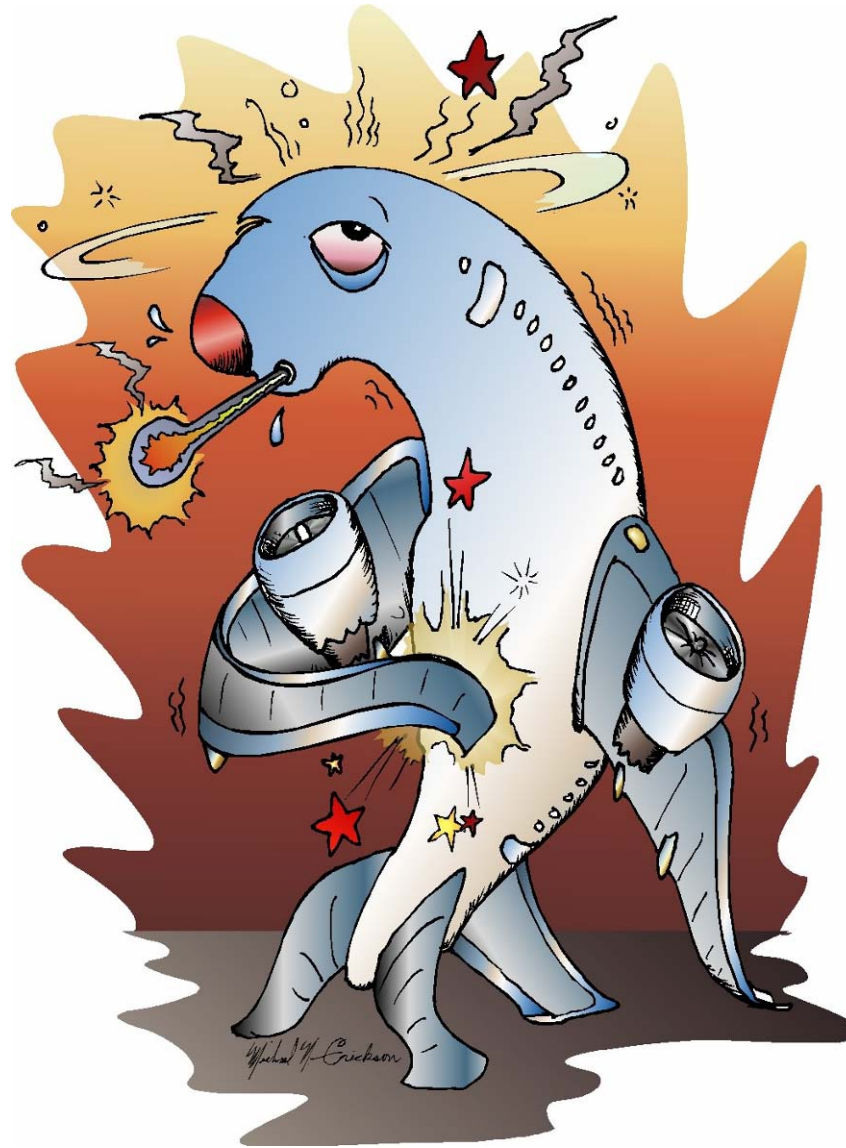
- **Telemedical**
 - Long distance medical consultation for maritime workers
 - Transfer medical expertise to seaborne vessels

- **Pacemaker**
 - Monitors the electrical impulses in the heart
 - Records electrical patterns when there is an abnormal heartbeat
 - Helps the doctor plan future treatment

Getting information in the hands of medical professionals faster to enable diagnosis and action to occur more quickly.

Tools in Aerospace

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Application in Aerospace

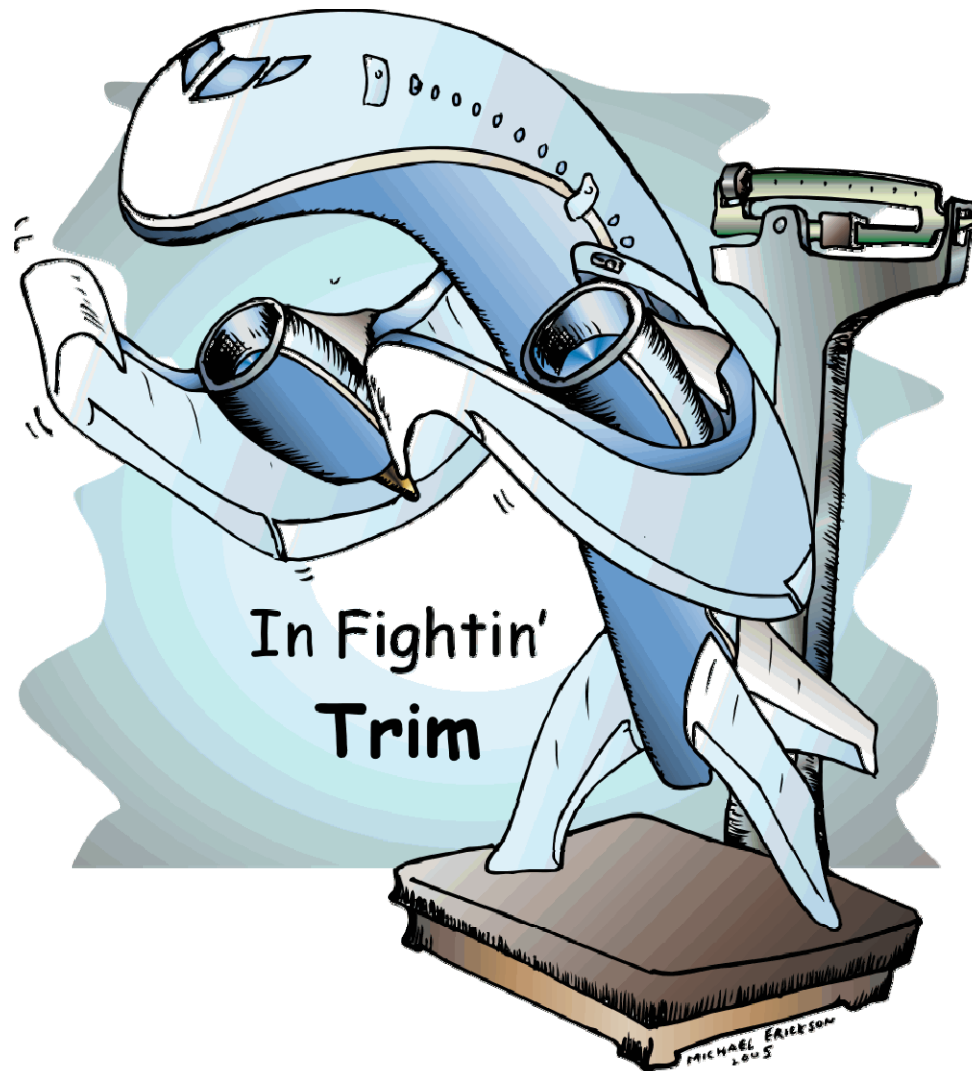
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- **Advancements in tools for the Technician (Surgeon)**
 - **How can we monitor and diagnose the health of the aircraft faster?**
 - **How can we get information into the hands of the Technician faster?**
 - **How can we be proactive in maintaining the health of the aircraft rather than reactive?**

Tools in Aerospace

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Integrated Network Operations

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Major benefits for passengers & crew

**Airplanes always connected ...
...sending/receiving valuable
information**

Increased revenue

**Improved Travel
Experience**

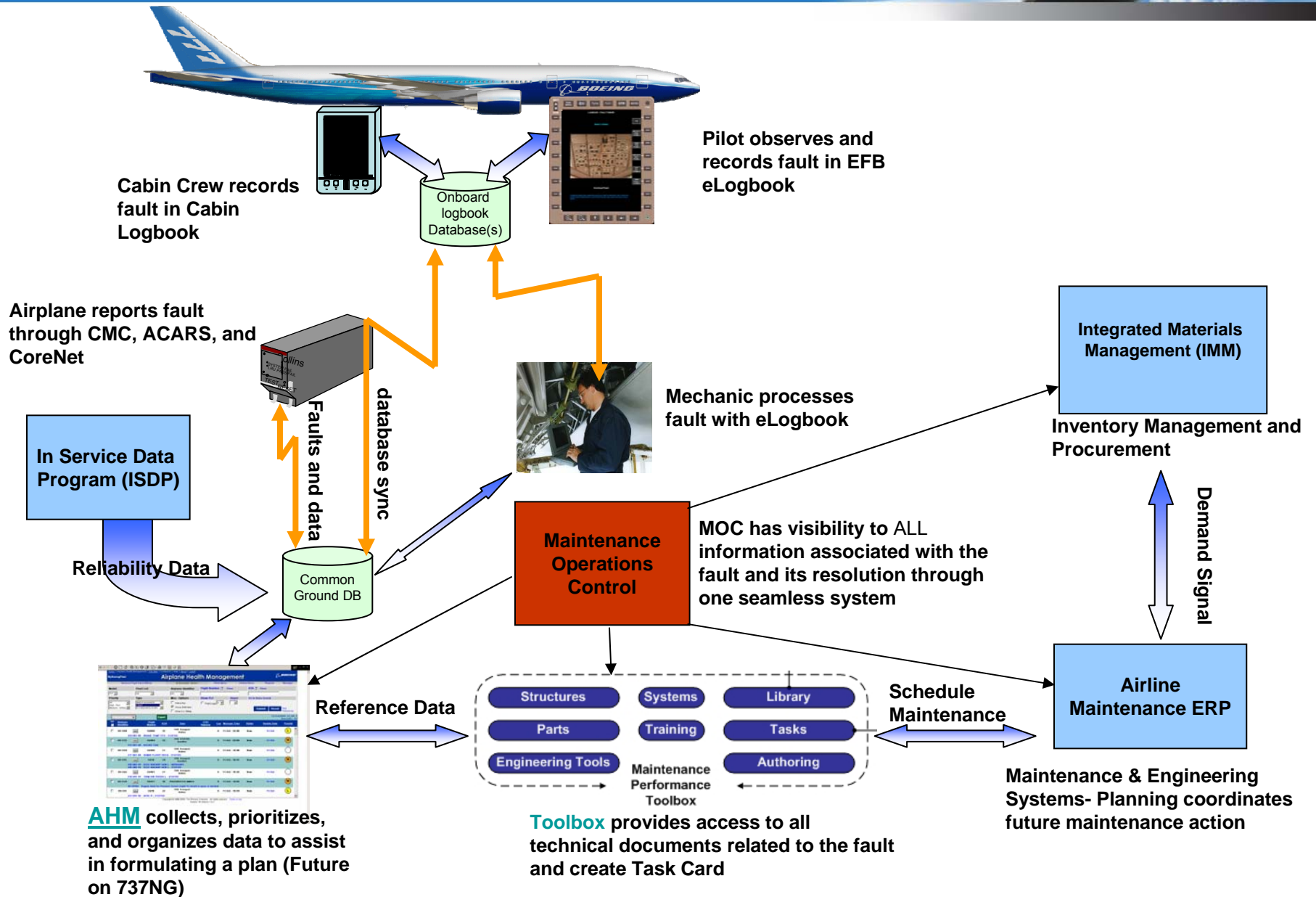
**Airline efficiency improvement ...
...optimized flight & maintenance
operations**

**Real time monitoring...
...predictive not reactive**

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Boeing Tools

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Value Increases With Each Step

Process for airline readiness is:

- Strategically driven
- Scalable
- Built of short-term projects
- Delivers value with each step
- Creates an enterprise solution

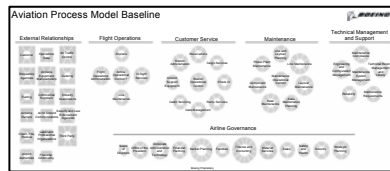


ValSim: people, processes, and tools

■ Customer Engagement Process

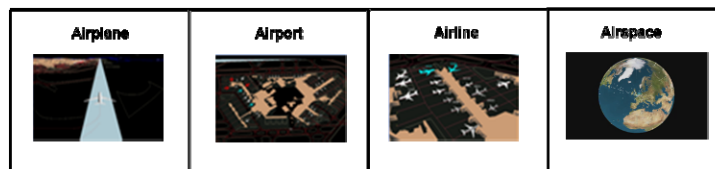


■ Aviation Process Modeling



- Model *as-is* airline process
- Identify and map customer needs and concerns
- Relate to Solutions
- Model *what-if* airline process

■ Dynamic simulation modeling (VizOps)



- Airline disruptions
- Fleet support studies
- Fleet intro. & operational changes

■ Financial, Economic, and Environmental Savings



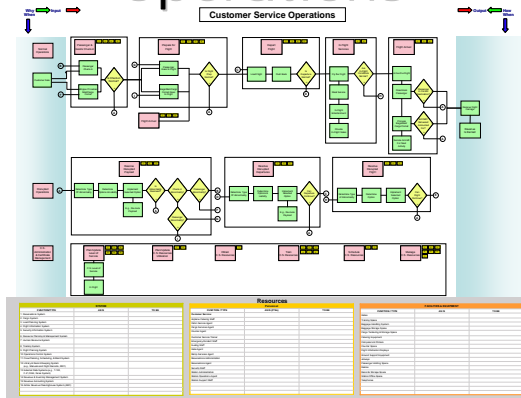
- Capture customer's values
- Analyze value of implemented Solution
- Generate savings summaries



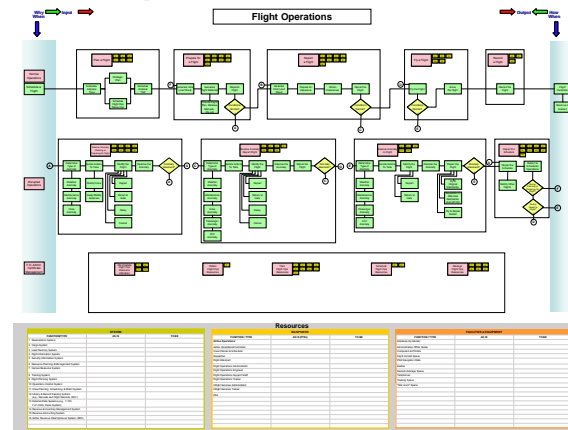
Airline Business Process Modeling

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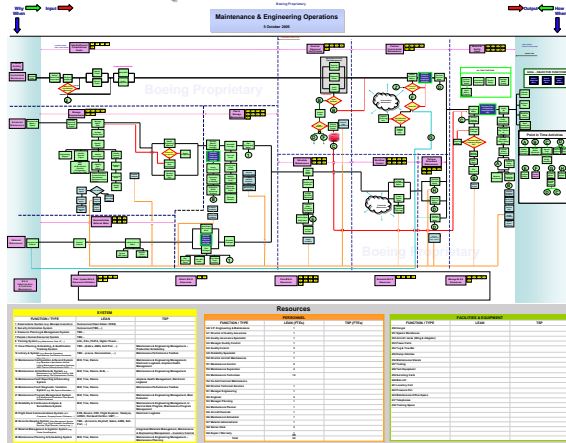
Customer Service Operations



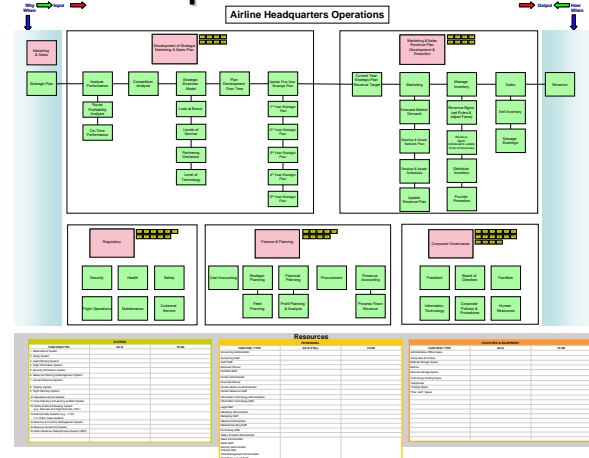
Flight Operations



Maintenance & Engineering Operations



Airline Headquarters Operations



Business Process Modeling Workshop Objectives

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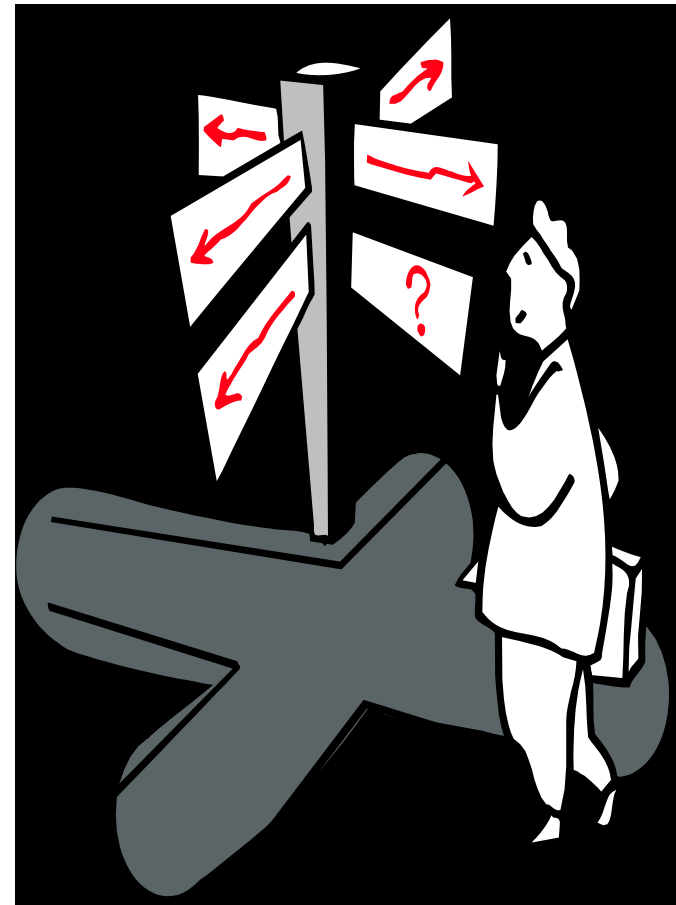


- **Introduce Process Based Modeling Methodology**
- **Adapt standard Templates to Airline Specific Functional and Business Process Models for:**
 - **Flight Operations**
 - **Maintenance & Engineering**
- **Map current “AS IS” Resources to the Tier 0 Processes for:**
 - **Systems**
 - **Personnel (in Full Time Equivalents)**
 - **Facilities & Equipment**
- **Establish a going forward modeling methodology to visualize and evaluate alternative business models and support options**
 - **Examine Industry Best Practices and Airline’s opportunities for improvement**
 - **Establish Common terminology**
 - **Means to value financial impact**
 - **Means to dialog with regulatory authorities**

Value Methodology

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- The Value Methodology is a function-oriented, systematic **team** approach.
- VM is used to analyze and improve value in a business, organization, product, process, facility design, system or service.
- VM is a powerful methodology for solving problems
- VM can be applied to any business or economic sector, including industry, government, construction and service.

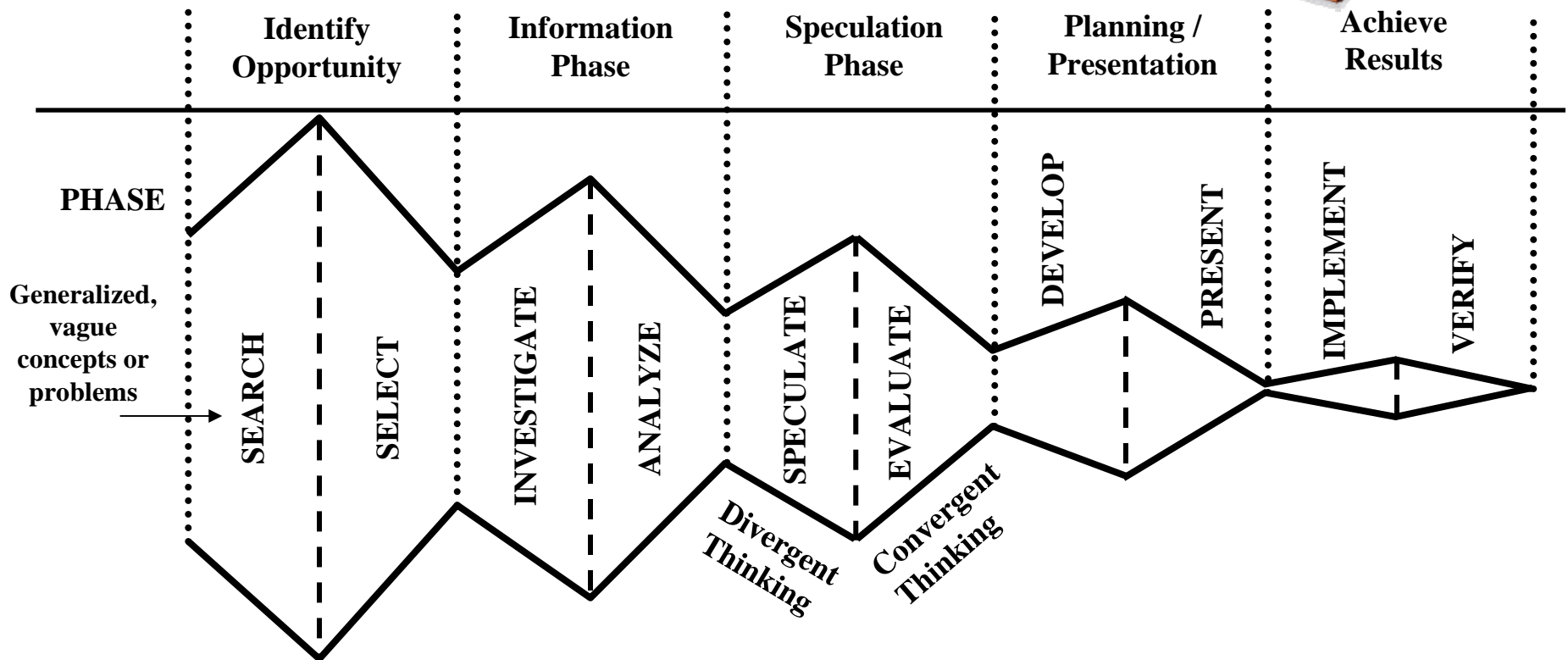


The Value Methodology

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VM Job Plan *From the General to the Specific*



A series of divergent and convergent thought processes that provide a logical path to achieving a solution.

Value Methodology (FAST) Model

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Function Analysis System Technical (FAST) Diagram



Maintenance & Engineering Operations Typical Process Model

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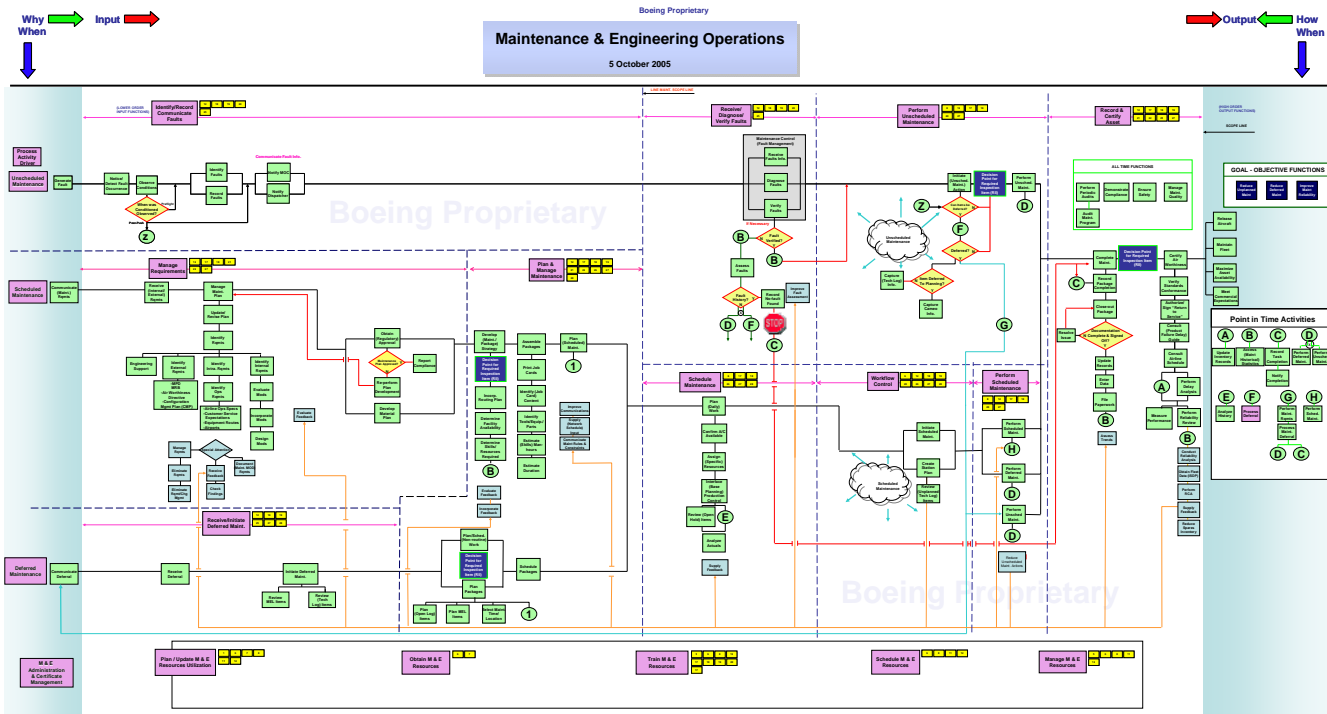
Process
Activity
Driver

Un-Scheduled
Maintenance

Scheduled
Maintenance

Deferred
Maintenance

M & E
Administration
& Certificate
Management



Objective
Functions

Release
Aircraft

Maintain
Fleet

Maximize
Asset
Availability

Meet
Commercial
Expectations

SYSTEM			Resources		FACILITIES & EQUIPMENT			
FUNCTION / TYPE	LEAN	TSP	FUNCTION / TYPE	LEAN (FTEs)	TSP (FTEs)	FUNCTION / TYPE	LEAN	TSP
1 Reservation System (e.g. Manage Inventory)	Outsourced (Open Skies / RES)		140 V.P. Engineering & Maintenance	1		250 Hangar		
5 Security Information System	Outsourced (EBD...)		141 Director of Quality Assurance	1		251 Spares Warehouse		
6 Resource Planning & Management System	TBD...		142 Quality Assurance Specialist	1		252 Aircraft Jacks (Wing & Alliger)		
7 People (Human Resources) System	TBD...		143 Manager Quality Control	1		253 Power Carts		
8 Training System (e.g. Maintenance, etc.)	UAL, DAL, PAFA, Higher Power...		144 Quality Control	2		254 Tag & Tow Bar		
11 Crew Planning, Scheduling, & Qualification Tracking System	TBD... (Sabre, AMS, Self-Prof...)	Maintenance & Engineering Management - Production Scheduling	145 Reliability Specialist	1		255 Ramp Vehicles		
12 Library & System (e.g. Manuals, Operations, etc.)	TBD... (Above, Documentum, ...)	Maintenance Performance Tools	146 Director Aircraft Maintenance	1		256 Maintenance Stands		
17 Maintenance Configuration & Record System	MXL, Trax, Ramco	Maintenance & Engineering Management, Electronic Logbook, Airline Health Management	147 Manager Engineering	1		257 Tooling		
18 Maintenance Action/Records System	MXL, Trax, Ramco, ELB, ...	Maintenance & Engineering Management	148 Engineer	2		258 Test Equipment		
19 Maintenance Fault Reporting & Recording System	MXL, Trax, Ramco	Airline Health Management, Electronic Logbook	149 Manager Planning	1		259 Servicing Carts		
20 Maintenance Fault Diagnostic / Isolation System (e.g. W-Scan, etc.)	MXL, Trax, Ramco	Maintenance Performance Tools	150 Director Technical Services	1		260 Man Lift		
21 Maintenance Program Management System	MXL, Trax, Ramco	Maintenance & Engineering Management, Mod Evaluator	151 Manager Engineering	1		261 Laundry Cart		
22 Reliability & Condition Analysis & Surveillance System	MXL, Trax, Ramco	Maintenance & Engineering Management, In Service Data Program, Maintenance Program Management	152 Manager Planning	1		262 Pressure Pot		
25 Flight Deck Communications System (e.g. EFIS, Displays, FDR, Flight Explanatory, Teletype, ARINC, Rockwell Collins / AMT, ...)	EFIS, Displays, FDR, Flight Explanatory, Teletype, ARINC, Rockwell Collins / AMT, ...	Electronic Logbook	153 Maintenance Planner	1		263 Maintenance Office Space		
26 Records Keeping System (e.g. Management System, etc.)	TBD... (Arconis, DayHut, Sabre, AMS, Self-Prof...)		154 Maintenance Planner	1		267 Telephones		
27 Material Management & Logistics System (e.g. Inventory Control)	TBD...	Integrated Materials Management, Maintenance & Engineering Management - Inventory Control	155 Aircraft Records	1		268 Training Space		
28 Maintenance Planning & Scheduling System	MXL, Trax, Ramco	Maintenance & Engineering Management - Maintenance Planning	156 Maintenance Scheduler	1				
			157 Material Administrator	1				
			158 Stores Clerk	2				
			159 Repair / Warranty	1				
			160 Repair / Warranty	30				
			Total					

Systems

Personnel

Facilities &
Equipment

Identifying Waste: The 7 Wastes

Wastes	Definition	Work Area Applications
Overproduction	Generating more information and products than needed	<ul style="list-style-type: none"> ■ Creating multiple copies of manuals regardless of use ■ Data overload with no analysis capability ■ Fleet reliability data
Transportation	Movement of products and information that does not add value	<ul style="list-style-type: none"> ■ Retrieving or storing log book files ■ Pilots carrying many documents ■ Data from CMC with no analysis ■ ACARS data transfer
Motion	Movement of people that does not add value	<ul style="list-style-type: none"> ■ Searching for files ■ Inserting page updates on manuals ■ Gathering information ■ Looking for tools, parts, and equipment to perform a job
Waiting	Idle time created when material, information, people or equipment is not ready	<ul style="list-style-type: none"> ■ Waiting for parts and information ■ Waiting for dispatch to perform new calculations ■ Waiting for ATC for situational awareness

Identifying Waste: The 7 Wastes (cont.)

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Wastes	Definition	Work Area Applications
<p>Processing</p>	<p>Efforts that create no value from the end-users viewpoint</p>	<ul style="list-style-type: none"> ■ Searching for information on multiple manuals ■ Waste from non-optimized takeoff conditions ■ Schedule interruptions ■ Unscheduled component removals ■ Use of inappropriate software
<p>Inventory</p>	<p>More information and/or material on hand than the end-user needs right now</p>	<ul style="list-style-type: none"> ■ No Fault Finds removals ■ Just-in-Case LRU inventory anticipated ■ Multiple ship sets of parts in inventory ■ Unused records in the database
<p>Defects</p>	<p>Work that contains errors, rework, mistakes or lacks something necessary</p>	<ul style="list-style-type: none"> ■ Missing information or out of date ■ Unplanned maintenance actions ■ Rejection tags allowed to go beyond more than one airplane ■ Wrong part removal ■ Missed specifications ■ Lost records, missing log files or non-signed

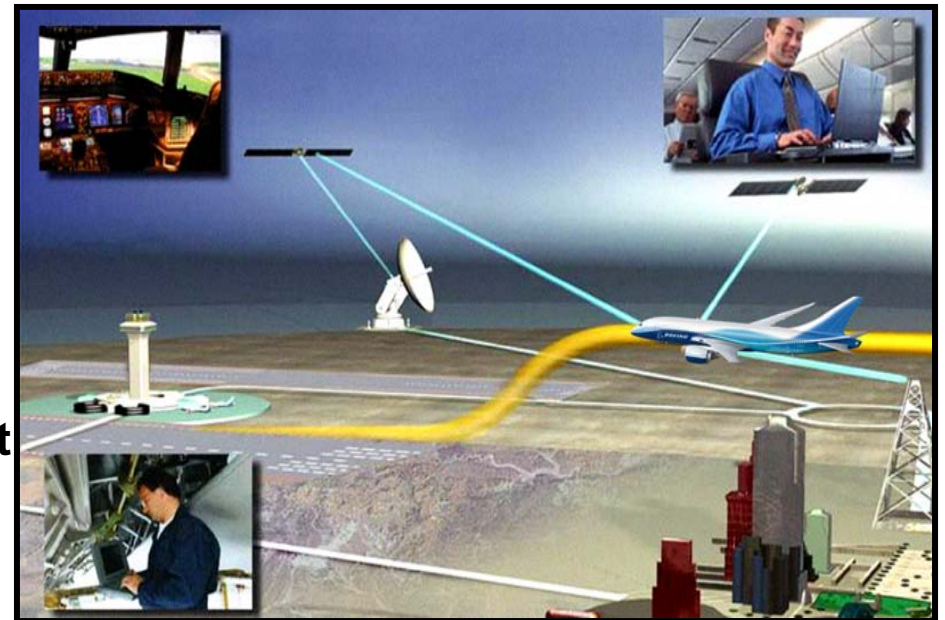
Benefits to Airline Customers

- **Examine Industry Best Practices and Airline's opportunities for improvement**
 - **Establish Common terminology**
 - **Means to value financial impact and impact to functions**
 - **Means to dialog with regulatory authorities**
 - **Share of process improvement in airline industry**
- **Supports airlines Goals:**
 - **Growth efficiency**
 - Implement an assessment project to achieve savings by the elimination of non-value added cost.
 - Promote a culture of productivity and cost efficiencies, to ensure our competitiveness
 - Leverage technology to reduce costs
 - Develop a culture of Quality based on international standards
- **Inventory of functions performed, tools, people and facilities to accomplish task**
- **Can be used for training as your fleet grows**
- **Airline owns end product – becomes airline process**
- **Time availability of key personnel is only investment required**
- **Partnership with Boeing**

Summary

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- **Airplane enterprise integration provides significant value to airlines**
 - Optimized efficiency, safety, security and passenger experience by having the right information at the right place
- **Lean thinking and Boeing Tools allow for new efficiencies in the air transport system**
- **Significant progress has been made**
 - Integrating across the enterprise
 - Engaging the industry
 - Investing resources



Enterprise Integration—achieves competitive advantage through advanced information networks

Creating Efficiencies Across the Enterprise

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Thanks for your time -

Questions ?