The Future Through History - SMS Development & Integration

November 15, 2016

American by the Numbers

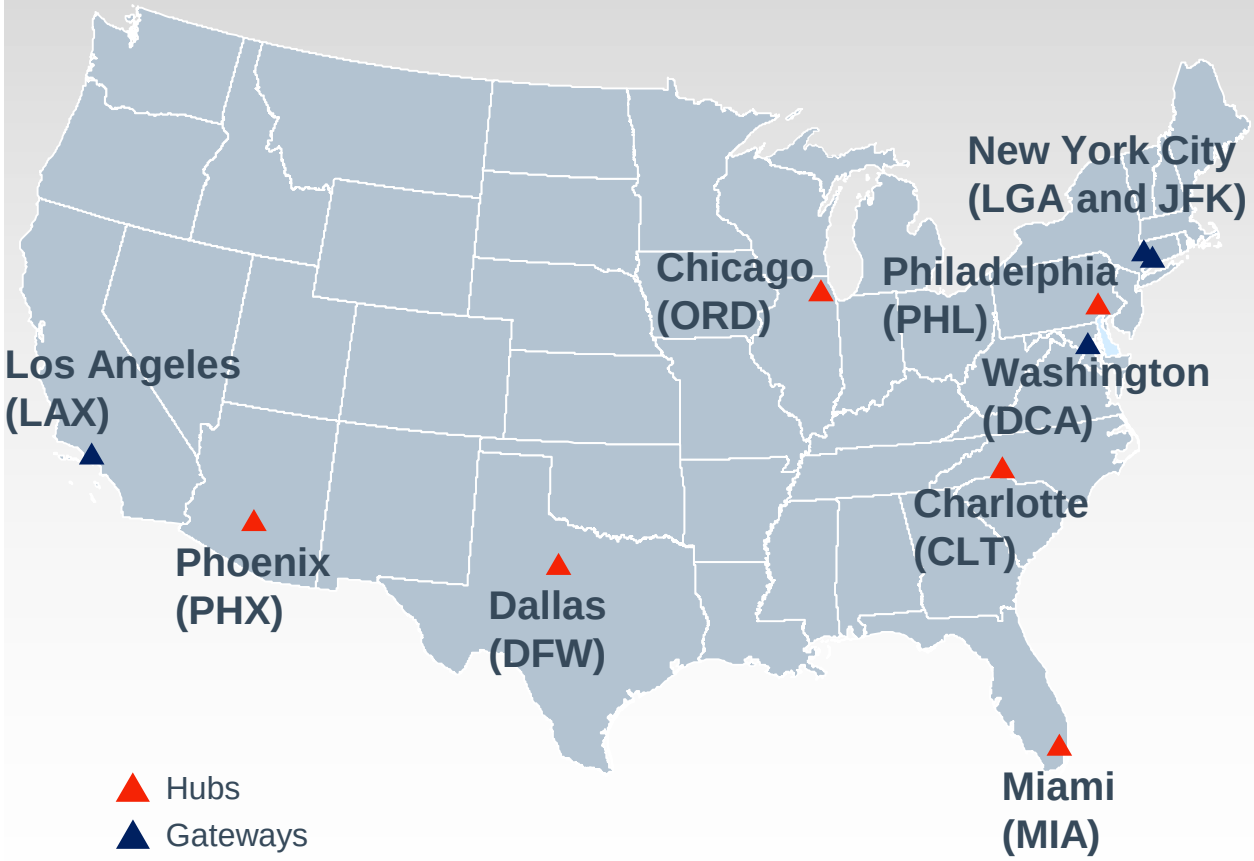
Each and every day …

926+	Planes take to the skies	**400,000**	Customers fly with AA
3,050	Average daily flights	**~100,000**	Full time equivalent employees serving our customers
9.9MM	Gallons of fuel consumed		

Source: American Airlines Annual Report, 2015 Form 10-K. Numbers reflect mainline operation only.

American's Hubs

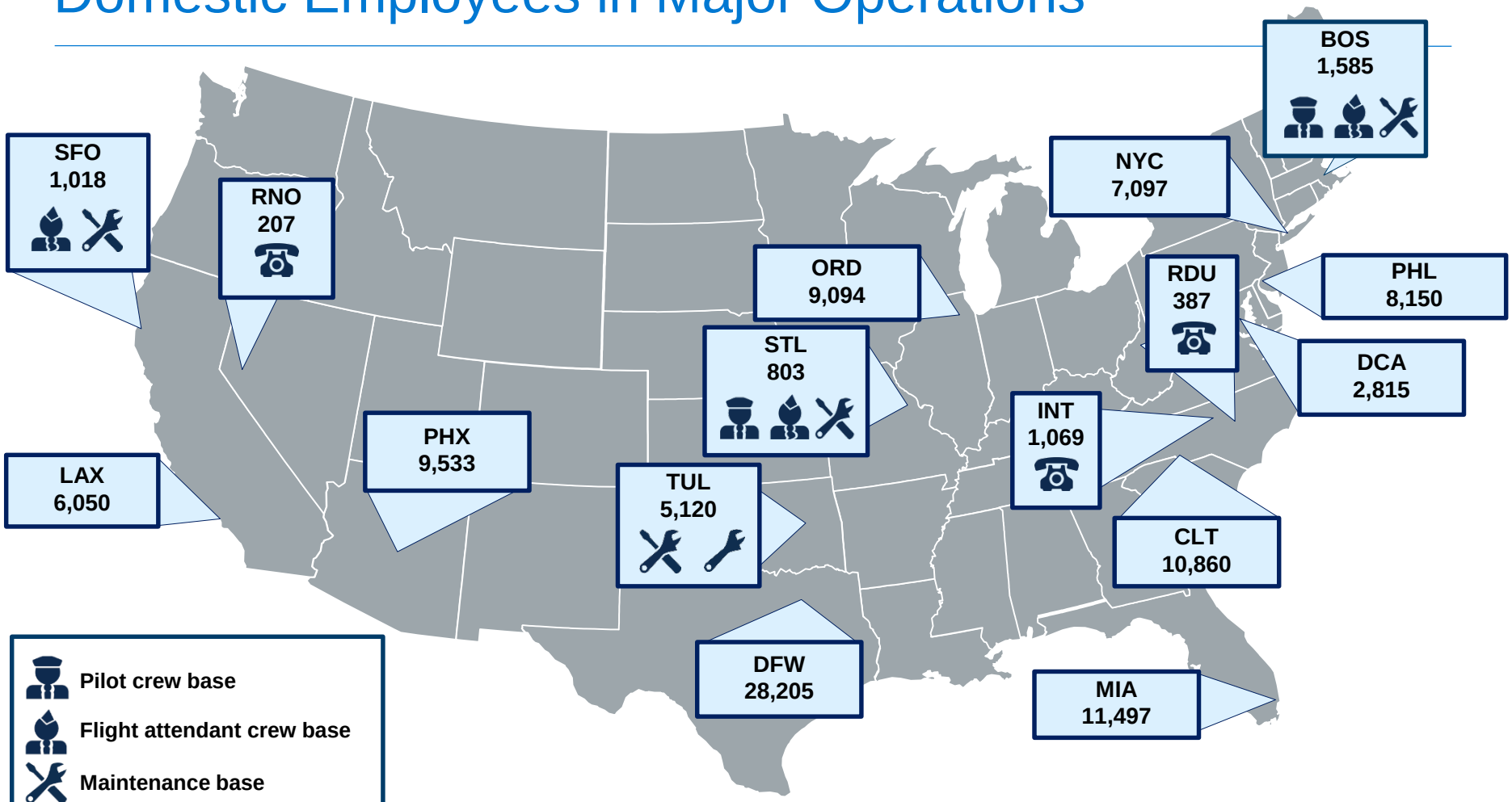
A complex operation with ten hubs and gateway cities across the U.S.



Scale of AA mainline and regional operation

- 6,700 flights carry 550,000+ passengers daily
- 926 mainline aircraft
- 594 regional aircraft

Domestic Employees in Major Operations



Includes wholly-owned regional carriers

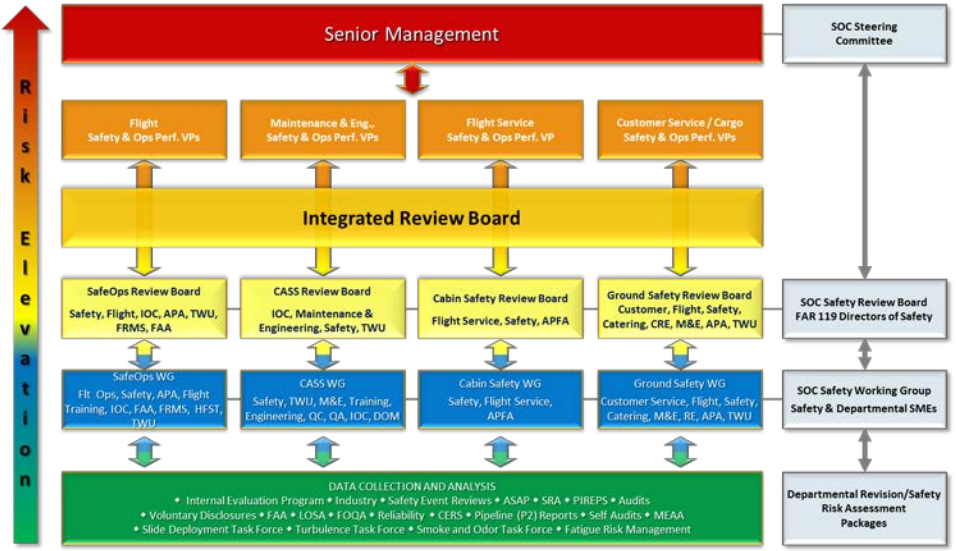
American Safety Management System

SMS through the years

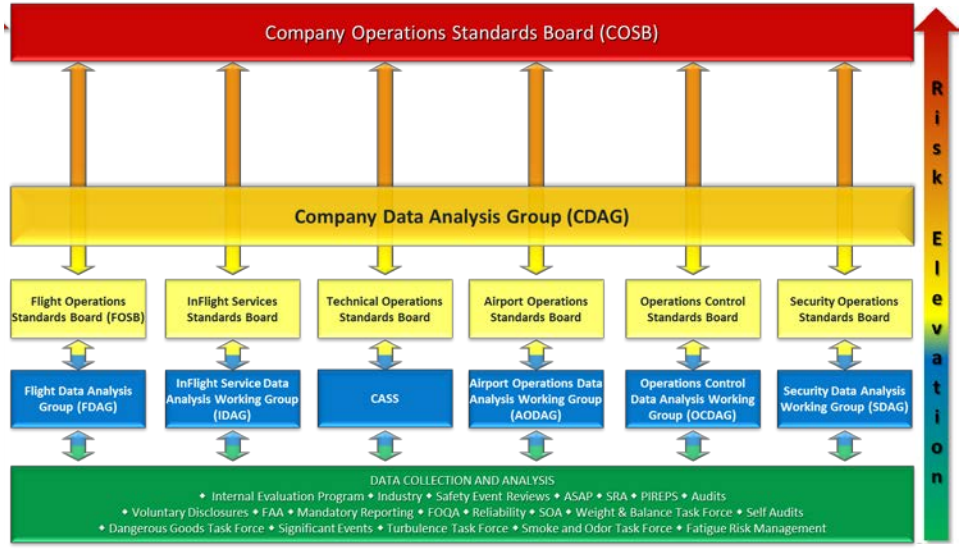
- Pilot Project 2007
- US Airways validated program 2011
- American validated program 2012
- Merger announced February 14, 2013
- First merger with SMS requirements
- SMS became the infrastructure for integration

Managing Risk during Integration

American Airlines



US Airways

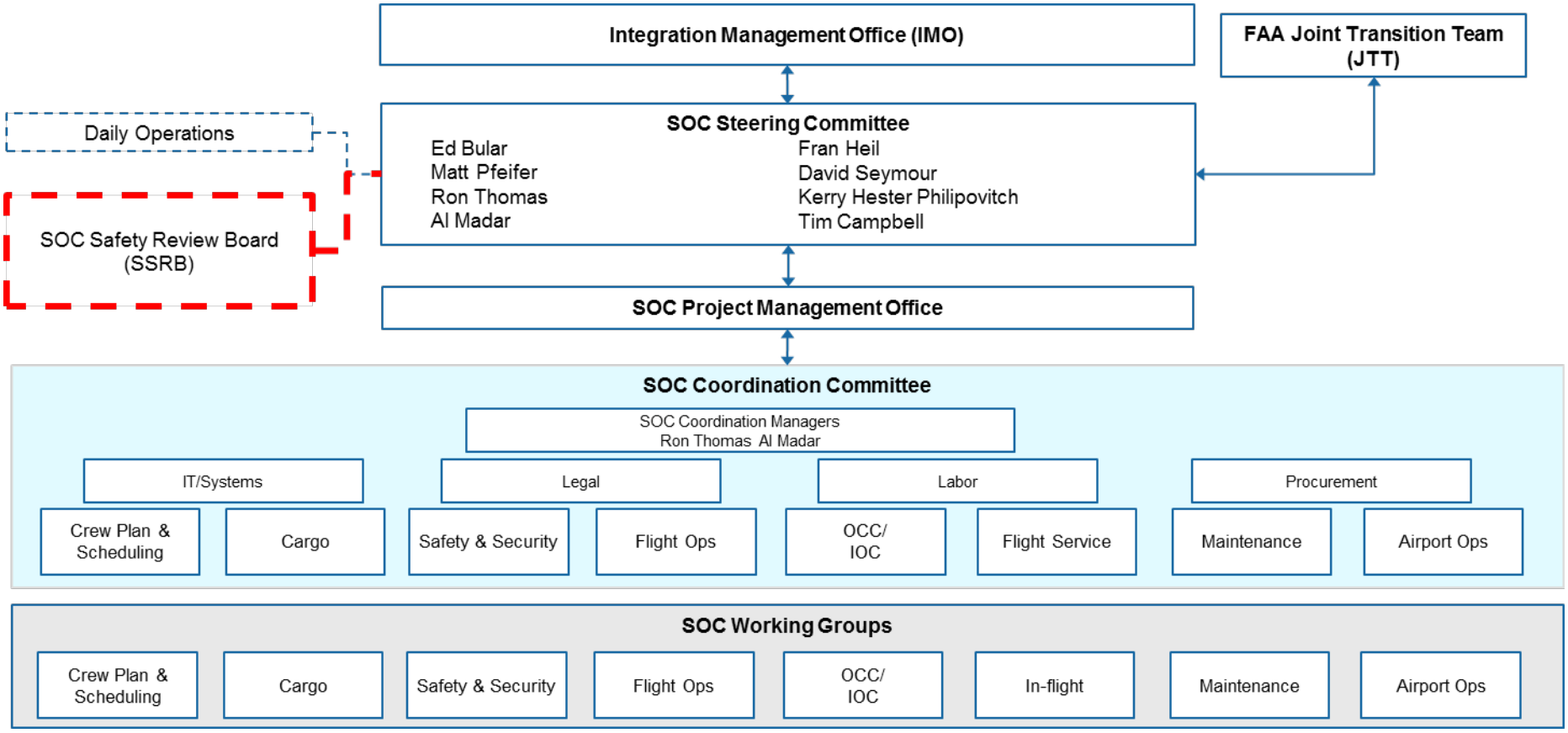


Managing Risk during Integration

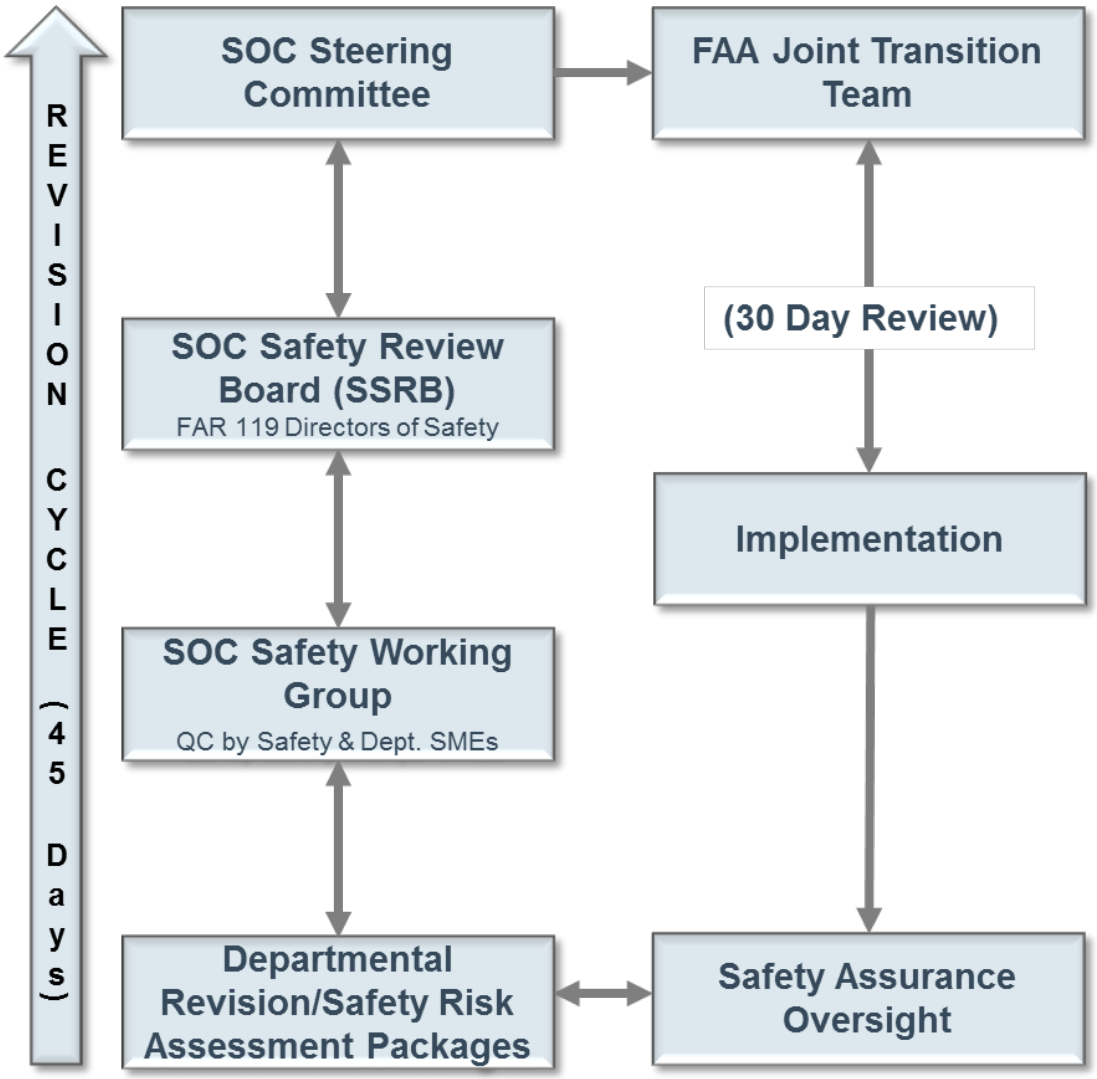
- Transition Plan – submitted and approved by the Certificate Management Office

- Fundamental Merger Risk Management Philosophy:
  - Integrate, Stabilize, Improve
  - Adopt & Go – in favor of the larger carrier when possible
  - Continuous Safety Assurance Process
  - Phased Integration Approach
  - Pace the rate of change introduced into the operation to minimize risk
  - Develop Key performance indicators (KPI) to measure effectiveness of change

Managing Risk during Integration



Managing Risk during Integration



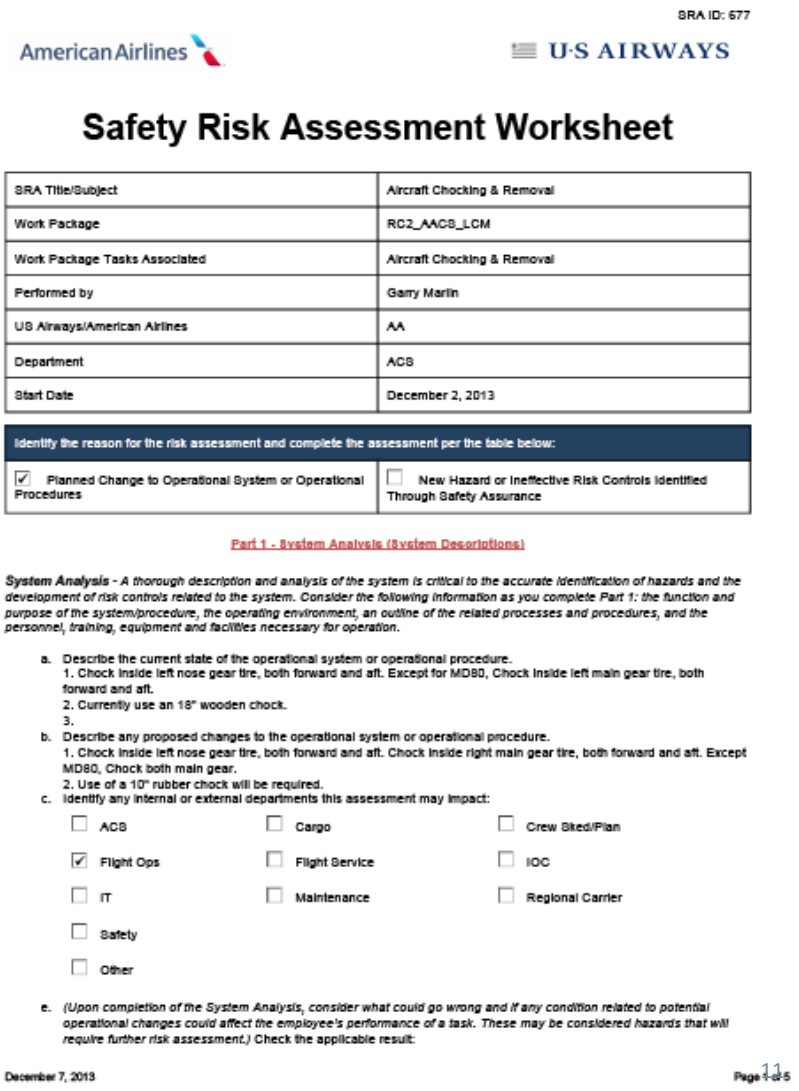
Tools:

- Reliance on the Safety Management System
- Safety Risk Management (SRM) Worksheet developed in conjunction with AFS 900 and harmonized across both systems
  - Identifies hazards
  - Safety Risk Assessment
  - Implements risk controls when needed
  - Identifies a follow-up process to validate controls
  - Identifies any unintended consequences
- Safety Assurance processes provide the oversight and pacing tools in the form of Key Performance Indicators (KPIs)

Managing Risk during Integration

Safety Risk Assessment Document

- **Part 1 – System & Task Description:**
  - Current State
  - Proposed Change
  - Impact/Interfaces
  - Potential Hazards requiring RA? Y/N
- **Part 2 – Hazard Identification Risk Assessment & Mitigation Plan:**
  - Hazard Identification
  - Risk Assessment
  - Risk Control/Mitigation Plan
  - Residual Risk
  - Follow-up/Monitoring Plan
- **Part 3 – Risk Acceptance Sign-off:**
  - Based on Risks Identified
- **Part 4 – Quality Review**
- **Part 5 – Validation**



SRA ID: 677

American Airlines U·S AIRWAYS

Safety Risk Assessment Worksheet

SRA Title/Subject	Aircraft Chocking & Removal
Work Package	RC2_AACS_LCM
Work Package Tasks Associated	Aircraft Chocking & Removal
Performed by	Garry Marlin
US Airways/American Airlines	AA
Department	ACS
Start Date	December 2, 2013

Identify the reason for the risk assessment and complete the assessment per the table below:

☑ Planned Change to Operational System or Operational Procedures	☐ New Hazard or Ineffective Risk Controls Identified Through Safety Assurance

Part 1 - System Analysis (System Descriptions)

System Analysis - A thorough description and analysis of the system is critical to the accurate identification of hazards and the development of risk controls related to the system. Consider the following information as you complete Part 1: the function and purpose of the system/procedure, the operating environment, an outline of the related processes and procedures, and the personnel, training, equipment and facilities necessary for operation.

a. Describe the current state of the operational system or operational procedure.
   1. Chock inside left nose gear tire, both forward and aft. Except for MD80, Chock inside left main gear tire, both forward and aft.
   2. Currently use an 18" wooden chock.
   3.
b. Describe any proposed changes to the operational system or operational procedure.
   1. Chock inside left nose gear tire, both forward and aft. Chock inside right main gear tire, both forward and aft. Except MD80, Chock both main gear.
   2. Use of a 10" rubber chock will be required.
c. Identify any internal or external departments this assessment may impact:

☐ ACS	☐ Cargo	☐ Crew Sked/Plan
☑ Flight Ops	☐ Flight Service	☐ IOC
☐ IT	☐ Maintenance	☐ Regional Carrier
☐ Safety		
☐ Other		

e. *(Upon completion of the System Analysis, consider what could go wrong and if any condition related to potential operational changes could affect the employee's performance of a task. These may be considered hazards that will require further risk assessment.)* Check the applicable result:

December 7, 2013 Page 1 of 5

Managing Risk during Integration

Illustrative

American Airlines

U·S AIRWAYS

Risk Assessment Matrix

	Severity				
Accident or incident	• Accident with serious injuries or fatalities, or significant damage to aircraft or property	• Serious incident with injuries and/or substantial damage to aircraft or property a large reduction in safety margins	• Incident with minor injury and or minor aircraft or property damage	• Incident with less than minor injury and/or less than minor system damage
Employee or customer injury	• Fatality or serious injury with total disability or capacity	• Immediate admission to hospital as an inpatient and/or partial disability/loss of capacity	• Injury requiring ongoing treatment, with no permanent disability/loss of capacity	• No treatment required or first-aid treatment with no follow-up required
Operational events	• State of emergency for an operational condition, impacting the immediate safe operation of an aircraft (i.e. declared emergency, immediate air interrupt, high speed abort)	• Condition resulting in abnormal procedures, impacting safe operation of an aircraft, (i.e. special handling w/o declared emergency, enroute diversion, low speed abort)	• Condition resulting in abnormal procedures with potential to impact safe operation of an aircraft (i.e. battery charger failure, single source of electrical power, slat disagree)	• Condition resulting in normal procedures with potential to impact safe operation of an aircraft (i.e. false indication)
Systems or processes	• Loss or breakdown of entire system, subsystem or process • Systemwide shutdown or loss of the air carrier certificate • Extreme customer dissatisfaction or greater than 2,000 customers disrupted for >48 hrs. • Potential for uncombined public relations event	• Partial breakdown of a system, subsystem, or process • Partial system shutdown • Customer dissatisfaction or more than 2,000 customers disrupted for >3 hrs. and les than 48 hrs. • Potential for large public relations impact requiring heightened management involvement	• System deficiencies leading to poor dependability or disruption • Partial system breakdown of air carrier operations • Customer annoyance or less than 2,000 customers disrupted for >3 hrs. and les than 48 hrs. • A potential public relation impact	• Little or no effect on system, subsystem or process • Little or no operational impact • Isolated customer annoyance or less than 2,000 customers disrupted for up to 3 hrs. • No public relations impact • Deficiencies present – opportunities for improvement

Managing Risk during Integration

Illustrative

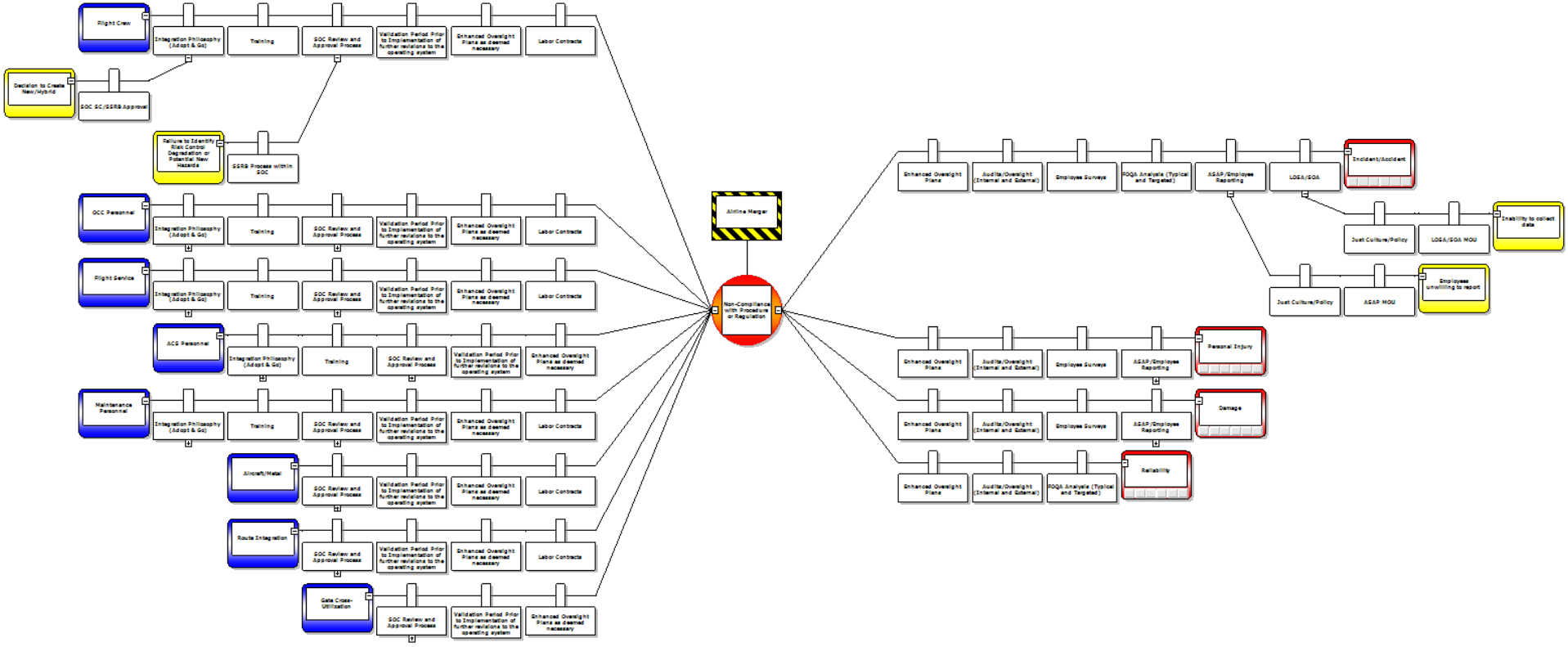
Likelihood		I	II	III	IV
Likely to occur (will occur in most circumstances, not surprised it happens) Or occurs ≥ 1 in 100	A	High	High	Serious	Moderate
Possible to occur (might occur in some circumstances) Or occurs 1 in 100 to 1,000	B	High	Serious	Moderate	Minor
Unlikely to occur (could occur in some circumstances, surprised if it happens) Or occurs in 1 in 1,000 to 10,000	C	Serious	Moderate	Minor	Low
Rare to occur (may occur but only in exceptional circumstances, may happen but it would be highly unexpected) Or occurs in 10,000 to 1,000,000	D	Moderate	Minor	Low	Low

Risk Acceptance Authorities

Risk assessment	Escalation and authorities
High	• Not acceptable for day-to-day operations; • Operation must begin or continue without mitigation to a lower risk level • VP or higher must review and approve mitigations from this risk region to a lower risk region
Serious	• Generally unacceptable but may be acceptable with mitigation, risk controls, and risk control monitoring • VP or higher review approval required for operations falling within this risk region
Moderate	• Acceptable with risk controls and monitoring w/o further mitigation. If neither risk control nor monitoring is possible, mitigation must be applied to achieve a Minor/low/green risk rating to continue • Mitigation should be applied in order to achieve As Low As Reasonably Practicable (ALARP) risk • Managing director/director or higher review and approval required for operations falling within this region
Minor	• Acceptable with risk controls and monitoring w/o further mitigation; however, if neither risk controls nor monitoring is possible mitigation must be applied to achieve a Minor risk rating to continue • Mitigation should be applied in order to achieve As Low As Reasonably Practicable (ALARP)
Low	• Acceptable with risk controls and monitoring w/o further mitigation • Mitigation should be applied in order to achieve As Low As Reasonably Practicable (ALARP)

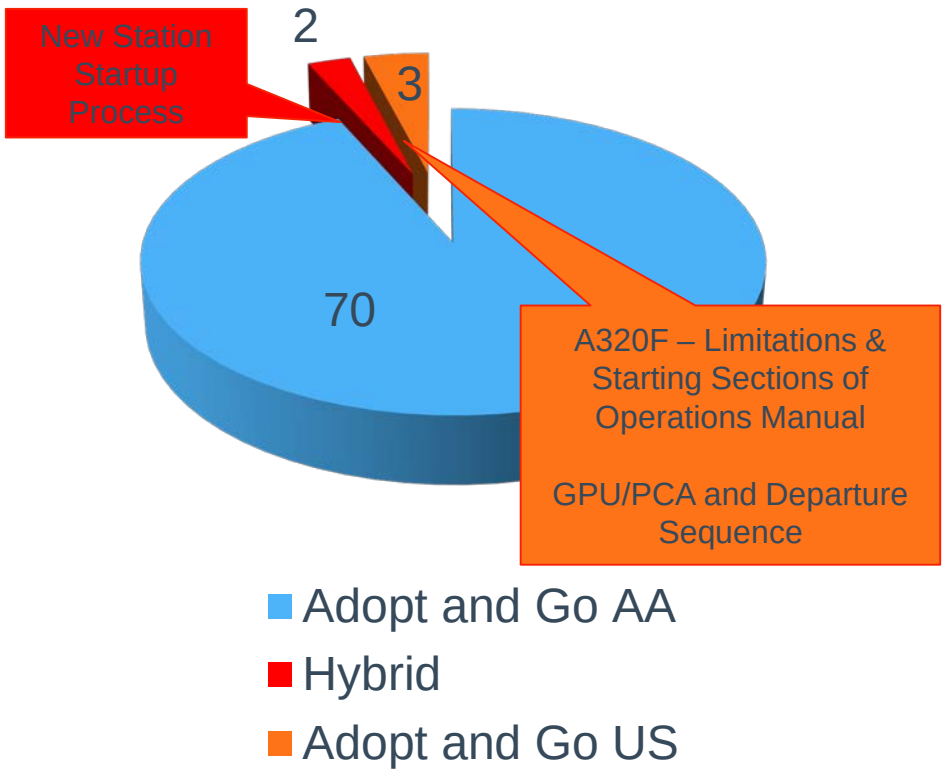
Managing Risk during Integration

Airline Merger Bow Tie– System Wide Controls

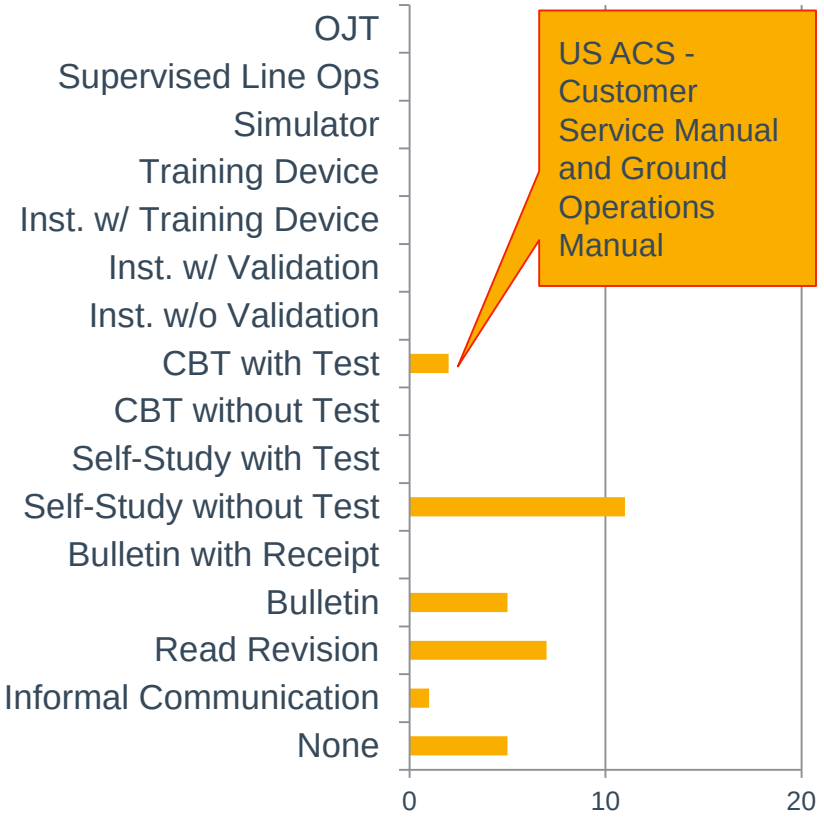


Managing Risk during Integration

Integration Approach
(Counted per SRA)



Training Classification
(Counted per Work Package)



Revision Cycle 1 -

- Volume of operational change is MINIMAL for all affected front line employee workgroups

Managing Risk during Integration

Hazards:

- 72 SRAs completed identifying 26 potential hazards

New Risk Controls:

- 36 new risk controls will be implemented to mitigate the risks identified

- Procedure/Policy
- Guidebook
- Training
- Posters
- Placard on equipment

Profile of SRAs indicated risk by highest Residual Risk:

No Hazards	Low	Minor	Moderate	Serious	High
46	26	0	0	0	0

Managing Risk during Integration

Follow-up/Monitoring Plans and Enhanced Oversight Plans (EOPs):

- Continuous monitoring of operational data will continue through the Operational Data Analysis Groups and Safety Working Groups.
- The majority of Follow-up Monitoring activities identified are operational observations to begin the day of implementation.

Follow-Up / Monitoring Plans	Enhanced Oversight Plans
47	0

- Breakdown of monitoring plans by accomplishing system:

LOSA/SOA	ASAP*	FOQA	CASS	Reliability	Other Systems
17	5	0	0	1	24

* or Safety Event Reporting (SER)

- No Enhanced Oversight of work packages was deemed required based upon the requirements outlined in the Transition Plan. Enhanced Oversight was elected for two areas to address areas with the highest levels of pre-mitigation risk as well the greatest operational and organizational change:
  - US - ACS, Below the Wing - Surveillance – recorded on Work Package RC1_UACS_GOM
  - US - FLT – Surveillance – recorded on Work Package RC1_UFLT_FMP1

Managing Risk during Integration

SOC Key Performance Indicators (KPI)

A. SOC Key Performance Indicators (SOC KPIs) are utilized to monitor the ability of the organization to support the current rate of change and are managed by the SSRB

- KPIs are provided as two mirrored reports, one per operating carrier, and are produced monthly for use by the SSRB and distribution to Senior Management.

Managing Risk during Integration

American Airlines

Reporting Period July 2013

Integration - Key Performance Indicators (KPI)

Revised on: July 28, 2013

CORPORATE	*Track*	G	Y	R	Threshold	1Q 2013	2Q 2013	12 mo.	KPI
IEP Audits per Qtr.	<	3	2	1	3	2	3		
NTSB Accidents	>			1	0	0	0		
NTSB Incidents	>			1	0	0	0		
Lost Time Injury									
Taken To Hospital									
Total Recordable Injuries									
* LOI per Qtr.	>	6	7	8	6	5	11		↑
* VSD per Qtr.	>	7	8	10	7	3	6		
* All Aircraft Damage (ATA Recordable)	>	14	15	18	17	19	16		

MAINTENANCE	*Track*	G	Y	R	Threshold	1Q 2013	2Q 2013	12 mo.	KPI
* MELs (Avg. No. Open per Aircraft)	>	0.58	0.59	0.68	0.58	0.63	0.58		
IFSD Rate per 1K Eng Hrs. 0.030 180 MIS ETOPS	>				0.030	0.003	0.004		
Short Term Escalations	>			1	0	0	0		
* Mechanical Air Interruption Events per QTR	>	30	31	34	30	28	27		
* ASAP Reports	<	32	31	21	32	26	29		
* MTX Aircraft Damage Events (Recordable)	>	5	6	7	5	8	5		
CASS Audits	<				370	408	374		
QA Audits	<				No Base	1,139	1,159		n/a
CRB Open Risk Register	<	22	21	16	22	24	30		

AIR OPERATIONS

FLIGHT	*Track*	G	Y	R	Threshold	1Q 2013	2Q 2013	12 mo.	KPI
* FOQA Unstable Approaches 1000FT* (Rate)	>	9.7	9.8	12.4	9.7	5.5	6.8		
* FOQA Unstable Approaches 500ft* (Rate)	>	2.4	2.5	2.9	2.4	1.9	2.7		↑
* FOQA VFE (Avg. Events per Qtr.)	>	10	11	14	10	10	15		↑
LOSA Audits	<					0	2		n/a
* ASAP Reports	<	604	603	412	604	540	635		
* Flight Aircraft Damage Events (ATA Recordable)	>	0	1	1	0	0	0		
SafeOps Open Risk Register	<	5	4	2	5	7	7		

FLIGHT SERVICE	*Track*	G	Y	R	Threshold	1Q 2013	2Q 2013	12 mo.	KPI
* ASAP Reports	<	41	40	34	41	36	55		
* Flight Service Aircraft Damage Events (Recordable)	>			1	0	1.0	0.0		
Cabin Open Risk Register	<	4	2	1	4	4	5		

DISPATCH	*Track*	G	Y	R	Threshold	1Q 2013	0	12 mo.	KPI
* ASAP Reports									

FRMS	*Track*	G	Y	R	Threshold	1Q 2013	2Q 2013	12 mo.	KPI
* Fatigue Removals per 1000 Duty Days	>	1.3	1.4	1.6	1.3	1.1	1.7		↑

CUSTOMER EXPERIENCE	*Track*	G	Y	R	Threshold	1Q 2013	2Q 2013	12 mo.	KPI
* Cust Care Aircraft Damage Events (Recordable)	>	7	8	11	7	9	9		
GSB Open Risk Register	<	11	10	6	11	15	14		

* Metric has calculated Green, Yellow & Red bands. Therehold based on 18 month datapoints - STDEV Calculation.
↑ KPI worse than last quarter

U·S AIRWAYS

Reporting Period July 2013

Key Performance Indicators (KPI)

Revised o ######

CORPORATE	*Track*	G	Y	R	Threshold	1Q 2013	2Q 2013	12 mo.	KPI
IEP Audits per Qtr.									
NTSB Accidents									
NTSB Incidents									
Lost Time Injury									
Taken To Hospital									
Total Recordable Injuries									
* LOI per Qtr.									
* VSD per Qtr.									
* All Aircraft Damage (Recordable)									

MAINTENANCE	*Track*	G	Y	R	Threshold	1Q 2013	2Q 2013	12 mo.	KPI
* MELs (Avg. No. Open)									
IFSD Rate per 1K Eng Hrs. 0.030 180 MIS ETOPS									
Short Term Escalations									
* Mechanical Air Interruption Events per QTR									
* ASAP Reports									
* MTX Aircraft Damage Events (Recordables)									
CASS Audits									
QA Audits									
CRB Open Risk Register									

AIR OPERATIONS

FLIGHT	*Track*	G	Y	R	Threshold	1Q 2013	2Q 2013	12 mo.	KPI
* FOQA Unstable Approaches 1000FT* (Rate)									
* FOQA Unstable Approaches 500ft* (Rate)									
* FOQA VFE (Events per Qtr.)									
LOSA Audits									
* ASAP Reports									
* Flight Aircraft Damage Events (Recordable)									
SafeOps Open Risk Register									

FLIGHT SERVICE	*Track*	G	Y	R	Threshold	1Q 2013	2Q 2013	12 mo.	KPI
* ASAP Reports									
* Flight Service Aircraft Damage Events (Recordable)									
Cabin Open Risk Register									

DISPATCH	*Track*	G	Y	R	Threshold	1Q 2013	0	12 mo.	KPI
* ASAP Reports									

FRMS	*Track*	G	Y	R	Threshold	1Q 2013	2Q 2013	12 mo.	KPI
* Fatigue Removals per 1000 Duty Days									

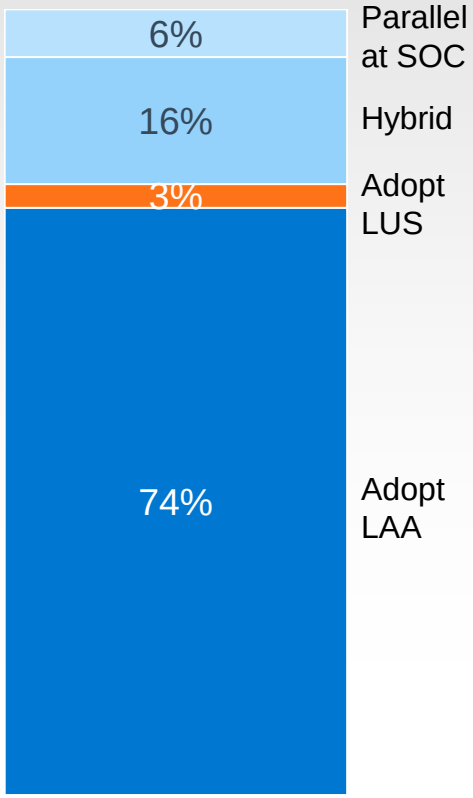
CUSTOMER CARE	*Track*	G	Y	R	Threshold	1Q 2013	2Q 2013	12 mo.	KPI
* Cust Care Aircraft Damage Events (Recordable)									
GSB Open Risk Register									

* Metric has calculated Green, Yellow & Red bands. Therehold based on 18 month datapoints - STDEV Calculation.
↑ KPI worse than last quarter
↓ KPI better than last quarter

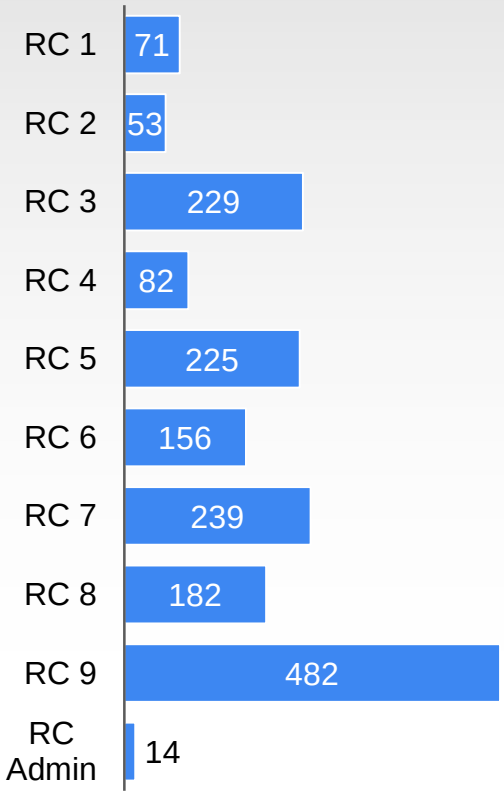
Managing Risk during Integration - SA

SOC Safety Review Board (SSRB) reviewed more than 1,700 Safety Risk Assessments during the SOC process

New American operations drawn primarily from LAA Disposition of SOC revisions



SRAs created and audited by Revision Cycles



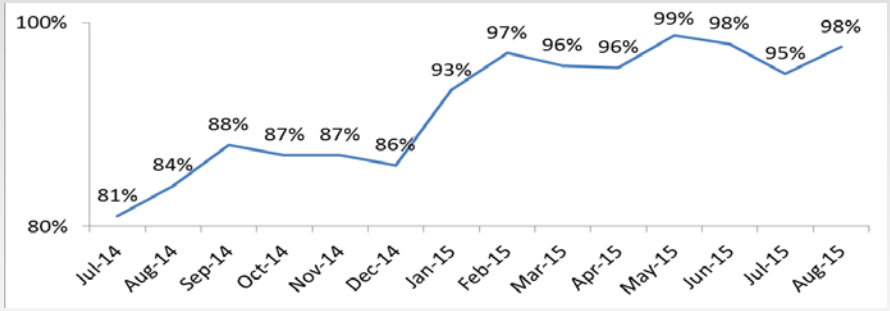
SOC leaves lasting SMS benefits for new American

- American is the first airline to have two fully mature SMS carriers go through the SOC process
- SOC enabled us to conduct a thorough review of all facets of the new operation
  - Examined all changes and reviewed with FAA
  - Imposed enhanced oversight where necessary
  - Managing risk and managing risk mitigation effectiveness
- Revision Cycle process has made SRAs and SMS second nature at American
  - Over 650 AA employees have participated in writing SRAs
  - SRAs firmly established as the way of doing business

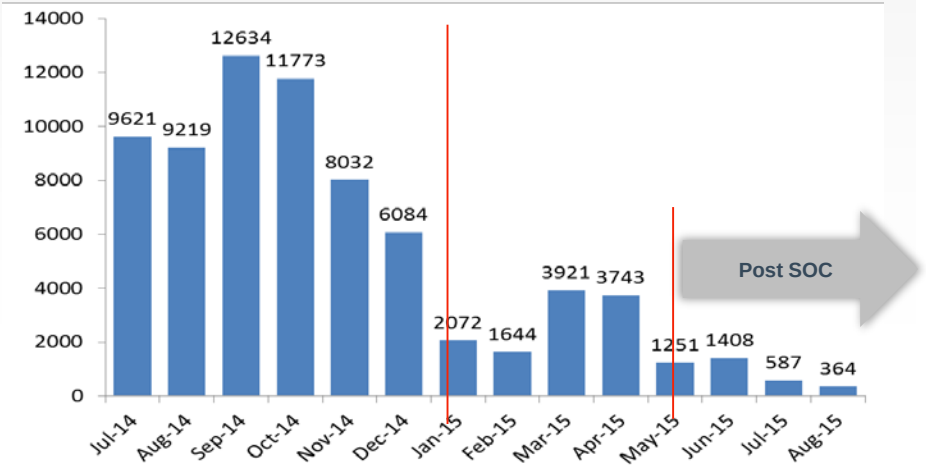
We continue to monitor and audit all process changes flagged as Enhanced Oversight (EOPs) RC 1 - 8

Enhanced oversight auditing results

Rate of compliance



Number of observations



- Over 57,000 observations made on SOC Enhanced Oversight processes
- Compliance rates approaching 100%
  - Feedback loops with SMS and operations target lower compliance issues for deeper analysis and remedy
- Auditing did not end with SOC
  - All SOC-related enhanced oversight auditing became part of the standard safety checklist
- Post SOC Auditing
  - Operating groups collect and trend results internally

What did it take to achieve Single Operating Certificate?

300 legacy manuals reviewed

115,000 pages on policies & procedures reviewed

1,700 Safety Risk Assessments (SRAs) completed

110,000 people enrolled in SOC training

Over 700 people directly involved in SOC coordination and manual revisions

651 days of effort

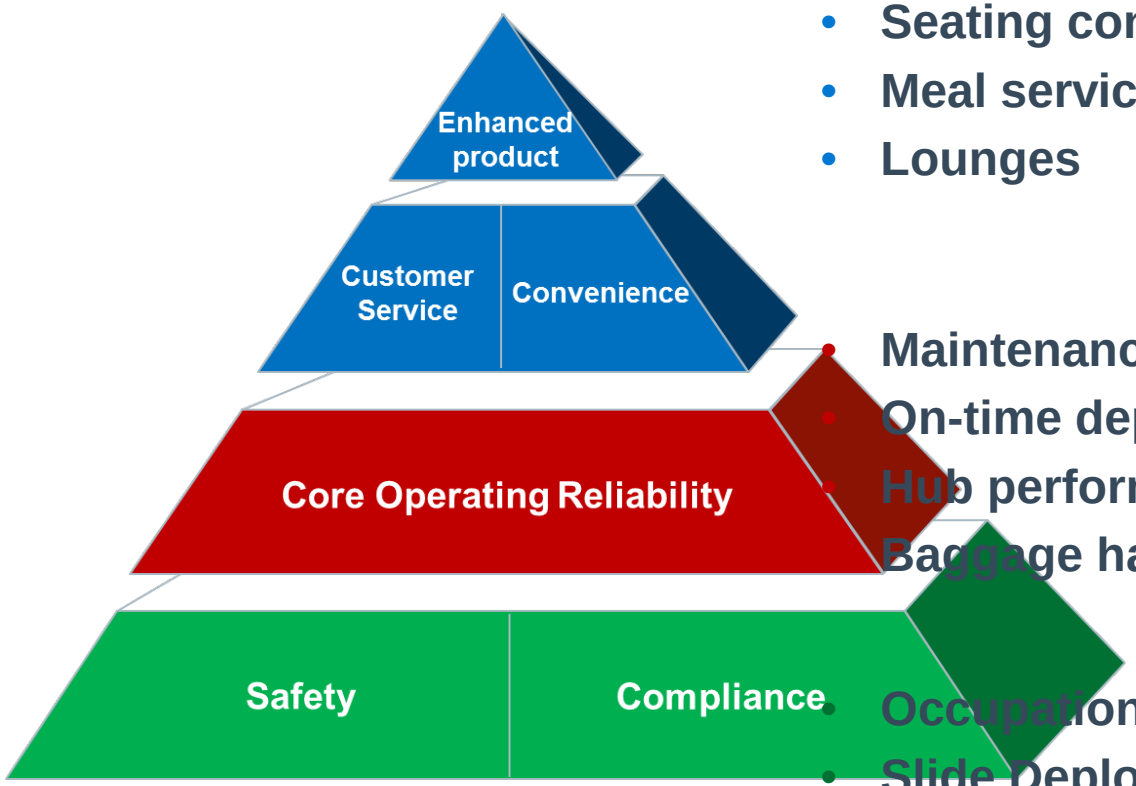
167 days of coordination in advance of legal close

0 days behind schedule

SMS and Safety Culture

American Airlines Heritage

American's Safety & Compliance Focus



- New aircraft
- Seating configurations
- Meal service
- Lounges

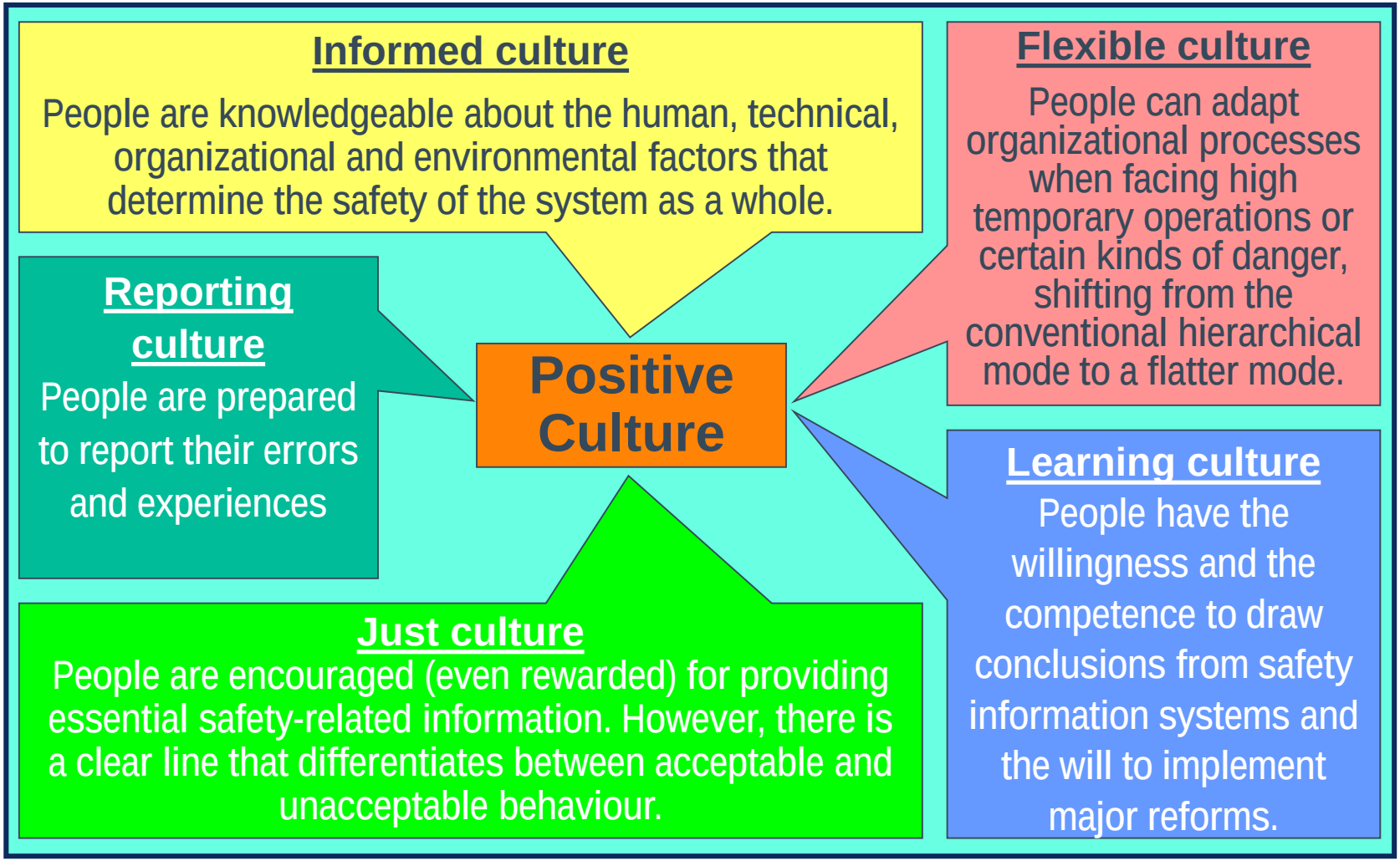
- Maintenance reliability
- On-time departures
- Hub performance
- Baggage handling

- Occupational Injuries
- Slide Deployments
- Ground Damages
- Flight Safety Index

What is a Safety Culture?

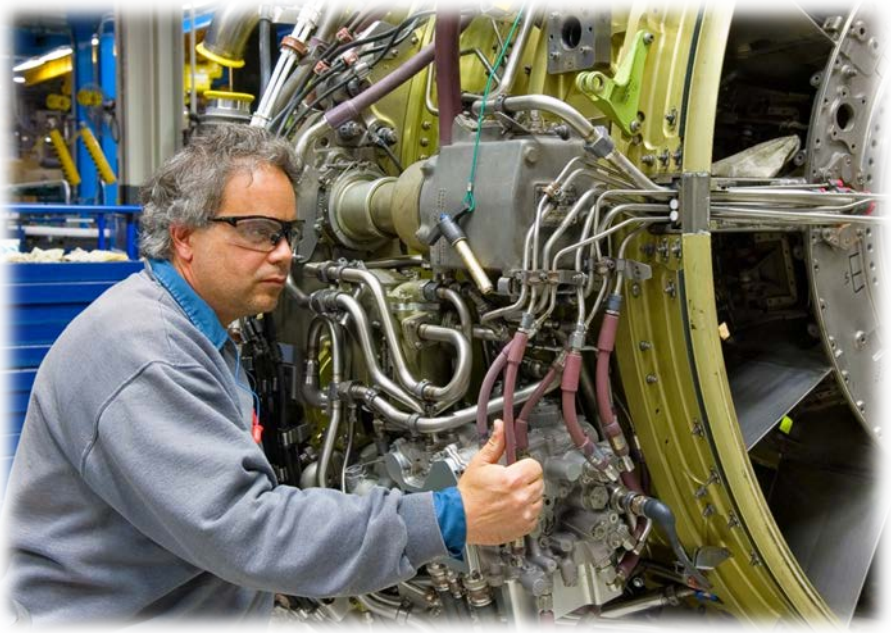
Source: St. Louis University Parks College

Aspects of a Positive Safety Culture



Source: Jim Reason

Understanding our Safety Culture



System of accountability that best supports a safety culture

A “Just” Safety Culture

Trust

A positive safety culture requires:

- a *workforce* with a questioning attitude, a sense of accountability to hold themselves and others to the highest safety standards, and the willingness to report safety concerns in an environment that is free of fear of reprisal;

- an *organization* that is willing to listen and appreciates the impact voluntary reporting can have on the ability to proactively mitigate the potentially unsafe indicators within an organization before an error or incident occurs.

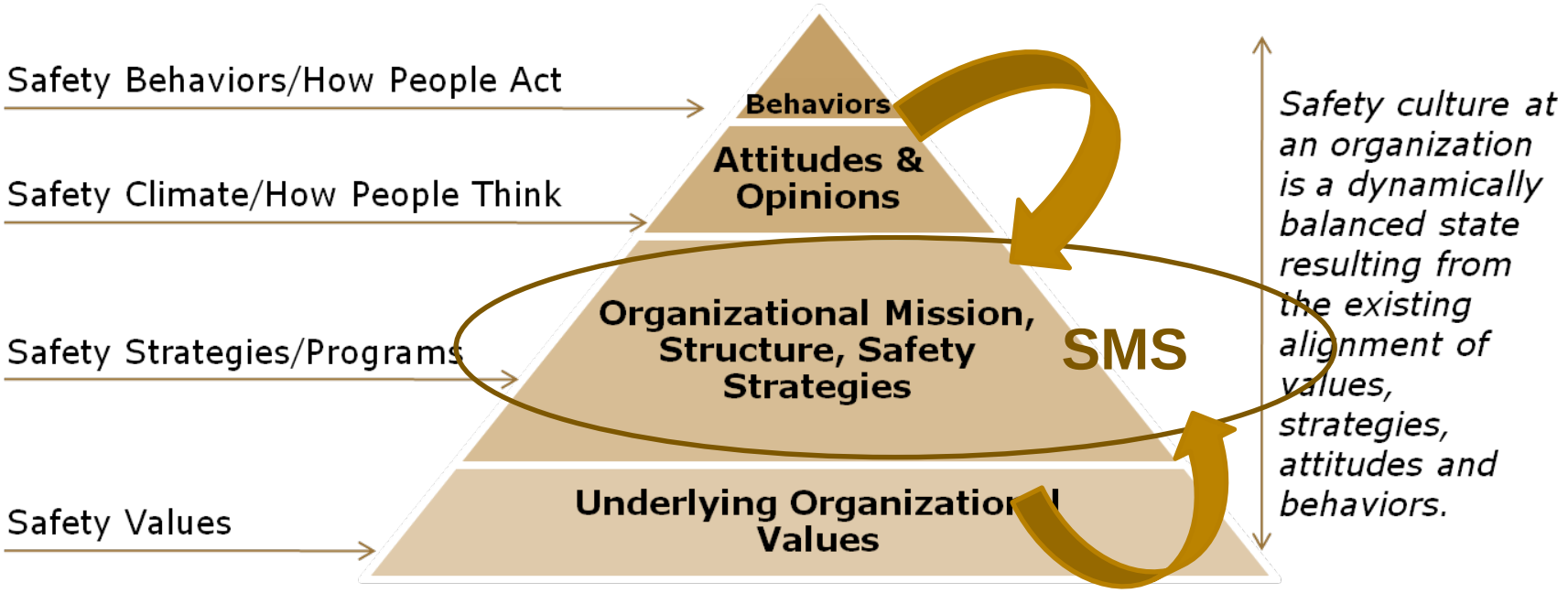
Safety Culture Transformation

Secretive Culture — **Blame** — **Reporting** — **Just Culture**

Benefits of a Just Culture

- Engagement of the Workforce
- Open Discussion between Management and the Workforce
- Employee Participation and Empowerment to be a Leader in Safety Risk Management
- Professionals willing to come forward regarding errors or risk identified in a system
- Maximum Reliability
- Enhanced Safety Culture

SMS + Safety Culture



SMS + Safety Culture

= ROBUST SAFETY CULTURE

Assess risk in your safety culture.

Understanding your risk and your safety culture strengthens your SMS.

Examples of how to measure your Safety Culture

Procedural Justice

Does my leadership team use fair procedures and methods and apply American Airlines policies and values when making decisions that impact me?

Management Credibility

Does my leadership team demonstrate skill, ability, and experience and do they do as they claim they will do (“walk the talk”)?

Perceived Organizational Support

Does my leadership team value me as an individual and recognize my contributions?

Does my leadership team provide me with the tools needed to accomplish my tasks in a safe and compliant manner?

Examples of how to measure your Safety Culture

Teamwork

Does your team function as a team to achieve safety objectives?
Does your team assist you to complete your work?

Workgroup Relations

Are you proud to be a member of your team?
Does your team inspire you to do your best work?
Do my peers get along and work together in harmony?

Leadership Training

Does your leadership team provide you with the appropriate training and knowledge to observe your direct reports, provide them feedback; positive and corrective, and hold them accountable for non-compliance

Examples of how to measure your Safety Culture

Organizational Value for Safety

Does my leadership team demonstrate safety as a value?
Does my leadership team value safety over operational performance?
Do I value safety over operational performance?
Do you often deviate from procedures to accomplish tasks?
Do you allow deviation from procedures to accomplish tasks?

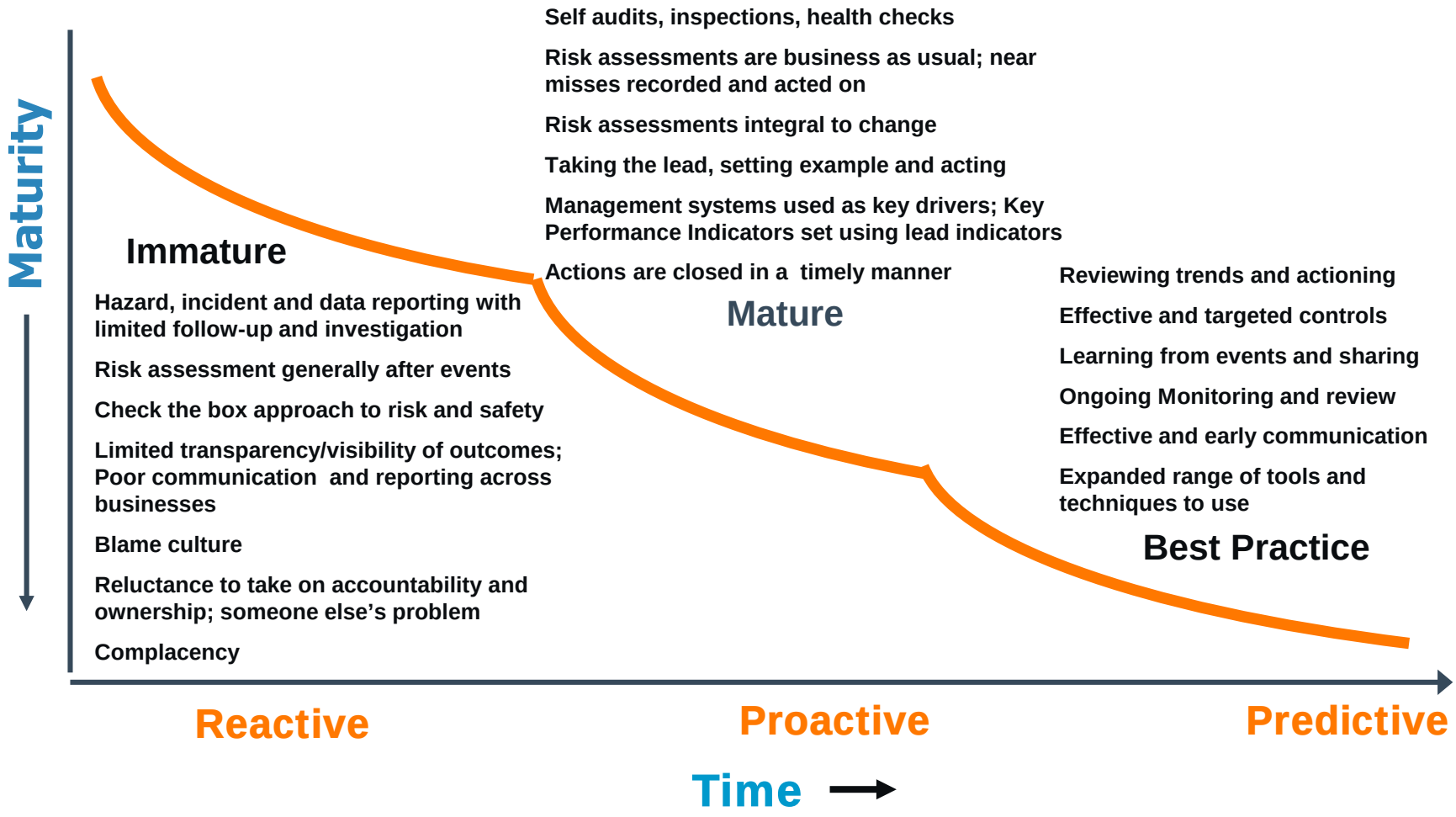
Upward Communication

Am I comfortable communicating safety concerns to my leaders?
Is the communication of safety concerns to my leaders welcome?

Approaching Others

Am I willing to approach my peers with safety concerns that are a result of their actions or behaviors?
When something unexpected comes up in your work, do you usually know who to ask for help?

What is our Culture towards Risk?



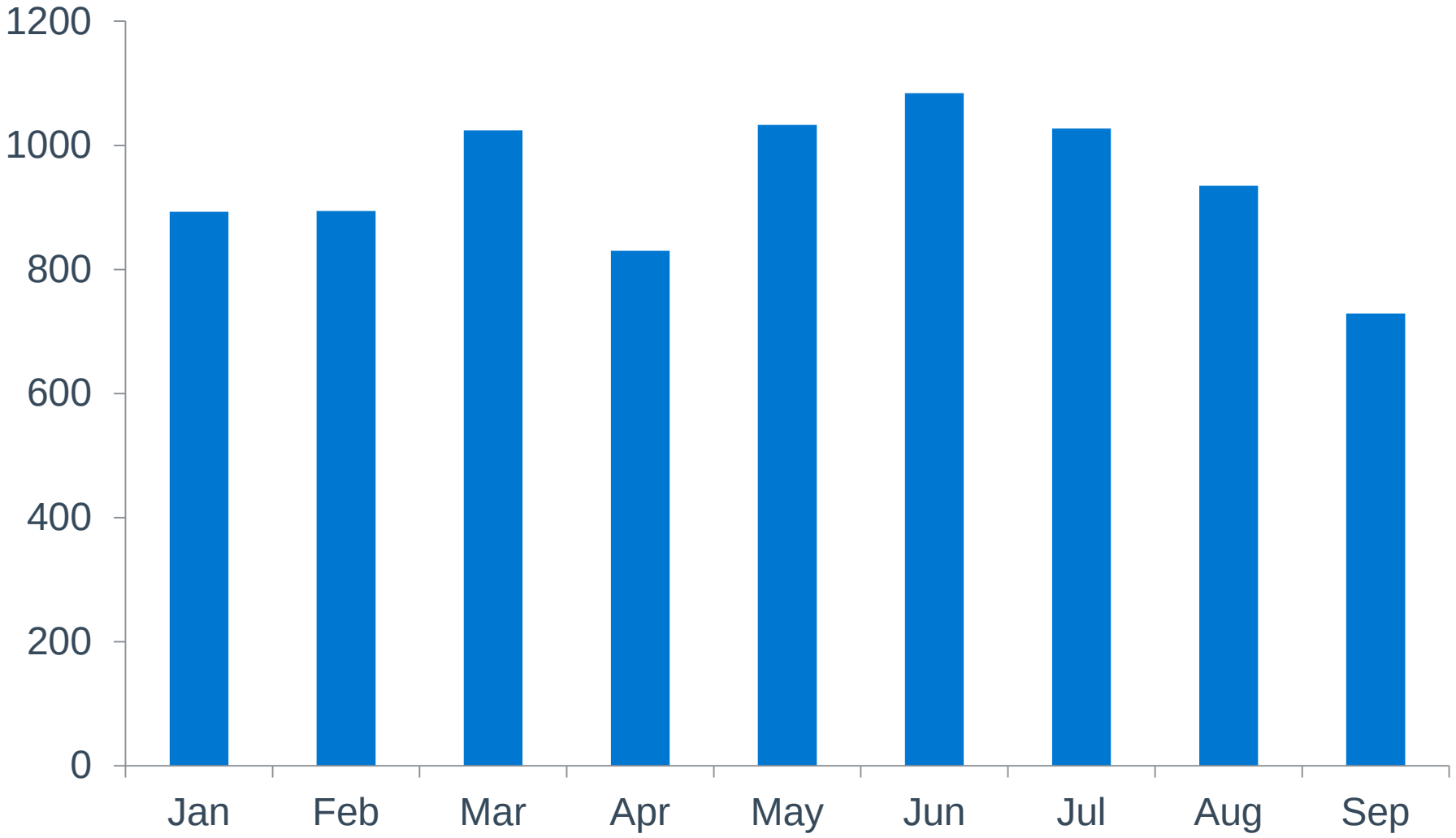
Non-punitive Employee Reporting Programs

14 CFR part 5 - 5.71 Safety Performance Monitoring and Measuring

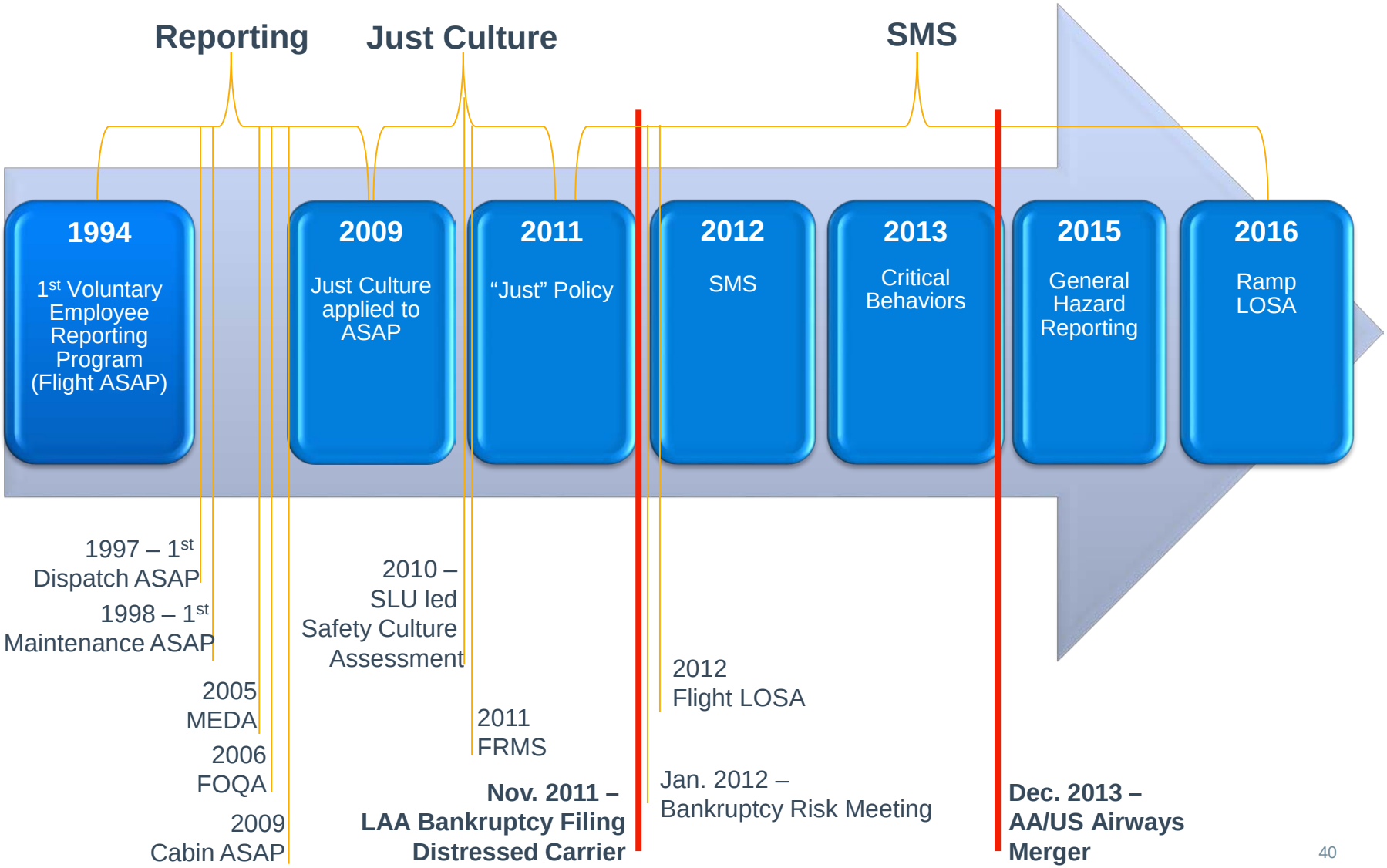
(a)(7) Confidential employee reporting systems in which employees can report hazards, issues, concerns, occurrences, incidents and propose solutions and safety improvements

- **Flight Ops (Pilots)**
- **Flight Service (Flight Attendants)**
- **Dispatch**
- **Tech Ops (Maintenance & Engineering)**

Total Safety Reports (Jan 2016 – Sept 2016)



Safety Culture Transformation Timeline



American Airlines – an Industry Leader in SMS

American Airlines continues to be an industry leader:

- Hosted the 2016 SMS Industry Forum
- Hosted the 2016 Regional Airline Association SMS Conference
- Hosted a 2-Day SMS/Root Cause Analysis Training for the industry – 85 industry peers attended and gave excellent reviews
- Hosting SMS Dangerous Good Summit for regulators and industry

2016 SMS Industry Forum
American Airlines Training Center
Fort Worth, TX

Thank you for your time!