



# Safety Management Systems

## *The Canadian Perspective*

# Agenda

- SMS - the Canadian Model
- Phased in Implementation
- SMS Assessments
- Using Risk Indicators
- Spreading the Word and Getting Industry Involved
- Guidance Material and Assistance to the Industry
- ICAO and the CARs

# What is SMS?

The Definition (CAR 101.01):

Safety management system means a documented process for managing risks that integrates operations and technical systems to ensure aviation safety or the safety of the public

In practice what does this actually mean?

***Transport  
Canada's  
SMS:  
Components  
& Elements***

**1. Safety Management Plan**

- Safety Policy
- Non-punitive Safety Reporting Policy
- Roles, Responsibilities & Employee Involvement
- Communication
- Safety Planning, Objectives & Goals
- Performance Measurement
- Management Review

**2. Document Management**

- Identification & Maintenance of Applicable Regulations
- SMS Documentation
- Records Management

**3. Safety Oversight**

- Reactive Processes
- Proactive Processes
- Investigation and Analysis
- Risk Management

**4. Training**

**5. Quality Assurance**

**6. Emergency Preparedness**

# Transport Canada's Philosophy

*A three layered approach*

**Accountable  
Executive**



**Accountability-  
responsibility upper  
management**

**Safety  
Management  
System**



**Systemic Approach  
to Safety**

**Human  
Factors  
Training**

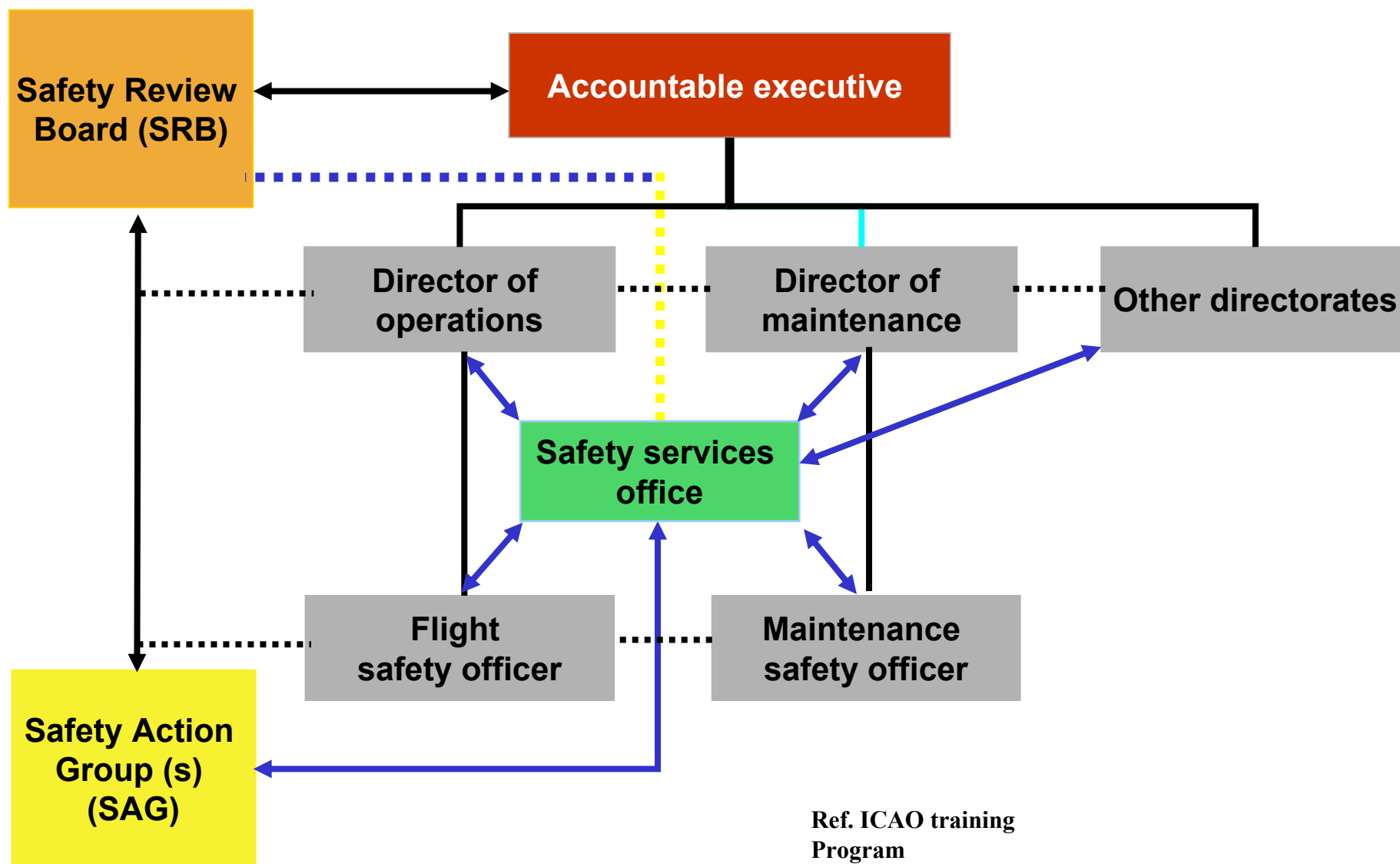


**Company-wide  
understanding of human  
performance & error**

# The Accountable Executive

- "Accountable executive" means the person having financial and executive control over an entity that is subject to these regulations.
- The accountable executive is the certificate holder or the certificate holder's representative.
- Single executive for all certificates held by organization (AOC, FTU, AMO, AEO, ATO etc..).

# Safety responsibilities – *An example*



# SMS COMPONENTS

- Safety Management Plan
- Documentation
- Safety Oversight
- Training
- Quality Assurance
- Emergency Response Plan



# COMPONENT 1 – SMS Plan

**The Safety Management Plan** should include:

- Company safety policy
- Roles and responsibilities
- Description of safety management system processes
- Safety performance targets
- Management review

# COMPONENT 2 - Documentation

## Processes for:

- Identifying applicable aviation safety regulations, including standards and exemptions, and where required, procedures for demonstrating compliance with them;
- Implementing changes to company documentation as required due to amendments to aviation safety regulations, standards and exemptions.

# COMPONENT 2 - Documentation

- Consolidated documentation describing the systems for each component of the safety management system;
- Maintenance of current applicable; and
- Maintenance of effective documentation.

*Note: Documentation includes all types of printed material including manuals, bulletins and safety reports.*

# COMPONENT 3 – Safety Oversight

Subcomponents of Safety Oversight are:

- Reactive processes of occurrence/ hazard reporting and event investigation and analysis;
- Proactive safety assessments; and
- Common elements to both reactive and proactive processes.

# **COMPONENT 3 – Safety Oversight**

## **Reactive Processes**

- Occurrence/hazard reporting; and
- Event investigation and analysis

## **Proactive Processes**

- Hazard Identification
- Hazard Register
- Safety Risk Profile
- Safety Case

# COMPONENT 4 – Training

- Training for SMS should be commensurate with the individual's function in the System and might include:
  - Investigation and analysis techniques
  - Human and organizational factors
  - Business processes
  - Reporting techniques
  - Auditing Techniques
  - LOSA/FOQA

# COMPONENT 5 – Quality Assurance

An effective QA system should encompass:

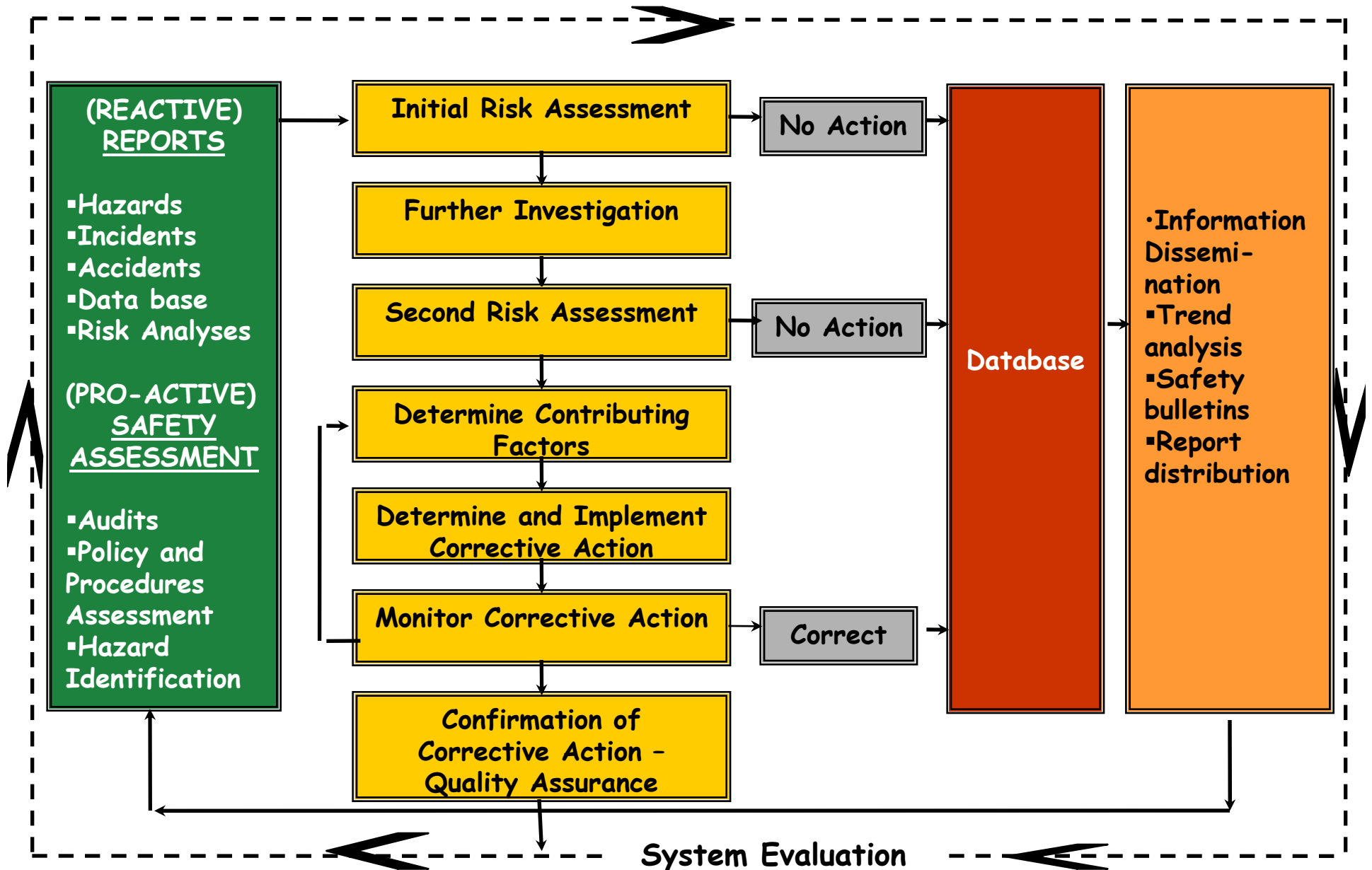
- Well designed and documented procedures for product and process control;
- Inspection and testing methods;
- Internal and external audits, as applicable;
- Corrective and preventive action; and,
- The use of appropriate statistical analysis, when required.

# COMPONENT 6 – Emergency Response Preparedness

- Emergency planning should aim where possible to prepare an organization in the event that an emergency situation occurs.
- This preparation should through good planning, reduce, control or mitigate the effects of the emergency.
- The ERP should
  - be monitored and changed as the operation changes
  - be subject to regular exercises
  - address all interested parties



# Safety Management System Process Flow



# Implementation Schedule

CAR Part	Gazette I Publication	Gazette II Publication	Planned In-Force
Part I	Completed - March 2005	Completed - June 2005	In-Force: May 31, 2005 Published: June 15, 2005
Part III			
Airports (Group 1)*	Forecast – Apr. 2007	Forecast – Oct. 2007	Dec 2007
Airports (Group 2)*	Forecast – Apr. 2007	Forecast – Oct. 2007	Dec 2008
Heliports	Forecast – June 2008	Forecast – Dec. 2008	Dec 2008
Water Airports	Forecast – June 2008	Forecast – Dec. 2008	Dec 2008
Part IV			
Aeroplane and Helicopter FTIs	Forecast – Mar. 2008	Forecast – Sept. 2008	Sept. 2008
Part V			
AMO (705 only)	Completed - March 2005	Completed - June 2005	In-Force: May 31, 2005 Published: June 15, 2005
Approved Maintenance Organization (AMO)	Forecast – March 2008	Forecast – Sept. 2008	Sept. 2008
Aircraft Certification	Forecast – Sept. 2009	Forecast – Jan. 2010	January 2010
Part VII			
702, 703, 704	Forecast – March 2008	Forecast – Sept 2008	Sept 2008
705	Completed - March 2005	Completed - June 2005	In-Force: May 31, 2005 Published: June 15, 2005
Part VIII	Forecast – April 2007	Forecast – Oct. 2007	Dec 2007

# Where Can You Find the Regulations?

- CAR 106 – Accountable Executive
- CAR 107 – Safety Management System Requirements
- CAR 573.30/31/32 – Safety Management System (Aircraft Maintenance)
- CAR 705.151/152/153/154 - Safety Management System (Flight Operations)
- CAR 706-15 – SMS (Maintenance requirements for Air Operators)
- CAR Part 3 and Part 8 – Airports and Air Navigation Service Providers

# Effectivity: Regulatory Requirement

- Effective May 31, 2005, Large Air Carriers and their Approved Maintenance Organizations were required to implement Safety Management Systems.
- Effective January 2, 2008 Large Airport Operators were required to implement Safety Management Systems.
- In both cases, an exemption was issued to enable structured, phased in implementation

# Why a phased in approach to SMS?

- Issuance of regulatory exemption to the CARs
- Provides a manageable series of steps for organizations to follow.
- Four implementation phases were identified; each phase involves the introduction of specific SMS components and elements.
- Provides for continuous improvement through “lessons learned”

# Implementation Phases

Initial Review	1 Year Follow-up	2 Year Follow-up	3 Year Follow-up
<ul style="list-style-type: none"><li>•Accountable Executive</li><li>•Gap Analysis</li><li>•Implementation plan and responsible person</li></ul>	<ul style="list-style-type: none"><li>•SMS Plan, Policies, and Procedures</li><li>•Reactive Reporting System</li></ul>	<ul style="list-style-type: none"><li>•Proactive hazard identification</li></ul>	<ul style="list-style-type: none"><li>•Training</li><li>•Quality Assurance</li><li>•Emergency Preparedness</li></ul>

# **Spreading the Word and Getting Industry Involved**



# SMS Implementation Working Groups

- Transport Canada participation in implementation teams with the major airlines:
  - Air Canada; WestJet; Skyservice; Air Transat
- Allows you to adjust your program to meet the reality of the industry
- Establish industry champions who speak from experience and support the SMS vision SMS Operator Information Sessions (road show concept)
- Small operators Working Group on SMS development and Implementation

# Small Operators Working Group

What did we learn? We learned one size does not fit all...

- ✓ A component of TCCA's continuous improvement approach to SMS.
- ✓ Invitation sent to CARAC Technical Committee members in January 2005 to identify volunteers for the project.

# SMS SOP Project Objectives

- ✓ Identify a cross-section of small air operators, flight training units and AMOs, taking into account such factors as, number of employees, aircraft types and/or ratings, scope and types of operation and operating environment, etc.;
- ✓ Review implementation strategies for the currently proposed regulations for small companies and make recommendations regarding any required changes;

# SMS SOP Project Objectives

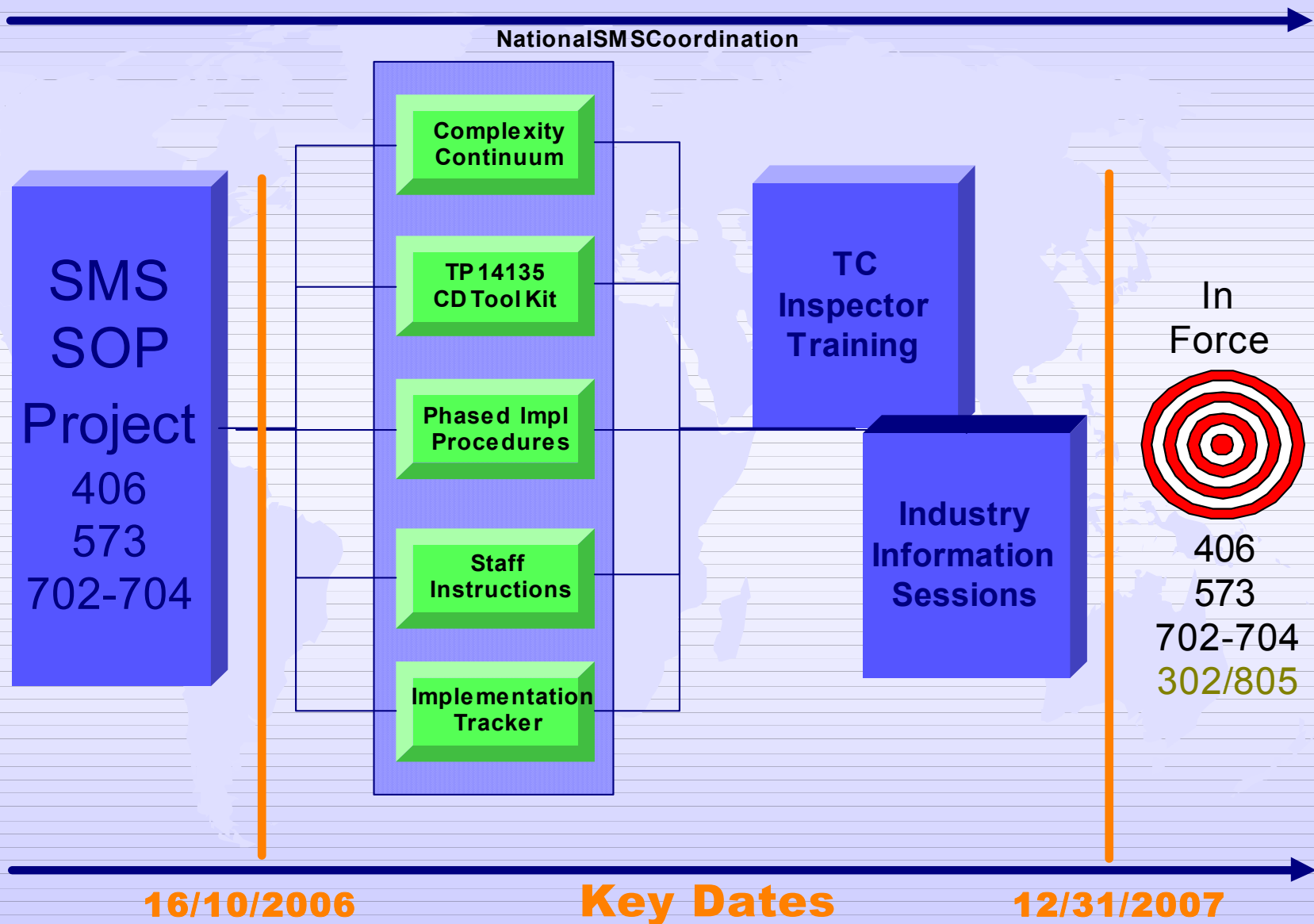
- Evaluate the tools and guidance material on SMS developed by TCCA and document any recommended changes;
- Evaluate the current implementation plan for SMS and document any recommended changes;
- Provide a written report within a practical timeframe to allow project recommendations to be considered.

# Executive Summary

Results from the project indicate that Safety Management Systems can be successfully implemented in, and become a positive addition to, small operations. However, the industry/Transport Canada project team identified the need to continue to develop and/or update infrastructure in the following areas;

- implementation procedures;
- guidance material;
- data management, and;
- training

# Recommendations



# Guidance Material

# Guidance Material

Develop your guidance material you need to assist in the interpretation and implementation of SMS

- AC 107-001 – Safety Management Systems for Large Operators
- Safety Management Systems for Small Operators
- Safety Management Systems for Design Organizations
- Introduction to Safety Management Systems – TP 1373
- TC Enforcement Policy

**Continuously improve the material**



# **Oversight Tools and Methodologies**

# SMS in the context of the Regulatory Structure

Safety Management Systems							
<b>CAR Part I</b>	<b>CAR Part 2</b>	<b>CAR Part 3</b>	<b>CAR Part 4</b>	<b>CAR Part 5</b>	<b>CAR Part 6</b>	<b>CAR Part 7</b>	<b>CAR Part 8</b>

- Debunking the myth: SMS is not de-regulation

# Audits versus Assessment

## Past (Audit)

1. Auditing to the procedures
2. Focus is on records review
3. Oriented mainly towards conformity to standard
4. Documentation reflects front line employees and middle management

## Future (Assessment)

1. Assessment of the processes
2. Balances manual review, on-site interviews, observations and records review
3. More oriented towards outputs and outcomes
4. Documentation reflects more involvement with senior management

# Assessment vs. Audit?

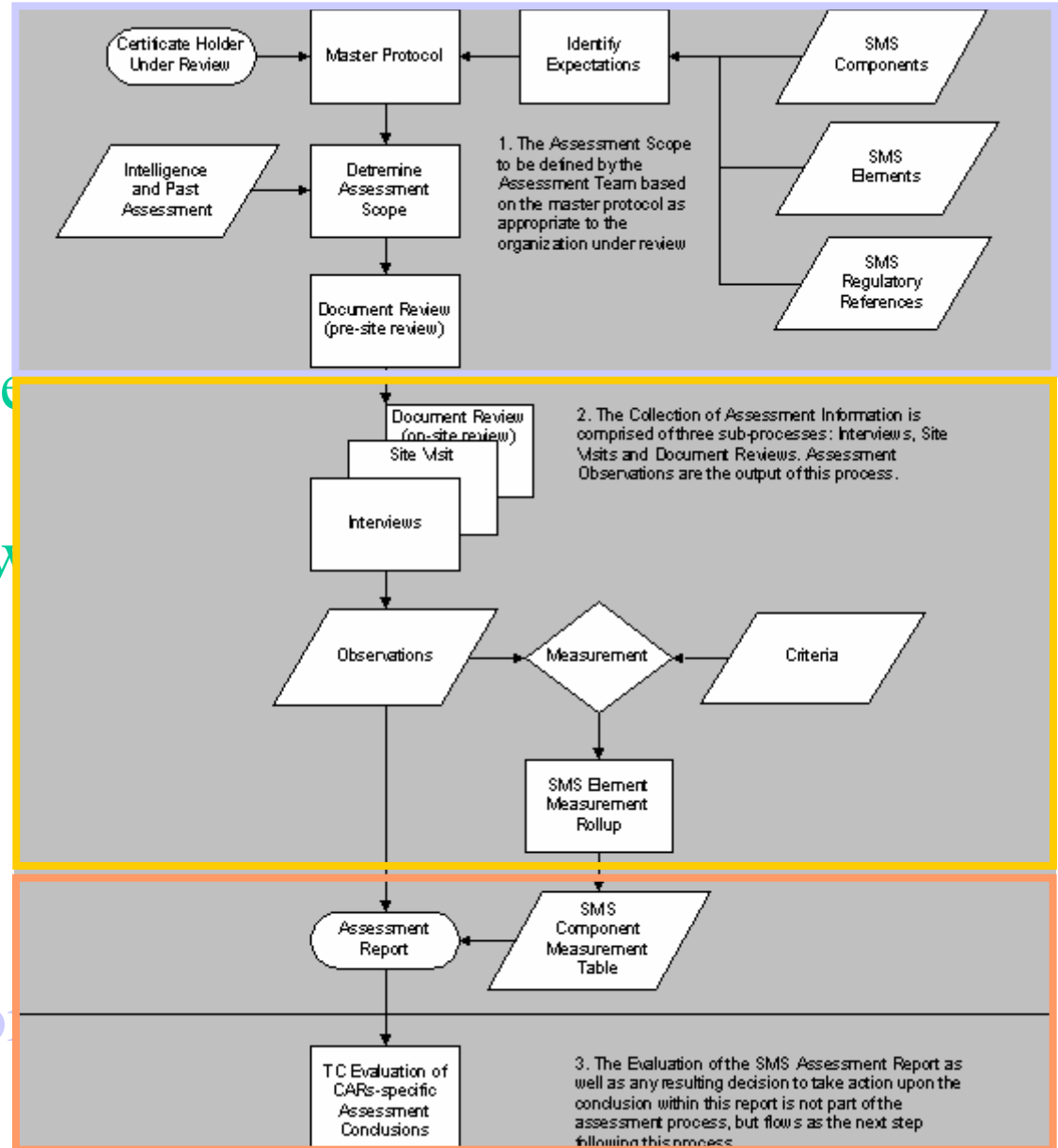
- ✓ Assessment focuses on the **effectiveness** of the system and makes judgments on its performance
- ✓ Audit focuses on **compliance** and **conformance** to a given standard and is based on factual verification of nonconformance

# Overview of Assessment Guide (TP 14326)

- ✓ Glossary
- ✓ SMS Assessment Process
- ✓ SMS Assessment Protocol: Framework
- ✓ Protocol Expectations
- ✓ Protocol Questions
- ✓ Evaluation Criteria

# SMS Assessment Process

- ✓ Determine Assessment Scope
- ✓ Pre-Site Visit Document Review
- ✓ Site Visit
- ✓ Observations
- ✓ Apply Measures
- ✓ Rollup
- ✓ Assessment Report



# Example TC Protocol

## Typical protocol expectations include:

- CARS & TC standards
- Industry guidelines & standards
- Permits & approvals
- SMS expectations as defined in TP13881 E
- Generally accepted “safety management practices”

***The CARS  
plus more!!!***

**Table B1 – Safety Management Plan**

Component	1. Safety Management Plan
Element	1.1 Safety Policy
<b>Expectations</b> <ul style="list-style-type: none"> <li>•A safety policy is in existence.</li> <li>•The organization has based its safety management system on the safety policy.</li> <li>•The safety policy is appropriate to the size and complexity of the organization.</li> <li>•The safety policy states the organization’s intentions, management principles and commitment to continuous improvement in the safety level.</li> <li>•The safety policy is approved by the accountable executive.</li> <li>•The safety policy is promoted by the accountable executive.</li> <li>•The safety policy is reviewed periodically</li> <li>•The safety policy includes a commitment to involve personnel at all levels in the establishment of the safety management system.</li> <li>•The safety policy includes a commitment to involve personnel at all levels in the maintenance of the safety management system.</li> <li>•The safety policy is communicated to all employees with the intent that they are made aware of their individual safety obligations.</li> <li>•There is a clear declaration of commitment to safety.</li> <li>•Senior Management has a clear commitment to safety.</li> <li>•Senior Management demonstrates their commitment to safety through active and visible participation in the safety management system.</li> <li>•The policy is implemented at all levels of the organization.</li> <li>•The policy is clearly visible to all personnel and particularly throughout the safety critical areas of the organization.</li> <li>•The policy is included in key documentation and communication media.</li> <li>•Senior managers clearly articulate the importance of safety when addressing company personnel.</li> <li>•Verification that personnel have understood the message.</li> </ul>	

# What questions might be asked?

- ✓ All the SMS components will be assessed: this is done by assessing every element of each component against expectations
- ✓ A protocol follows the TC SMS model and questions follow the expectations for each element.
- ✓ The questions will depend on who is being interviewed.



# Sample SMS Questions for Senior Executive Management

1. What are your basic expectations for your organization's SMS performance?
2. If I were one of your direct reports, how might I summarize what I *think* are *your* expectations for the organization's SMS performance? Are there any particular SMS initiatives with which you or your senior management are personally identified?
3. How do you communicate your SMS performance expectations to your direct reports and throughout the organization?

# Observations

Describe the situation (SETTING)

- ✓ The setting can be described in the title of the observation or can be included as the first sentence of the observation
- ✓ Identify the requirement (CONDITION EXPECTED)
  - ✓ The condition expected comes from the protocol or regulatory citation
- ✓ Describe objective evidence (CONDITION FOUND)
  - ✓ The condition found is the observation and must be stated in a factual manner that is clear, precise and yet conveys the full extent of the situation. It must also be backed up with the appropriate type and amount of evidence
- ✓ Cite the reference to the standard (REQUIREMENT)
  - The requirement is the specific regulatory, company policy, good management practice or other citation reference. This must be included in every observation

# Example of Assessment Criteria

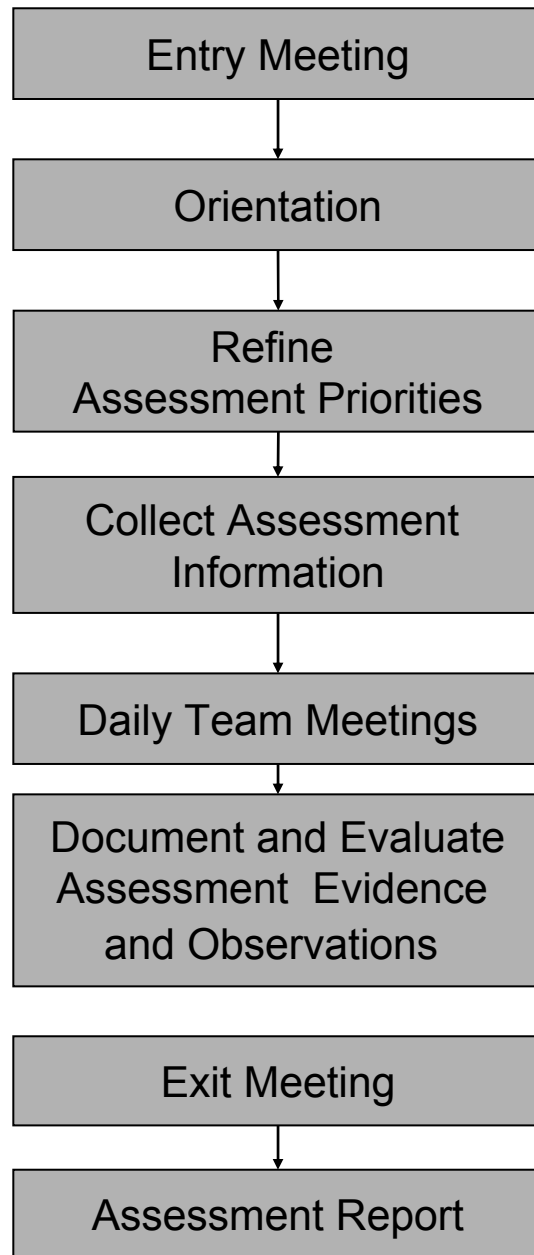
Table D1.1 – Safety Management Plan – Safety Policy	
Score	Criteria
1	Senior Management does not demonstrate commitment to a SMS. Safety policies are not well developed and most personnel are not involved in SMS.
2	(3) less some aspects
3	<p>A.A safety policy is in existence and appropriate to the size and complexity of the organization.</p> <p>B.The organization has based its safety management system on the safety policy.</p> <p>C.The safety policy is approved by the accountable executive.</p> <p>D.The safety policy is promoted by the accountable executive.</p> <p>E.The safety policy is reviewed periodically.</p> <p>F.The safety policy is communicated to all employees with the intent that they are made aware of their individual safety obligations.</p>
4	All of (3) plus some aspects of (5)
5	<p><b>All of 3, plus all of the following:</b></p> <p>There is a clear declaration of commitment to safety and commitment to continuous improvement in the safety level.</p> <p>Senior Management has a clear commitment to safety through active and visible participation in the safety management system.</p> <p>Personnel at all levels are involved in the safety management system.</p> <p>The policy is implemented at all levels of the organization.</p> <p>The policy is clearly visible to all personnel in safety critical areas of the organization.</p> <p>The policy is included in key documents and communicated to company personnel.</p> <p>Senior managers clearly articulate the safety policy.</p> <p>Verification that personnel have understood the safety policy.</p> <p>Commitment of the organization's senior executives to the development and ongoing improvement of the safety management system.</p>

**Assessment level 3 defines the minimum requirements for the SMS to meet the CARS and TC standards**

# Assessment Evaluation

- The SMS components of a company will only be assessed once the required documents are in place
- Components are evaluated according to the timetable for implementation
- Normal SMS assessment review period **once the SMS is fully implemented** is 3-5 yrs (depending on certificate type)

# Evaluation of Corrective Action



Complete Assessment Records Retention

Follow Up

- Once a non-compliance has been identified, it must be addressed by a **corrective action plan**
- Corrective action plan is reviewed by TC
- After corrective action is implemented, organisation monitors to ensure that the problem has been eliminated

# **Regulatory Oversight Activities during the Transition to Safety Management Systems (SMS)**

# Types of Oversight

Depending upon the state of transition within the organization, three different oversight scenarios are available:

- SMS Assessment – where the company has a complete SMS.
- SMS Acceptance Validation – where a company is in the process of implementing a SMS in accordance with the regulatory exemption.
- Program Validation – where the company is not subject to any SMS regulatory requirement or where a portion of the company's SMS is being validated.

# Definitions

- “Assessment” means a process comprised of a documentation review and on-site review of the entire organization in order to determine if the safety management system is documented, in place and effective. A score is assigned.
- “Program Validation” means a process comprised of a focused review of one or more aspects of an organization or an SMS. A score is assigned. Program validations are only conducted in circumstances where risk indicators provide sufficient evidence to warrant a regulatory intervention or a failure of the SMS is suspected resulting from risk indicators such as the CADORs or an incident report.



# Definitions

- “Process Validation” means an in depth review of the processes utilised to produce an output. This might include a review of the steps taken to create an end product such as an incident report and would include people, equipment, environmental factors, monitoring and testing methods, procedures and materials used or consumed. A score is not assigned.
- “Acceptance Validation” means a process comprised of a documentation review and an on-site review to confirm that an element is documented, in place and understood, and is being utilized by the organization under review (no score is assigned).

# Enhanced Monitoring

- Enhanced Monitoring is intended to be a transitional oversight tool for non-SMS certified operations.
- Enhanced Monitoring will be convened where a certificate holder score less than 3 on a PV. Enhanced monitoring will be conducted in accordance with Staff Instruction XXX.
- Any subject of a cancelled certificate would be required to submit an initial application should they wish to reacquire a certificate.

# EM Basics

## **Phase I – Day 1 through 10**

- Issuance of NOS to company: notification by letter
- Duration of EM = 90 days from receipt of letter
- Company must address conditions stated in the NOS and submit an Improvement Plan identifying the milestones it intends to meet

## **Phase II – Day 11 through 90**

- On-going monitoring of the organisation

# Existing Oversight Tools

- During the phased in implementation period, companies that fail to meet the terms of the regulatory exemption; or exhibit sufficient risk indicators; or where there is sufficient evidence that the SMS does not appear to be managing the associated risks, it is permissible to utilize traditional oversight methods such as audit or inspection to determine compliance with other aspects of the CARs.
- Where an organization is issued an approval in accordance with an international agreement e.g. EASA

# Using Risk Indicators

- Risk indicators are important when determining the scope and frequency of oversight activities. The ranking of each indicator may vary according to circumstances within the company when it is evaluated. A thorough evaluation of all risk indicators should be conducted including the following where applicable:
  - a) Financial Change
  - b) Labour Difficulties
  - c) Management Practices
  - d) Internal Audit or Quality Assurance Program, etc
- Where a company is SMS compliant risk indicators maybe obtained from a review of the company's SMS database. Trends, unusual events, a lack of reports or incomplete reports, lack of corrective actions or inadequate monitoring if analyzed appropriately, and in the context of the SMS, be used as effective risk indicator.
- Working Group is deliberating at present on how to standardise and automate this activity.

# ICAO and SMS

# ICAO and SMS

From **1 January 2009**, States shall require, as part

of their safety programme, that an operator implement a safety management system acceptable to the State of the Operator that, as a minimum:

- a) identifies safety hazards;
- b) ensures that remedial action necessary to maintain an acceptable level of safety is implemented;
- c) provides for continuous monitoring and regular assessment of the safety level achieved; and
- d) aims to make continuous improvement to the overall level of safety.

# The CARs vs ICAO Requirements

## 1. Safety Management Plan

- Safety Policy
- Non-punitive Safety Reporting Policy
- Roles, Responsibilities & Employee Involvement
- Communication
- Safety Planning, Objectives & Goals
- Performance Measurement
- Management Review

## 2. Document Management

- Identification & Maintenance of Applicable Regulations
- SMS Documentation
- Records Management

## 3. Safety Oversight

- Reactive Processes
- Proactive Processes
- Investigation and Analysis
- Risk Management

## 4. Training

## 5. Quality Assurance

## 6. Emergency Preparedness

## PLAN: Safety Policy and objectives

- Management commitment and responsibility
- Safety accountability of managers
- Appointment of key personnel
- SMS implementation plan

## PLAN: Safety Assurance -

- Safety performance and measurement
- Management of change

## PLAN: Safety Promotion - safety communication

## DOCUMENTATION -Documentation

## SAFETY OVERSIGHT:

## Safety Hazard Identification & Risk Management

- Hazard identification process
- Risk assessment and mitigation
- Internal safety investigation

## TRAINING: Safety Promotion - Training and Education

## QUALITY ASSURANCE: Safety Assurance - Audits and surveys

- Safety performance measurement
- Audits and surveys

## Safety Hazard Identification & Risk Management – Continuous improvement

## EMERGENCY RESPONSE PREPAREDNESS - Development of ERP



# Principle Messages

- Develop your regulatory framework with the industry. This may involve changing the way you do business.
- Produce and continuously improve guidance material at all stages of implementation – *Communication is key!*
- Determine if your existing oversight framework is adequate to assess the SMS.
- Manage the transition – this may involve resource allocations and changes in the traditional approach to safety oversight.

**Questions?**