



2015-2016  
**CORPORATE SAFETY REPORT**



NOVEMBER 2016

S E R V I N G   A   W O R L D   I N   M O T I O N





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## CEO Introduction

On November 1, 2016, it was 20 years since the transfer of Canada's civil Air Navigation System (ANS) to NAV CANADA. Employees – past and present – have been at the core of our success and have much to be proud of, especially our consistently strong safety record over this time, ranking us among the very best in global air navigation.

Every minute, of every hour, of every day, our dedicated workforce operates and maintains the ANS, delivering service to some 40,000 customers in 18 million square kilometres of airspace. Their efforts have demonstrated to the world what skilled and dedicated people can accomplish in a safety-sensitive organization such as NAV CANADA.

Safety begins with individuals, extends to teams and units, and ultimately includes the entire Company. As part of our Safety Management System (SMS), this Corporate Safety Report documents the progress of groups throughout the past year in completing their tasks in support of NAV CANADA's Corporate Safety Plan goals and objectives.

### ***Safety Benchmark***

To evaluate the effectiveness of our safety initiatives, we benchmark our safety data against air navigation service providers (ANSPs) around the world, as well as against our own past performance.

The key benchmark for safety performance among ANSPs is the rate of IFR-to-IFR losses of separation. As of August 31, 2016, NAV CANADA remains in the top decile of major ANSPs worldwide. The Company has a five-year moving average of 0.69 per 100,000 air traffic movements and a current year rate of 0.52 per 100,000 movements.

### ***Safety Information System***

The complexity of our operations means that we must use technology and processes to help us identify and address safety issues effectively and efficiently. We require data that is captured accurately and analyzed properly.

One of our safety goals is to support the integration of safety data into our SMS. A core team from Information Management and Safety Management and Human Factors is leading the development of the NAV CANADA Safety Information System (NC-SIS), assisted by an extended business team representing various NAV CANADA groups.

NC-SIS will replace, and improve upon, the variety of separate systems currently in place today. Once implemented, it will enhance our ability to access accurate, timely and relevant safety data, heighten our ability to share information, and enable us to gain new insights and apply lessons learned.

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The first-phase design has been completed, and development of the new system – which will capture data currently reported in unit logs, Aviation Occurrence Reports, Oceanic Reporting and Safety Investigations – is now underway and scheduled to complete in the spring of 2017.

## ***Mandatory Briefing Application***

This year, we expanded the use of our mandatory briefing application, iSign.

This application currently delivers the many mandatory briefings that air traffic controllers and other operational employees are required to acknowledge, within their areas of responsibility.

They use the application to access content on a mobile interface that is easy to use. Moreover, managers and supervisors can monitor and confirm, at a glance, compliance of regulatory briefing requirements by employees currently seated in control or other operational positions.

The mandatory briefing application is available in our Area Control Centres (ACC) and eight Towers, with plans to make it available to more operational sites in the coming year. A pilot was also conducted with Technical Operations units and, because of its success, is proceeding to deploy the technology to approved Technical Operations users.

## ***Human Performance***

NAV CANADA's strength is its people – their dedication to excellence in safety and service has always been at the heart of the Company's success. Our employees rely on us to ensure that they have the optimal tools, infrastructure, systems and environment to allow them to thrive.

On March 31, 2016, NAV CANADA's decades-old operational references, ATC MANOPS and FS MANOPS, were replaced with a suite of four small printed Manuals of Air Traffic Services (MATS) for ACC, Tower, FSS and FIC, as well as web-based electronic versions called eMATS.

eMATS is easy to navigate and search using phones, tablets and computers. The series was developed following human factors principles and a rigorous quality assurance process. It has also introduced hundreds of new illustrations and dozens of icons and flowcharts, rendering the new series far easier to understand and apply.

In NAV CANADA's ongoing retrofit of operational consoles at facilities across the country, the Company continues to improve the design process with a better understanding of local requirements and solutions. Workshops have been conducted at several facilities, including the Vancouver ACC Technical

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Operations Coordinator desk; Winnipeg, Yellowknife and Whitehorse towers; and Yellowknife and Whitehorse FICs. These workshops have become an important part of the retrofit process, enabling design and ergonomic factors to be more fully understood; with each retrofit, new lessons are learned and ideas implemented.

### ***Sharing Safety Information***

One of our most important safety practices is sharing safety information internally and externally with other ANSPs, airlines, airports, regulators and industry partners.

The Company has continued to facilitate the Canadian Aviation Safety Officer Partnership (CASOP), which was formed with the goal of sharing best practices and proactively managing safety risks in the industry. During the past fiscal year, NAV CANADA took part in hosting two CASOP forums, held in Cornwall and Vancouver.

Each event attracted over 70 representatives and keynote speakers from groups including airlines, airports, and national and international government organizations. Discussions covered safety concerns such as laser strikes, runway incursions, and the operation of unmanned aerial vehicles in our airspace, along with industry-wide initiatives involving trend analysis, just culture and change management.

Several internal initiatives are underway to reduce runway incursions by sharing practices and knowledge between facilities. A Normal Operations Safety Survey (NOSS) has been conducted in Calgary, which also included observers from Vancouver, Toronto and Montreal Towers, with the hopes of each facility learning and brainstorming in collaboration.

On a broader scale, NAV CANADA's Runway Incursion Project aims to have every NAV CANADA control tower and flight service station identify, assess and share best practices as an additional preventive measure and risk control.

### ***Improving Systematic Risk Assessment***

The effective management of safety requires NAV CANADA to have processes and procedures designed to effectively identify hazards and mitigate risks.

The Hazard Identification and Risk Assessment (HIRA) is an excellent safety analysis technique, used widely and effectively across the Company. Yet, for some categories of changes, other techniques may be more appropriate.

The Safety Management System Integrated Working Group has identified and field-tested a set of alternative safety analysis techniques to assess the safety impact of a change to a NAV CANADA system, equipment, procedure, and/or product, when a HIRA is not necessary. These alternative safety assessment tools and the corresponding guidance documents have been rolled out this year.

A second addition during the past fiscal year to the Company's safety processes is the NAV CANADA Organizational Safety Event Analysis (NCOSEA) tool. The NCOSEA is a process used by the Office of Safety and Quality (OSQ) to conduct an in-depth analysis of an event or a series of events in which latent organizational factors may have, or are likely to have, contributed to the occurrence.

## ***Award Winners in Safety***

This year I am proud to recognize Jim Daher, Roger Morell, Jeff Cochrane, James Carr, Remington Danford, Bénédicte Latimer and André Bérubé, who received awards for their exemplary efforts to improve and ensure safety.

Inspired by his CASOP experience, Jim Daher believed the spirit of this national initiative could be applied locally, in the Winnipeg FIR. His vision was to bring air traffic services staff and customers together in “Bear-Pit” sessions, to share information, discuss safety concerns, and a multitude of day-to-day operational topics that all too often fly beneath the radar.

For introducing these Bear-Pit sessions, which have strengthened customer relations and raised the profile of NAV CANADA as a safety-sensitive organization, Jim received a Chairman's Award for Employee Excellence.

Roger Morrell was also honoured with a Chairman's Award for Employee Excellence, for his safety action last January, taken while controlling traffic at the Hamilton International Airport. Unexpectedly, a B737 aircraft started a left turn into an extended downwind for the approach, while a parallel aircraft was flying at the same altitude, less than five miles away, on an intersecting heading.

Roger's high state of alert and split-second, decisive reaction helped to avert a potential collision that day. He gives true meaning to “safety in the skies.”

James Carr, Remington Danford, Bénédicte Latimer and André Bérubé won a Chairman's Award for Employee Excellence for their contributions to the VFR Phraseology Guide. This product responds to an identified need, giving pilots and airport vehicle operators a single comprehensive reference to mitigate against communication errors – recognized as one of the top three factors in aviation safety events. The team followed a collaborative process, which

involved extensive stakeholder consultations and information-gathering, and resulted in an authoritative and user-friendly document, endorsed by key industry stakeholders and NAV CANADA operational units.

When Gander Oceanic observed that a B787 was transmitting a series of ADS-B positions that indicated a deviation from its flight-planned route, it was Jeff Cochrane who took the lead on identifying and resolving this potential aviation safety issue, with global implications. Suspecting a fault in the aircraft's avionics, Jeff coordinated with professional contacts around the world, to confirm that this was indeed the case. Boeing subsequently forecast that it would take up to six months to correct the fault in the Integrated Surveillance System on all B787s. In the interim, Jeff recommended that NAV CANADA not apply ADS-B out separation on B787s until the fix had been completed. At the time, this affected 12 airlines and 71 aircraft.

In investigating and helping to rectify this failure, Jeff showed the leadership the aviation industry has come to expect of NAV CANADA. His efforts continue to have a positive impact on the aviation industry, while ensuring continued confidence in ADS-B as a surveillance technology.

## ***2015–2016 Highlights***

Inside this Corporate Safety Report is a complete list of the tasks and activities undertaken by NAV CANADA employees during the past fiscal year, in order to advance our Corporate safety goals and complete last year's objectives.

As well, there are many additional activities conducted at NAV CANADA to enhance safety.

- A new approach to conducting Safety Culture Surveys was implemented that creates a more meaningful process by linking it to the SMS Assessment in each FIR, providing timely and targeted results and allowing OSQ to follow up directly with employees in the region.
- Construction and Facilities Services deployed the new dual redundant power system for the Toronto ACC in April 2016 with no single points of failure and an enhanced overall reliability of this critical system.
- The Vancouver ACC operations room received a new main lighting system to address glare issues that had been reported by controllers on the floor.
- Two workgroups have been initiated to address the future ability for Technical Operations Coordinators to monitor activities. They aim to develop an alarms and alerts philosophy along with the design of a graphical user interface for monitoring tools.



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- ADS-C was introduced to northern Canadian airspace to assist with the overall increase in polar traffic.
  - Thanks to prompt Global Navigation Satellite System (GNSS) anomaly reporting by NAV CANADA and its customers, Innovation, Science and Economic Development Canada was able to pinpoint and seize jamming devices located near two international airports.
  - Additional guidance regarding closed RNAV STAR procedures was provided for pilots in a supplement to the Transport Canada Aeronautical Information Manual (TC AIM).
  - NAV CANADA removed the restriction on the use of LNAV/VNAV minima for aircraft equipped with barometric inputs on a GNSS approach.
  - NAV CANADA changed its terminology so that IFR routes in major terminal and enroute phases are published as preferred routes, to align with standard terminology.
  - New RNP Approaches, STARs and sectorization in Vancouver ACC Airports Specialty were completed in Spring of 2016.
  - New RNP procedures were implemented for all Calgary runways.
  - The Company completed an eight-year, \$66 million project to upgrade the Company's aviation weather systems.

## ***Conclusion***

These examples, and many more at every site across the country, are what lie behind NAV CANADA's excellent record in safety performance. I am proud of the safety culture and performance we have built together, and I wish to express my thanks and deep respect to the people at the heart of it all – the employees of NAV CANADA.



Neil Wilson  
President and CEO

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## *Opinion*

The Office of Safety and Quality is responsible for providing internal corporate oversight of the management of ANS-related operational risk. In support of this role, the Office oversees the development and implementation of activities necessary to achieve the goals outlined in the Corporate Safety Plan. The task completion rate was 97% for fiscal year 2015–2016.

In the opinion of the Office of Safety and Quality, the NAV CANADA 2015–2016 Corporate Safety Report accurately reflects the achievements of the Company with respect to the safety goals and objectives during fiscal year 2015–2016.



Larry Lachance  
Vice President, Safety and Quality

One key indication of a strong safety culture and an effective Safety Management System is an excellent safety record.

As of August 2016, our rate of IFR-to-IFR losses of separation – the benchmark for ANS safety – was 0.52 per 100,000 air traffic movements, which represented a decline from about 1.0 per 100,000 movements in 2001. Our benchmark rate used as a measure for our Corporate Safety Objective – maintaining a safety record in the top decile of major ANSPs worldwide – is less than 1.0.

On the international front, the benchmark for safety is IFR-to-IFR losses of separation per million flight hours. In this measure, NAV CANADA has declined from 25 losses of separation per million flight hours in 2004 to 15.6 as of August 2016. Our benchmark rate for this measure is 39 or less.

NAV CANADA's Primary Corporate Safety Objective is to *maintain a safety record in the top decile of major ANS providers worldwide*. These benchmark rates are set to support the achievement of this objective.

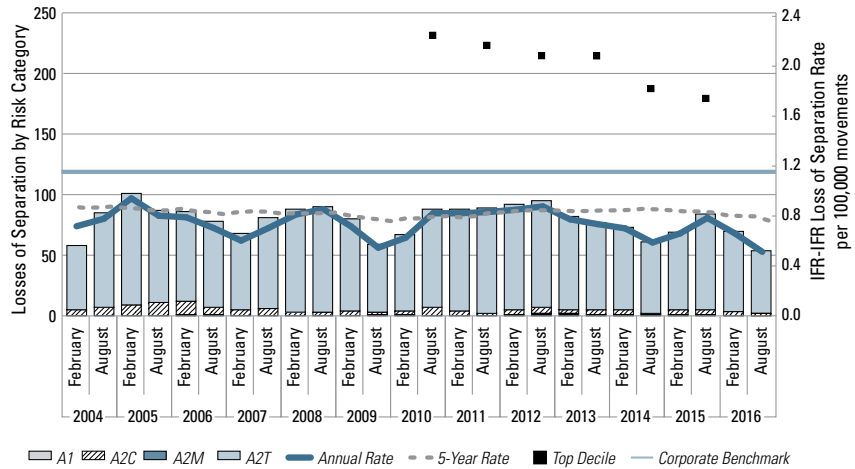
Beyond these rates, each loss of separation is classified based on how close the aircraft came to one another. NAV CANADA has not had an IFR-to-IFR loss of separation classified as an A1 Critical since 1998.

Severity	IFR-to-IFR Loss of Separation in Radar Airspace	IFR-to-IFR Loss of Separation in Non-Radar Airspace
A1 <i>Critical</i> Criteria are applied to aircraft where the tracks are converging.	Aircraft operated with less than or equal to 200 feet vertical spacing and less than or equal to 500 feet lateral spacing.	A report of a TCAS/RA or evasive action is received.
A2C <i>Serious</i> Criteria are applied to aircraft where the tracks are converging.	Aircraft operated with greater than 200 feet and less than 500 feet vertical spacing and less than 50% of the required radar standard.	Aircraft operated with less than 500 feet vertical spacing and less than 25% planned lateral/longitudinal separation standard, excluding A1.
A2M <i>Moderate</i> Criteria are applied to aircraft where the tracks are not converging.	Aircraft operated with less than 500 feet vertical spacing and less than 50% radar standard.	Aircraft operated with less than 500 feet vertical spacing and less than 25% planned lateral/longitudinal separation standard.
A2T	Aircraft operated with greater than or equal to: <ul style="list-style-type: none"> <li>• 500 feet vertical spacing; or</li> <li>• 50% of the required radar separation standard.</li> </ul>	Aircraft operated with greater than or equal to: <ul style="list-style-type: none"> <li>• 500 feet vertical spacing; or</li> <li>• 25% planned lateral/longitudinal separation standard.</li> </ul>

# CORPORATE SAFETY REPORT 2015–2016

## IFR-IFR Losses of Separation

Rate per 100,000 Movements

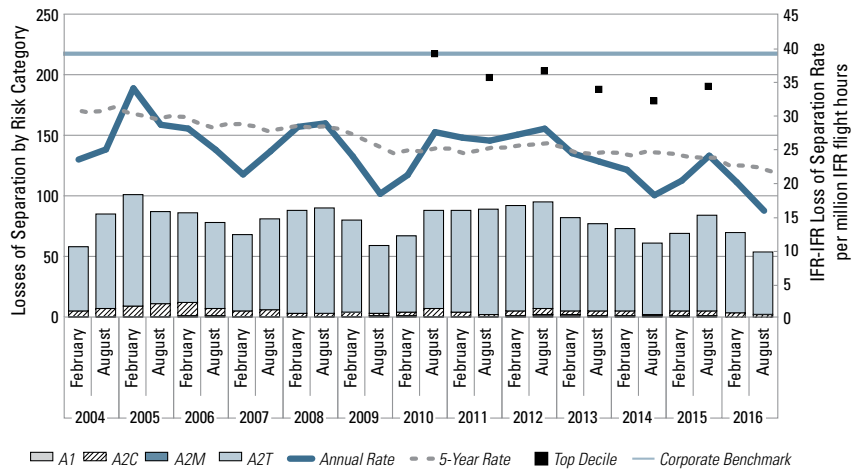


— Board Safety Committee benchmark rate of 1.0 or below

Each bar in the above graph represents a 12-month period ending in the stated month (February or August)

## IFR-IFR Losses of Separation

per Million IFR Flight Hours



— Board Safety Committee benchmark rate of 39 or less

Each bar in the above graph represents a 12-month period ending in the stated month (February or August)

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### ***Goal 1: Support the integration of safety data into NAV CANADA's SMS.***

#### **Objective 1: Complete Deployment of Phase 1 of NC-SIS Program.**

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Completed Phase 0 of NC-SIS Program to establish the plan and architecture of the solution.

*Lead:* Information Management

*Supported by:* Communications, Engineering, Human Resources, Office of Safety and Quality, Operations, Service Delivery, Technical Operations

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Initiated Phase 1 of the NC-SIS Program that will establish Incident Capture and Basic Investigation capabilities.

*Lead:* Information Management

*Supported by:* Communications, Engineering, Human Resources, Office of Safety and Quality, Operations, Service Delivery, Technical Operations

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Completed the detailed technical design of the Phase 1 solution.

*Lead:* Information Management

*Supported by:* Communications, Engineering, Human Resources, Office of Safety and Quality, Operations, Service Delivery, Technical Operations

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The configuration and development of the Phase 1 solution was completed in September 2016.

*Lead:* Information Management

*Supported by:* Communications, Engineering, Human Resources, Office of Safety and Quality, Operations, Service Delivery, Technical Operations

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While testing for the Phase 1 solution was begun, an extension to the NC-SIS project's schedule has delayed its completion until fiscal 2016-2017.

*Lead:* Information Management

*Supported by:* Communications, Engineering, Human Resources, Office of Safety and Quality, Operations, Service Delivery, Technical Operations

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The pilot deployment that was originally scheduled for late fiscal 2015–2016 has been delayed. Preparation activities for this pilot will occur in early fiscal 2016-2017.

*Lead:* Information Management

*Supported by:* Communications, Engineering, Human Resources, Office of Safety and Quality, Operations, Service Delivery, Technical Operations

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Completed the training strategy for the Phase 1 solution.

*Lead:* Service Delivery

*Supported by:* Communications, Engineering, Human Resources, Information Management, Office of Safety and Quality, Operations, Technical Operations

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Completed the communication plan for the Phase 1 solution including the establishment of an extended team that will be engaged to provide input on the Phase 1 processes and solution.

*Lead:* Communications

*Supported by:* Engineering, Human Resources, Information Management, Office of Safety and Quality, Operations, Service Delivery, Technical Operations

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## **Goal 2: Streamline the operational risk management activities associated with change.**

**Objective 2: Implement the alternate safety analysis methods developed for technology deployment and maintenance.**

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Trialed the alternate safety analysis methods and evaluate their effectiveness.

*Lead:* Service Delivery

*Supported by:* Engineering, Operations, Technical Operations

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Implemented recommendations resulting from the trial application of alternate safety analysis methods.

*Lead:* Service Delivery

*Supported by:* Engineering, Operations, Technical Operations

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**Objective 3: Expand guidance material for safety analysis related to the revised Change Risk Management Policy.**

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Reviewed the existing Safety Management Activities Manuals and recommended improvements to document design.

*Lead:* Service Delivery

*Supported by:* Engineering, Operations, Technical Operations

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Adapted the Safety Management Activities Manuals for non-Service Delivery groups.

*Lead:* Office of Safety and Quality

*Supported by:* Communications, Customer and Commercial Services,  
Information Management, Internal Audit, Finance, Human  
Resources, Legal and Corporate Services

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Trialed the ATS unit safety management activity guidance material.

*Lead:* Service Delivery

*Supported by:* Engineering, Operations, Technical Operations

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**Objective 4: Implement quality assurance of the HIRA program and alternate safety analysis methods in Service Delivery and update criteria, as required.**

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Implemented the enhancement to the SMS Assessment process, to monitor the understanding and application of policy SQ-SP-005: Change Management.

*Lead:* Office of Safety and Quality

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Implemented criteria for auditing safety analysis activities in Engineering audits.

*Lead:* Service Delivery

*Supported by:* Engineering

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Implemented criteria for auditing safety analysis activities in Operations audits.

*Lead:* Service Delivery

*Supported by:* Operations

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Implemented criteria for auditing safety analysis activities in Technical Operations audits.

*Lead:* Service Delivery

*Supported by:* Technical Operations

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**Objective 5: Develop a process map to incorporate Human Performance requirements earlier in the design and implementation of new technology.**

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Developed a process map for consideration of ATS Human Performance requirements early in the design lifecycle, which enables an integrated approach to deriving requirements for Procedures, Technology and Training.

*Lead:* Service Delivery

*Supported by:* Engineering, Human Resources, Operations

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Developed an implementation strategy for the ATS Human Performance driven requirements for Procedures, Technology and Training.

*Lead:* Service Delivery

*Supported by:* Engineering, Operations

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Developed a process map for consideration of Technical Operations Human Performance requirements early in the design lifecycle, which enables an integrated approach to deriving requirements for Procedures, Technology and Training.

*Lead:* Service Delivery

*Supported by:* Engineering, Human Resources, Technical Operations

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Developed an implementation strategy for the Technical Operations Human Performance driven requirements for Procedures, Technology and Training.

*Lead:* Service Delivery

*Supported by:* Engineering, Technical Operations

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***Goal 3: Enhance the response to safety management activities through a standardized “actions taken” process.***

**Objective 6: Develop and implement a harmonized SMS-related actions-taken process based on criteria developed last year.**

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Developed the harmonized actions-taken process for SMS-related activities.

*Lead:* Service Delivery

*Supported by:* Engineering, Office of Safety and Quality, Operations,  
Technical Operations

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Implemented the harmonized actions-taken process for SMS-related activities.

*Lead:* Service Delivery

*Supported by:* Engineering, Office of Safety and Quality, Operations,  
Technical Operations

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## **Goal 4: Enhance organizational learning from safety activities and events.**

### **Objective 7: Implement opportunities for the capture and distribution of successful practices and lessons learned within the SMS.**

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Implemented a communication plan of the map developed in FY2015 that identifies what forums in ATS are currently in place for sharing successful practices and lessons learned, and what the focus of discussion is at those forums. The plan will include seeking feedback from ATS Safety Pillars on priority areas for future successful practice and lessons learned focus.

*Lead:* Service Delivery

*Supported by:* Communications, Operations, Human Resources

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Implemented a communication plan of the map developed in FY2015 that identifies what forums in Technical Operations are currently in place for sharing successful practices and lessons learned, and what the focus of discussion is at those forums. The plan will include seeking feedback from Technical Operations' Supervisors on priority areas for future successful practice and lessons learned focus.

*Lead:* Service Delivery

*Supported by:* Communications, Technical Operations

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Incorporated a project review step in Engineering's project management process which will include the capture and sharing of lessons learned at appropriate stages of project execution and close-out.

*Lead:* Service Delivery

*Supported by:* Engineering, Human Resources

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Developed a multi-year strategy for NAV CANADA's SMS to expand the Company's ability to assess and improve safety from positive outcomes.

*Lead:* Office of Safety and Quality

*Supported by:* Engineering, Human Resources, Information Management, Operations, Service Delivery, Technical Operations

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**Objective 8: Develop a strategy on the use of simulation in operational training for use with experienced ATC and FSS.**

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Researched best practices for maintenance of proficiency for existing, qualified ATS personnel.

*Lead:* Operations

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Conducted gap analysis of currently deployed capabilities versus requirements to mimic the operational environment's automation.

*Lead:* Operations

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Developed a process map enabling simulation capabilities to be updated prior to release in the Operation.

*Lead:* Operations

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Developed implementation strategy of the process to provide simulation capabilities prior to release in Operation.

*Lead:* Operations

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