Ensuring Safe Performance in ATC Operations: Observational Safety Survey Approaches

A White Paper

EUROCONTROL/FAA Action Plan 15 Safety
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EUROCONTROL

EXECUTIVE SUMMARY

This White Paper is built on collaboration between EUROCONTROL, the FAA, a number of ANSPs and key research establishments with a common area of interest, namely ATM safety. One relatively new approach to improving operational safety is via **observational safety surveys**. This White Paper explores the utility of this approach for enhancing operational safety in ANSPs.

Observational safety surveys are key tools in helping to prevent gradual erosions in safety or excessively variable performance. Incident data tend not to highlight this '**drift into danger**', because incident data are reactive and incidents are relatively few in number, often with unique patterns of contributory factors. By observing performance in the natural setting, such as the Ops room, it is possible to understand the threats, errors, and undesired states that can impact safety, and the use of positive techniques that controllers use to maintain safety. These surveys can act as **leading safety indicators**, warning of potential threats which are just starting to emerge.

Observational safety surveys are 'over the shoulder' observations in a normal working situation by trained observers (usually controllers) focusing on safety improvement. The observations are not a competency check; they focus on the ATC system, not the individual. Controller participation is **voluntary** and the observations are **anonymous**, **confidential** and **non-punitive**. Two particular methods are described in detail in this White Paper. The Normal Operations Safety Survey (**NOSS**) focuses on threats, errors and undesired states. The Day 2 Day Safety Survey (**D2D**) focuses on techniques and practices that benefit safety.

This White Paper is aimed at anyone in the aviation industry concerned with safety. It has four objectives:

- Explain why existing safety data sources may not be enough.
- Introduce the concept and rationale of observational safety surveys.
- Describe NOSS and D2D, and outline case studies from ANSPs.
- Explain how to get started with observational safety surveys.

Introducing observational safety surveys

- Why do we need observational safety surveys?
- What are observational safety surveys?
- How can they improve human performance and safety?

Normal Operation Safety Survey (NOSS) and Day to Day Safety Survey (D2D)

- What are these approaches?
- Who has used them?
- How do they work?
- How can they improve human performance and safety?
- What are their key stages?
- How have ANSPs used the approaches?

Getting started

- What are the key differences between NOSS and D2D?
- Which approach is right for us?
- What preparation is needed?
- What resources are required?
- What other publications are available?
- Who can we contact for help?

The White Paper includes outline case studies from FAA (USA), FINAVIA (Finland), NATS (UK) and IAA (Ireland).

Observational safety surveys[1] are key tools to help ANSPs notice that performance is drifting toward a less safe state, or becoming more variable than desired, and hence to reinforce existing or new safer working practices where required.

It is hoped that this White Paper will answer some of the key questions that ANSPs and other ATM-related organisations may have about how observational safety surveys work, what other ANSPs have found, and how to get started.

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[1] See also the SAF-Survey Safety Management course at the EUROCONTROL Institute of Air Navigation Services (IANS) and EUROCONTROL Guidelines on Safety Surveys.

INTRODUCING OBSERVATIONAL SAFETY SURVEYS

Why do we need observational safety surveys?

Air traffic management is considered to be an 'ultra-safe' industry, with a very small number of serious incidents and accidents. However, even in ultra safe industries, the performance of individuals, teams, and organisations can 'drift into danger'. Small changes occur over time, which are hard to notice because they gradually become normal. Alternatively, performance can simply become more variable, with no specific trend.

How can this happen? Many states and ANSPs have systems for incident reporting, investigation and lesson learning. But however sophisticated, there are three problems with these systems. First, the data are reactive rather than proactive; the accident or incident has already happened. Second, accidents and incidents are often quite unique events, with different patterns of contributing factors, so preventing future incidents is not always possible. Third, there are few accidents and serious incidents, so we cannot rely on these data for safety monitoring and improvement.

There are other sources of safety data. But these too have drawbacks. Anonymous or confidential reporting systems, while valuable, are triggered by a safety concern or self-detected 'errors', and drifts in performance may not be recognised. Safety net (e.g. Short-Term Conflict Alert) data relate to past events, and do not always explain why they occurred. Safety audits tend to focus on the safety management and safety regulatory requirements, not on operational safety. Risk assessments look at what abnormal events could happen, not what does happen every day. So how can we notice that safety performance is drifting toward a less safe state, or becoming more variable than desired (see Figure 1)? A solution that has now been tested in several ANSPs in the US, Europe and Australasia is the **observational safety survey**.

Two methods are further presented here: the **Normal Operations Safety Survey (NOSS)** focuses on threats, errors and undesired states, and the **Day 2 Day Safety Survey (D2D)** focuses on techniques and practices that benefit safety.

## How will you know if you are drifting into danger?
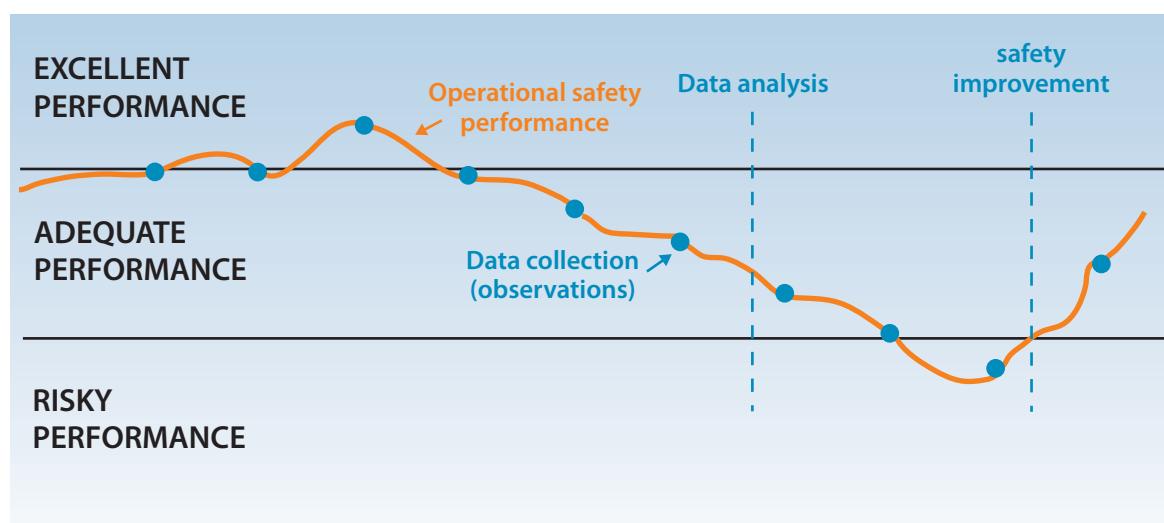
Figure 1: Preventing "drift into danger' with human performance observations

Figure 2: Key stages of observational safety surveys

What are observational safety surveys?

Observational safety surveys[2] have several things in common:

- They focus on safety improvement.
- They are 'over the shoulder' observations in a normal working situation.
- They involve trained observers (usually controllers).
- Controller participation is voluntary.
- The observations are anonymous, confidential and non-punitive.
- The observations are **not** a competency check; they focus on the ATC system, not the individual.
- They are periodically-recurring rather than continuous programmes.

Because the observation is not a competency check or training session, human performance is much more natural and does not suffer from the 'observer effect', where performance can change because it is being observed (so-called 'angel performance'). Instead, the controller is free to perform as he or she normally would. Both NOSS and D2D Safety Surveys involve some key stages, shown in Figure 2 and described in the following sections.

How can this improve safety?

The data on performance in a particular sector or unit over a specific time period may show several things. For instance, there may be a long-term change in strip management activities, or significant differences in strip use from a paper to electronic system. RT communication may change under increased traffic load. Once this is known, the organisation will be able to set targets for safety improvement, which can be measured during follow-up observations.

Improving safety depends on commitment and involvement. Just as controllers are involved in the observation process, controllers are also involved in finding the right safety enhancements, as they are in the best position to know what changes are likely to have the most beneficial effect. And as controllers have been involved in finding the solution, it is more likely that they will implement the solutions, improving safety *from the inside*.

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[2] As well as the two specific techniques described in this paper, observational safety surveys using similar principles can also be embedded during traditional safety surveys, as has happened in a number of European Safety Management Surveys run within ESP programme.

NORMAL OPERATIONS SAFETY SURVEY

What is NOSS?

The Normal Operations Safety Survey (NOSS) is a method to collect safety data during normal, everyday operations. It has been developed, in partnership, by ICAO, the University of Texas, and a number of ANSPs, including Airservices Australia, Airways Corporation New Zealand, Deutsche Flugsicherung (DFS), EUROCONTROL, IFATCA, NAV CANADA, UK CAA, and US FAA. NOSS is the ATM equivalent of the Line Operation Safety Audit (LOSA), used on the flight deck.

NOSS is founded on scientific principles and, in particular, on the 'threat and error management' (TEM) framework. The purpose of conducting a NOSS is to evaluate everyday operations, using the TEM framework to characterise operations relative to threats, errors, and undesired states.

Threats are events or errors that occur beyond the influence of the air traffic controller, increase operational complexity, and which must be managed to maintain the margins of safety. Threats include complexities such as dealing with adverse meteorological conditions, airports surrounded by high mountains, congested airspace, aircraft malfunctions, and/or errors committed by other people outside of the control room.

Errors are actions or inactions by the air traffic controller that lead to deviations from organizational or air traffic controller intentions or expectations. Unmanaged and/or mis-managed errors can lead to undesired states.

Undesired states are operational conditions where an unintended traffic situation results in a reduction in safety margins. Undesired states may be the last stage before an incident or accident, and must be managed by air traffic controllers. Examples of undesired states would include an aircraft climbing or descending to the wrong flight level.

Once that information is available, the controllers and ANSP can propose measures to reduce the risk, such as changes in procedures, or specific safety topics for recurrent training programmes for air traffic controllers, as countermeasures to the threats and errors that the controllers are confronted with on a daily basis.

The following ten operating characteristics define NOSS's approach to collecting safety data from normal operations:

- over-the-shoulder observations, with clearly defined stop rules, during normal shifts
- joint management/controller association support
- voluntary participation
- de-identified, confidential and non-disciplinary data collection
- systematic observation instrument based on the threat and error management (TEM) framework
- trained and standardized observers
- trusted data collection sites
- data verification process
- data-derived targets for safety enhancement
- feedback of results to the controllers.

Who has used NOSS?

To date NOSS has been piloted or used in **FAA** (USA), **Nav Canada**, **FINAVIA** (Finland), **Airways** (New Zealand), **Airservices Australia** and **South Korea**.

How do NOSS observations work?

The NOSS process begins with data collection in the operational setting by volunteer controllers. Following this, the data generated are de-identified immediately; individuals and their workstations are not traceable from these data or from the subsequent report. Data are examined for inconsistencies and clarity (data cleaning) and then analyzed prior to the NOSS report being produced by an independent agency.

Participation in the NOSS process is voluntary and individuals who are the subject of a NOSS observation can stop the NOSS observation at any time and ask for records to be destroyed.

How can NOSS improve safety?

After conducting a NOSS, the organization will be able to set clear targets for safety enhancement of its operations. Safety enhancement can be measured by conducting a follow-up or repeat NOSS. In the meantime the effect of changes may be noticeable by comparing specific events trends from the pre- and post-NOSS periods.

Preparation

- Ensure management and union/association endorsement
- Establish project steering committee (optional) and appoint project manager
- Conduct promotion campaign
- Select operational focus for NOSS
- Scope number of observations required
- Determine duration and timing of project
- Select volunteer observers
- Create observation protocols
- Determine data storage and protection arrangements
- Plan to receive and act upon the report
- Brief affected groups
- Train observers

Data collection

- Observer introduces him/herself to staff on duty and explains presence
- Sits close to working position
- Makes notes during the session

Data preparation/cleaning

- Complete structured narrative form to summarise events observed factually
- Record all threats, errors and undesired states observed and assign relevant codes

Data analysis

- Arrange review of observations by independent analyst
- Arrange review of threats, errors and undesired systems states by SME group
- Analyse the data

Reporting

- Complete structured narrative form to summarise events observed factually
- Record all threats, errors and undesired states observed and assign relevant codes

Safety enhancement

- Select targets for safety enhancement

Feedback/evaluation

- Evaluate NOSS project

Case Study: FINAVIA, Finland

A NOSS trial was conducted at two FINAVIA sites during August 2006. Sixty-three NOSS observations were made by six observers across Area Control Centre (ACC), Approach and Tower settings. The number of observations made during this trial was approximately a third of what one would expect for a full NOSS study in an organisation like FINAVIA.

The NOSS observers coded 511 **threats**. Within ACC, the most frequent threats were internally generated by the organisation (69%). Within the tower setting the most frequent threats were generated by the airborne side of operational activity (41%). At a more detailed level, the most frequent threats involved other controllers, flight data, workspace/materials, equipment, R/T communication and pilot issues. Controller distraction was a relatively frequent threat that was sometimes not well managed.

The NOSS observers coded 176 **errors**. The most frequently occurring errors related to communication (52%). Errors relating to procedures were the next biggest category (32% of errors).

The key problem areas were:

- incomplete briefings at handover
- errors relating to position relief
- coordination
- distracting non-operational conversation
- not using the correct procedure.

Areas for more detailed scrutiny included the nature of the communication errors, errors related to procedures and the execution of procedures, and communication during position relief. Subsequent NOSS studies could compare trends in the error codes used.

Twenty-six **undesired states** were coded during the NOSS observation. The tower environment accounted for a greater number of these than expected based on the proportion of observations made in this environment. The small numbers of undesired states observed was encouraging as these represented some of the precursors to reportable events. However, eleven undesired states related to some form of possible reduction in safety for airborne separation.

Some potential areas for future intervention included investigation of the ground traffic congestion; and possible solutions, and review of the undesired states by the safety team and manager.

Overall, NOSS enabled FINAVIA to gain insights into threats and errors in current operations, and to determine ways to tackle these problems, improving human performance and ATM effectiveness.

Case Study: FAA, USA

Recently, the FAA conducted over 230 one-hour observations of ten controllers in Minneapolis Center, and ten in Indianapolis Center, in collaboration with The University of Texas and the NOSS Collaborative as a secure data collection site.

Overall, there were 5.6 **threats** per 60-minute observation. Communications were the most frequent threat. 15% of the threats led to error or an undesired state. There were 2 **errors** per 60-minute observation. 13% of the errors led to an undesired state. There was one **undesired state** per 4 observations. The most frequent undesired state related to ensuring separation standards. The undesired states resulted from a threat, a threat then an error, or an error.

Most threats get 'trapped' before they can evolve into errors and then into undesired states. A key aspect is therefore to reinforce the controller habits and ways of working to make sure that such 'trapping' continues to work well.

The first trial at Minneapolis found that the methodology and processes were workable. The findings converged with the pre-existing understanding of the operational conditions. The second trial at Indianapolis found that modifications made to the methodology were beneficial.

The strengths were facility specific, but included the use of position relief briefings and completion of briefing checklist. Few undesired states were associated with an error committed during the context of a position relief.

The NOSS trial highlighted several key vulnerabilities. The most frequent threats involved pilot communications, such as frequency congestion, simultaneous transmissions, incorrect readback, and pilot failure to respond to call. These threats have limited impact on operations but were still a key contributor to undesired states. There were also threats from similar call signs, aircraft transfer, errors in frequency change, and other controllers, with variation in how well these were managed.

The NOSS evaluation gave a clear picture of the threats and errors of concern, and enabled FAA to identify remedial measures in order to improve system-wide performance. These remedial measures often take the form of 'best practice' guidance for controllers.

Participation in the studies has underlined the message that NOSS is about **positive safety**, not just focusing on what is sometimes done wrong, but what controllers are doing right. A good deal of the impact of a NOSS survey is therefore aimed at reinforcing good behaviours and habits that keep the skies safe.

At the time of this White Paper going to press, a new NOSS study was being commissioned in the US at one of its major TRACON centres.

DAY 2 DAY SAFETY SURVEY (D2D)

What is D2D?

The aim of the Day to Day Safety Survey (D2D) is to observe controllers in their normal working situation in a non-threatening and non-judgemental way and to record how some pre-agreed, observable techniques are employed. The focus of the survey is on the positive behaviours and techniques that operational staff employ to maintain safety. The observations allow the ANSP to see how often controllers employ the positive practices and techniques, and see how well the practices work.

There are five areas of focus, each with a number of observation items:

- **Visual scanning cycle** – active movement of the head and eyes to gather the relevant data to be used in future decision making or to check the status of the aircraft.
- **Active listening** – hearing, selecting, attending, understanding and remembering information (includes usage of standard phraseology).
- **Defensive controlling** – using techniques to allow for safe management in case a pilot, driver or colleague does not comply with an instruction as expected.
- **Write As You Speak Read As You Listen (WAYSRAYL)** – performing RT and strip-handling tasks in a routine to assure the stream of the information is correctly coded.
- **Strip management** – keeping the flight progress strips organised and the information on the strips up to date.

D2D observations are conducted by trained operational staff, usually from different sectors or units. The solutions found are developed by operational staff – often the controllers' own colleagues. This creates a sense of safety 'ownership' which leads not only to enthusiasm for driving safety improvement, but also to a strengthening of the unit's safety culture.

Who has used D2D?

To date D2D has been used in **NATS (UK)** and **IAA (Ireland)**.

Overall, the experience of these ANSPs has been positive. The observation technique has been accepted by controllers and management, a reasonably smooth data collection process has been devised and credibility of the findings as a means to fill a gap in safety data has been established.

How do D2D observations work?

An observer requests permission from the person being observed, then sits with the controller and monitors the performance of one or two of the focus areas (e.g. visual scanning and active listening) in any one session, so that the observer uses only one checklist. The observer may make short notes about each practice (observation item) then, at the end of the session, the observer rates the degree to which the controller has employed each practice (always/sometimes/never). The observer also completes other relevant details, such as traffic load and complexity, adverse weather and whether any of the sectors were split or combined during the observation.

Following the observed session, the observer debriefs the controller about the session to further explore situations, clarify any comments or record pertinent examples.

How can D2D improve safety?

Over time, the data can reveal trends to enhance the understanding of what it is we do to keep it safe, and answer the question "How safe are we?"

The Day 2 Day Safety Survey provides more data on proactive and positive behaviours, which are acceptable and tangible to both managers and controllers.

They can be used not only in operations, but also in training and throughout the ATM project lifecycle for assessing the potential impact of changes (e.g. technological or procedural) to the operation.

Preparation

- Ensure management and union/association endorsement
- Establish project steering committee (optional) and appoint project manager
- Conduct promotion campaign
- Select operational focus for D2D
- Scope number of observations required
- Determine duration and timing of project
- Select volunteer observers
- Create observation protocols
- Plan to receive and act upon the report
- Brief affected groups
- Train observers

Data collection

- Observer introduces him/herself to staff on duty and explains presence
- Sits close to working position
- Rates the extent that the activities associated on one checklist are undertaken
- Interviews the controller

Data preparation/cleaning

- Record notes from interview

Data analysis

- Analyse the data

Reporting

- Write the report
- Present report to organisation

Safety enhancement

- Select targets for safety enhancement

Feedback/evaluation

- Evaluate D2D project
- Feedback findings to those affected

Case Study: NATS, UK

NATS has now applied D2D to many units and activities. The data from one unit were reviewed and cross-referenced with the unit's incident data. This helped to formulate action plans to target the areas that were identified. A pattern of errors seen in incidents was originally believed to have been caused by problems with strip management. However, review of the D2D observation data, discussion with data analysis experts and human factors specialists, and – most crucially – the close involvement of operational controllers from the sectors concerned, led to a different conclusion. With this assistance the unit was able to identify visual scanning patterns of both radar and strips as being the root of the problem.

As a result, work commenced on eye movement tracking experiments to determine the sector 'hot-spots' and to identify best practice techniques to protect controllers from the most common errors. The results also confirmed the value of D2D.

Results from the analysis of over 1,000 data sets have now indicated that a Unit's D2D Safety Survey results map almost exactly on to their incident occurrence data. This demonstrates how comparing leading and lagging indicators allows the ATM system to predict, manage and mitigate the risks before an adverse event occurs.

It is already evident that those units which have committed to D2D observations are benefiting from techniques aimed at keeping their decision-making straightforward, defending themselves against common errors, and thereby raising the standard in safety performance.

As a result of the success of this work, work has begun on the following:

- Military/civil interface risks (i.e. co-ordination standards).
- Level bust risks (i.e. identifying the flight-deck risks).
- Operational interface risks, including interface collaboration with the IAA (i.e. Shannon-Dublin procedures and Swanwick-Oceanic-Shanwick procedures).
- Oceanic risks (i.e. visual scanning and interacting with the Shanwick Automated Air Traffic System).
- New technology risks (i.e. human performance and electronic flight data).
- Pilot/controller flight deck risks (i.e. communication and procedures alignment).

Case Study: IAA, Ireland & NATS, UK

The Day-to-Day safety survey programme was extended to incorporate the UK-Irish interfaces as part of the UK-Irish Functional Airspace Block (FAB) activities. The first interface activity of this nature was undertaken at Swanwick Centre (London Area Control - LAC) in February 2009 where observers from Shannon and London carried out observations on the London-Shannon interface.

Following on from that initial study, observations were carried out on the Shannon-London Interface in the Shannon Ops Room from 13th to 15th July 2009. Data collection involved trained observers (from both Shannon and LAC Ops Rooms) making a series of observations of controllers working the Shannon sectors during certain periods of the day. The majority of traffic levels during observations were moderate and the complexity varied from light to moderate-high. After the observations, the controller and observer could discuss the session and add additional comments to the observations to provide more detail and to explore their context. After completion of all data collection, the data were discussed at an IAA/NATS review meeting (attended by IAA and NATS) to provide additional context to the results, and develop recommendations from the observed data.

The results from the observations were positive. The majority of responses indicated that the observers 'always' or 'mostly' saw the positive behaviours being carried out.

Particular strong points, where the positive behaviours were rated as 'always' being carried out, related to optimal traffic presentation (to London and to Shannon), accommodating reasonable requests from the each other, and BANBA box transferral in accordance with procedures. Coordinations were effected in good time 'always' or 'mostly'. Mixed results were obtained for practices relating to the ACT levels accurately reflecting the likely levels from several departure points, and behaviours regarding the observed position and the other party fully identifying themselves. There were small improvements since previous observation in some key behaviours.

After completion of all data collection, the results were discussed at an IAA/NATS review meeting to provide additional context to the results. Recommendations were developed from the observed data and a briefing note was developed for operational staff. Following the success of this London-Shannon study, the programme has been further extended to consider the Dublin – Scottish/Manchester interfaces.
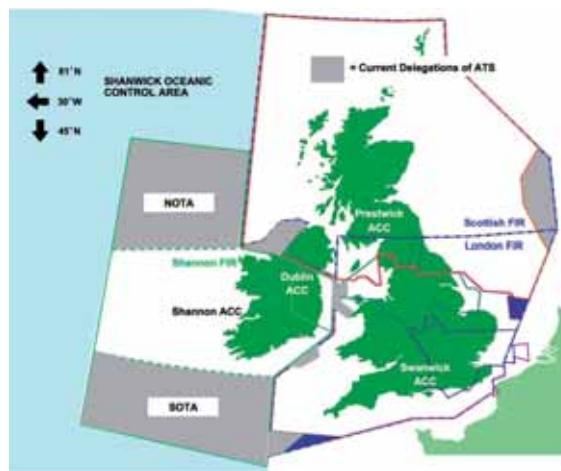
The observational safety survey approach has an obvious possible application for FABs, such as the UK-Ireland FAB, but also other FABs. D2D could be used to ensure closer integration of different controller styles and working methods, in order to maximise safety in FAB airspace.
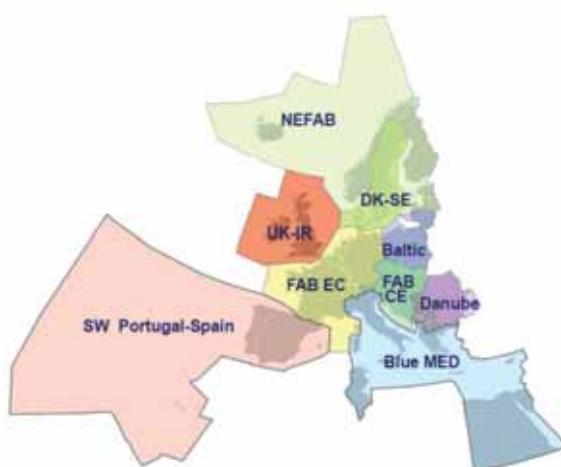
GETTING STARTED

What are the key differences between NOSS and D2D?

The key differences are as follows:

- **Philosophy:** NOSS is based on the threat and error management framework. D2D is based on the use of techniques that are considered good practice.
- **Observation forms:** NOSS requires the observer to write notes during observation, then write a narrative and code the threats, errors and undesired states after the session. D2D requires the observer to rate the use of the practices.
- **Debrief:** NOSS is observation only. D2D is observation plus debrief.
- **Maturity:** NOSS has been around for longer, has wide endorsement and easily-available materials. D2D is a fairly new but expanding and evolving approach.

Which approach is right for us?

At present, it is too early to say which method will best fit a particular ANSP. This White Paper has presented each method's characteristics, and individual ANSPs interested in the approach should choose the one that appears best suited to their managerial and operational cultures, or adapt a method to fit their Safety Survey approaches.

What preparation is needed?

The first thing to do is to ensure management and the trade unions and professional associations endorse the initiative. A person or team will need to be appointed to direct the project. A promotional campaign can then be conducted to clarify the aims of the initiative, encourage participation and answer any questions or concerns. Following this, the focus moves to some detailed planning decisions, such as:

- When should the project commence?
- How long should the project last?
- Which units, sectors, positions, etc, should be observed, and when?
- How many observations are required?
- Who should be the observers?

- What materials are required?
- What are the observation protocols/rules?
- How will the data be handled, stored and analysed?
- How will the results be managed?

Once these questions have been answered, the key activities remaining are to brief the affected groups and train the observers.

What resources are required?

In terms of people, the key resources required are:

- Project/programme manager
- Steering committee (optional)
- Trainers
- Observers
- Review group/analyst & report writer
- Independent data storage personnel (NOSS)
- Safety and procedures specialists (NOSS, optional)

Required materials include:

- Promotional materials
- Training materials
- Note pads (NOSS)
- Observation forms

What other publications are available?

FINAVIA/EUROCONTROL (2007) FINAVIA/ NOSS trial report. Public final version.

ICAO (2008) Normal Operations Safety Survey (NOSS). 1st Edition. ICAO. Order No. 9910.

Isaac, A., Brooks, V., Jordan, N., & McCabe, M. (2009) Preventing the drift into failure: How do we know when we get it right. Hindsight, 8, Winter 2009. Brussels: EUROCONTROL.

See also the SAF-Survey3 Safety Management course at the EUROCONTROL Institute of Air Navigation Services (IANS).

Who can we contact for help?

For enquiries regarding NOSS:

FAA: Paul Krois (paul.krois@faa.gov)

EUROCONTROL: Ian Patterson
(ian.patterson@eurocontrol.int)

NOSS Collaborative: Chris Henry
(henry@nosscollaborative.org)

For enquiries regarding D2D Safety Survey:

NATS: Anne Isaac (anne.isaac@nats.co.uk)

IAA: Nick Lowth (nick.lowth@iaa.ie)
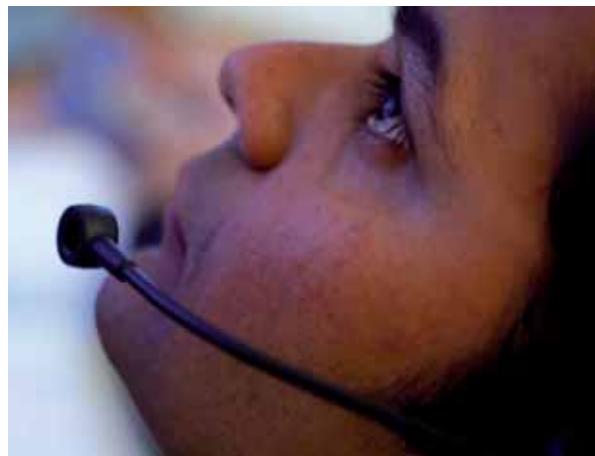
General enquiries

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Concluding Comments

Observational Safety Studies are a form of '**leading indicator**' in safety management terms. They aim to detect subtle changes in operational practices, either caused by a 'drift' to more dangerous practices, or due to external pressures affecting the ability of controllers to manage effectively and safely the traffic and traffic perturbations.

What both NOSS and D2D allow is a clear perspective on current operational safety, from which a judgement can be made about whether safety margins are being eroded or not. With these techniques, this information should be available before safety problems manifest as incidents such as losses of separation or runway or taxiway incidents.

These techniques have a strong focus on **positive safety**, identifying what we do right. Such knowledge can be useful for future operational scenarios including near-term improvements such as Functional Airspace Blocks (**FABs**) in Europe, as well as medium-term ATM programmes such as **SESAR** in Europe and **NextGen** in the USA.

It is possible that further observational safety survey approaches may be developed in the future, but in the meantime these two tools are practicable, and can reinforce safety management, helping the safety manager to 'see ahead' and keep his or her organisation 'resilient' in the face of pressures to do with cost and efficiency.

NOTES

ABOUT AP15

EUROCONTROL/FAA Action Plan 15 on Safety Research is aimed at advancing safety concepts and practices in air traffic management, via the sharing of expertise from its membership. It has three main axes: understanding system safety, developing new approaches to assess and improve safety, and disseminating its results into the industry. AP15 came into existence in 2003 and its current terms of reference run until end 2013. Approaches such as NOSS and Day-to-Day Observations try to bridge the gap between formal safety assessment methods which try to predict what can go wrong, and investigations of actual (but effectively rare) incidents, focusing instead on the wealth of data available every day in an operational centre. These two approaches may also be seen as falling under the umbrella of the Resilience paradigm, since they focus on the 'normal' everyday deviations which happen and are usually corrected, but if left alone may enable a 'drift' towards more serious events.

The AP15 Members hope this White Paper will help ANSPs better understand why these two methods have been developed, and how they can help maintain a high level of human performance and safety in ATM.

AP15 Membership

- **EUROCONTROL** – Barry Kirwan (Co-chair), Eric Perrin, Steven Shorrock and Tony Licu
- **FAA** - Joan Devine (Co-chair), Dino Piccione, Sherry Borener, Warren Randolph, Hossein Eghbali, Michael Sawyer, Jim Daum, Mark Denicuolo and Karin Jarvis
- **NASA** – Michael Feary, Dawn McIntosh and Steve Darr
- **DFS (Germany)** – Joerg Leonhardt
- **AVINOR (Norway)** – Anne Chavez
- **LFV (Sweden)** – Billy Josefsson
- **Skyguide (Switzerland)** – Stephane Barraz
- **NATS (UK)** – David Harrison
- **NLR (the Netherlands)** – Henk Blom and Michel Piers

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Other White Papers Produced by AP15

- Safety Culture in Air Traffic Management
- Resilience Engineering for ATM
- Human Performance in Air Traffic Management Safety
- Degraded Modes Safety for Operational Engineering

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