

Normal Operations Safety Survey (NOSS)

Chris Henry

The University of Texas Human Factors Research Project
The University of Texas at Austin



NOSS Background and Development



Overview

- The ICAO NOSS Study Group
 - Airservices Australia
 - Airways New Zealand
 - NAV CANADA
 - EUROCONTROL
 - Federal Aviation Administration
 - International Civil Aviation Organization
 - International Federation of Air Traffic Controllers
 - United Kingdom Civil Aviation Authority
 - DFS (Germany)
 - University of Texas
- TEM = Framework - What we look for
- NOSS = Tool - How we capture what we are looking for



TEM – The Framework



TEM Terminology for ATC

- Threats: 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
- Errors: Actions or inactions by the air traffic controller that lead to deviations from organisational or controller intentions or expectations
- Undesired States: Operational conditions where an unintended traffic situation results in a reduction in margins of safety



TEM: A Sample Scenario

- Aircraft are holding at the SHINE inbound fix for metering delays inbound to the field, with departures coming out on the MUSKY departure route which have to climb through the holding aircraft.
- A departing aircraft was issued a clearance to continue their climb on the MUSKY departure, which put them through the levels of the holding aircraft.
- As the departure continued its climb, the Short Term Conflict Alert (STCA) indicated a conflict between the climbing departure and an aircraft in the hold.
- The controller immediately stopped the climb of the departure before a loss of separation occurred.



TEM: A Sample Scenario

■ Threats

- Airspace design – the departure route conflicts with the published holding procedure
- Flow control command – holding for metering

■ Errors

- Late detection of the conflict

■ Undesired States

- Lack of Separation Assurance

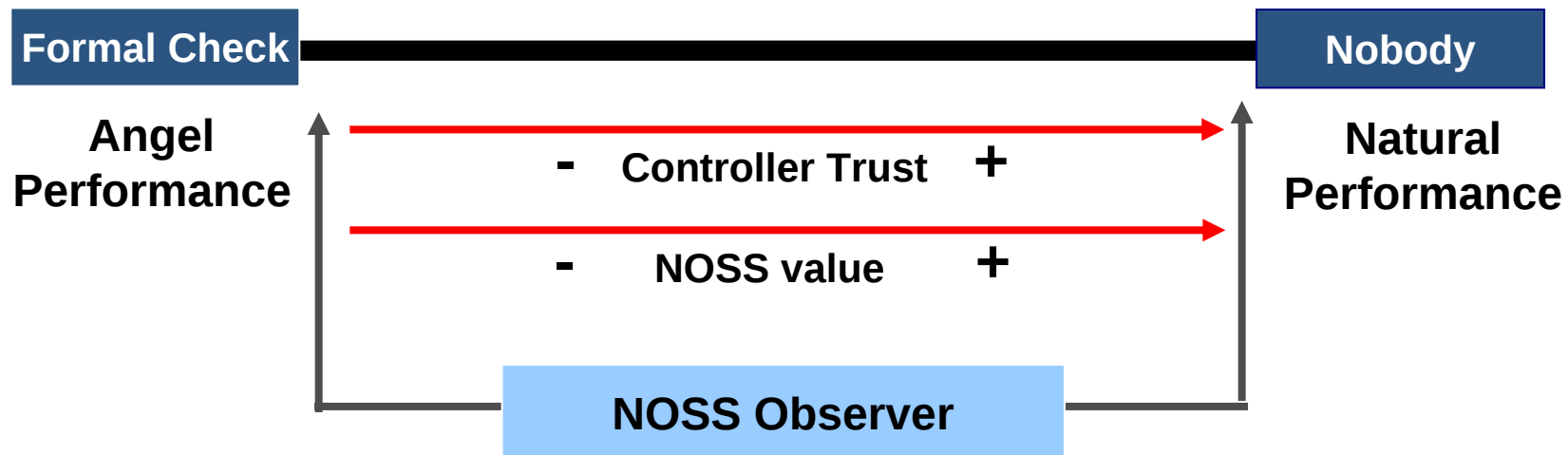


NOSS – The Data Collection Tool



NOSS Success Factors

- NOSS success is dependent upon methodology and execution



Low controller trust = Low quality data because there will be no differentiation between NOSS and proficiency checks



NOSS: Gaining Controller Trust

1. Over-the-shoulder observations during normal shifts
2. Joint management / association sponsorship
3. Voluntary Participation
4. Trusted and trained observers
5. Anonymous, confidential, and non-punitive data collection
6. Trusted and secure data collection site
7. Systematic data collection instrument
8. Data verification process
9. Data-derived targets for safety enhancement
10. Feedback results to controllers



NOSS Activities



NOSS Projects

■ NOSS Field Trials

- Airservices Australia
- Airways New Zealand
- NAV CANADA
- Finavia
- Federal Aviation Administration – analysis of the quality of NOSS data at the FAA's Technical Center

■ First Full-Scale NOSS

- Airservices Australia - 2006

■ Ongoing/Planned Projects

- Federal Aviation Administration
- NAV CANADA
- Airways New Zealand
- Airservices Australia



Lessons Learned

- The Controller task is more continuous than flight operations
- How long are NOSS observations?
 - Observations approximately one hour in duration have given us good data
- Do we observe individual controllers, teams, or operating positions?
 - To stress we are assessing the system as opposed to individuals, we observe operating positions
 - Team dynamics captured, but from the perspective of an individual operating position
- What should the scope of a NOSS be?
 - Depends on the size of the facilities and the comparisons to be made
 - Towers and En Route/Terminal environments should be considered separately



NOSS Contributions



What can NOSS provide?

- Identify threats within the operating environment
- Identify weaknesses in airspace design
- Check the quality/usability of procedures
- Identify problems with controller/equipment interfaces
- Assess the degree of transference of training to the line
- Understand controller shortcuts and workarounds
- Provide additional insight into known problems
- Make comparisons across units or facilities
- Assess safety margins & base rates



Sample Findings



Field Trials – Recurrent Findings

- Airspace design systemically leading to conflicts
- Vulnerabilities around position relief briefings
- Automation providing frequent, spurious alarms
- Coordination issues – movements in other controllers airspace
- Pilots are a major source of threat to controllers
- Controllers are a major source of threat to other controllers
- **Reportable incidents on 6-10% of observations**



Case Study 1

- Incident data showed one Complex had an elevated number of incidents pertaining to discrepancies in altitudes indicated on strips and actual clearances
- NOSS revealed this Complex to have:
 - An elevated number of associated US's
 - An elevated number of errors leading to the US's and incidents
 - Potential threats in the automation that could contribute to such errors



Case Study 2

- One sector had a reputation as being a challenging piece of airspace, but there was little objective information to substantiate it.
 - More threats, mismanaged threats, errors, and undesired states in Sector X than other sectors
 - Impartial observers agree, the sector is a mess!



Presenting the Results

- Presenting the Results to and Receiving Feedback From:
 - NOSS Observers
 - The final report is a good representation of what they saw
 - Air Traffic Controllers from the observed Complexes
 - “That’s how we move traffic”
 - “You’ve got us”
 - Check and Audit Controllers
 - More surprised than other groups

