FROM INNOVATION TO SOLUTION

# TIME BASED SEPARATION

## Heathrow Concept of Operation

SESAR JOINT UNDERTAKING

#SESAR
@World ATM_Now

founding members
EUROPEAN UNION
EUROCONTROL

# Introduction

- Aim - Improve landing rate resilience to headwind conditions on final approach
- How - Change from distance based separation to time based separation rules
- Tools to support the safe application of Time Based Separation (TBS) between wake pairs

FROM INNOVATION TO SOLUTION

# Headwind affect on landing rate

Normal Landing Rate – Light Headwind

FROM INNOVATION TO SOLUTION

# Headwind affect on landing rate

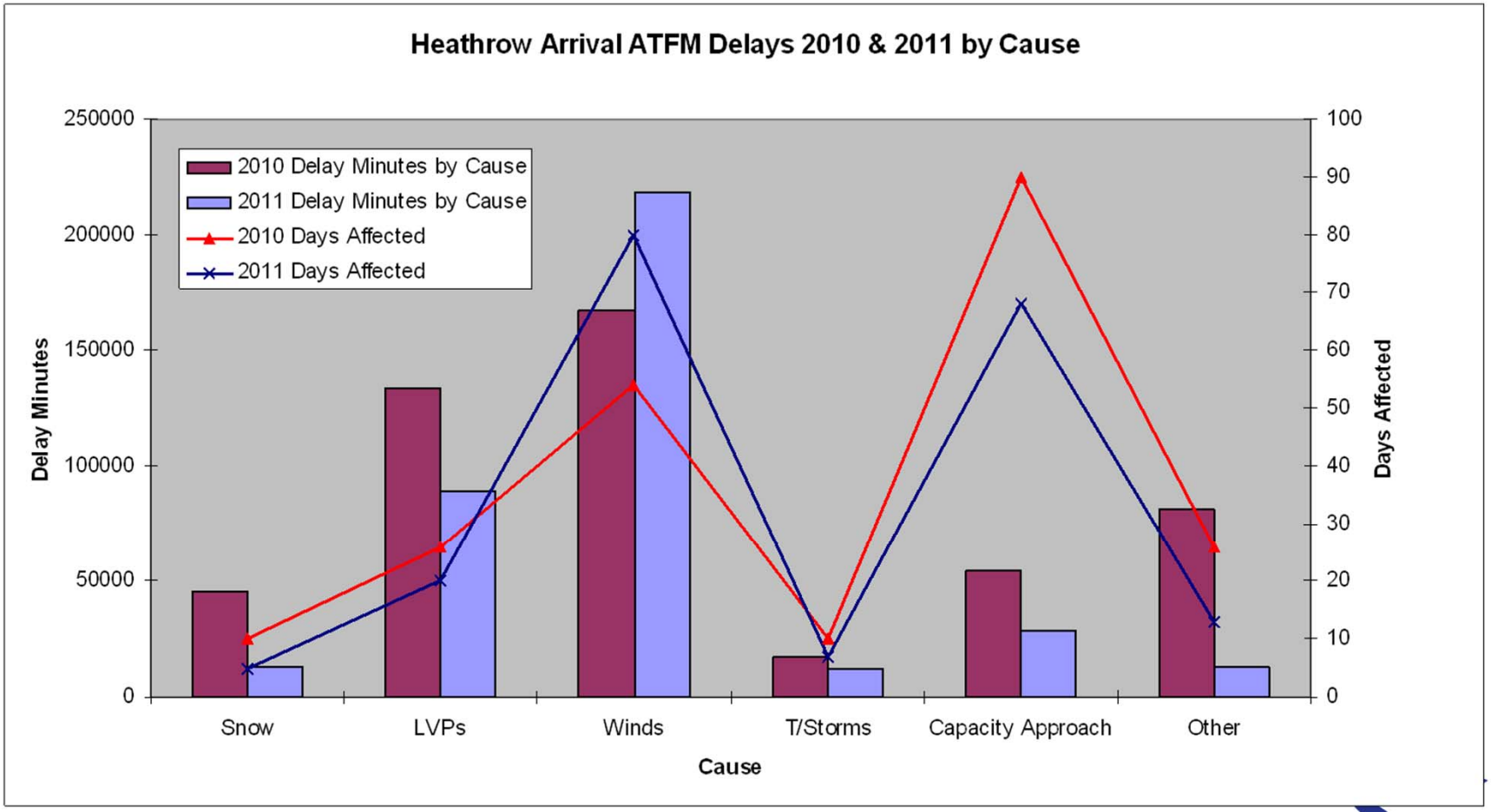
Normal Landing Rate – Light Headwind

Reduced Landing Rate – Strong Headwind

FROM INNOVATION TO SOLUTION

# Heathrow wind delay

## Wind is the biggest cause of Heathrow ATFM delay



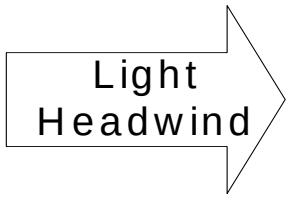

FROM INNOVATION TO SOLUTION

# DBS / TBS Minima

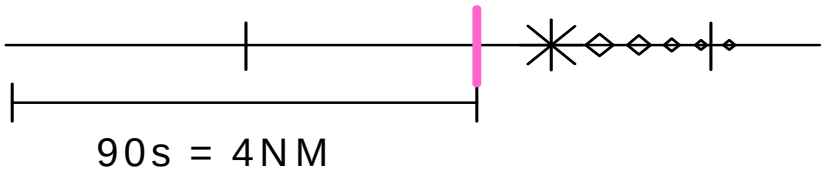
| Nautical Miles | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|
| TBS equivalent (seconds) | 68 | 90 | 113 | 135 | 158 | 180 |

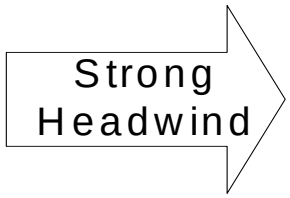
FROM INNOVATION TO SOLUTION

# Effect on Distance Between Aircraft

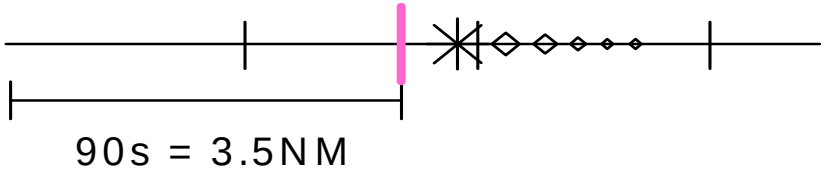


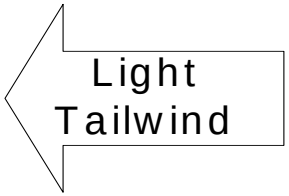

IAS = Steady 160kt
Mean GS = 160kt



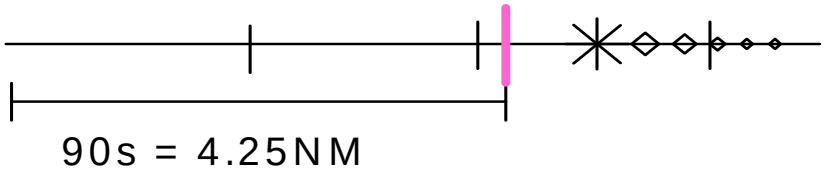




IAS = Steady 160kt
Mean GS = 141kt

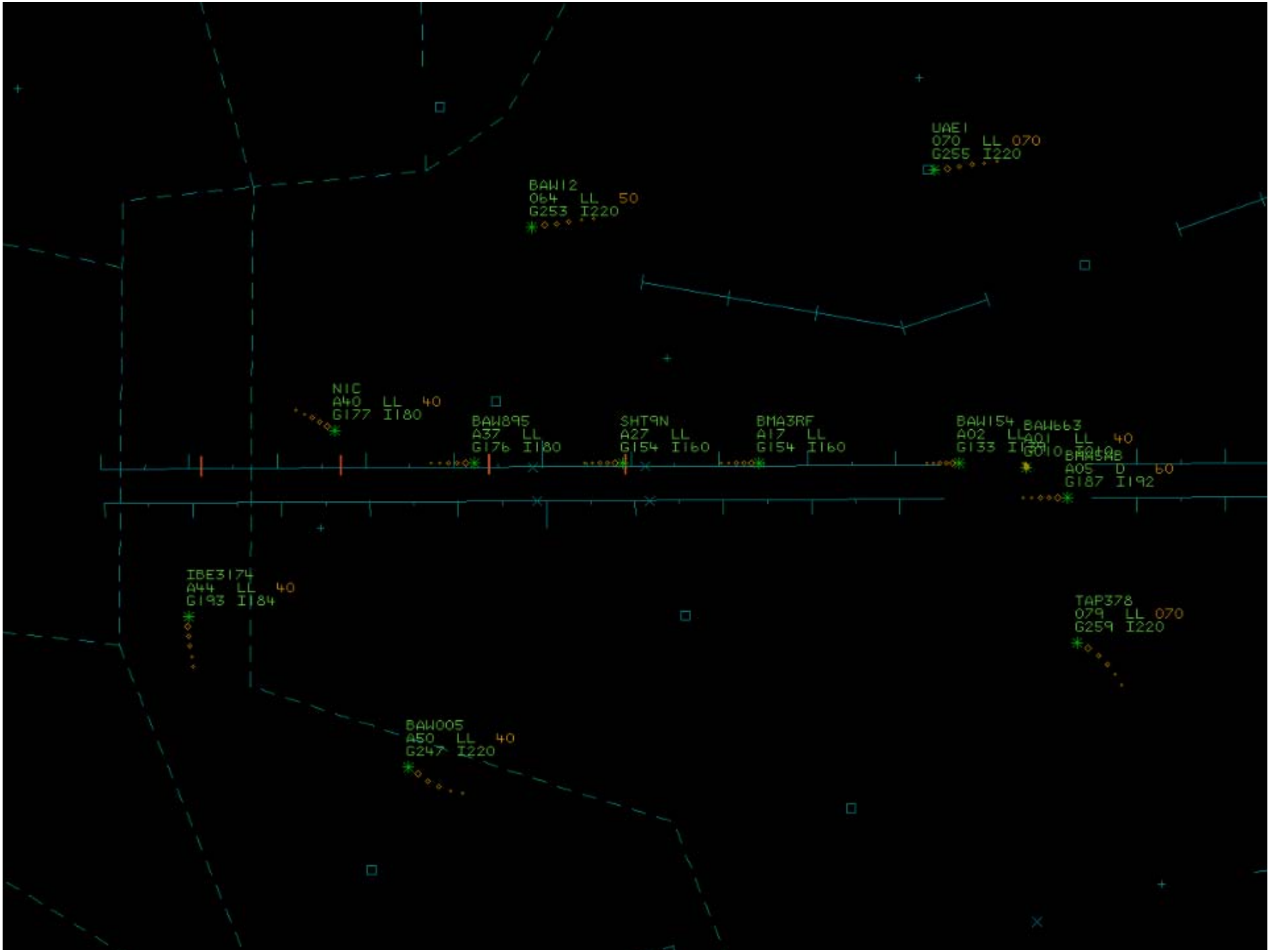



IAS = Steady 160kt
Mean GS = 169kt




FROM INNOVATION TO SOLUTION


UAE1
070 LL 070
G255 I220
BAW12
064 LL 50
G253 I220
NIC
A40 LL 40
G177 I180
BAW895
A37 LL
G176 I180
SHT9N
A27 LL
G154 I160
BMA3RF
A17 LL
G154 I160
BAW154
A02 LL
G133 I
BAW663
A01 LL 40
G010
A05 D 60
G187 I192
IBE3174
A44 LL 40
G193 I184
TAP378
079 LL 070
G259 I220
BAW005
A50 LL 40
G247 I220

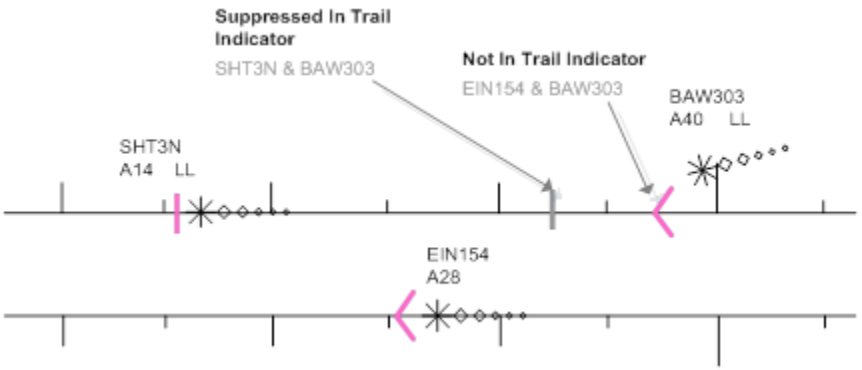
# Indicators

## Separation Indicators

- Linked to preceding aircraft
- A reference for separation


## TEAM

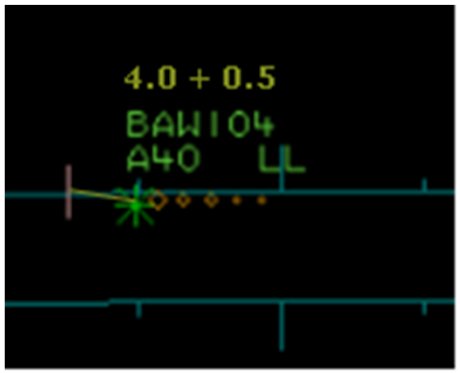
- Required diagonal separation displayed
- In trail and not in trail indicators calculated
- Maximum constraint displayed



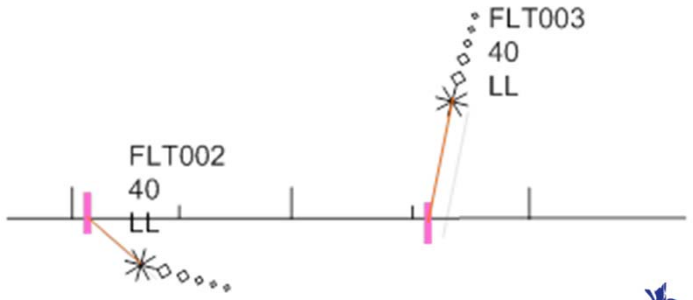

FROM INNOVATION TO SOLUTION

# Quick Look Tools

- Distance indicators
  - TBS indicator distance
  - Actual distance from indicator

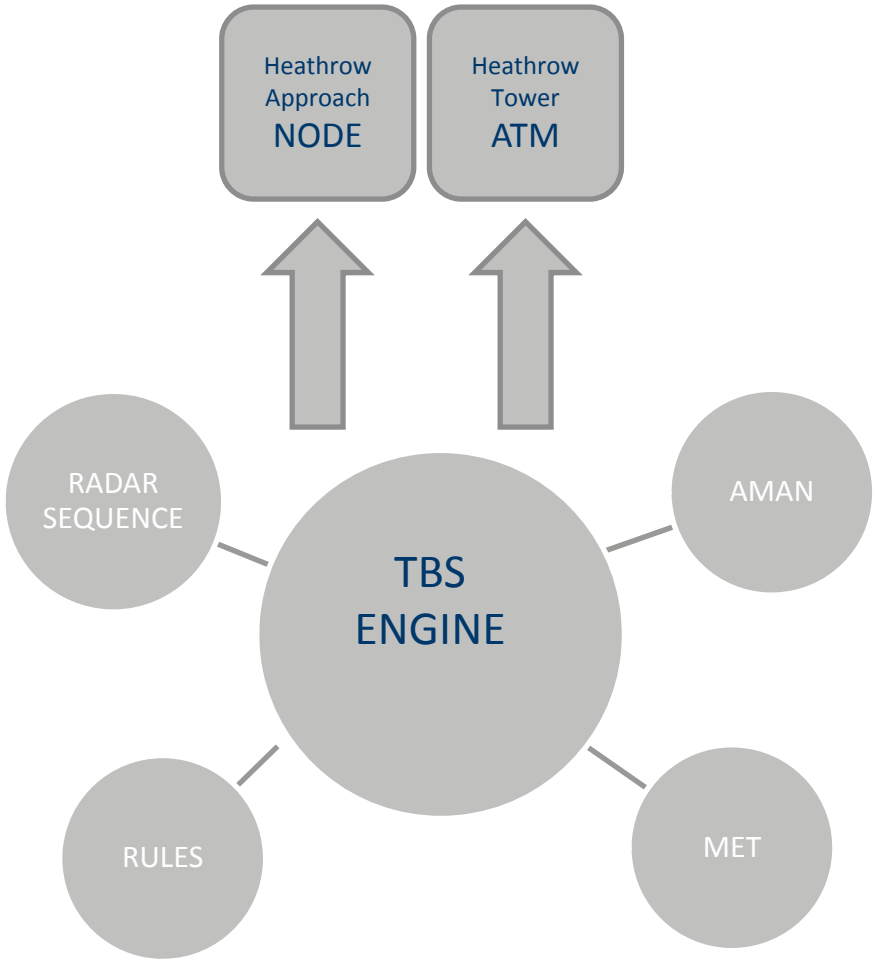



- Aircraft/indicator pairing




FROM INNOVATION TO SOLUTION

# TBS System Overview




NATS

FROM INNOVATION TO SOLUTION

# TBS Landing Rate Recovery

Normal Landing Rate – Light Headwind

Reduced Landing Rate – Strong Headwind

TBS Landing Rate – Strong Headwind

FROM INNOVATION TO SOLUTION

# Adaptations from SESAR P6.8.1

- TBS applied to wake pairs only
- Indicators displayed for wake pairs, not in trail and some spacing separations
  - No indicators for minimum radar pairs
- Mode-S derived winds used for TBS tool calculations
- No Electronic Flight Data on Heathrow Approach
  - Sequence determined automatically by system
    - Aircraft detected when it turns on to base-leg
    - Indicators displayed later to controller

FROM INNOVATION TO SOLUTION

# Benefits

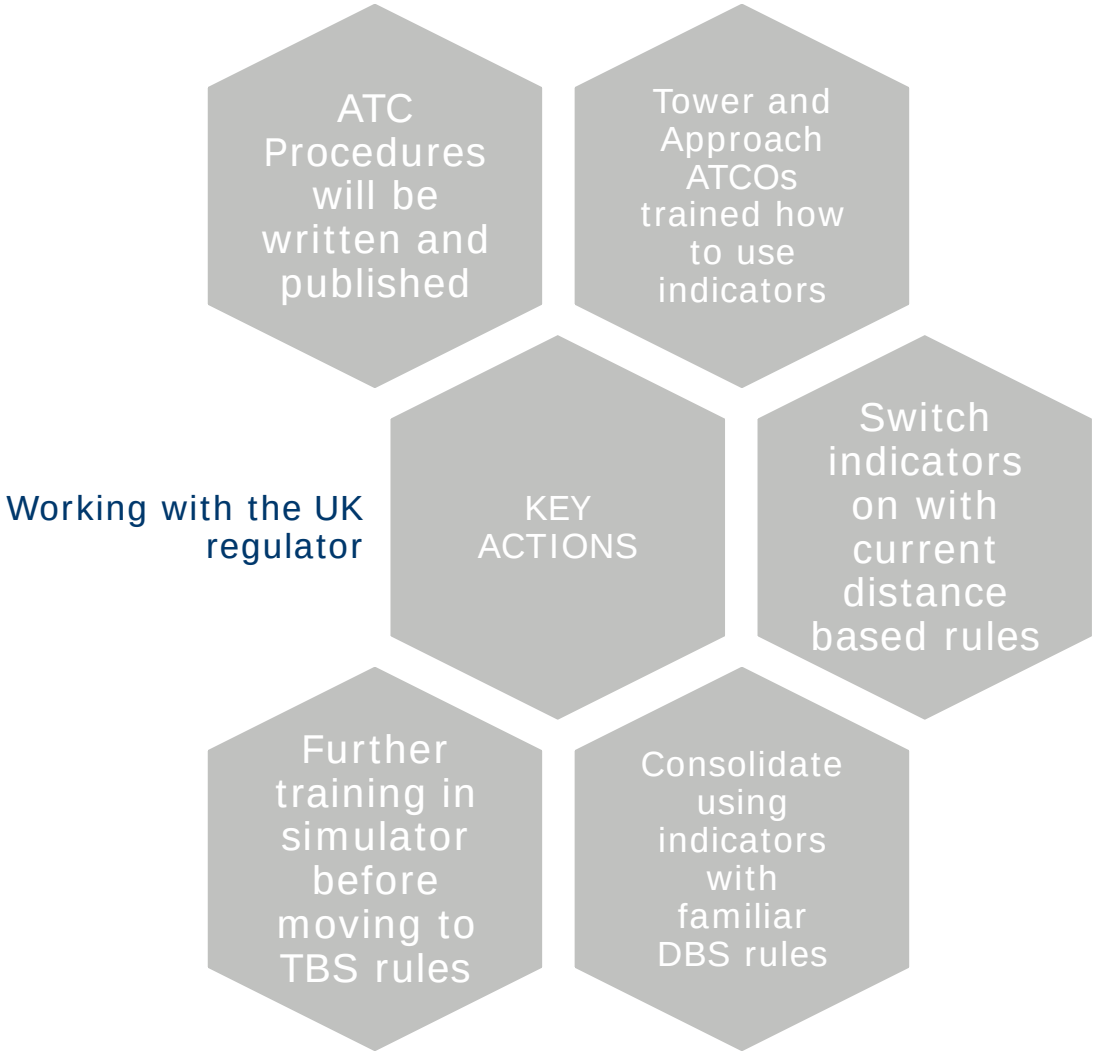
Save over 80,000 minutes of delay per annum through recovering lost landing rate

Reduce ATFM delays due to strong headwinds on final approach by up to 50%

Flight cancellations due to strong headwinds would be minimised

FROM INNOVATION TO SOLUTION

# Operational Spring 2015




Working with the UK regulator

FROM INNOVATION TO SOLUTION


# Thanks for your attention

Please visit the N stand, 890

NATS

FROM INNOVATION TO SOLUTION