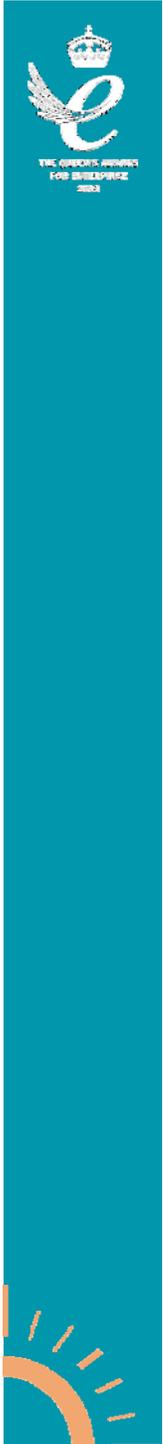


# The uptake of EGNOS in aviation

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## This presentation will demonstrate how EGNOS is already realising benefit to aviation users

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- Provide an overview of the global and industrial context
- Elaborate the benefits to users and service providers
- Describe some of the implementation issues at a regional and local level
- Describe in detail one example of how EGNOS is already delivering real safety benefits



# Helios is an independent business and technical consultancy

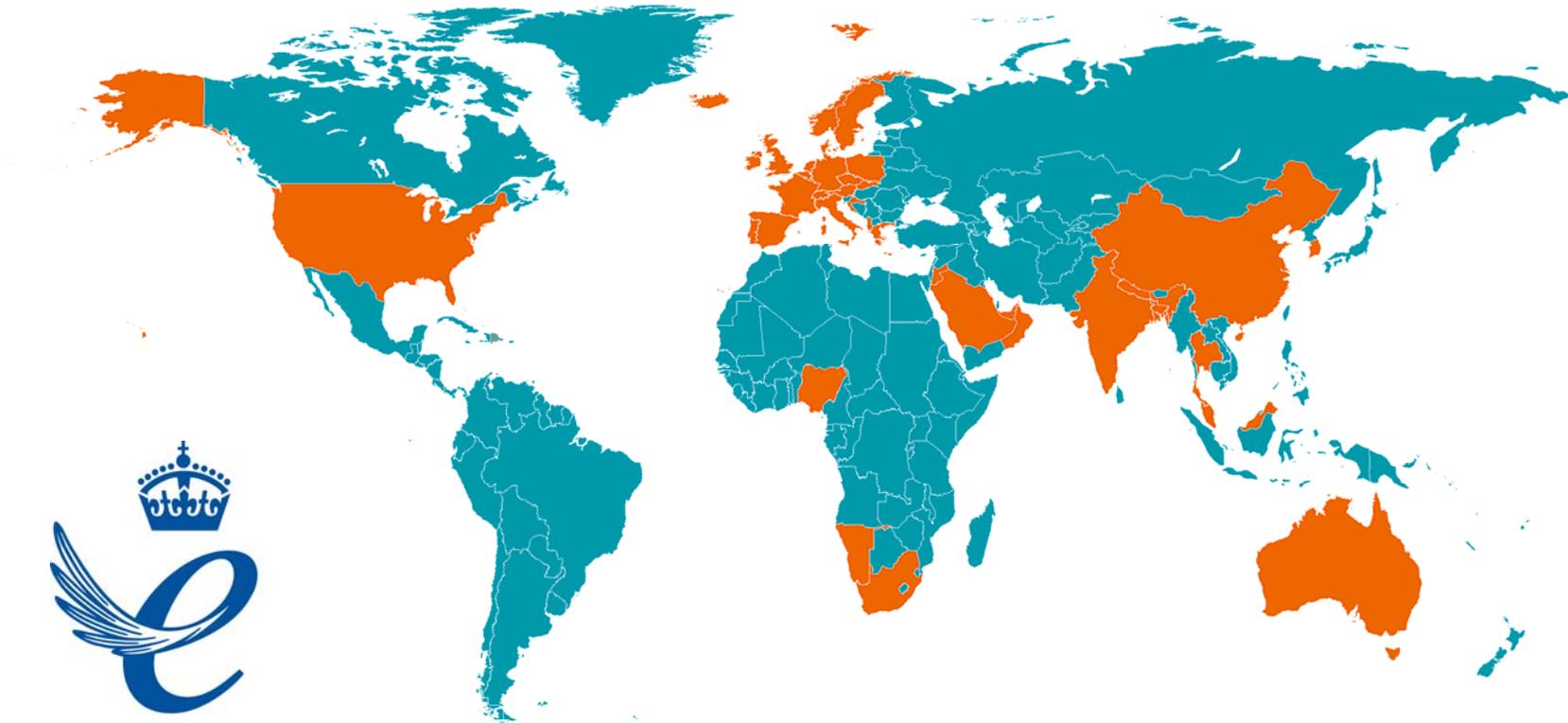
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- Long track record in GNSS, leading the application of EGNOS in European aviation for ten years
- We advise all relevant stakeholders...
  - Regulators, service providers, operators, industry
- ...tackling a broad range of implementation issues
  - Operational: Procedures, safety cases and certification
  - Technical: Flight trials, simulations and analysis
  - Business: Investment cases



# Helios also has a global presence in the commercial aviation market

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THE QUEEN'S AWARDS  
FOR ENTERPRISE  
2009

■ Countries in which Helios has worked



# RNAV approaches are being implemented world-wide for the benefits of airspace users

Widespread use of GPS based RNAV procedures

Many conventional approaches can be flown as an RNAV overlay

Lower minima available compared to NPA

In many cases RNAV approaches can use existing avionics for little additional cost

Existing FMS

New generation panel mount  
GPS

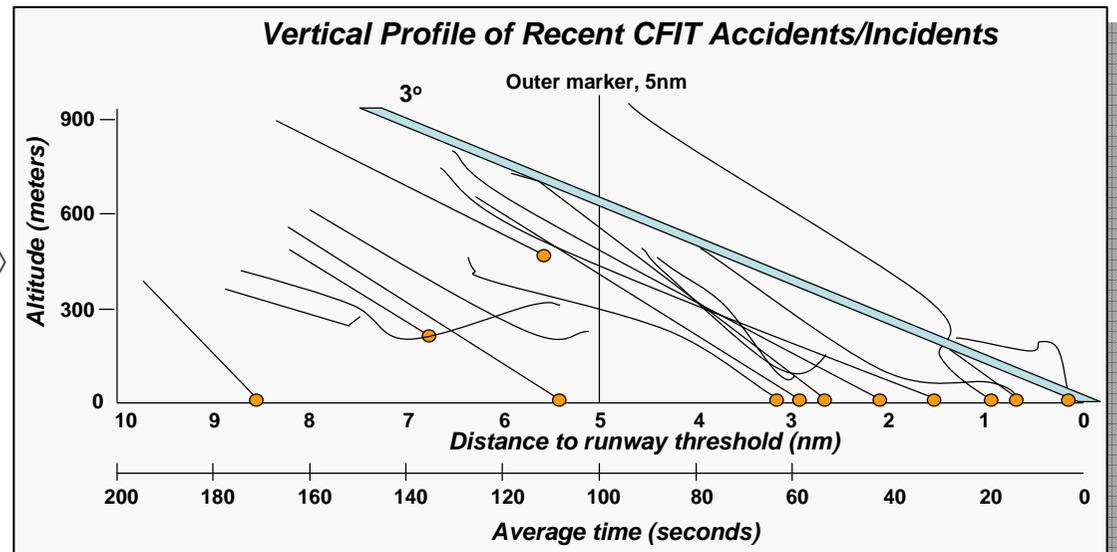
Benefits  
to  
airspace  
users



# RNAV approaches offer many benefits – the most significant is **enhanced safety**

## Traditional Non-Precision Approaches can be hazardous

- Account for 60% of CFIT accidents
- 47% of accidents during step-down approaches
- Most common cause is a descent below MDA



RNAV approaches help to mitigate this situation

- Stabilised descents with vertical guidance
- Enhanced positional awareness through moving map displays
- Lower workload - monitoring rather than calculating

# RNAV approaches deliver other potential benefits to both aircraft operators and ANSPs



## Aircraft Operators

- Optimised approach routing from various arrival directions
- Optimum descent profile
- Engine-idle descents
- Improved track keeping
- Use of more flexible route and procedure designs



## Airports and Air Navigation Service Providers

- Limited need for ground infrastructure
- Can be implemented in areas where ILS cannot be sited for terrain or obstacle reasons
- Can provide approaches to more runways without additional infrastructure costs
- Increase the usability of many airports

## Leading to:

- ↓ Reduced fuel burn and noise footprints
- ↓ Reduced environmental impact
- ↓ Reduced Radio Traffic (R/T)
- ↓ Reduced controller and pilot workload
- ↓ Reduced delays, diversion and cancellations due to bad weather
- ↓ Reduced costs

## ICAO GNSS strategy calls for the uptake of SBAS (EGNOS) enabled APV approaches from 2013

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- 36<sup>th</sup> ICAO Assembly Resolution
  - *“all instrument runway ends should have an approach procedure with vertical guidance (APV), either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014.”*
- 36<sup>th</sup> ICAO Assembly Resolution also called for:
  - *“where RNAV operations are required, enroute (oceanic and continental) and terminal ATS routes should be implemented according to PBN by 2016”*



## EGNOS (SBAS) is a cost effective solution to meet the new ICAO GNSS strategy

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- ICAO resolution supports already recognised industry need for PBN navigation
  - Supports RNAV implementation en-route / TMA
  - Supports RNP implementation on approach
- EGNOS offers increased availability supporting RNAV applications:
  - Not limited by line of site coverage and coverage holes
  - Accuracy afforded exceeds current RNAV requirements for terminal areas
  - Requires no investment on the ground by operator



## Aircraft operators will bear most of the cost that must be converted into tangible benefits

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- Costs
  - Standards compliant receivers
  - Equipment certification – can be complicated dependent on aircraft type and level of integration required
  - Operational certification – crew training, changes to operations manuals
  - New approach and landing procedures to be developed
  - Upgrade of simulators
- Transition of operations and technology requires joint decision between aircraft and airport operators at a local level



# Many supporting projects and programs are already underway in Europe

- Significant work is been undertaken covering:
  - Research and development
  - Prototyping
  - Certification
  - Implementation



- Case study: HEDGE
  - Focused upon application of EGNOS by helicopters



## The application of EGNOS in helicopters offers a tangible and immediate safety benefit

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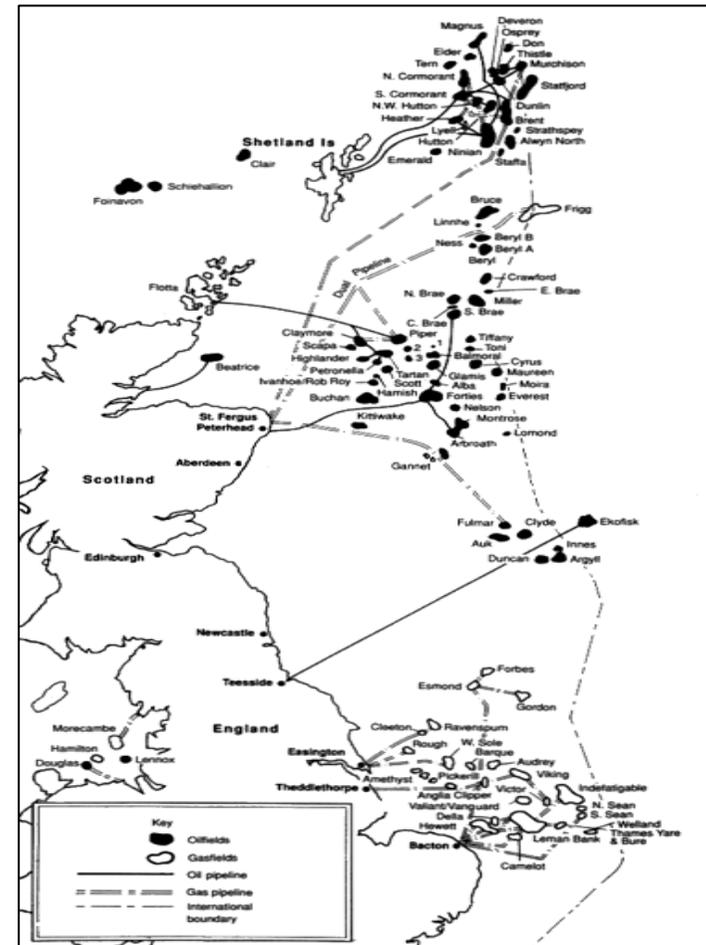
- Helicopters have:
  - different operating environments to fixed wing
  - complications from structure (i.e. interference from rotor blades)
- Opportunity to implement EGNOS and learn from certification authorities the requirements for EGNOS use in the cockpit:
  - will facilitate an 'easier' upgrade path for helicopters and fixed wing general aviation
- Technology platform is applicable to offshore oil, emergency medical services and other rotorcraft users



# North Sea oil and gas exploration and production is underpinned by efficient helicopter transport...

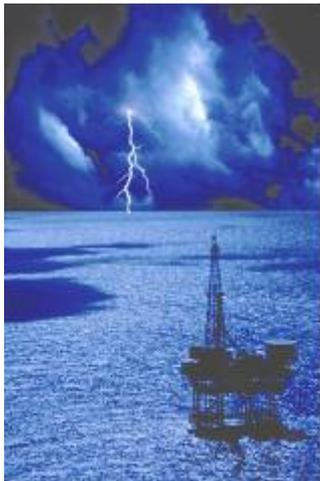
- Oil production commenced in 1960's
- Underpinned by regular helicopter transport for staff and equipment
- More than 300 helidecks in UK sector
- Rigs often very remote
- 7 fatal accidents since 1976 with loss of 94 lives, 34 non-fatal accidents

North Sea – UK Sector



# The offshore environment can be an inhospitable place for helicopters...

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- Fierce winds with strong gusts
- No protection from the terrain
- Winter lightning strike season due to passing cloud base
- Operating flight levels can be subject to icing
- Helidecks commonly high enough to be located in low cloud



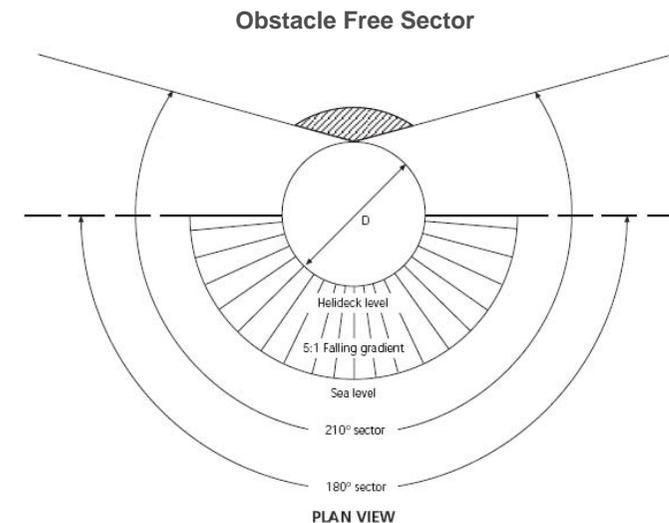
## Even in good conditions there are a number of challenges unique to offshore operations...

- Not all rigs are fixed in one location
- Moving cranes, gantries and chimneys
- 'Flaring' of natural gas
- Turbulence/wind shear caused by wind over superstructure
- Mobile obstacles close in to the helipad



# Ideally an offshore instrument approach would have a number of characteristics...

- Capable of AFCS coupling for lateral and vertical guidance
- Straight in approach to abeam the rig
- Straight ahead climbing missed approach
- Crew selectable approach heading
- Supports mobile rigs
- Able to be retrofitted to existing fleet



## EGNOS together with an advanced RNAV capability presents the best available solution

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- Navigation system specifically designed for approach operations
- Only means of providing North Sea coverage
- Requires no infrastructure on the rigs themselves
- High accuracy and integrity
- “Straight line path” avoids hazardous missed approach procedure
- Positive guidance from EGNOS signal gives a much lower crew workload
- Standalone avionics designed to minimise retrofit costs



Thank you for your attention

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