WakeNet Europe - European Coordination Activities for Aircraft Wake Turbulence

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Safety and Security
Session 6C “The Safety Issues of Wake Vortex in Aviation”
22 OCT 2015, London, GB
Wake Turbulence Phenomenon
Wake Turbulence Hazard

Boeing/NASA/FAA [http://youtu.be/dGFy8z-o9MY]
Wake Turbulence
Safety and capacity

• Traditional wake turbulence separations: safe, but static and partly overly conservative, limit capacity
• Traffic increase, larger aircraft
• Improving aircraft separation to increase capacity
  ▪ no/ little infrastructure changes
  ▪ individual/ dynamic separations
  ▪ economic benefit
  ▪ reducing delays/ fuel burn
  ▪ while maintaining or improving safety
Wake Turbulence
Multi-disciplinary Topic

large variety of involved disciplines and organisations, e.g.

- Meteorology
- Aerodynamics
- Sensor technology
- Flight Dynamics
- Simulation
- Safety Assessment
- Air Traffic Management

- Air Transport Regulators
- Safety Agencies
- Air Navigation Service Providers/ Controllers
- Airlines/ Pilots
- Airports
- Aircraft & System Manufacturers
- Research Organisations

Wake Turbulence: a highly multi-disciplinary topic!
WakeNet Europe
Fostering links

• R&T projects in Europe
  ▪ EC Framework Programme projects
  ▪ SESAR-JU Development projects
  ▪ national/ internal activities (e.g. industry, research, Eurocontrol)

• International activities
  ▪ WakeNet USA
  ▪ WakeNet Russia
  ▪ Global Wake Vortex Conference
  ▪ RECAT I-III FAA and Eurocontrol
  ▪ ICAO Wake Turbulence Study Group

• Major stakeholder groups
  ▪ e.g. airlines/ pilots, ANSP/ controllers, airports, agencies, manufacturers
  ▪ also beyond Europe
WakeNet-Europe Workshops

- Main and vital element for dissemination and exchange
- International/ global audience
- Typically one major event per year with 70-100 participants
- Also dedicated specific workshops on selected expert topics
- All presentations publicly available online: wakenet.eu
WakeNet-Europe
Major Workshops – History

• 2015 WN-E Amsterdam NL
• 2014 WN-E Bretigny-sur-Orge FR
• 2013 WN-E Bonneuil-sur-Marne FR
• 2012 WN3E Langen DE
• 2011 WN3E Southampton GB
• 2010 WN3E Toulouse FR
• 2009 WN3E Jouy-en-Josas FR
• 2008 Eurocontrol Brussels BE
• 2007 Eurocontrol Brussels BE

• 2005 WN2E Bretigny-sur-Orge FR
• 2004 WN2E Langen DE
• 2003 WN2E Heathrow GB
• 2002 WN1E Toulouse FR
• 2001 WN1E Langen DE
• 2000 WN1E Amsterdam NL
• 2000 WN1E Malvern GB
• 1999 WN1E Oberpfaffenhofen DE
• 1998 WN1E Chatillon FR

• 2010 Global Wake Vortex Conference II San Diego USA
• 2009 Global Wake Vortex Conference I Brussels BE
European WakeNet Activities

**WakeNet**
Understand wake physics, encounter probabilities and mechanisms
Bridge gap between R&T and operational aspects and requirements

**WakeNet2-Europe**
Understand safety impact and mechanisms
Bridge gap between R&T and operational aspects and requirements

**WakeNet3-Europe**
Support for recategorisation and operational implementations
Continued R&T

**SESAR Development**

**SESAR 2020 Deployment**

**WakeNet4-Europe**

**Workshop committee chairs:**
DLR & TU Braunschweig

- WakeNet- Europe Workshops 2007/2008
  Brussels (Euro-control)
- WakeNet- Europe Workshop 2013
  Paris/Bonneuil-sur-Marne (STAC)
- WakeNet- Europe Workshop 2014
  Paris/Brétigny (Euro-control)
- WakeNet- Europe Workshop 2015
  Amsterdam (NLR)

Timeline:
- 1998
- 2002
- 2006
- 2010
- 2014
Wake turbulence activities and networking
Success story

• Global task: A380, B747-8 wake categorisation ✓
• Global wake community and cooperation - WakeNet
• Paving way towards re-categorisation “RECAT”

Air traffic management
New wake categories/ separations/ procedures

- Time based separation (TBS) implementation
  - London LHR 2015

- RECAT I
  - 6 categories implementation
  - USA 2012/ Europe 2015

- FP7 UFO project
  - airport wind sensors

- RECAT II
  - static pair-wise

- RECAT III
  - dynamic pair-wise

- SESAR/ SESAR 2020
  - SESAR 12.2.2
    - runway management tools
  - SESAR 6.8.1
    - dynamic separations
  - SESAR2020 PJ02
    - increased throughput
  - SESAR2020 PJ10
    - separation management

- H2020 SESAR exploratory research

- ICAO Wake Turbulence Study Group

- aerodays2015/ WakeNet Europe - European Coordination Activities for Aircraft Wake Turbulence/ C. Schwarz - DLR
Airborne pilot support
Warn, avoid and alleviate wake encounters

- SESAR
  - 9.11 Aircraft Systems for Wake Encounter Alleviation
  - 9.30 Weather Hazards/Wake Vortex Sensor
- Wake warn & avoid demonstration flight test: Airbus, IANS, DLR
- SAE G-10WV Wake Vortex Committee
- RTCA Wake Vortex Tiger Team (WVTT) RTCA DO-360 White Paper on aircraft-derived data standards development for wake, ATM and met applications, 2015

Towards airborne pilot support - technology and standards
WakeNet Europe Mission
Research needs

Research Needs for technology leaps:

• Ground-based and airborne sensors for operational monitoring and characterisation of wake turbulence

• Improved monitoring of wake vortex encounters

• Wake turbulence encounter risk assessment

• Integration of novel wake turbulence monitoring and prediction systems into future air traffic management/cockpit concepts
Quo vadis WakeNet Europe

- Wake turbulence – safety and capacity topic, very relevant now and also in the future
- European wake turbulence competence, continuously built up until today – serving European interests
- Successful cooperation among stakeholders, crucial to maintain in the future
- European framework vital for focusing competence for future activities (networking/technical projects)
- WakeNet Europe website, please visit wakenet.eu
- Any involvement is welcome!