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Aviation in Europe – Innovating for Growth

The 7th European Aeronautics Days



WakeNet-USA - Tackling the Wake Vortex Issues in Aviation

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

WakeNet USA

- Officially Established in 2002
 - Part of the FAA-NASA Wake Turbulence Research Management Plan
 - Inspired by WakeNet Europe
- Intended to Provide Opportunities to Directly Solicit Stakeholder Feedback on Wake Turbulence R&D
 - Prior to the FAA SMS Process (FAA SMS Was Implemented in 2004)
- Does Not Replace Other Communications with Stakeholders
 - But Remained a Primary Forum for the Entire User Community to Provide Feedback Under the Same Roof
 - And Still an Integral Part of the FAA SMS Process



WakeNet USA - History

WakeNet USA History		
Date		Location
Month	Year	City
October 8-9	2002	Washington
October 21-22	2003	Denver
March 18-19	2003	St. Louis
April 14-15	2004	Seattle
October 13-14	2004	Cambridge, MA
March 16-17	2005	Boca Raton, FL
October 12-13	2005	Seattle
March 29-30	2006	Dallas
November 7-8	2006	St. Louis
March 28-29	2007	Houston
October 23-24	2007	Seattle
October 21-22	2008	San Francisco
March 19-20	2008	Miami
October 14-15	2009	Washington
March 25-26	2009	Miami
March 17-18	2010	Miami
October 20-21	2010	Boston
March 16-17	2011	Miami
October 18-19	2011	Denver
October 17-18	2012	Seattle
March 28-29	2012	Memphis
March 19-21	2013	Memphis
October 29-30	2013	NASA Ames
October 21-22	2014	Atlanta
March 26-27	2014	NASA Ames
April 8-9	2015	Chicago



The Two Partners In Crime



The Way We Were

- Earlier Days Involve 10-15 Participants
 - Now Routinely 70 or More
- Focused on Presentations of Research Planning, Not Updates on Solutions in Progress
 - A Lot of “R”, Very Little if Anything on the “D” Part of RE&D
 - A Lot of Equations and Pictures of LIDAR
 - Lots of Difficulty in Filling Agenda That Addressed the Needs of All Attendees (Particularly Stakeholder Participants)



Examples of Early Feedback

- *“Wake turbulence separation absolutely cannot be reduced”*
- *“Any new wake solutions must have zero wake encounters”*
- *“I don’t care what your research shows, unless it says more runways are needed, I am not going to endorse it”*
- *“I expect that you will throw a bunch of AIAA papers at me and tell me all of the problems are solved”*
- *“If I am going to see another equation or another picture of the LIDAR, I am going to scream”*
- *Etc.*



The Way We Are – Since 2002

- CSPR Dependent Approaches
- WTMD
- WTMA-P
- RECAT Phase I / 1.5
- RECAT Phase II



The Way We Are – Others

- Establishment with International and Industry Partners on A388, B748, B788, B789 and A350 ICAO Separations
- B757 Harmonization
 - Harmonized the Separation for All Three Variants of the B757 in 7110.65
- Jet Blast at JFK
 - Not a Wake Turbulence Issue, But Demonstrated that Wake Turbulence Separation Applied at JFK for Intercepting Runway Geometry was Not Necessary
- Wind Turbines on Fire Island, Alaska
 - Not a Flight Generated Wake Turbulence Issue, But Procedurally Provided Wake Avoidance Solution



The Way We Are

- We Still Have Equations and Photos of LIDARs at WakeNet USA – But Mostly on the Second Day Describing Ongoing R&D
- Example of the Transition from Very R&D Nature to Very Operationally Focused Agenda
 - 2012's WakeNet USA at Memphis
 - 7 Hours Into the First Day of Agenda Describing Operational Experiences of Various Wake Solutions Without a Single Equation or a Photo of LIDAR
- Routine Participants of International Forums
 - WakeNet Europe
 - WakeNet Global
 - Other Special International Workshops (e.g., ICAO WTWG)



The Way We Are

- A Substantial Portion of Feedback from Attendees of WakeNet USA Identified the Following to be Most Beneficial:
 - Face to Face, Smaller Group Dedicated Side Bar Discussions (A Face to Face in Real Time is Worth A Few Thousand Emails and Teleconference)
 - Opportunities to be Updated on Other Aspects of the Wake Turbulence Effort at Both Interagency as well as Inter-Organizational Levels
- User Comment at Recent Wakenet USA Meeting
 - “This program has made remarkable progress. *Here we are now talking about Runway Occupancy Time, not wake, being the limiting factor*”



WakeNet USA - Future Topics

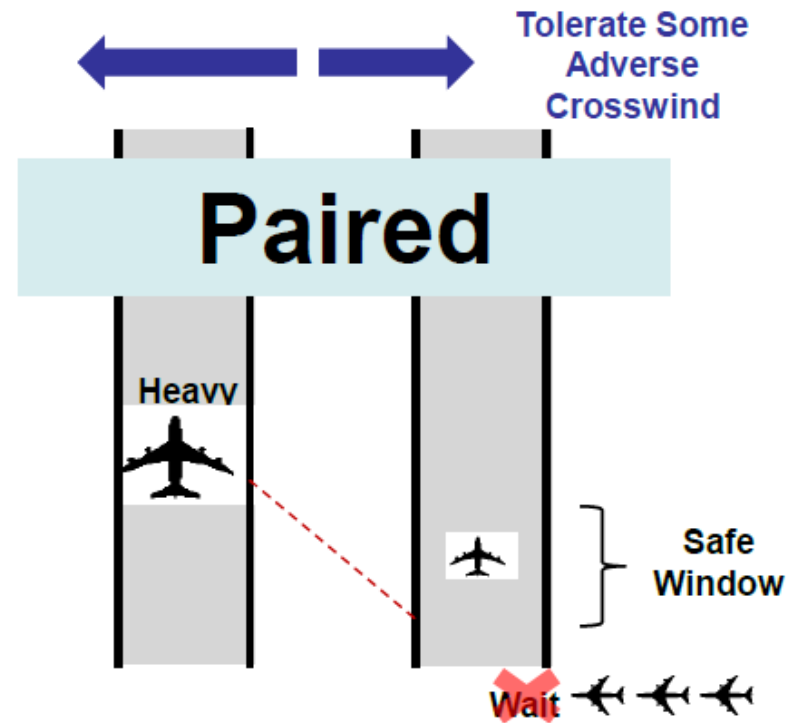
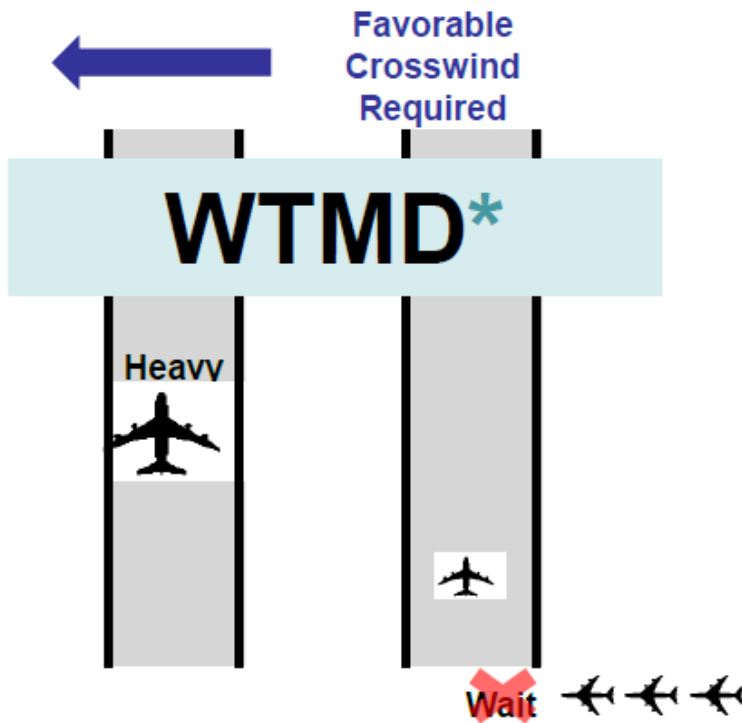
- A Series of Wake Mitigation Procedures and Systems Have Been Delivered to the NAS with WakeNet USA Playing an Instrumental Role
- The Next Series of Objectives for the FAA Wake Turbulence Research Office Include
 - RECAT 2.5
 - Including Revisions of Intersection Departures and Intersecting Operations.
 - Refinement of Crosswind Based CSPR Departure Solution WTMD
 - Paired-Departure
 - Dynamic Spacing for CSPR Arrivals
 - WTMA-S Coupled with Paired-Arrivals
 - Dynamic Spacing for SR Arrivals and Departure
 - Wind Based
 - En-Route Wake Mitigation (One of Top 5 Safety Issue for 2016)
 - Integration of New Large and Heavy Aircraft into NAS
 - Integration of UAS



WTMD vs WTMD-PD

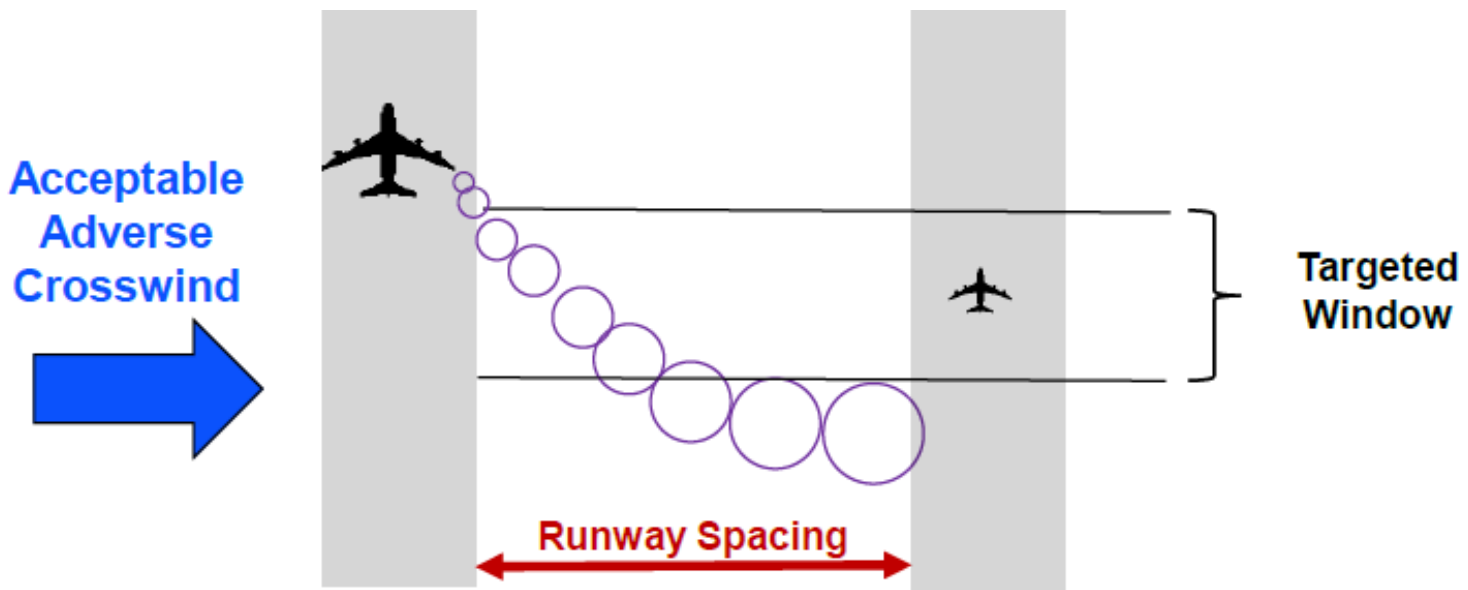
Predict “wake free” **periods**

Predict “wake free” **windows**

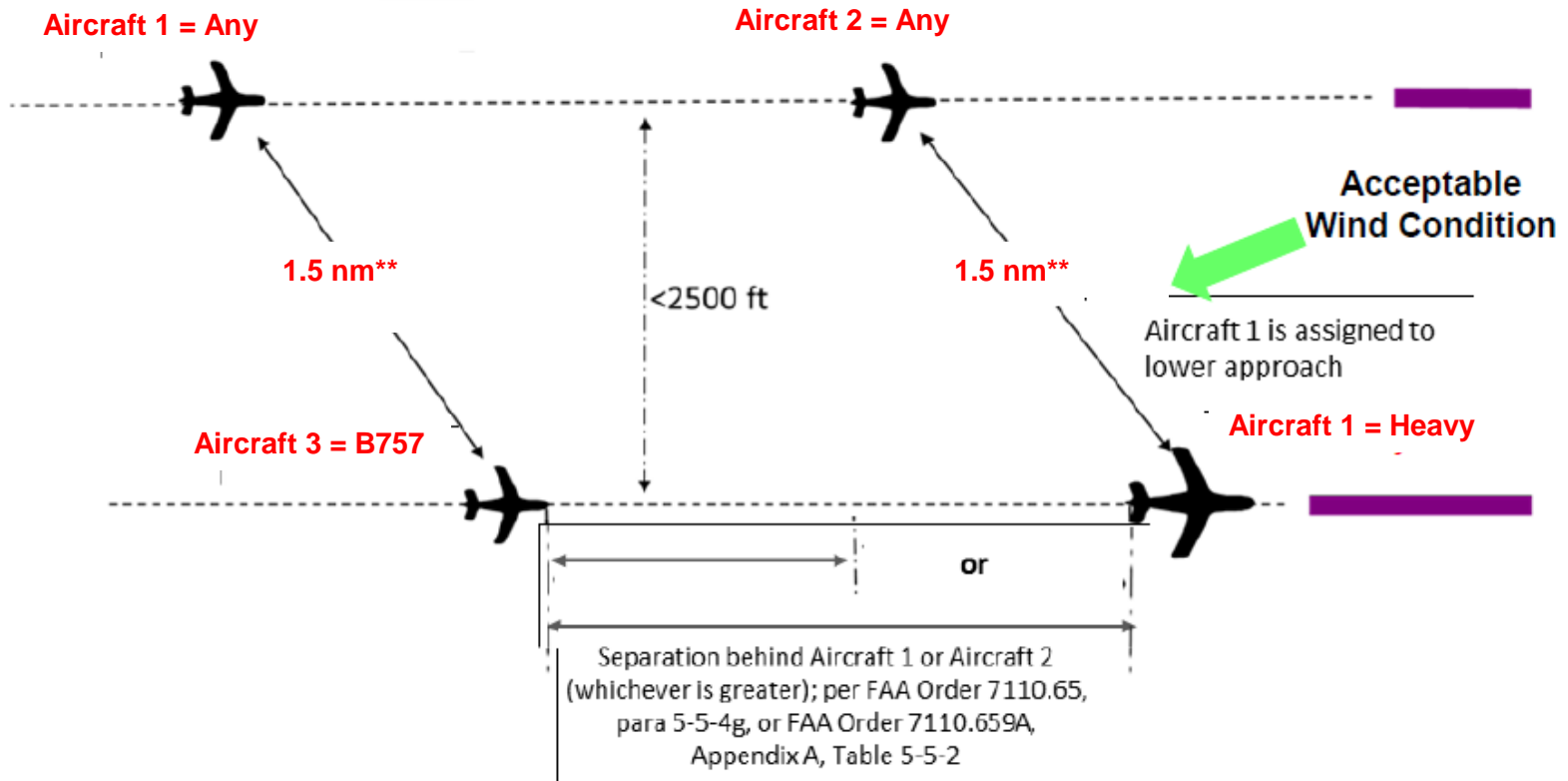


WTMD-PD

- Shorter Inter-Departure Time Translates to Higher Tolerance of Adverse Crosswind
- Larger Runway Spacing Translates to Higher Tolerance on Adverse Wind (and More Available WTMD-PD Operations)



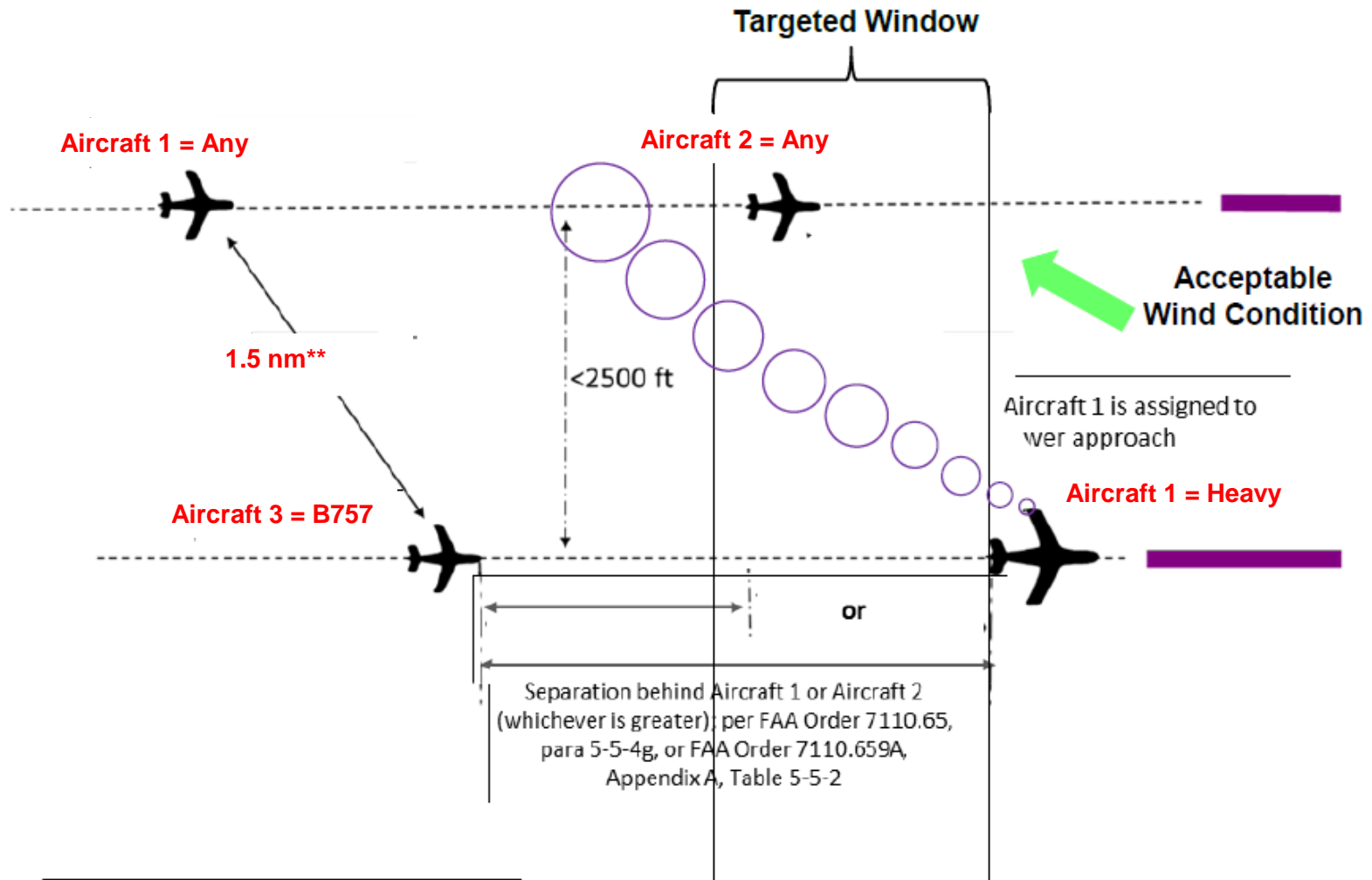
WTMA-S



**** Notional Diagonal Separation (1.0 nm is the Collision Risk Minima)**



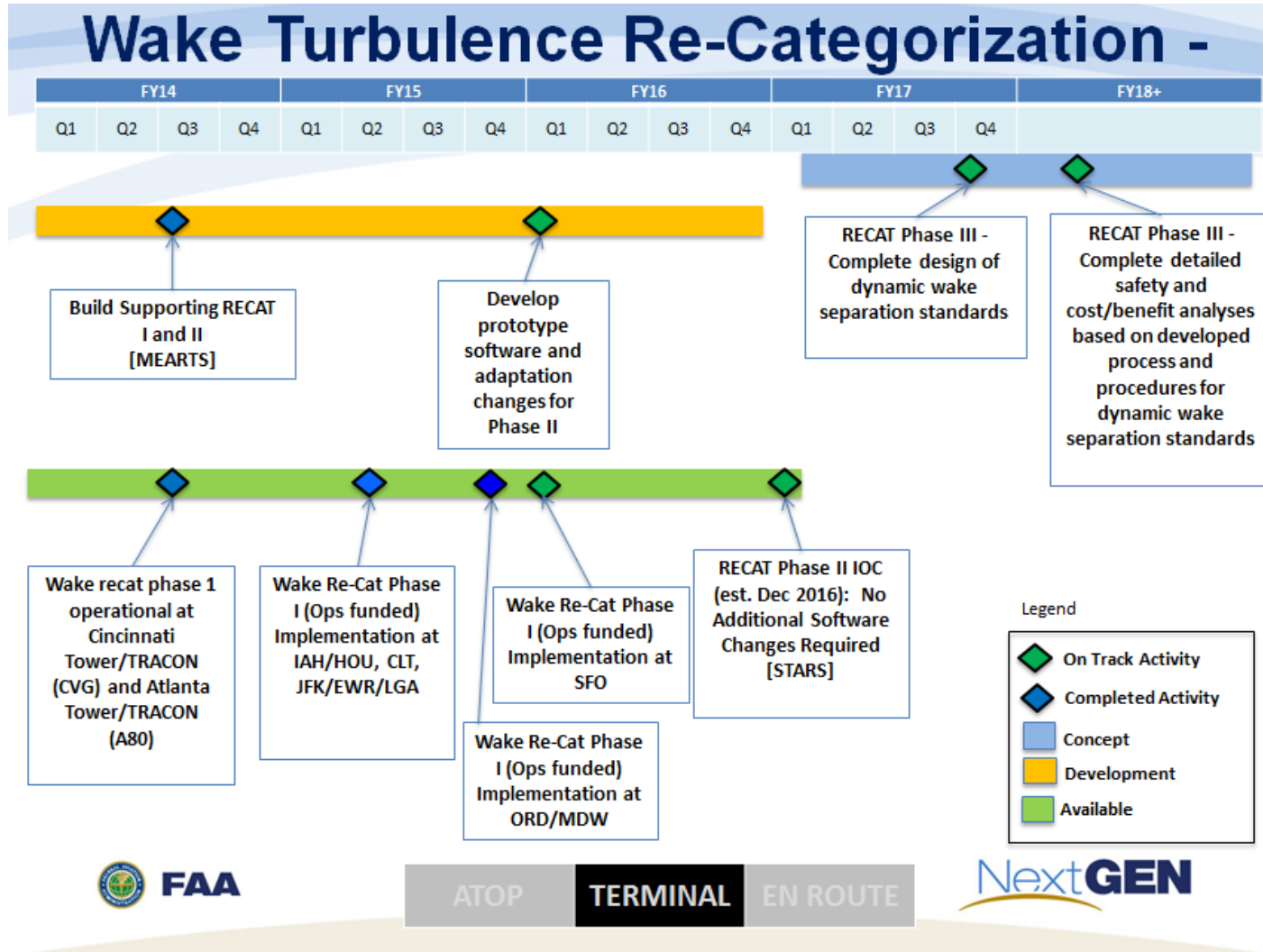
WTMA-PA



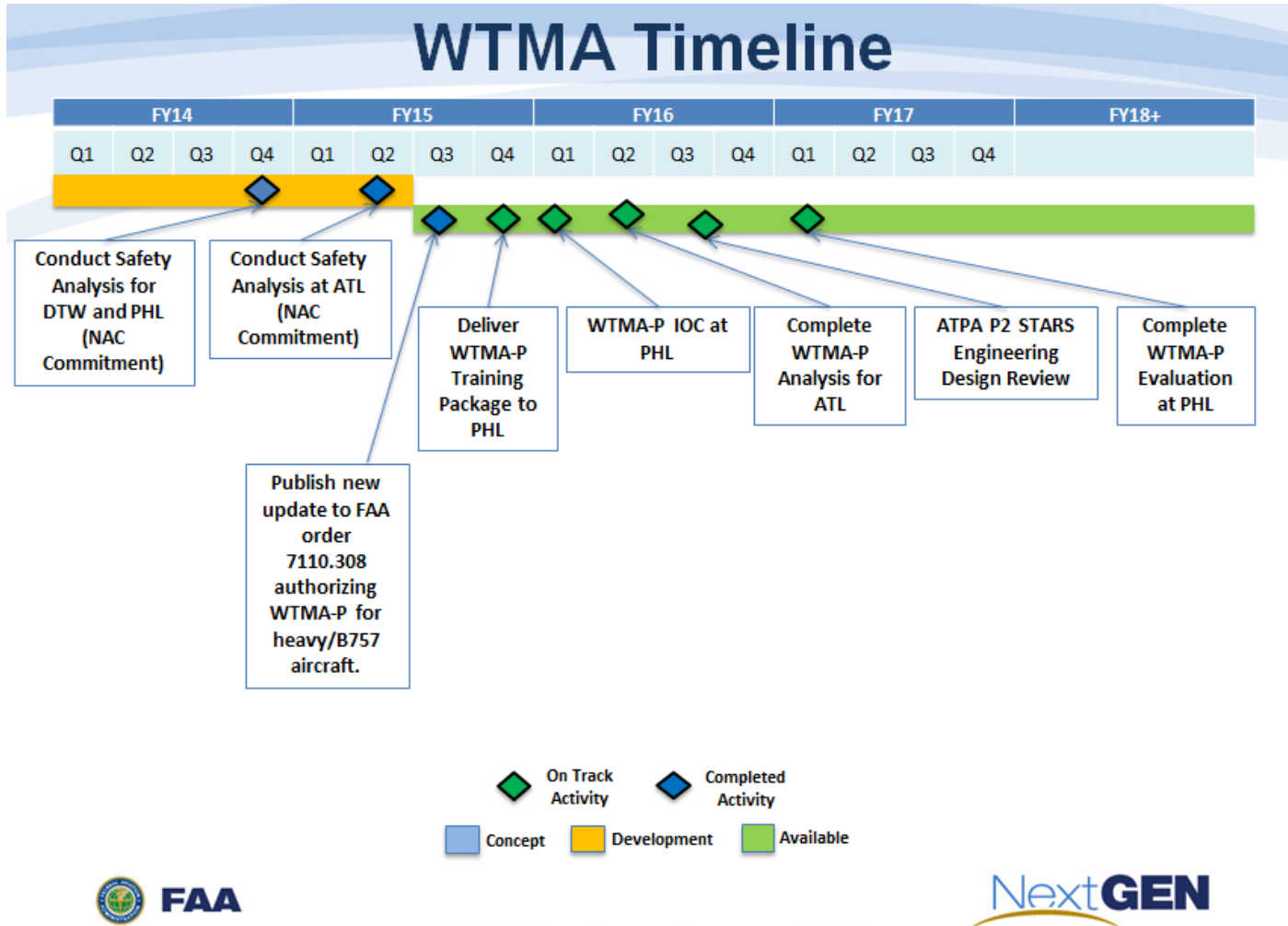
**** Notional Diagonal Separation (1.0 nm is the Collision Risk Minima)**



WakeNet USA - Future Topics

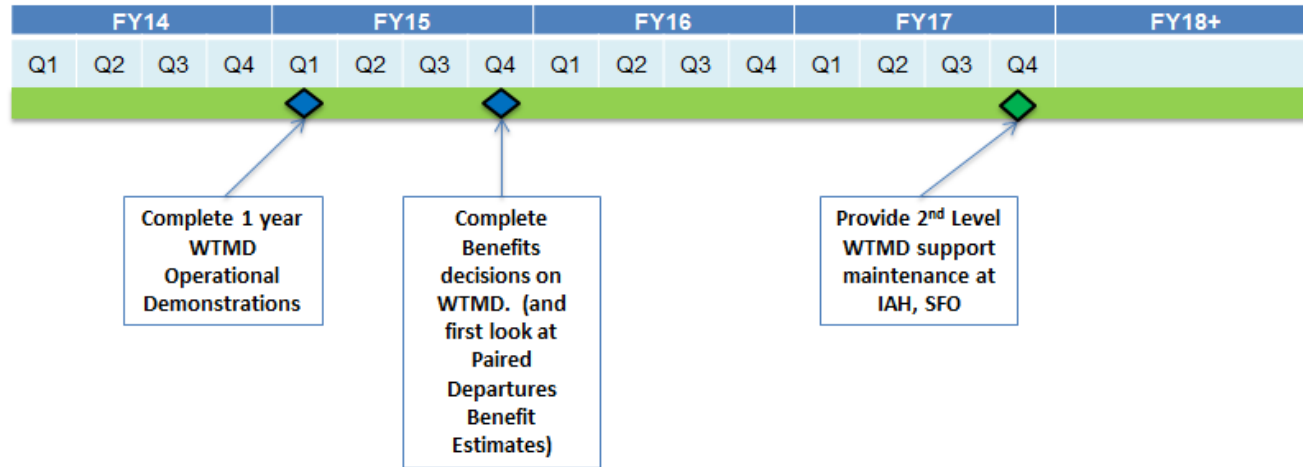


WakeNet USA - Future Topics



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WTMD Timeline



WakeNet USA – Coming Up

- Co-Hosted by
 - Jeff Tittsworth, FAA Wake Turbulence Research Office
 - Wayne Gallo, FAA Flight Standards Service Future Flight Technologies
- November 19-20, 2015
 - National Institute of Aerospace Headquarters
 - 100 Exploration Way, Hampton VA 23666, USA
 - Lat: 37° 4'57.19"N
 - Lon: 76° 23'54.11"W
- Further Coordination
 - Thomas Proeschel - thomas.h.proeschel@nasa.gov
 - Ashley Hoff - Ashley.Hoff@engilitycorp.com



WakeNet USA – Into the Future

- WakeNet USA Has Been Instrumental and Will Continue to be Influential, Especially as FAA Embarks on Solutions That Require Even Broader Interagency, Industry and Stakeholder Engagement.

