

AIRPORT WINDSHEAR DETECTION SYSTEMS:

5 steps for setup, siting and scanning strategies

Windshear can spell danger or disaster at an airport: It happens at altitude when aircraft are most vulnerable. Be ready with accurate detection and advance warning from a windshear detection system. Every airport is different, from location to traffic to types of windshear. Determining the best system, site and scanning strategy are critical for the highest accuracy and situational awareness — right when your airport and pilots need it. Here are the 5 steps for selecting, siting, and determining a scanning strategy for your windshear detection system.

Step 1. Evaluate your location

For the best location, accuracy and availability, work with an expert to get a site survey with analyses of all possible obstacles.

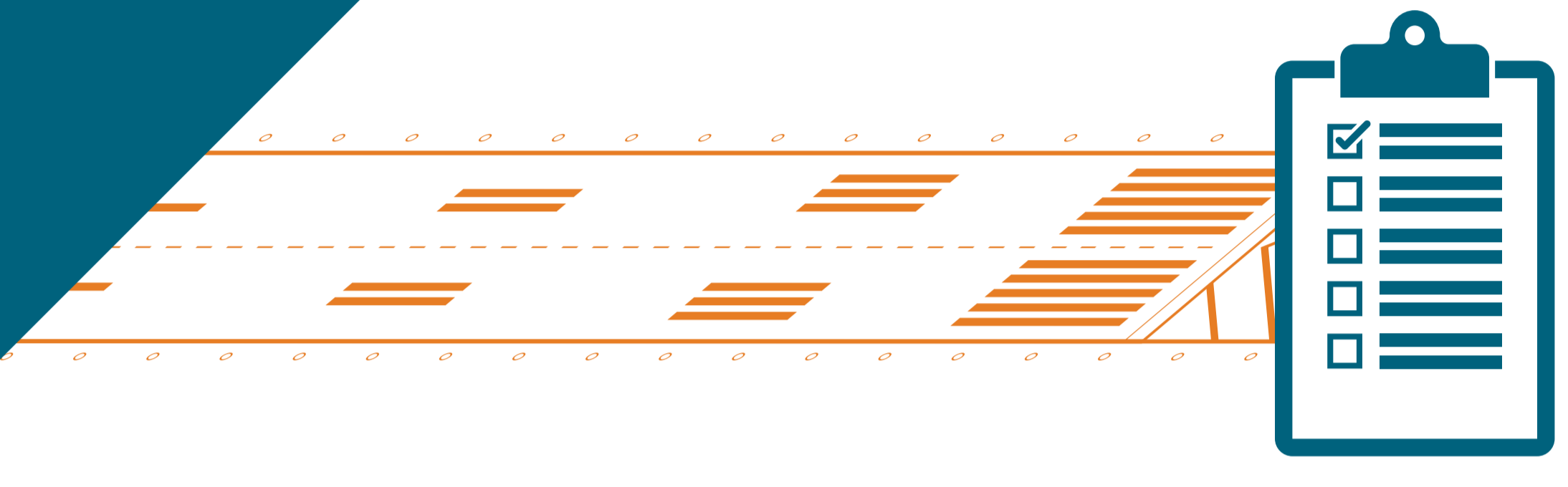
Location guidance

- Address practical and technical constraints
- Ensure high data availability in the area of interest

- Wind Lidar: Allow a clear view of the approach corridors by locating Lidar close to the runway center to cover both approaches
- Weather Radar: In addition to clear view to the approach corridors consider other weather radar data use cases when locating the weather radar

- LLWAS system: Perform site survey to ensure locations and access to possible wind mast sites
- Ensure high-quality windshear detection
- Maximum 30° of angle difference with runway direction to maximize headwind component on radial wind speeds

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Step 2. Select the detection system

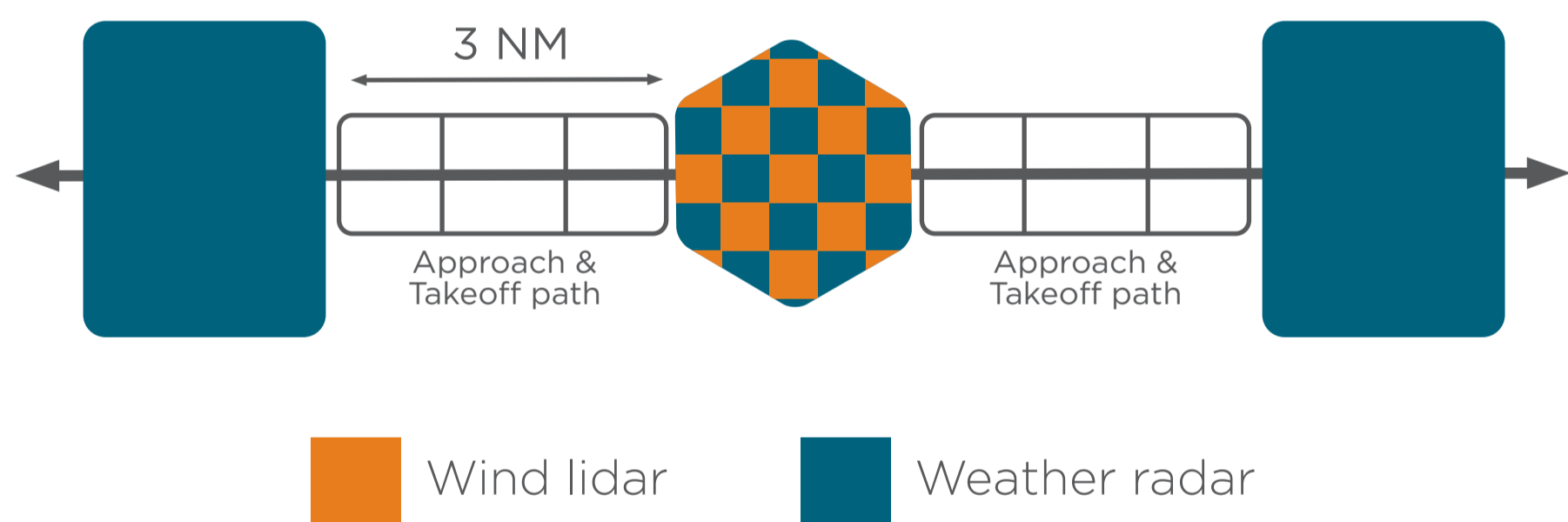
The three main measurement technologies are Low Level Windshear Alert Systems (LLWAS), weather radar and wind lidar. This table provides guidance on ideal systems depending on airport location, weather conditions and windshear type.

Weather Conditions	Non convective						Convective / Thunderstorm		
	Urban winds	Mountain	Valley / Katabatic-anabatic	Low level jets	Nocturnal jets	Sea / Land breezes	Gust front	Microburst	Downburst
Clear air	Lidar								LLWAS
Light rain									
Moderate to heavy rain	Radar								

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Step 3. Determine siting requirements

The ideal locations for lidar and radar depend on an airport's constraints. This illustration shows the best-case scenario for each. Some airports have one runway; others need additional sensors for the most accurate windshear detection.



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Step 4. Determine your scanning strategy

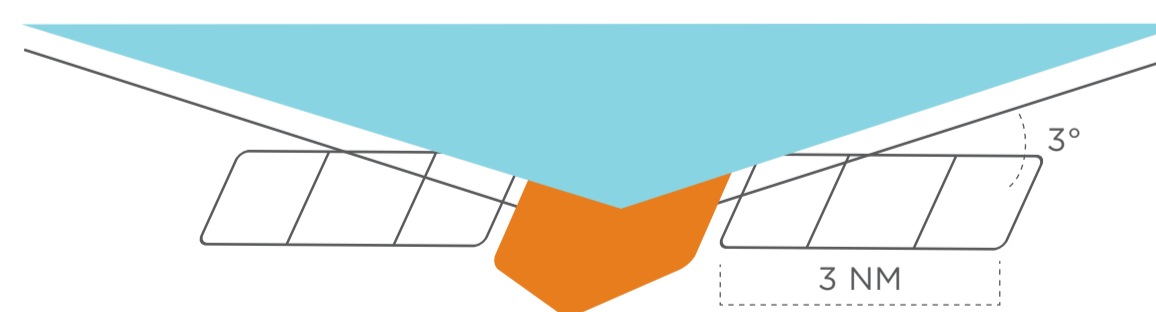
A typical scanning strategy for wind lidar is the azimuthal or plan position indicator (PPI) scan. This is a conical scan operated at an upward glide slope.

Scanning strategy

- PPI scan at glide slope elevation
- Physical resolution: 100-200 m
- Angular resolution: 1-3°

Data outputs

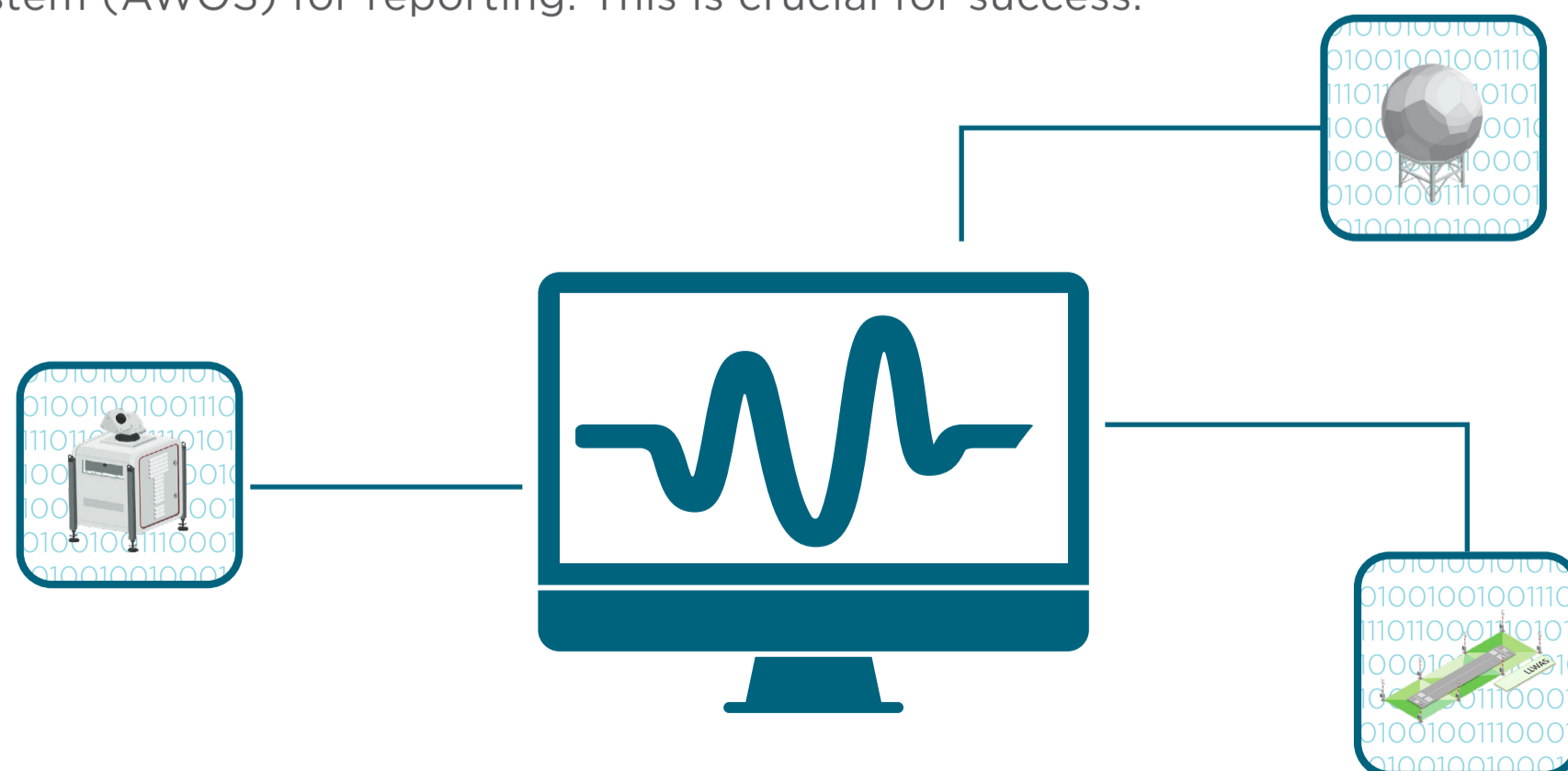
- Typical measurement ranges:
 - 10 km for wind lidar
- Update rate: Every 1-2 minutes or better



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Step 5. Integrate

Whatever system and configuration you choose, integrate the windshear data into a single system that links to an automatic weather observation system (AWOS) for reporting. This is crucial for success.



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