The French approach: inter-comparison, management of uncertainties, training of staff

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Runway Surface Conditions Assessment and Reporting

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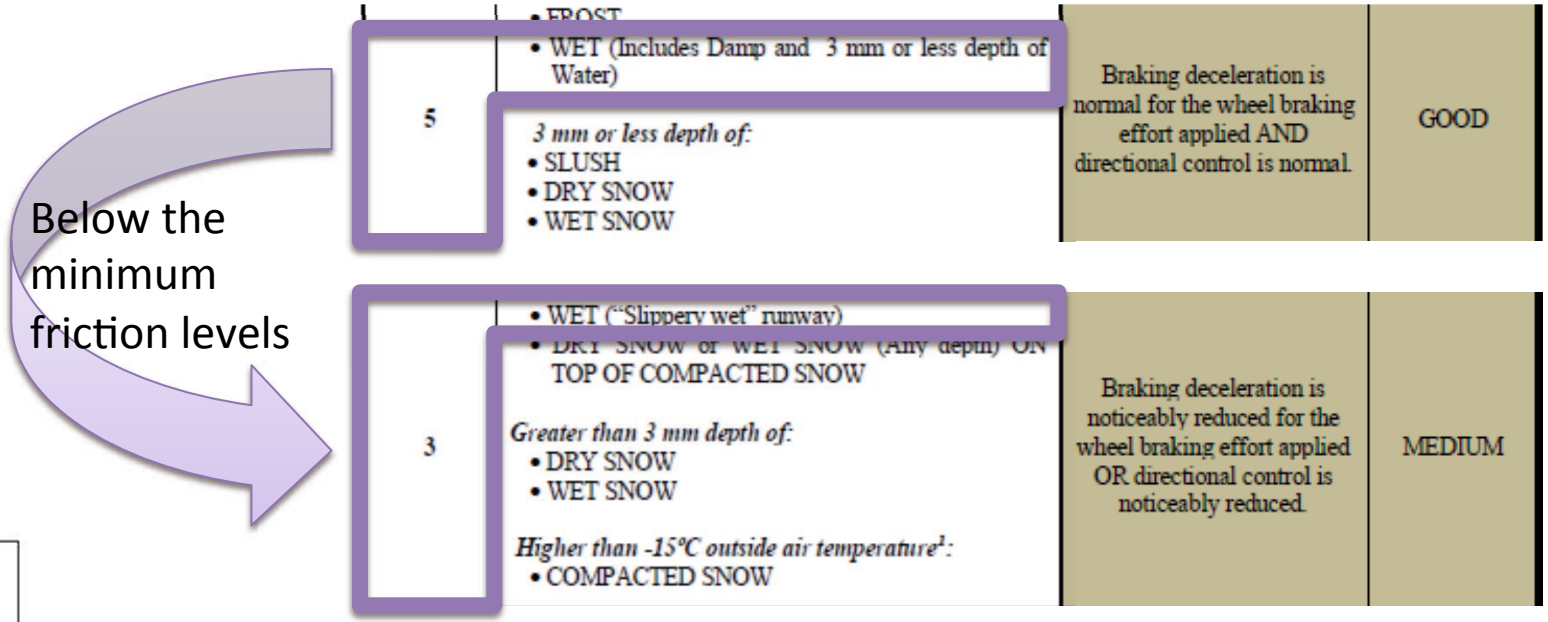
DGAC - Paris 15

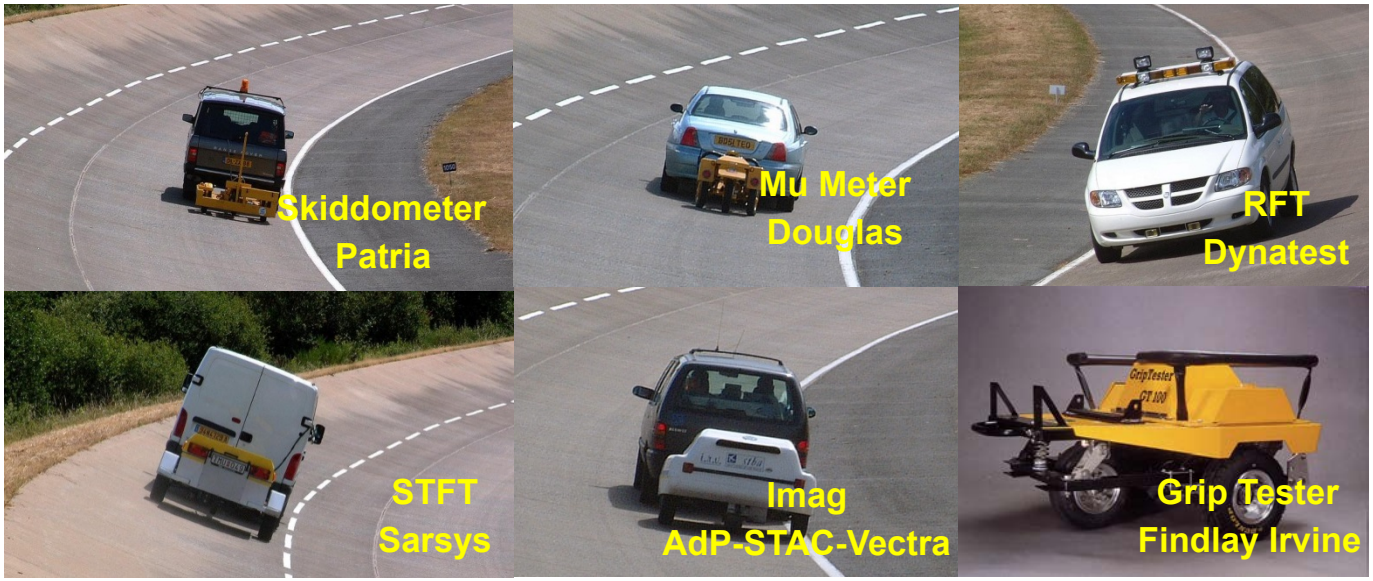
CONTEXT

- Implementation of the Runway Condition Report
- Definition of slippery wet runways in accordance with aircraft performances



CONTEXT

- Limitations of CFME measurements
  - Device-dependency of friction readings
  - Reproducibility
  - Device time stability



CONTEXT

- Background of inter-comparison
  - ICAO programme for correlating equipment used in measuring runway braking action (1970's)
  - Tire/Runway Friction Workshop at NASA WALLOPS Flight Facility (1990's)
  - International PIARC experiment to compare and harmonize texture and skid resistance measurements (1990's)
  - Joint Winter Runway Friction Measurement Program (1996-2003)
- Still today
  - ROSANNE in Europe
  - International Friction Workshop at Pennsylvania State University in the US

CONTEXT

- Issue with a rigid values – ex-ICAO table A1

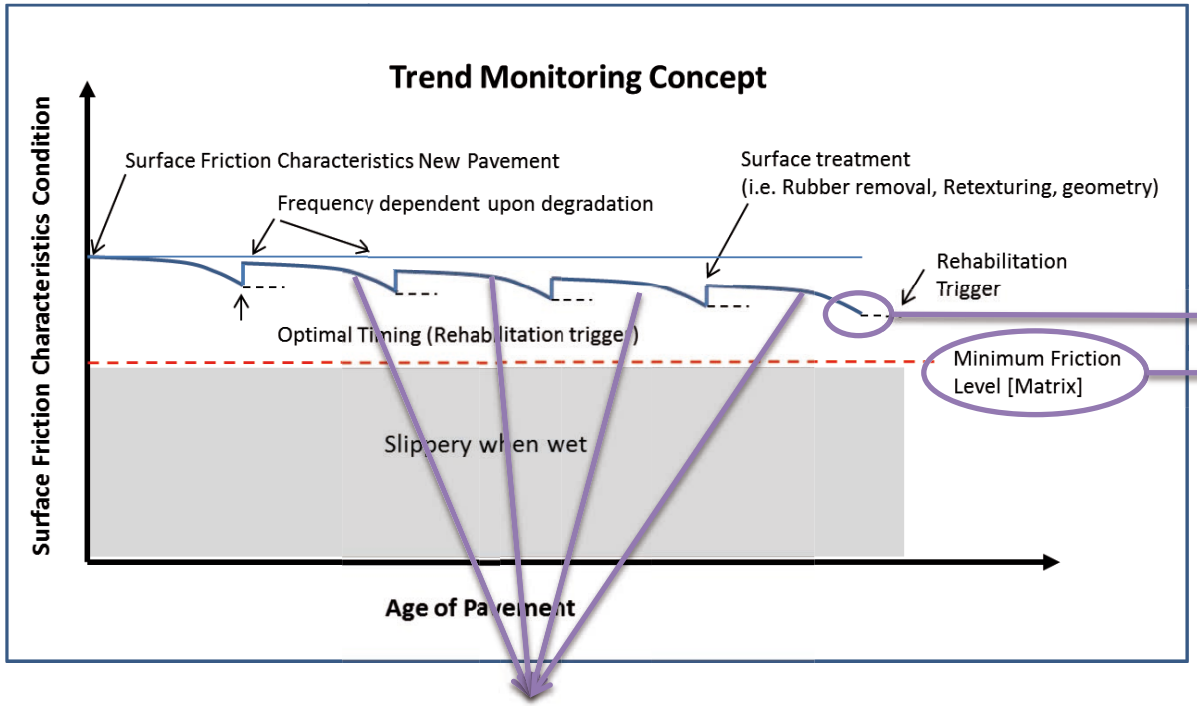
Table A-1. Friction levels for new and existing runway surfaces

Test equipment	Test tire		Test spe	Design objective surface	Maintenance planning level	Minimum friction level
	Type	Pressure (kPa)				
(1)	(2)				(6)	(7)
Mu-meter Trailer	A	70			0.52	0.42
	A	7			0.38	0.26
Skiddometer Trailer	B				0.60	0.50
	B				0.47	0.34
Surface Friction Tester Vehicle	B				0.60	0.50
	B				0.47	0.34
Runway Friction Tester Vehicle	B	2			0.60	0.50
	B	21			0.54	0.41
TATRA Friction Tester Vehicle	B	210			0.57	0.48
	B	210			0.52	0.42
GripTester Trailer	C	140	6	0.74	0.53	0.43
	C	140	95	0.64	0.36	0.24

Amendment 12 of ICAO Annexe 14

CONTEXT

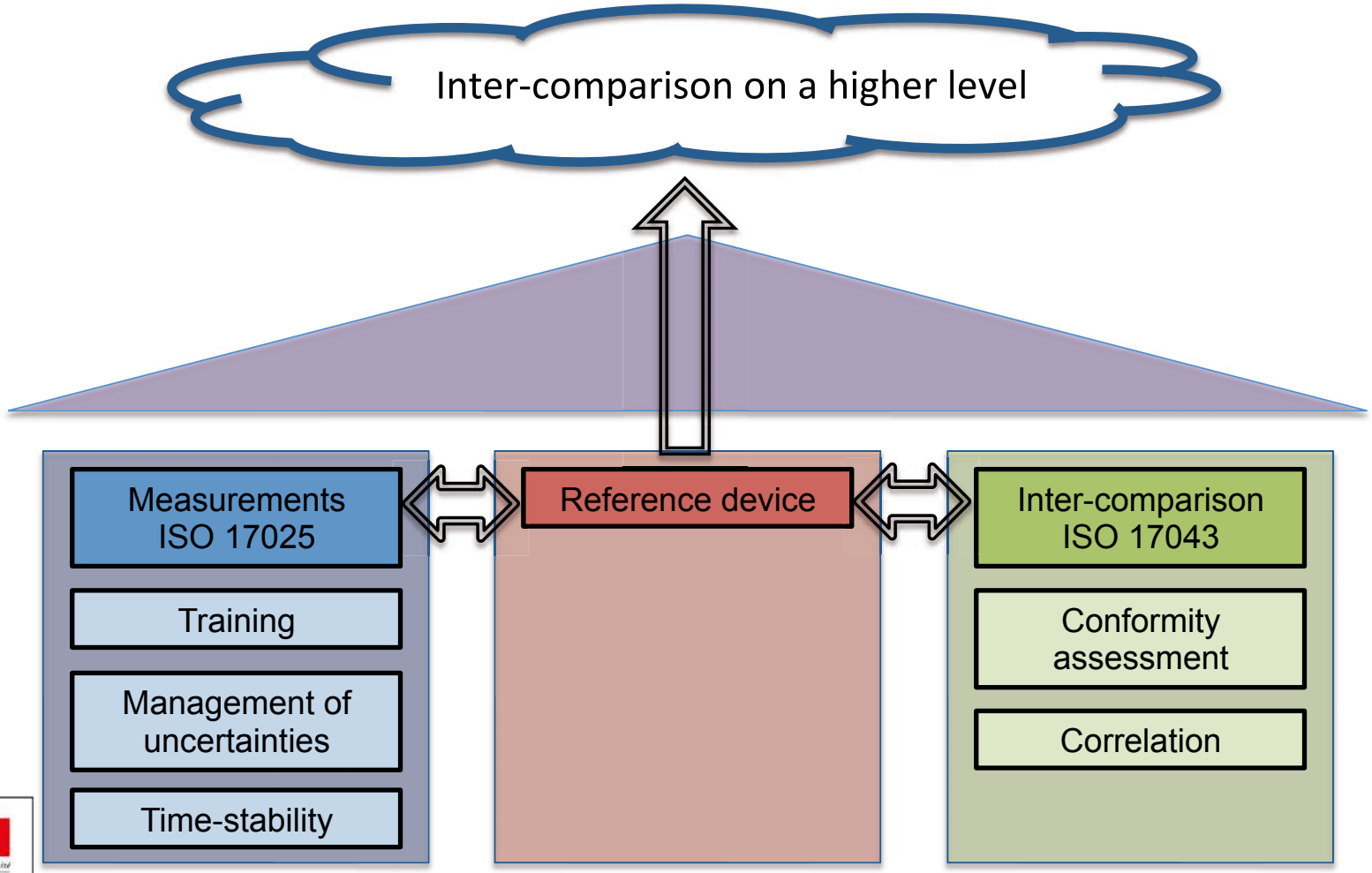
- Trend monitoring concept



What's the trigger?
Still necessary

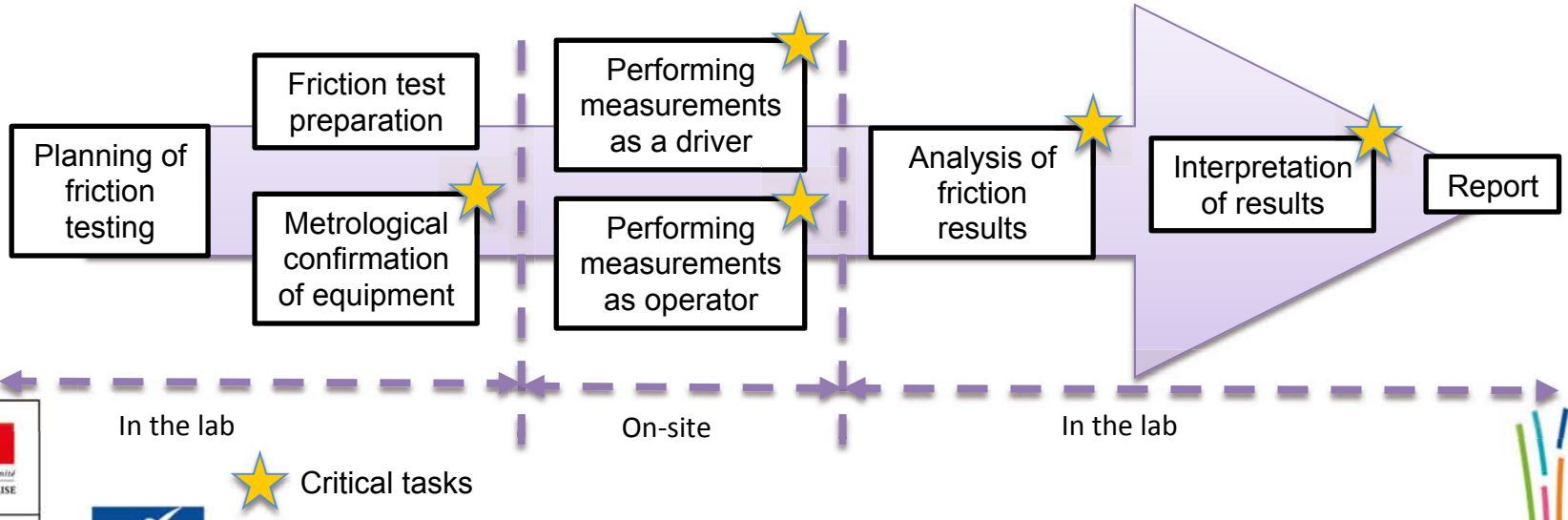
Is it the very same device?
Is the device time-stable?

FRENCH APPROACH



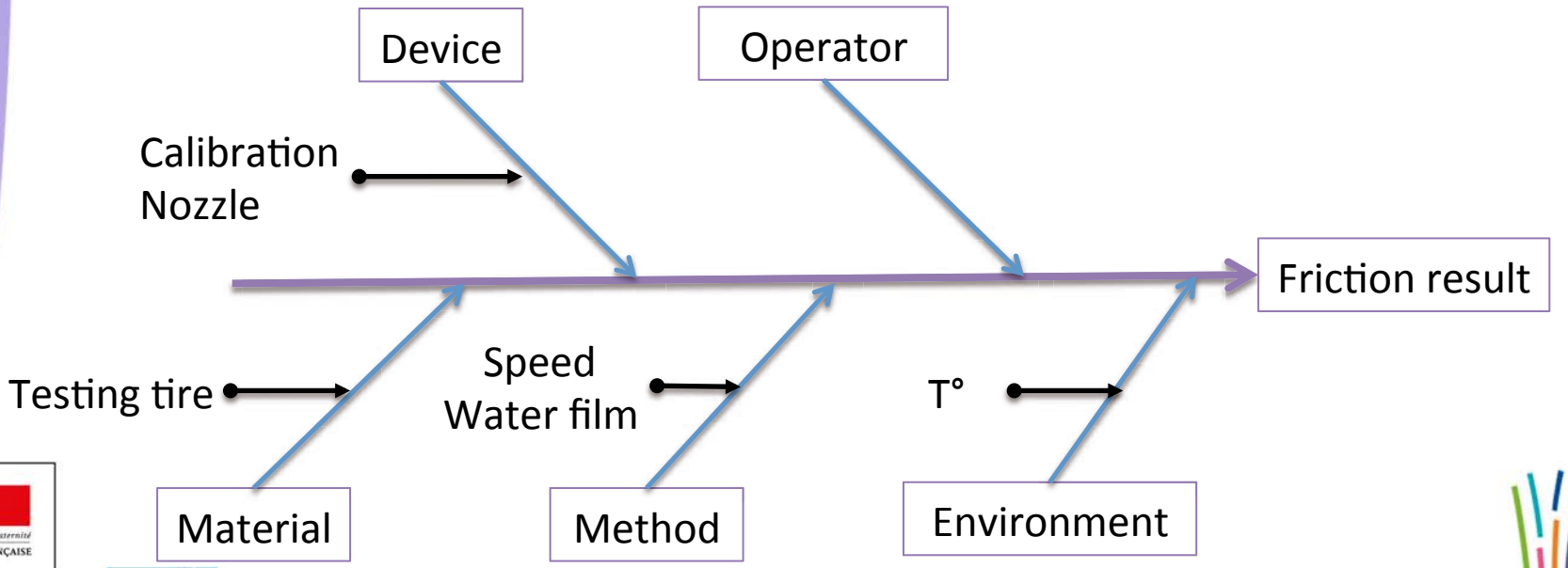
MEASUREMENTS

- Training
  - Identification of critical tasks
  - Definition of required skills
  - Development of criteria for qualification, renewal or suspension of qualification



MEASUREMENTS

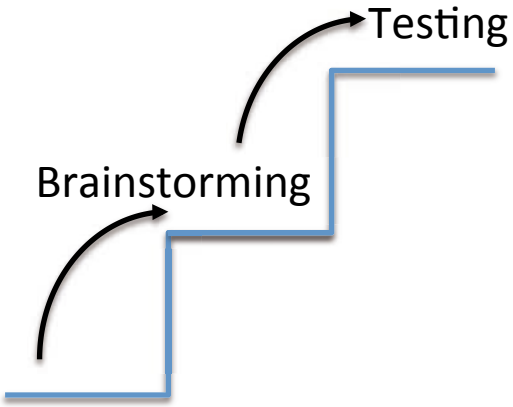
- Uncertainties
  - Identify all possible sources for uncertainties
  - Quantify the uncertainty due to these sources
  - Reduce the uncertainty of the measurement

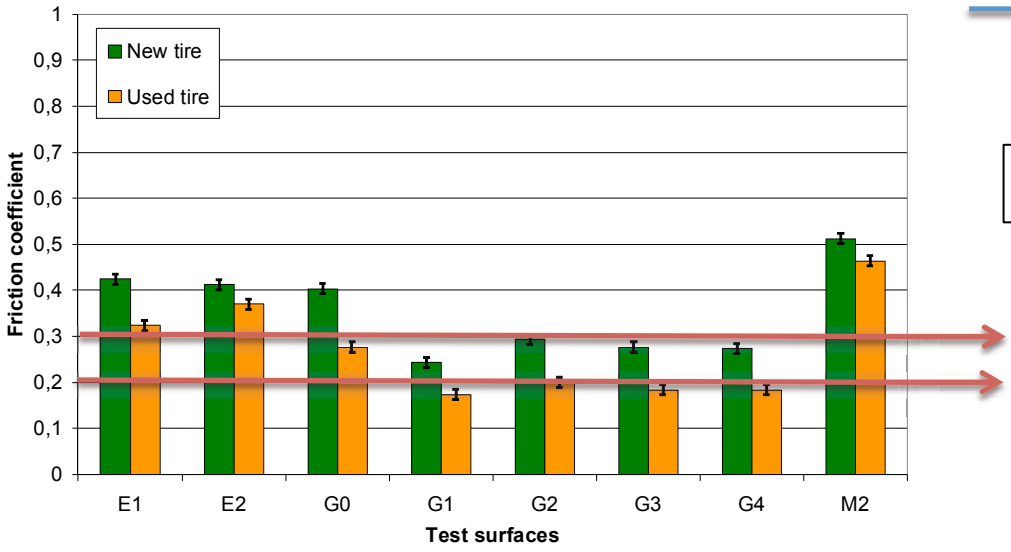


MEASUREMENTS

2 levels

- Level 2 -> Testing
- Level 1 -> Brainstorming





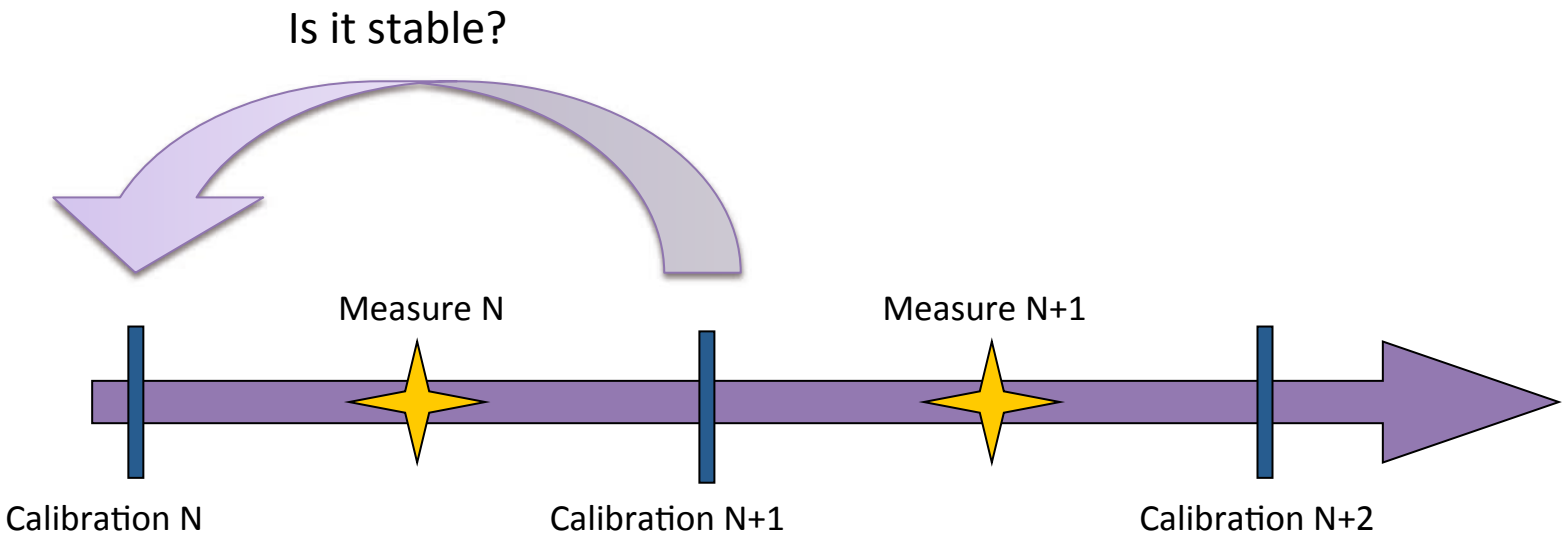
Effect of tire wear

Maintenance planning friction level

Minimum friction level

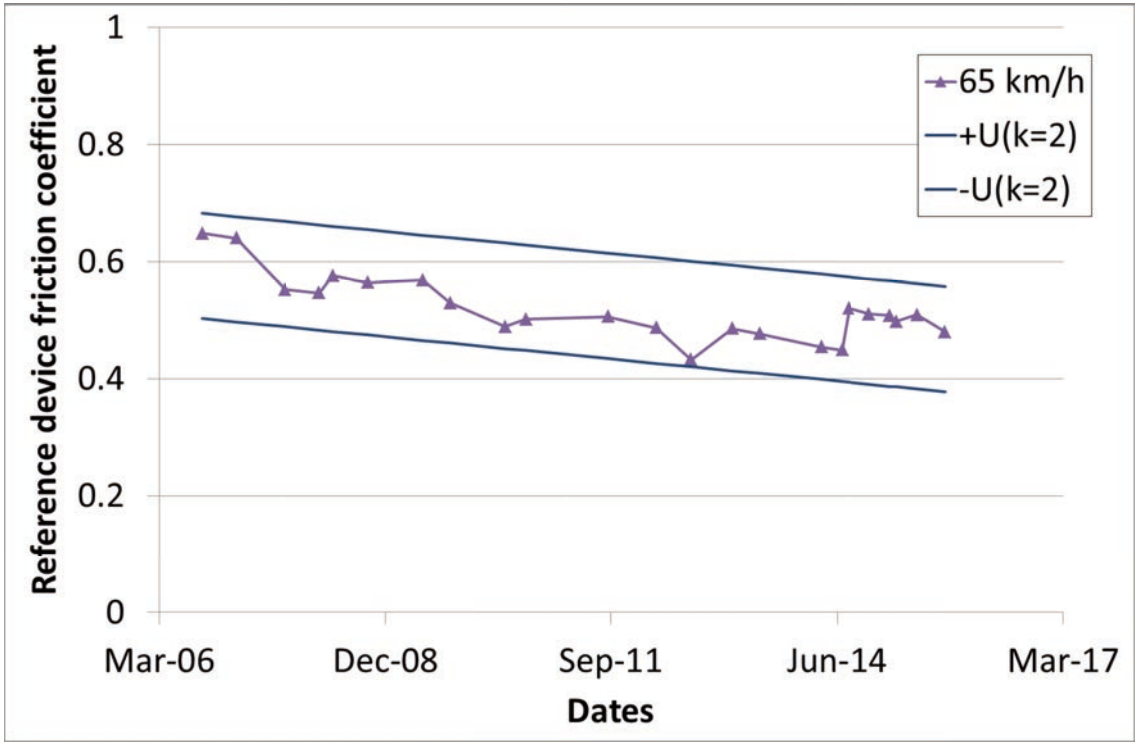
MEASUREMENTS

- Stability
  - Through the calibration

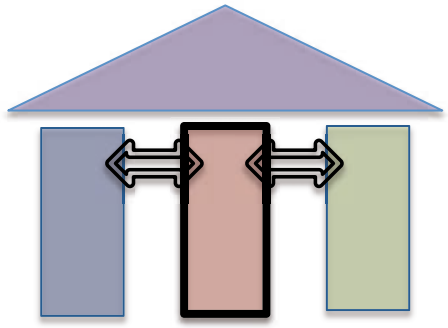


MEASUREMENTS

- Stability
  - Through tests on a reference surface



REFERENCE DEVICE



- Used by an ISO 17025 lab
- Used for CFME inter-comparison
- Participated to international test campaigns
  - Tire/Runway Friction Workshop at NASA WALLOPS Flight Facility
  - Joint Winter Runway Friction Measurement Program
  - International Friction Workshop (2013)
  - ROSANNE (2014, 2015)
- Time-stable

REFERENCE DEVICE

Correlation with aircraft performances?

FAA

CAA UK

DGAC

INTER-COMPARISON

Conformity assessment

Correlation

INTER-COMPARISON

- Test facility

Test surface		Material
E1		Semi-granular bituminous concrete (0/10)
E2		Semi-granular bituminous concrete (0/10)
M2		Very thin bituminous concrete (0/6)
G5		Slightly painted surface
G6		Painted surface +
G0		Low friction asphalt concrete
G4		Painted surface +++
L1		Resin Epoxy

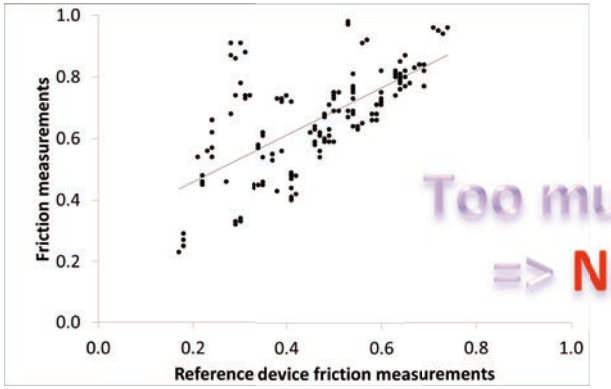
Medium to high friction level

Low friction level, around the minimum friction level of the reference device

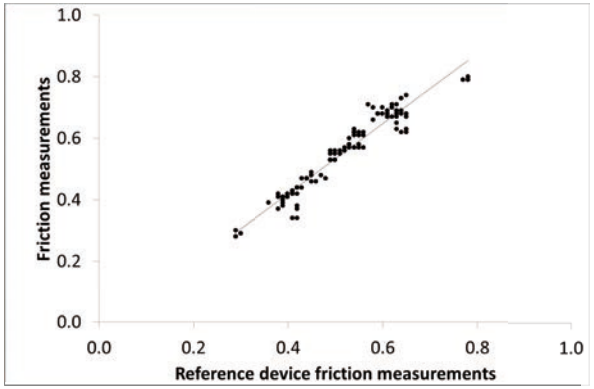
Very low friction level

INTER-COMPARISON

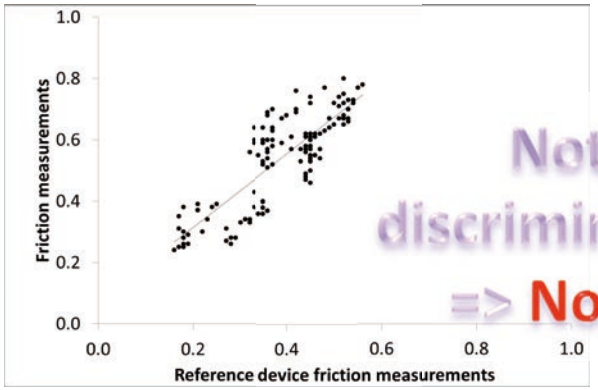
- Results



Too much dispersion
=> Not conform

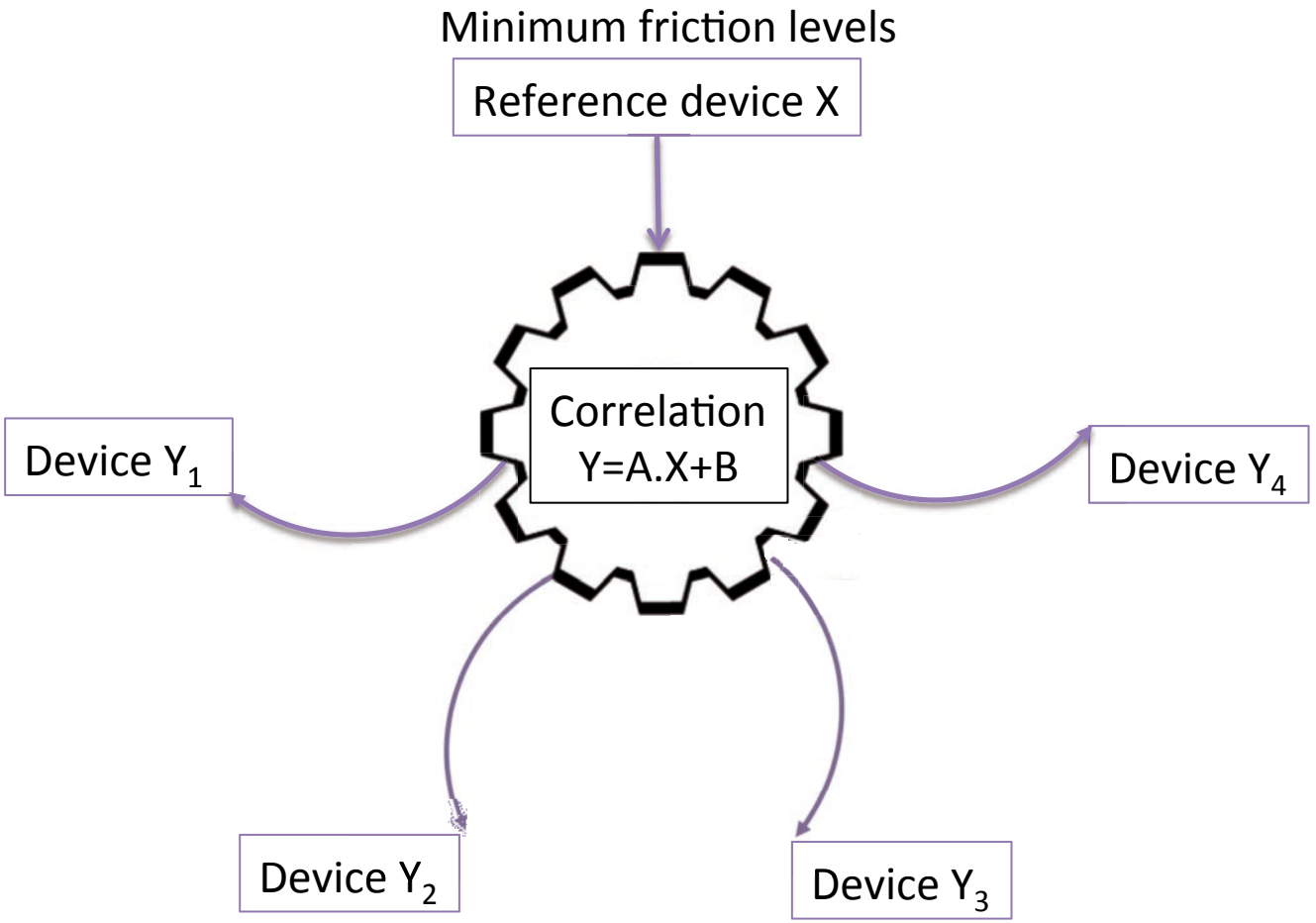


Few dispersion
Surface discrimination
Good correlation
=> Conform



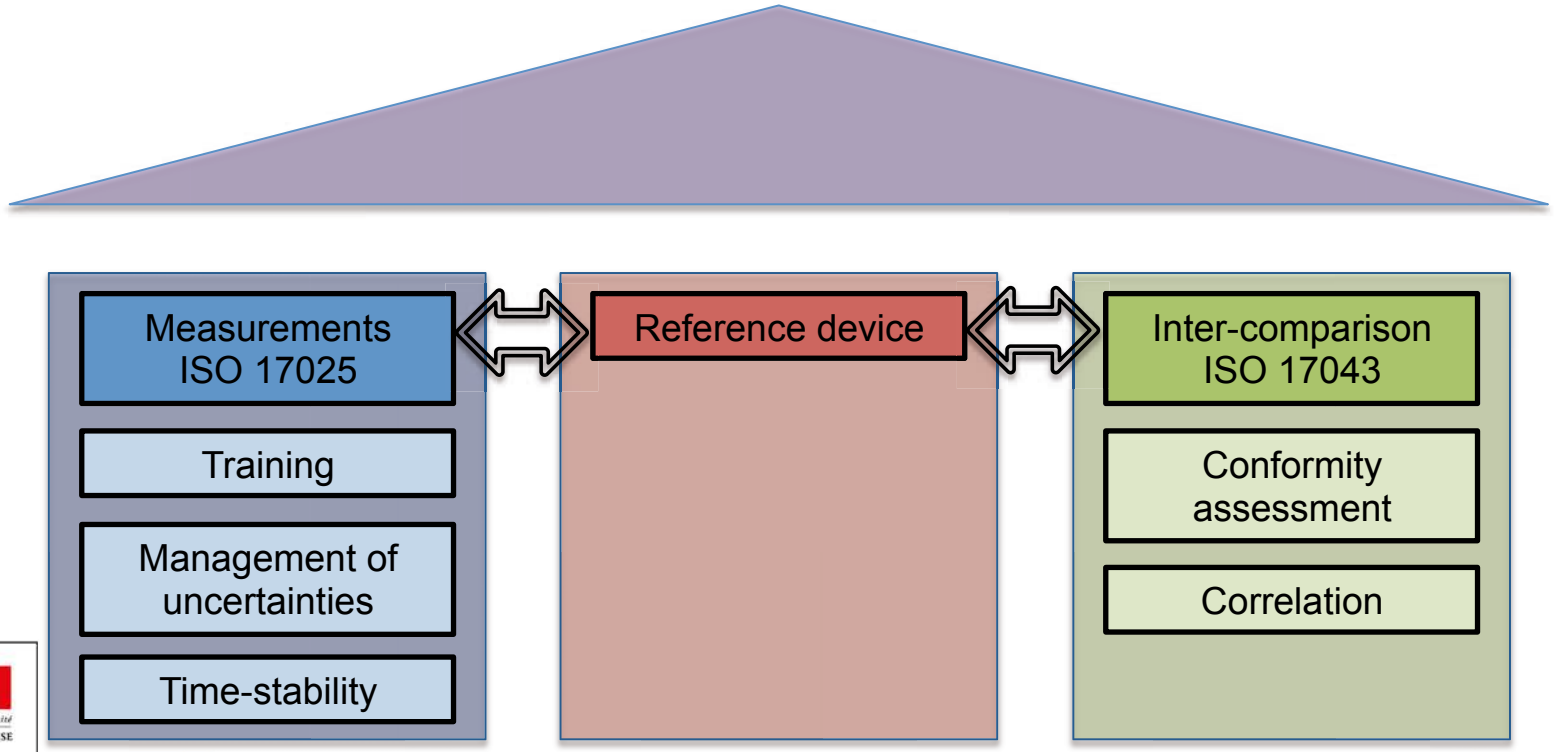
Not able to
discriminate surfaces
=> Not conform

INTER-COMPARISON



CONCLUSION

- Reduction of the overall uncertainty of friction measurements



CONCLUSION

- Plan for actions
  - Inter-comparison Mu-Meter/IMAG
  - Promotion of inter-comparison
    - On a local scale
    - On a regional scale
  - Regular updating of minimum friction levels

THANK TO THE WHOLE TEAM

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- Claire Azoulay

Thank you for listening!