



Overall Assessment Estimated Runway Surface Friction

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Agenda

1. Introduction
2. Swiss Regulation
3. ESF Overall Assessment Method
4. Experiences



Introduction



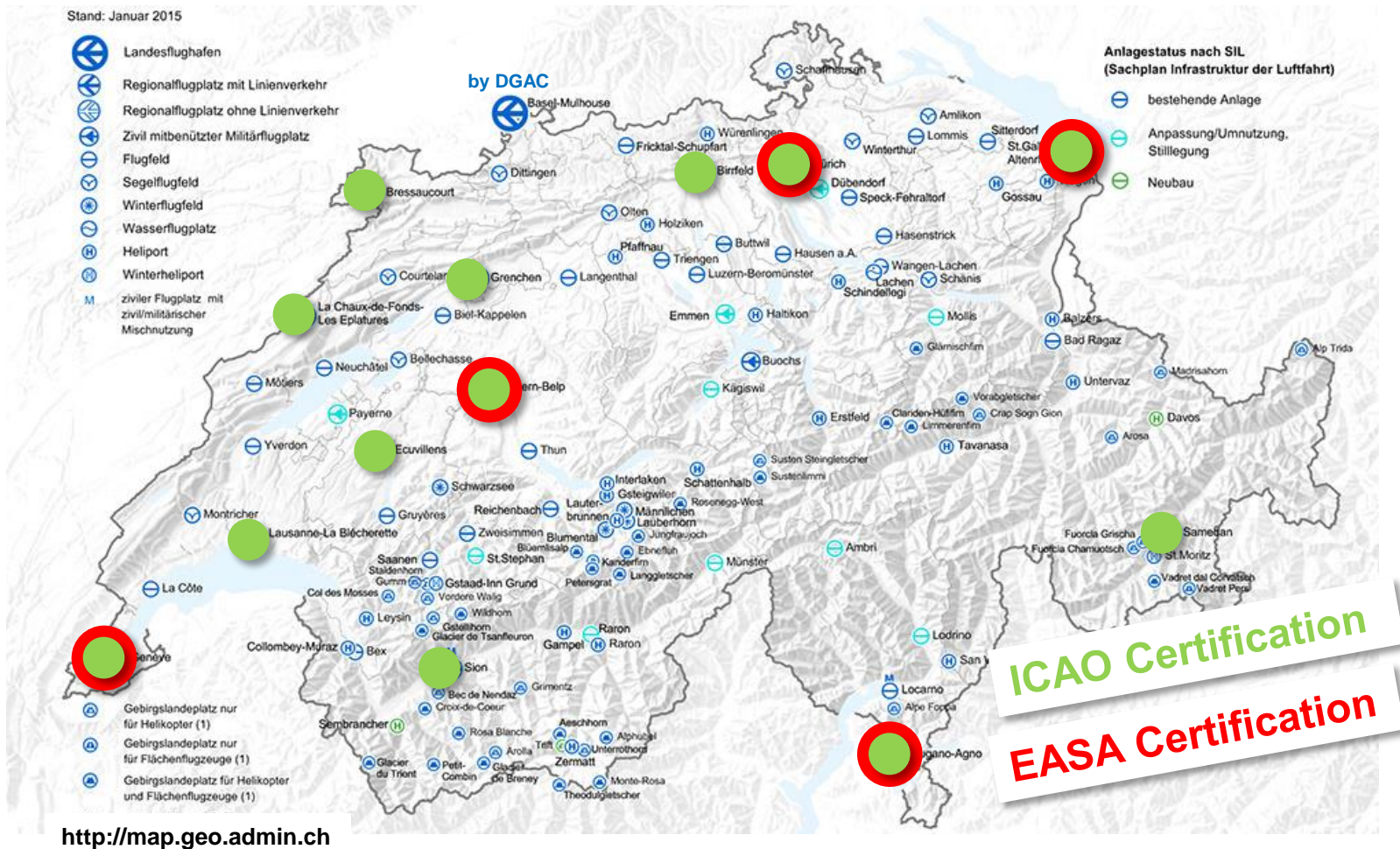
Switzerland

- 4 national languages (D, F, I, Rumantsch)
- Federal Office of Civil Aviation (Bern, Zurich Airport)
- Approx. 200 staff (6 Aerodrome team)

- 3 National aerodromes
- 11 Regional aerodromes
- 44 Airfields
- 26 Heliports
- 40 Mountain Landing Sites (no infrastructure)



Swiss Aerodromes





Swiss Regulation



Swiss Regulation for Aerodromes

- Assessment and reporting of Runway Surface Friction if open to **public use** and **commercial** air traffic
- Operational: if operating on **contaminated runways**
 - Runway policy (e.g. black runway ops only)
 - ESF by «overall assessment»



Swiss Regulation for Aerodromes

- Design and Maintenance: at least every **5 years** or after **resurfacing**
 - Design Objective (ICAO)
 - Maintenance Planning Level (ICAO)
 - Minimum Friction Level (ICAO)





Existing Limitations

1. FC measurement on **wet contamination**
(accuracy, repeatability of measuring devices)
2. Uncertainties for **correlation** between measured FC and aircraft BA (aircraft type, configuration etc.)
3. No harmonised **assessment method** and **reporting format** (yet) due to lack of international consensus (many national solutions)



ICAO Development

- Amendment 11A, Annex 14 Vol. I (Nov 2013) et al. as initial response to limitations:
 - Reporting of ESF (instead of BA)
 - ESF by «Overall Assessment»
 - Direct reporting of FC deleted
 - FC on ice / compacted snow as ESF indication
- Criteria for «Overall Assessment» open



Swiss ESF Overall Assessment

1. FC primary indicator
2. Downgrading options (from RCAM by TALPA ARC)
3. SNOWTAM code 1-5

no adopted ICAO alternative

**SNOWTAM
Code (1-5)**

Airport Estimated Runway Condition Assessment			Pilot Reports (PIREPs) Provided To ATC And Flight Dispatch
Runway Condition Assessment - Reported		Downgrade Assessment Criteria	
Code	Runway Description	Mu (μ)	PIREP
6	• Dry	-	Dry
5	• Wet (smooth, Grooved or PFC) • Frost 1/8" or less of: • Water • Slush • Dry Snow • Wet Snow	40 μ or higher	Good
4	At or below -13°C: • Compacted Snow	39-36 μ	Good to Medium
3	• Wet (Slippery) At or below -3°C: • Dry or Wet Snow greater than 1/8" Above -13°C and at or below -3°C: • Compacted Snow	35-30 μ	Medium
2	Greater than 1/8" of: • Water • Slush Above -3°C: • Dry or Wet Snow greater than 1/8" • Compacted Snow	29-26 μ	Medium to Poor
1	At or below -3°C: • Ice	25-21 μ	Poor
0	• Wet Ice • Water on top of Compacted Snow • Dry or Wet Snow over Ice Above -3°C: • Ice	20 μ or lower	Nil

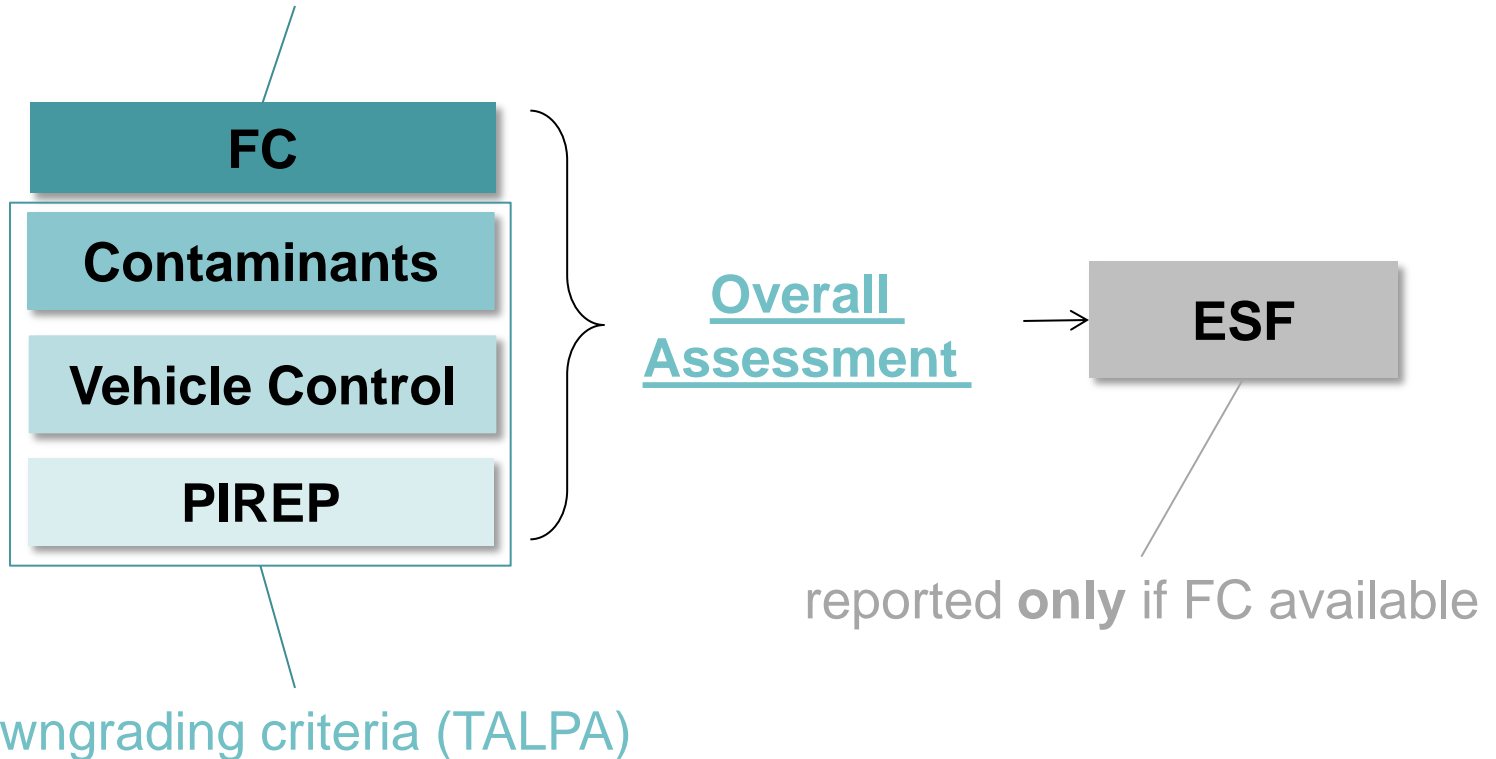
FC

+ downgrading



Swiss ESF Overall Assessment

primary indicator (**only** on compacted snow, ice)





Swiss ESF Assessment Matrix

Measured FC *	Downgrade Criteria (based on TALPA ARC)			ESF
	Contaminants	Vehicle Control	PIREP	
0.4 or higher	(FROST) (WET, WATER 3mm or less) (SLUSH, 3mm or less) (DRY SNOW, 3mm or less) (WET SNOW, 3mm or less)	Braking deceleration AND directional control normal	GOOD	GOOD
0.39 – 0.36	COMPACTED SNOW (OAT -13°C or colder)	Braking deceleration OR directional control good to medium	GOOD to MEDIUM	GOOD to MEDIUM
0.35 – 0.30	(WET, slippery when wet) (DRY SNOW, more than 3mm) (WET SNOW, more than 3mm) COMPACTED SNOW (OAT -3°C to -13°C)	Braking deceleration noticeably reduced OR directional control slightly reduced	MEDIUM	MEDIUM
0.29 – 0.26	(WATER, more than 3mm) (SLUSH, more than 3mm) COMPACTED SNOW (OAT -3°C or warmer)	Braking deceleration OR directional control medium to poor	MEDIUM to POOR	MEDIUM to POOR
0.25 or lower	ICE	Braking deceleration OR directional control significantly reduced	POOR	POOR

* only on compacted snow, ice (ICAO), no upgrading



Reporting to Flight Crews

- ESF reported **only** if measured FC available

ESF (TWR)	SNOWTAM Code	METAR / SPECI Code
GOOD	5	95
GOOD to MEDIUM	4	94
MEDIUM	3	93
MEDIUM to POOR	2	92
POOR	1	91

Relaying of BA PIREPs by TWR (wet conditions)



Equipment

FC

- Skiddometer
- Surface Friction Tester
- Mu-Meter
- Decelerometer

Contamination

- Tyre Tread Gauge
- Future: runway sensors?





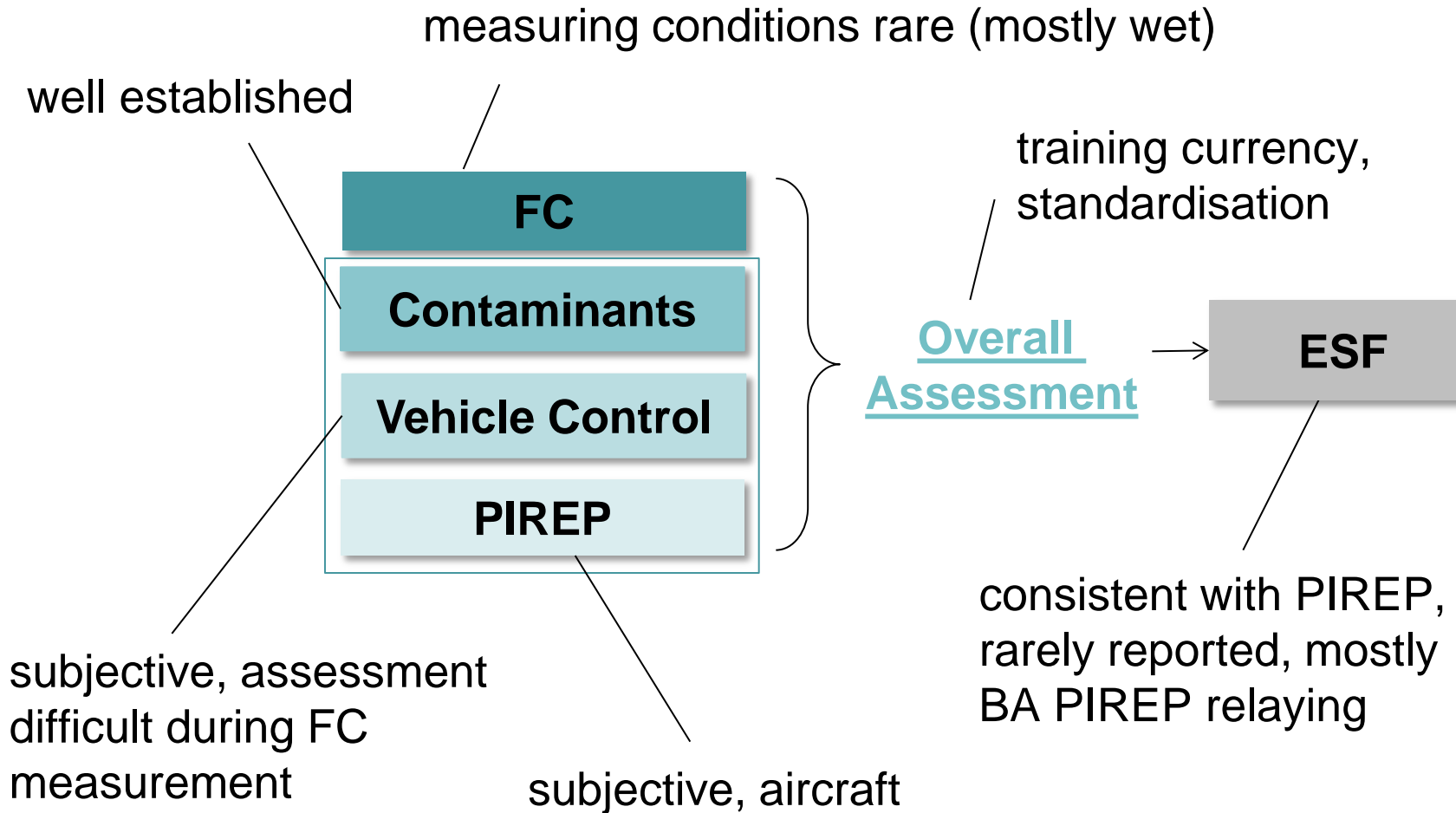


Lessons Learned





Lessons Learned





Lessons Learned

- **Normal case** = wet contamination → no FC
→ no **ESF report** → **relaying of BA PIREPs**
- Assessed ESF mostly consistent with PIREPs, but downgrading remains subjective
- Future method should be simple and objective

- **New Enhanced Global Reporting Format for Runway Surface Condition** strongly supported!
 - One single format for runway condition
 - Contamination as primary indicator
 - Keep FC as objective element for downgrading

