OPERATIONAL SAFETY INDICATORS AND TARGETS

European ATM Safety Conference
Beograd, 27-28 October 2010
**Concepts**

**level of safety** is the degree of safety of a system. It is an emerging property of the system, which represents the quality of the system, safety-wise. It is expressed through safety indicators;

**safety indicators** are the parameters that characterize and/or typify the level of safety of a system;

**safety targets** are the concrete objectives of the level of safety;

**acceptable level of safety** is the minimum degree of safety that must be assured by a system in actual practice;

(ICAO DOC 9859 – SMM)
Effort

ACCEPTABLE LEVEL OF SAFETY

SAFETY TARGETS

SAFETY INDICATORS
Setting Targets

• Quantitative safety targets (if possible);
• Qualitative safety targets, expressed in industry-recognised ways (e.g. ALARP);
• Applicable national or international standards for performance of the ATM system or its elements;

“The defined baseline can be a mixture of some or all of the above”.

(SRC POL DOC 3)
Setting Targets – industry overview

\[ n \times 10^{-m} \]

**OCCURRENCIES**
(accidents, incidents of a given severity, specific occurrences)

- flight hours
- sector/unit operative/working hours
- “missions” (i.e. average flight, 1.5 hours)
- movements
- specific operations (takeoff, landing)
(ECAC region) Maximum tolerable probability of ATM direct contribution to:

**ACCIDENT**
- $1.55 \times 10^{-8}$ per Flight/Hour

**INCIDENT**
- future revision of ESARR 4
- should be determined at ECAC / national level
Choosing Indicators

Typical ESARR2 Indicators

- Accidents
- Incidents
  - Near collision
  - Potential for collision or near collision
  - ATM-specific occurrences (ability to provide safe ATM services)
Choosing Indicators

Eurocontrol – SAFER

Key Safety Indicators

• Separation Minima Infringement
• Runway Incursion

Other Key Safety Issues

• Unauthorised Penetration of Airspace
• Aircraft Deviation from ATC Clearance
• Level Bust
• Near CFIT
Choosing Indicators

FAA examples:

- % of flights complying with existing separation rules
- In case of separation loss, % of actual compliance with applicable separation
ENAV Safety Plan 2010

Targets

- no ATM accidents or total inability to provide service
- 0.4 ATM related class A incidents x 100,000 flights ($4 \times 10^{-6}$)

Indicators

- Reporting levels
- ESARR 2 (Key S.I: Runway incursions and SMIs)
- “Fuori Norma” preliminary evaluation (separation actually assured and expressed as a percentage of that applicable, in a combination of the applicable separation and the rate of closure)
  + “exploring” APF
Quarterly Safety Report

- adherent to ESARR 2 principles and international methodologies;
- Disseminated to IATA and EUROCONTROL EVAIR;
- aimed to provide up-to-date safety monitoring and wide information.
ENAV Safety Monitoring

Annual Safety Report

- adherent to ESARR 2 principles and international methodologies;
- aimed to provide up-to-date safety monitoring and wide information;
- depicting safety performance trends and target hitting
A look at main ENAV indicators
FN - Fuori Norma ("out of the rule")
preliminary evaluation of separation loss

Not a collision risk assessment, but just an aid in:

- Prioritizing investigations
- Assigning proper resources
Fast and simple method for a “pre-evaluation”:

- TXT radar data
- Excel worksheet
**ENAV Ops. Safety Indicators**

- **FN – How does it work?**

- **Excel Worksheet**

  **Evaluates RoC and Separation**

  **Rate of Closure Table**

<table>
<thead>
<tr>
<th>Separation</th>
<th>≤25%</th>
<th>≤25%</th>
<th>&gt;25%</th>
<th>&gt;25%</th>
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<tbody>
<tr>
<td>10</td>
<td>11</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>8</td>
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<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;50% &gt;75%</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>&gt;75%</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>&gt;1000ft/min</td>
<td></td>
<td></td>
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</tbody>
</table>

- **In norma**
  - Fuori Norma
  - Fuori Norma 75
  - Fuori Norma 50
Aerospace Performance Factor

Aggregates multiple operational safety risks into **ONE** graphical performance representation over time, based on historical indicators.
ENAV Ops. Safety Indicators

APF – An example

ESARR 2 “Mindmap”

Airspace Infringement
Near Controlled Flight into Terrain
Lost Bats

Prolonged Loss of Communications
A/C Deviation from ATC Clearance
A/C Deviation from ATM Procedure
A/C Deviation from ATM Regulation

Potential Near Collisions Air

Ground Incidents

Runway Incursion
All Ground Incidents which are not Runway Incursion

ESARR 2 AIP

Inadequate Separation
Separation Mismatch Infringement

Air Incidents

ATM Specific Occurrences

AEROSPACE PERFORMANCE FACTOR - EUROCONTROL

CHART

CALCULATIONS

NAVIGATION:

AI

Mindmap Link

- Path Near Coll Air
- Airline Events
- G
- ATM Specific

CALENDAR YEAR DATE RANGE

[01/2006 - 12/2008]

submit >>

DISPLAY TYPE

- Monthly

- Quarterly

REGISTRATION:

- Yes

- No

- Other

- None
ENAV Ops. Safety Indicators

APF advantages:

• Easy monitoring
• Organizational performance then “drill down” into causal factors
• Graphical representation of Safety levels

ENAV peculiarities:

• Integration with ASMT
• Integration of “intangible” factors (safety promotion, investments...)
ENAV Ops. Safety Indicators

ENAV objective through APF

ENAV SAFETY indicator

ENAV “customized” APF

ESARR 2 APF (based on reporting)  ASMT  Intangible Safety factors
Aiming to assess its own Safety Culture maturity, ENAV requested EUROCONTROL support for an in-depth analysis on about 2000 people.

Surveyors involved in:
- preparing the material
- conducting the survey
- analyzing the results
- elaborating the Final Report
Managing Safety KPIs

- Continuous “real time” high-level picture triggered by alerts
- Deeper look on scheduled periodical basis
- Action as appropriate
- Feedback
Conclusions

Not “measuring the unmeasurable”; instead:

- setting appropriate safety targets
- constantly monitoring safety performance (and taking necessary actions)
- dynamically reviewing and updating indicators towards set targets
- proactively contributing to review and update targets at national and international regulatory level
Towards the Future

SES II PERFORMANCE SCHEME (FRAMEWORK REGULATION)

- Community-wide performance targets on the key performance areas of safety, the environment, capacity and cost-efficiency;

- National or FAB plans, including performance targets, ensuring consistency with the Community-wide performance targets;

- Periodic review, monitoring and benchmarking of the performance of ANS and network functions.
Towards the Future

PROGRESSIVE INTEGRATION OF:

- **subject**: various performance indicators and targets (safety, capacity, environment, ...)
- **context**: ANSP, national, international (FAB, Single Sky, ...)

Synchronized TARGETS
Any Questions?

Thank You!