

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;

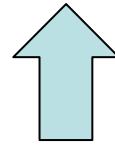
(ICAO DOC 9859 – SMM)



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



$n \times 10^{-m}$

OCCURENCIES
(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

- 1.55×10^{-8} per Flight/Hour

INCIDENT

- future revision of ESARR 4
- should be determined at ECAC / national level

Choosing Indicators



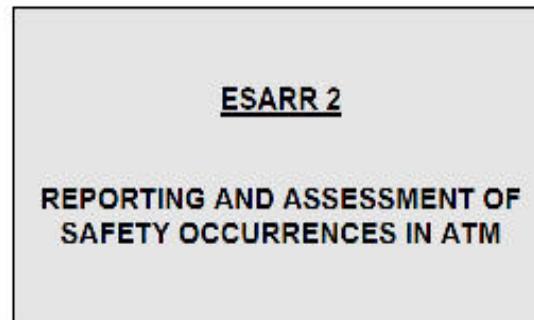
Typical ESARR2 Indicators

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

EUROPEAN ORGANISATION
FOR THE SAFETY OF AIR NAVIGATION



EUROCONTROL SAFETY REGULATORY REQUIREMENT
(ESARR)



Edition	:	3.0
Edition Date	:	10 December 2008
Status	:	Referred issue
Distribution	:	General Public
Category	:	Safety Regulatory Requirement

SAFETY REGULATION COMMISSION



ENAV S.p.A.
ITALIAN COMPANY FOR AIR NAVIGATION SERVICES

Choosing Indicators



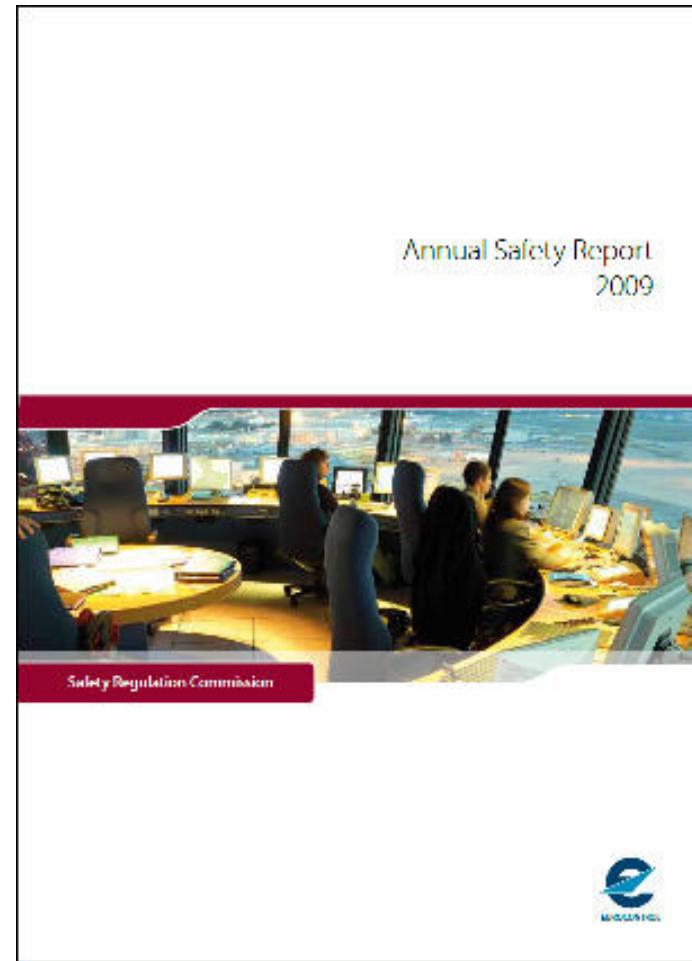
Eurocontrol – SAFER

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



Targets

- no ATM accidents or total inability to provide service
- 0.4 ATM related class A incidents x 100,000 flights (4×10^{-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

 ENAV S.p.A. 047600449

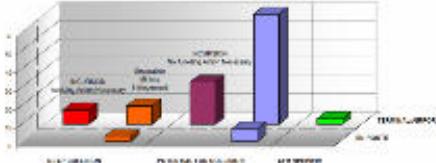
1. Introduction

Safety Report Q4/09, based on ENAV SMS (P.7.7 - Safety Monitoring) and P.9.2 (Safety Monitoring) documents, describes the state of the air traffic safety monitoring within ENAV in the 4th quarter of 2009. The Report provides a new database for further analysis and will be used for identification of relevant corrective actions.

No ATC-related incident has been recorded in the period concerned. 380279 flights have been handled in the quarter, with 13 recorded minor infringements, thus the applicable separation has been assured to the 99.997% of the flights, while in the 2.000% of the cases, will fall closer than permitted by separation standards.

The graph shows a breakdown of reported incidents, subdivided between on-route and approach, and their severity, in accordance with ICAO-HM2 criteria.

REPORT ANALYSIS FOR Q4/2009



Severity	Incidents
APPROXIMATELY 100%	~10
APPROXIMATELY 90%	~10
APPROXIMATELY 80%	~10
APPROXIMATELY 70%	~35
APPROXIMATELY 60%	~5

The Report does not include any PAAERD-based severity classification of the occurrences, which will only be available after completion of the related investigations, included. It provides a detailed picture of all reported occurrences within the quarter October – December 2009, categorized according to the following criteria:

- occurrence type - prevent

- 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.



Annual Safety Report



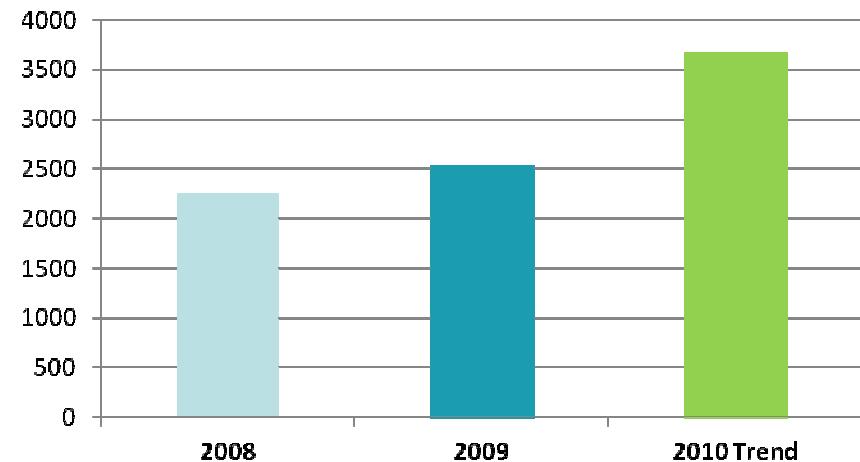
- adherent to ESARR 2 principles and international methodologies;
- aimed to provide up-to-date safety monitoring and wide information;
- depicting safety performance trends and target hitting

ENAV Ops. Safety Indicators

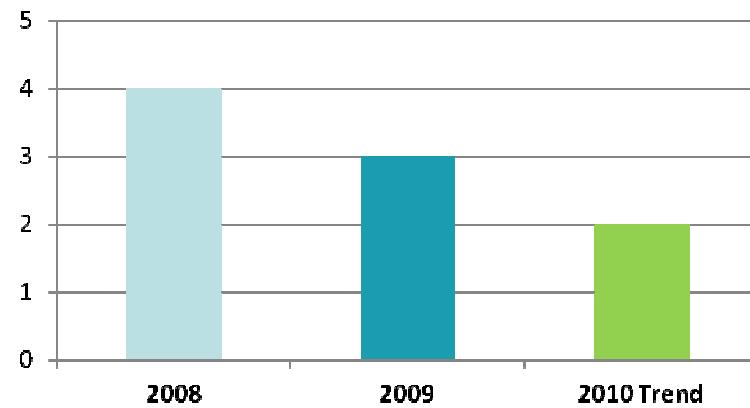


A look at main ENAV indicators

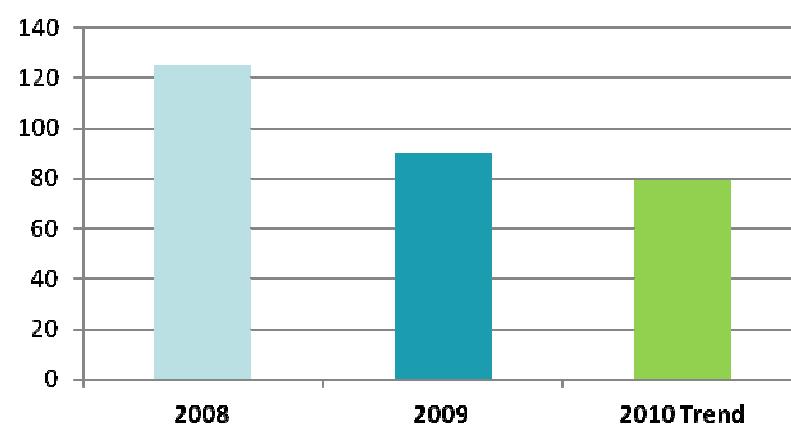
Reporting



RWY Inc ATM



SMI ATM





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

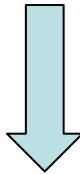
ENAV Ops. Safety Indicators



FN

Fast and simple method for a
“pre-evaluation”:

TXT radar data



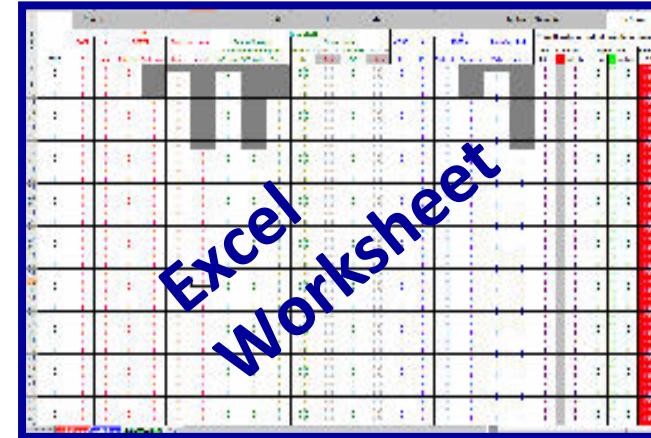
Excel worksheet

TIME	PCC	PPC	ERR	M4	MAN	GOM	SNT	X	Y	Z	MC	LN	YK	WW	PPG	SPD	
124745	3	0	0	0	0	0	0	0051	05751	370	0122	000001044	03860	-03300	4005	05	
124750	3	0	0	1	0	0	0	00575	05761	370	0122	000001044	03861	-03300	4005	1245	
124755	3	0	0	0	0	0	0	00560	0705	05615	370	0122	000001044	03855	-03304	4005	1245
124800	3	0	0	0	0	0	0	00573	05650	370	0122	000001044	03855	-03304	3005	2040	1810
124805	3	0	0	0	0	0	0	00574	05652	370	0122	000001044	03856	-03304	3005	2040	1810
124810	3	0	0	0	0	0	0	00561	0570	05710	370	0122	000001044	03857	-03315	4005	1245
124815	3	0	0	0	0	0	0	00540	05543	370	0122	000001044	03860	-03301	3205	0800	
124820	3	0	0	0	0	0	0	00570	05740	370	0122	000001044	03860	-03301	3205	0800	
124825	3	0	0	0	0	0	0	00560	05870	370	0122	000001044	03865	-03302	4005	1245	
124830	3	0	0	1	0	0	0	00925	05500	370	0122	000001044	03868	-03302	4005	1245	
124835	3	0	0	0	0	0	0	00555	0475	370	0122	000001044	03870	-03293	405	1550	
124840	3	0	0	0	0	0	0	00565	05430	370	0122	000001044	03875	-03293	405	1550	
124845	3	0	0	1	0	0	0	00102	05470	370	0122	000001044	03887	-03293	405	1550	
124850	3	0	0	0	1	0	0	00104	05847	370	0122	000001044	03887	-03307	0305	0405	
124855	3	0	0	0	1	0	0	00104	05847	370	0122	000001044	03887	-03307	0305	0405	
124860	3	0	0	0	0	0	0	01072	05873	370	0122	000001044	03888	-03315	405	1245	
124865	3	0	0	0	0	0	0	01000	05344	370	0122	000001044	03892	-03312	405	1245	
124870	3	0	0	0	0	0	0	01132	05371	370	0122	000001044	03888	-03322	405	1330	
124875	3	0	0	0	0	0	0	01060	05822	370	0122	000001044	03882	-03324	405	1330	
124880	3	0	0	0	0	0	0	01191	05656	370	0122	000001044	03882	-03324	405	1330	
124885	3	0	0	0	0	0	0	01221	05241	370	0122	000001044	03885	-03323	405	1650	
124890	3	0	0	0	0	0	0	01252	05185	370	0122	000001044	03889	-03330	405	1020	
124895	3	0	0	0	0	0	0	0281	05190	370	0122	000001044	03881	-03322	405	1245	
124900	3	0	0	0	0	0	0	01010	05168	370	0122	000001044	03885	-03321	405	1330	
124905	3	0	0	0	0	0	0	01430	05414	370	0122	000001044	03885	-03328	405	1330	

ENAV Ops. Safety Indicators



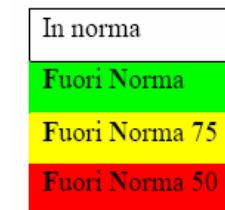
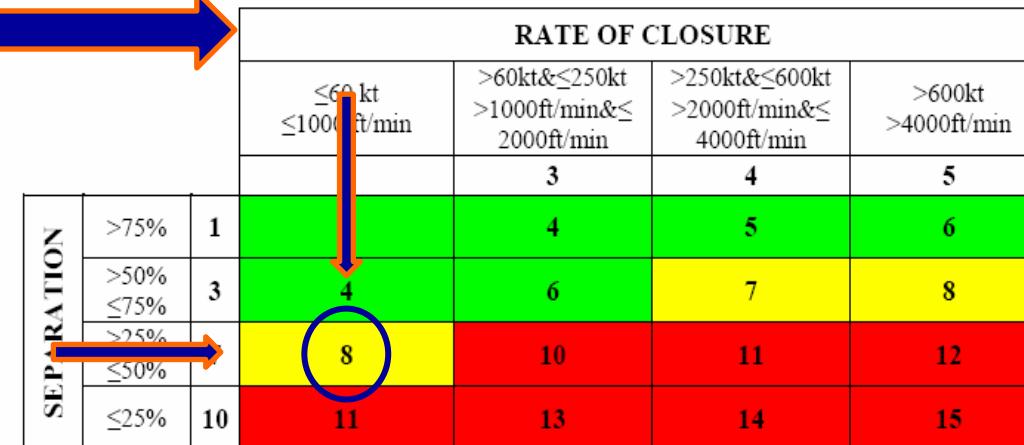
PLO-LIS



FN – How does it work?



Evaluates
RoC and
Separation





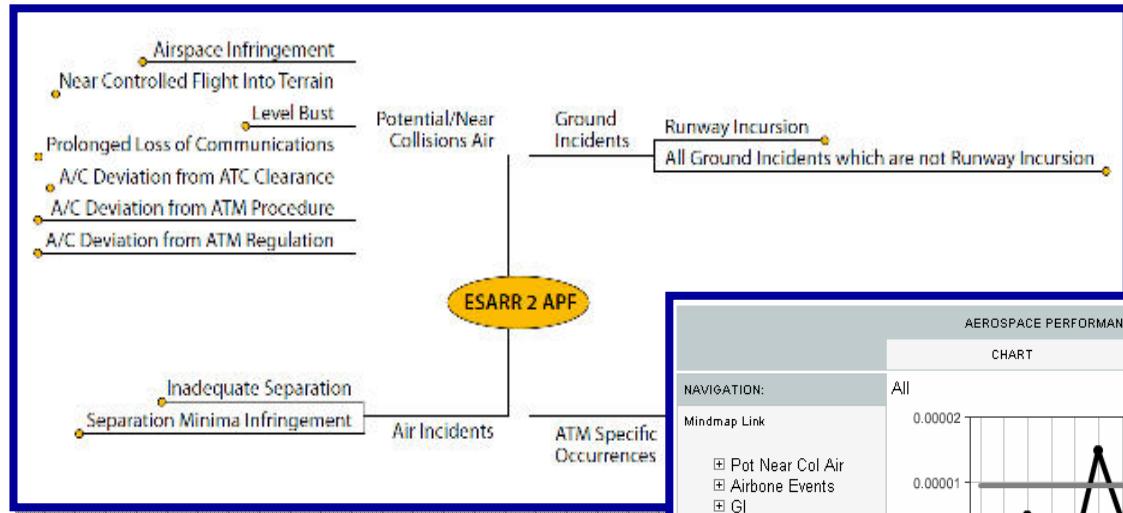
Aerospace Performance Factor

Aggregates multiple operational safety risks into **ONE** graphical performance representation over time, based on historical indicators

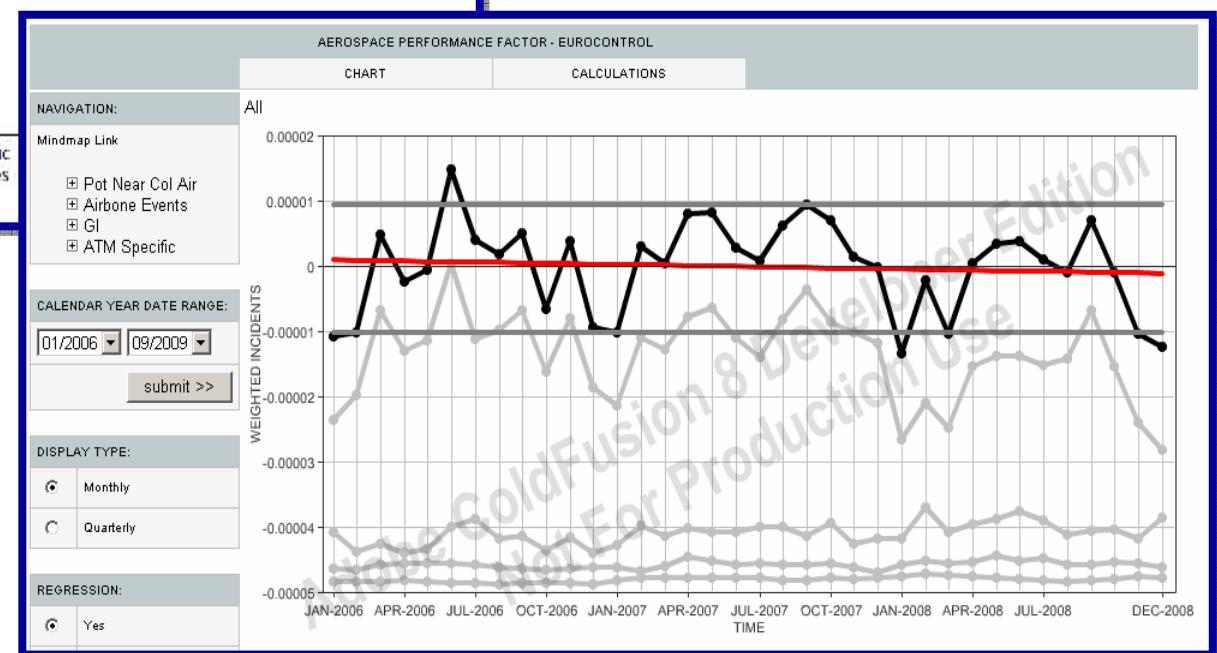
ENAV Ops. Safety Indicators



APF – An example



ESARR 2
"Mindmap"



ENAV Ops. Safety Indicators



APF advantages:

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

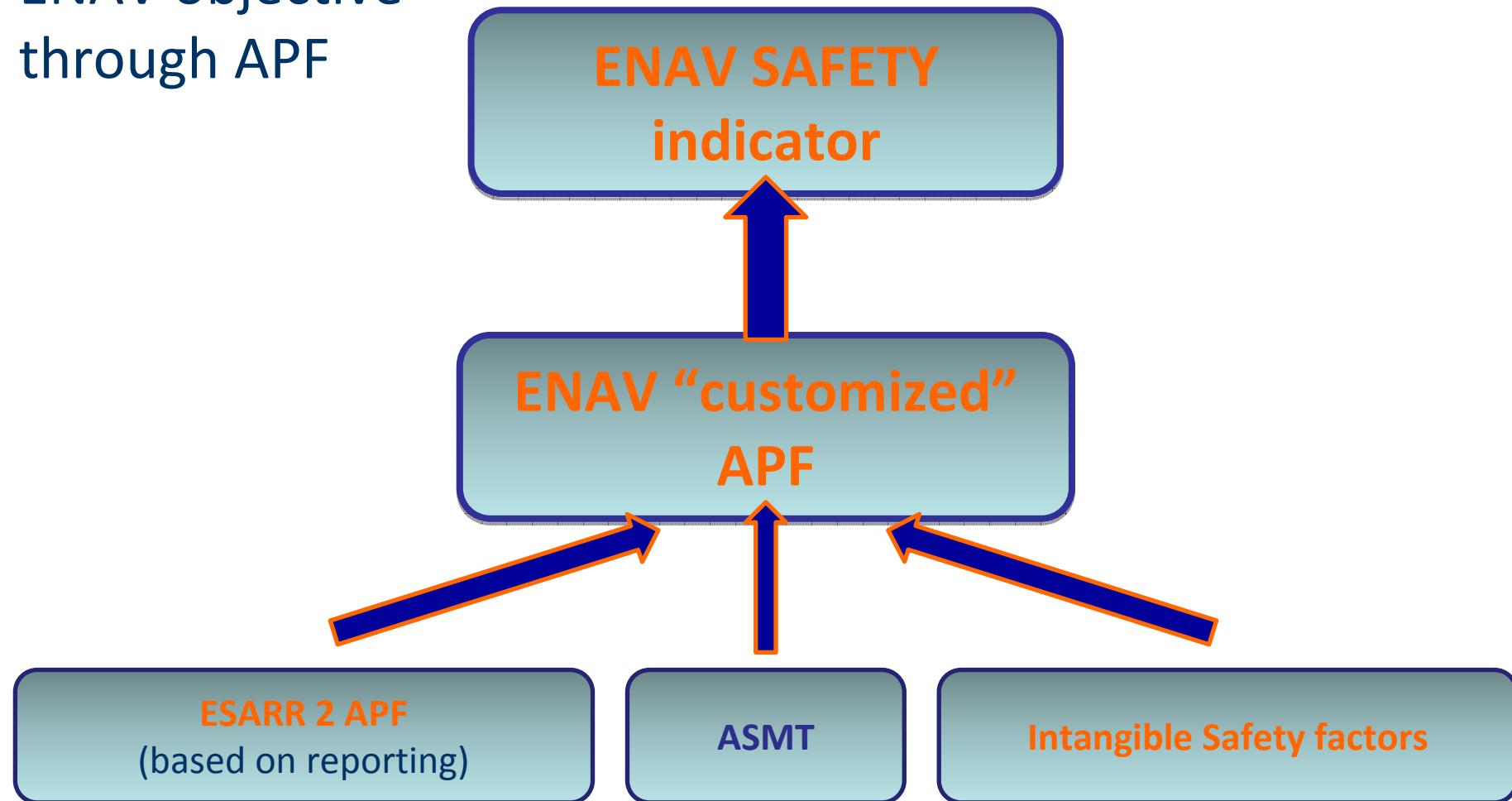
ENAV peculiarities:

- Integration with ASMT
- Integration of “intangible” factors (safety promotion, investments...)

ENAV Ops. Safety Indicators



ENAV objective
through APF



Safety Culture Survey



Aiming to asses 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
- Deeper look
 - triggered by alerts
 - 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.



PROGRESSIVE INTEGRATION OF:

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

BORMONIZED TARGETS



Any Questions?



Thank You!

