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INTERNATIONAL
RAILWAY SAFETY COUNCIL

RISK MANAGEMENT AT SNCF



From LAGGING to LEADING INDICATORS

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SNCF

The SNCF logo is a red rectangle with a white diagonal line and the letters 'SNCF' in white.

JLW Conseil S.A.S.

The logo for JLW Conseil S.A.S. is a blue stylized 'J' or 'L' shape.

Risk Identification

Four main sources of information are used to identify risks:

- ▶ Experts use risk analysis methods:
 - ▶ To design safe systems: FEMCA
 - ▶ To check systems' robustness: HAZOP
- ▶ Analysis of accidents, near-misses and incidents
 - ▶ Allows identifying new risky situations
 - ▶ Allows updating frequency of causes and severity of impacts
 - ▶ Allows assessing efficiency of risk reduction measures and devices
- ▶ Audits and work monitoring by managers
 - ▶ Allow assessing the reliability and safety of the organization
- ▶ Risks perceived by managers and staff
 - ▶ Help improving knowledge about the real context of operation

Risk Assessment

In order to describe and assess a risk, we analyze the “feared situation” corresponding to this risk:

- ▶ Description of the situation and its context
- ▶ Identification of the combination of causes that creates it
- ▶ Identification of its potential consequences/impacts

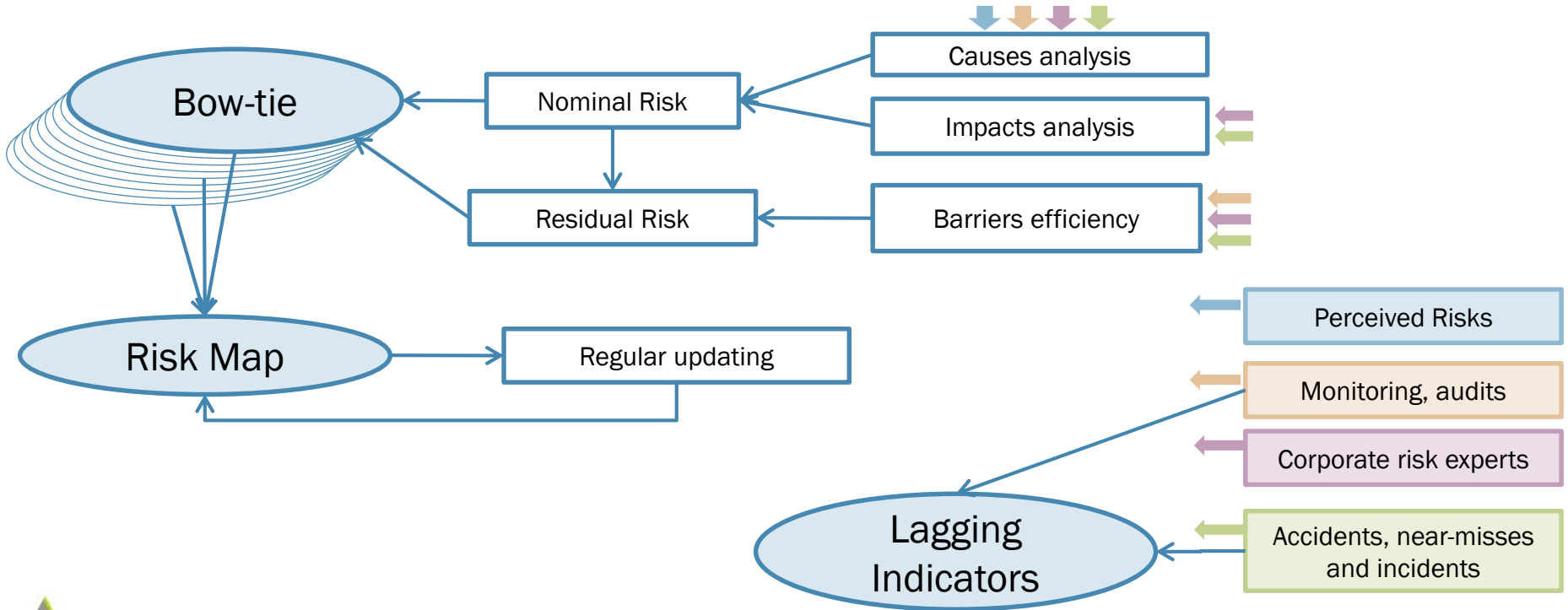
The result of this analysis is the “nominal” level of risk

In a second time, we assess the effect of risk reduction measures:

- ▶ Planned reduction of the probability/frequency of causes
- ▶ Planned reduction of the potential impacts
- ▶ Evaluation of the availability and efficiency of these measures

The result of this assessment is the “residual” risk

Risk Management Process



Managers' risk perception

During the annual SNCF Safety Convention attended by 700 managers, they were proposed to provide their perceptions about:

- ▶ What risks they consider as most important in their activity:
 - ▶ Work environment and technology (119);
 - ▶ Application of regulations and procedures (115);
 - ▶ Human and organizational issues (54)
- ▶ The priority level of risks as a function of frequency and severity
 - ▶ Average values of managers choices (1, 2 or 3):

High priority	3	2,33 to 3,00
Medium priority	2	1,66 to 2,33
Low priority	1	1,00 to 1,66

Frequency ↑	1,96	2,47	3,00	3,00
	1,60	2,18	2,95	3,00
	1,03	1,60	2,36	2,89
	1,00	1,14	2,06	2,64
	Severity →			

From Lagging to leading indicators

SNCF uses a series of lagging indicators to assess risk management performance, and leading indicators that contribute to evaluate the safety level by anticipating risky situations.

In the survey of managers' risks perceptions, we also collected suggestions for leading indicators:

- ▶ 80 related to technology and 64 to human and organizational issues;
- ▶ 44 related to management and 20 to Human Resources issues;
- ▶ 14 related to safety barriers and 10 to security issues.

The set of leading indicators will be defined using the bow-tie risk model, by crossing 3 criteria:

- ▶ The combined criticality of risks related to the indicator;
- ▶ The ease/difficulty to collect data needed to assess the indicator;
- ▶ Managers and staff's perceptions of the indicator's meaning and relevance.

Methodology

Find “sponsors”, train managers and risk officers, support them:

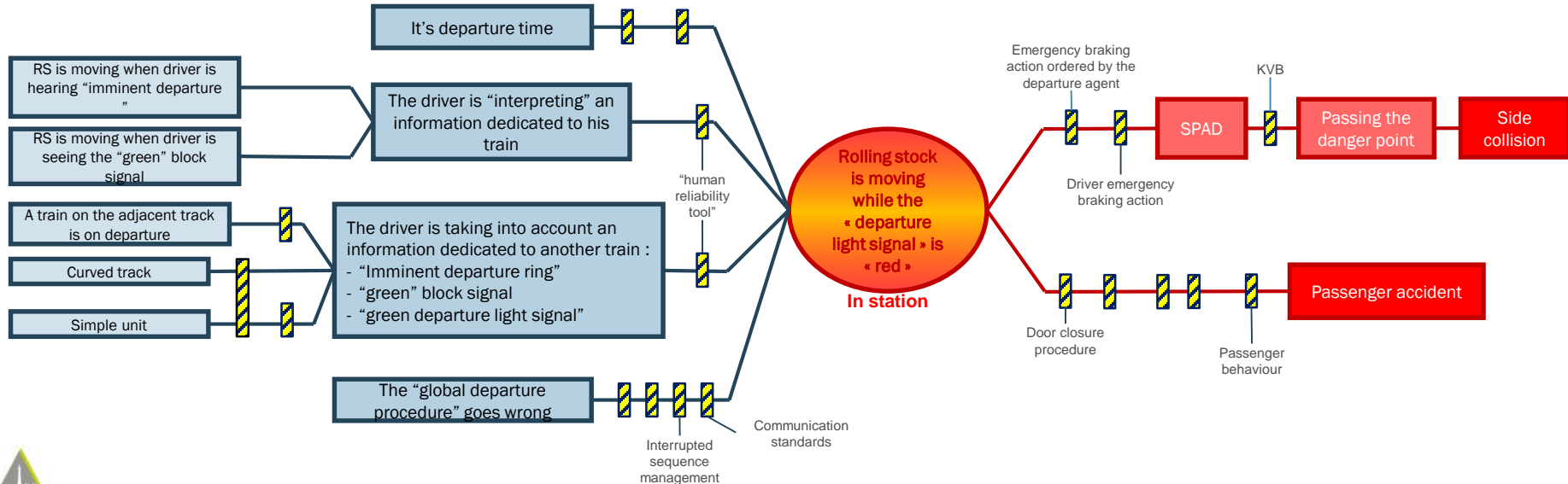
- ▶ To identify the risks to address first;
- ▶ To identify or set up risk reduction barriers;
- ▶ To assess barriers availability and efficiency;
- ▶ To synthesize risk maps

4 pilot departments to “test” the methodology:

- ▶ 2 from SNCF Réseau (Infrastructure Manager):
 - ▶ Engineering & Projects;
 - ▶ Railway traffic;
- ▶ 2 from SNCF Mobilités (Railway Undertaking):
 - ▶ Transilien (Commuting trains in the Paris area);
 - ▶ TER (regional trains)

Build Bow-tie diagrams

The Bow-tie representation is used as a visual support in the dialogue between experts, managers and staff to identify causes and impacts of risky situations and set up prevention/protection barriers.



Set up prevention and protection barriers

Objective: improve both railway and occupational safety

Prevention and protection barriers are of different nature:

- ▶ Technical barriers: KVB (Train protection system)
- ▶ Human barriers: individual procedures, human reliability tools
- ▶ Organizational barriers: collective procedures

Focus on “human reliability” tools:

- ▶ Mission preparation, briefing
- ▶ “Self-check”, cross-check, enhanced communication
- ▶ Uncertainty/ambiguity/doubt management
- ▶ Debriefing, reporting

Assess barriers' availability and efficiency

To control risks, experts and managers have to select and set in place reliable barriers to reduce the risk from nominal to residual.

This selection is made based on three barriers' properties:

- ▶ Availability: is the barrier always in place and active?
- ▶ Efficiency: is the barrier always 100% efficient?
- ▶ Controllability: is it possible to check/monitor the barrier's state?

Different ways to check/monitor a barrier's state:

- ▶ Availability of a technical barrier (like KVB devices):
 - ▶ production indicator
- ▶ Efficiency and reliability of an individual procedure (like a "braking procedure"):
 - ▶ "Watching over" process :
 - ▶ Do all the drivers implement the procedure as expected ?
 - ▶ If not, what are the reasons ?

Conclusion

SNCF is developing a risk-based management to reduce the frequency and severity of railway and occupational accidents.

To achieve this objective, managers and staff are associated to experts

- ▶ to identify and understand risky situations;
- ▶ To analyze incidents, near-misses and accidents;
- ▶ To select and operate prevention and protection barriers;
- ▶ To monitor causes' frequency and barriers' efficiency;
- ▶ To share this knowledge of risks and develop vigilance.

Information collected from these processes is used to build

- ▶ Lagging indicators reflecting the risk management performance;
- ▶ Leading indicators reflecting the safety level by anticipating risky situations

Managers and staff are closely related to this risk-based management to develop a strong safety culture in the company