



# IRSC 2022

INTERNATIONAL RAILWAY  
SAFETY COUNCIL

SEVILLA, OCTOBER 16-21, 2022



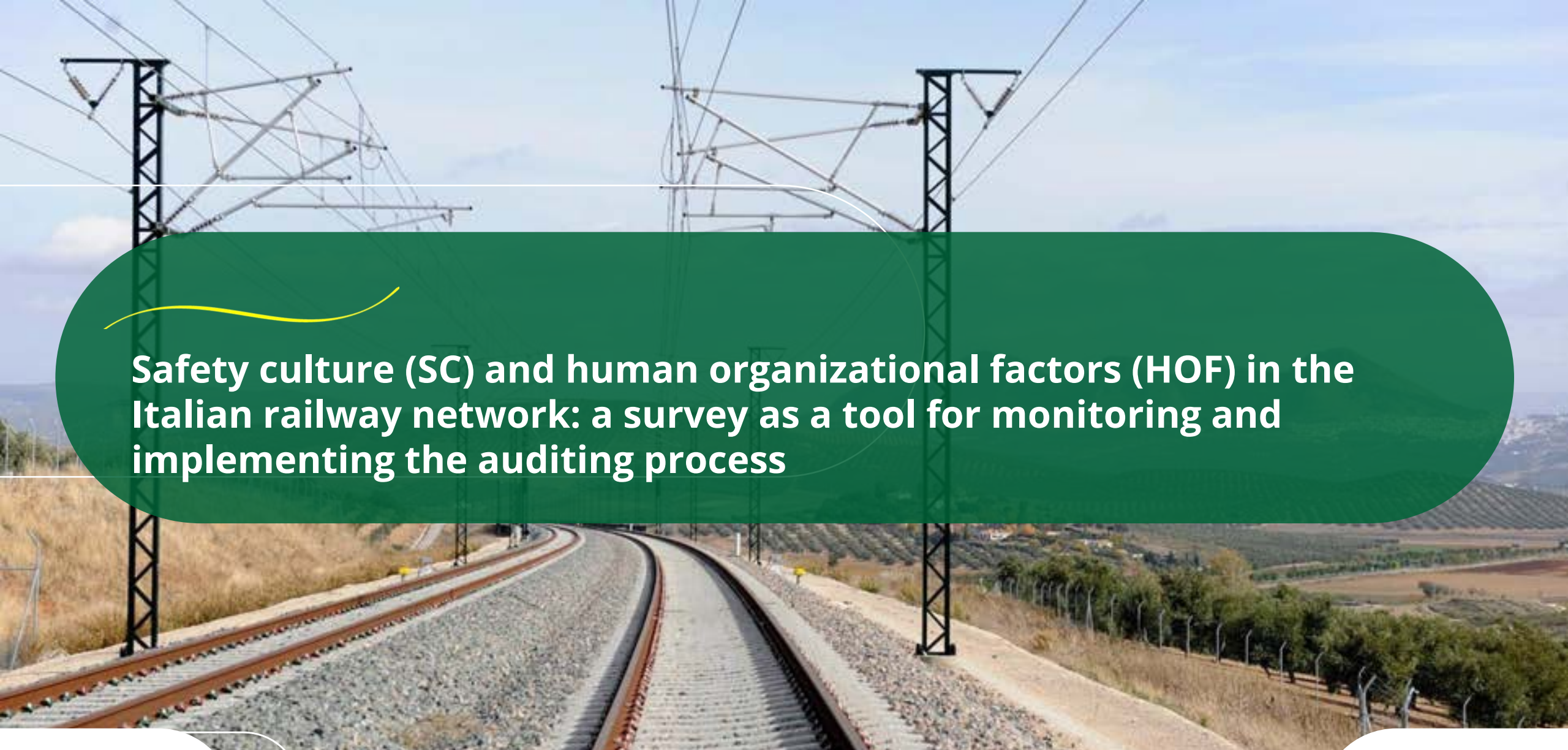
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**IRSC 2022**  
INTERNATIONAL RAILWAY SAFETY COUNCIL  
SEVILLA, OCTOBER 16-21, 2022





# Safety culture (SC) and human organizational factors (HOF) in the Italian railway network: a survey as a tool for monitoring and implementing the auditing process

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# CHAPTER 1

## BACKGROUND AND OBJECTIVES

## BACKGROUND

- Increasing importance in high-risk sectors of HOF and SC in improving both safety levels and well-being of workers
- The 4th Railway Package introduced at EU level important innovations for the safety management system (SMS), introducing requirements for HOF and SC in safety and organization management
- HOF and SC are becoming (**must become**) systemic
- Therefore, innovative, systematic methods and approaches to effectively monitor and assess HOF and SC within the SMS of railways organizations are needed



# OBJECTIVES: WHY A QUESTIONNAIRE?



## Because it's an effective tool for obtaining:

- a general picture of the state of integration of HOF and SC in SMS at the national level 2 years after the entry into force of the 4th Railway Package, despite pandemic limitations
- information about the strengths and weaknesses of railway organizations on HOF and SC with quantitative and qualitative data
- information from all railway organizations at the same time
- structured criteria for planning further activities, such as targeted supervision campaigns with short/mid/long-term goals
- relevant information (tips) for on-site audits on HOF and SC

# CHAPTER 2

## SUPERVISION METHODS AND RESULTS



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# SUPERVISION METHODS: QUESTIONNAIRE AND AUDITING PROCESS

## Phase 1 published in November 2021

- A questionnaire was developed and submitted to all 63 Italian railway organizations. The questionnaire (29 questions pre-filled with single/multiple-choice answers), based on the ERA "*Guideline on the requirements of the safety management system for safety certification or safety authorization*", permitted a baseline assessment before the on-site audit



## Phase 2 in progress

- Semi-structured interviews (based on 18 questions) are administered to the organization's staff (leaderships, middle-managements, and operative staff).

During the on-site audit the operative staff interview allows:

- Verification of the effectiveness of the actions implementing HOF and SC
- Quantification of two indexes: Compliance (Ci) and Effectiveness (Ei) about HOF and SC
- The operative staff's point of view about the implementation of HOF and SC



## Phase 3 under construction

- Developing the subsequent Audit Cycle



# PHASE ONE: A QUESTIONNAIRE ON HOF AND SC AS A DATA COLLECTION TOOL

- It follows the same rationale adopted in Regulation (EU) 2018/762
- It contains 28 questions, divided into the 6 SMS' requirements sections, 1 question related to strategy implementation of HOF and SC and 2 final considerations (strengths and weaknesses)
- Many questions permit the organizations to fill in the free space box (open answers) to allow for the provision of additional information
- It is based on evidence

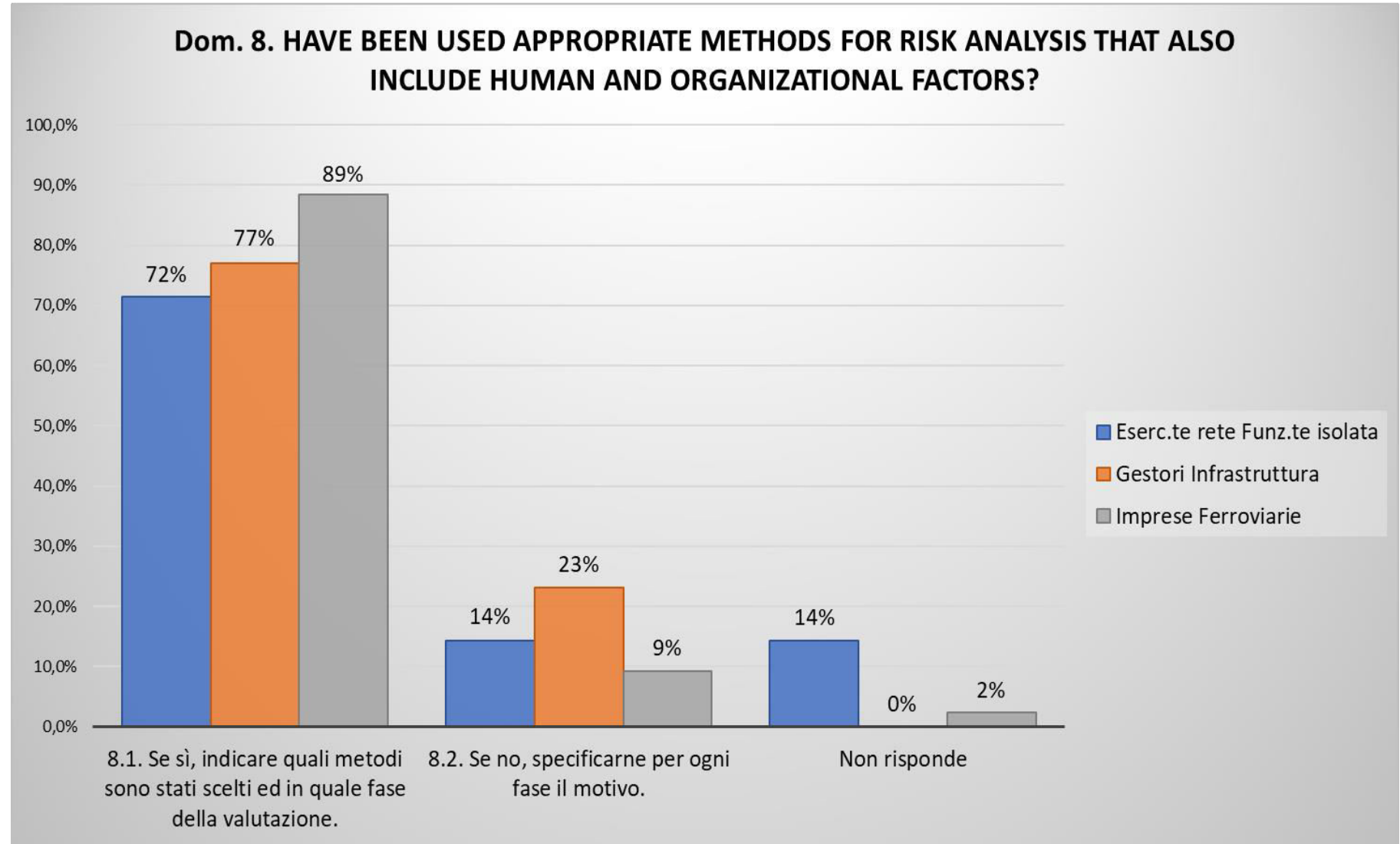


All the results are available on the ANSFISA website

# SURVEY RESULTS

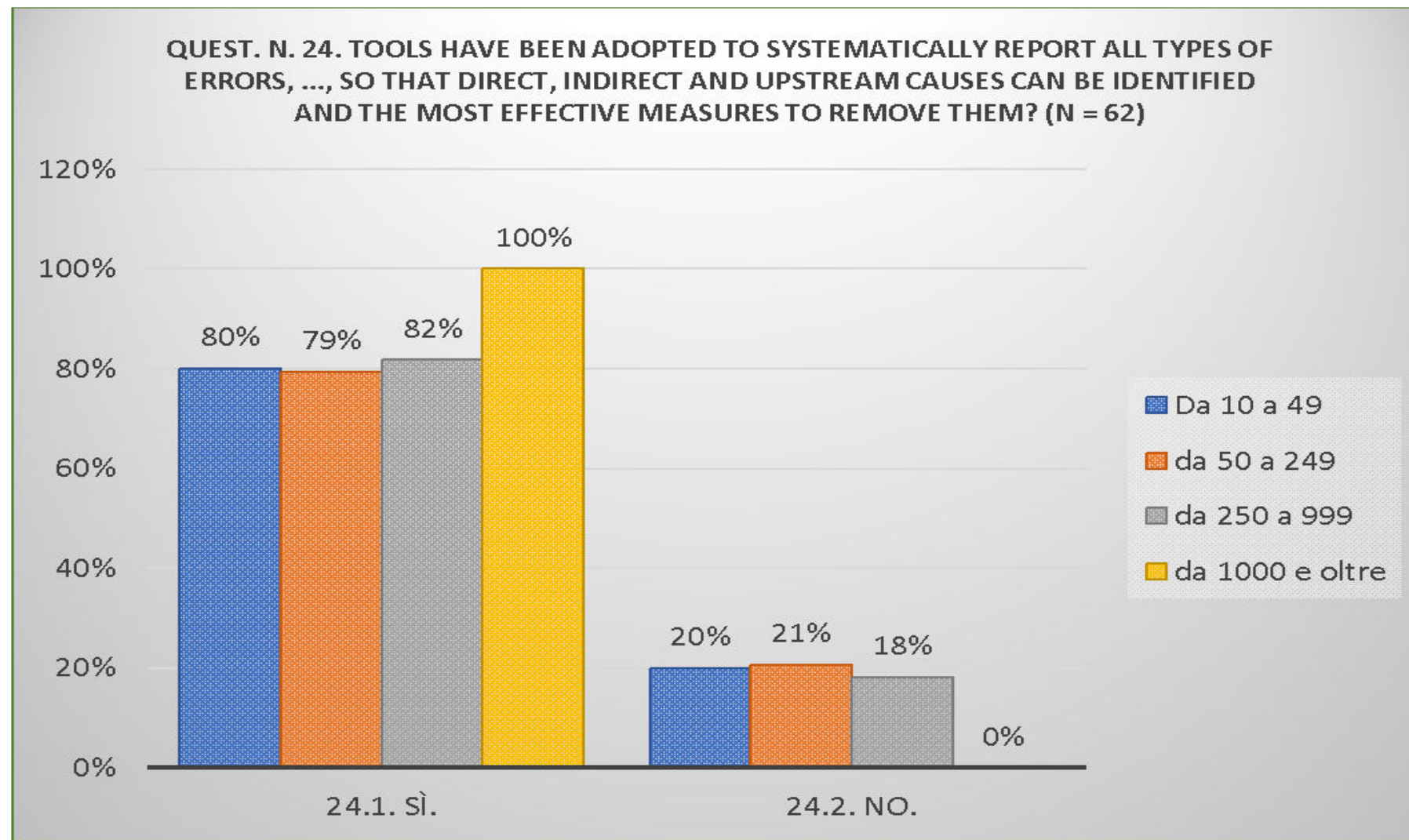
Figure 1

63 Railway organizations involved in the survey



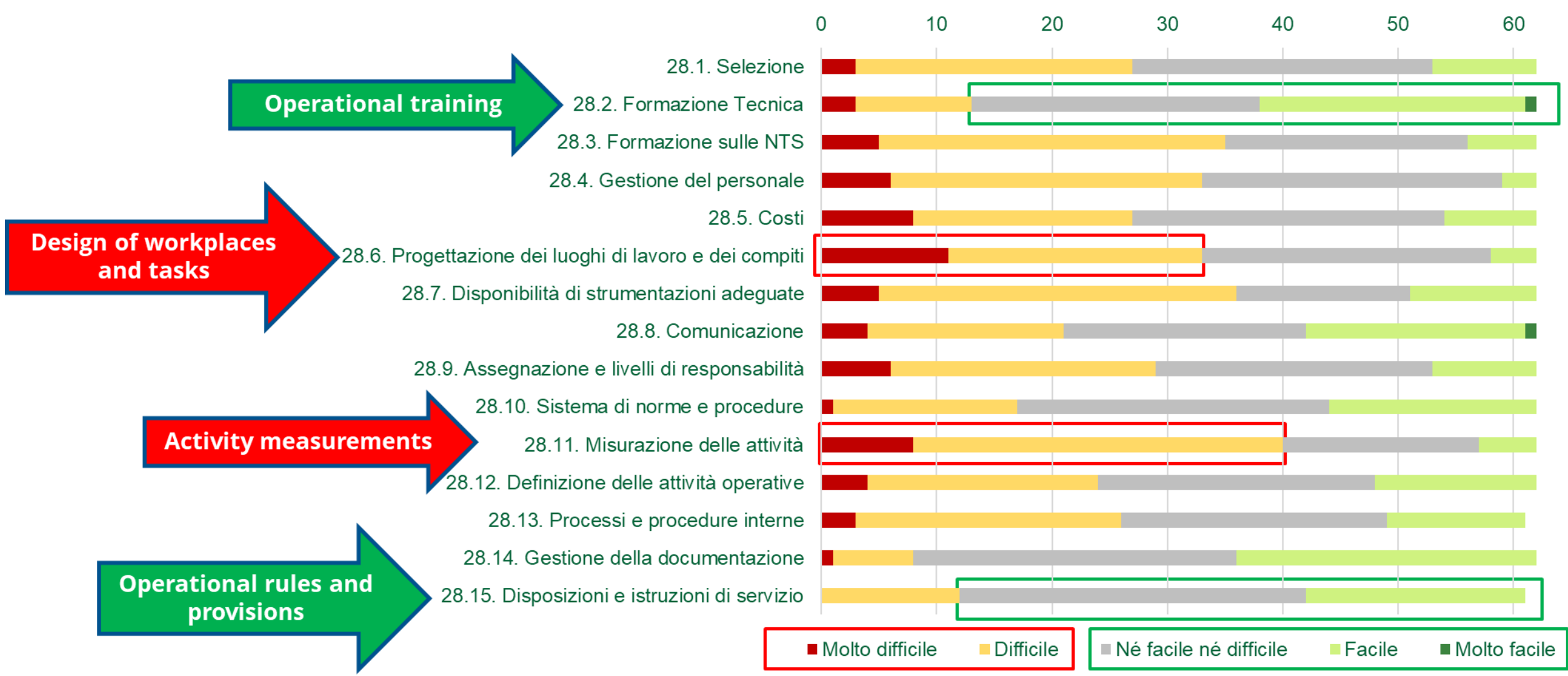
# SURVEY RESULTS

Figure 2



# SURVEY RESULTS

Figure 3



Design of workplaces and tasks

Operational training

Activity measurements

Operational rules and provisions

# SURVEY RESULTS



## Questionnaire analysis and evidence verification

- The operators' answers to the survey have been evaluated during a preliminary analysis and verified with evidence during the on-site audit
- This combined process led to the definition of a Compliance index (Ci), providing a quantitative assessment of the implementation level of HOF and SC in the audited organization

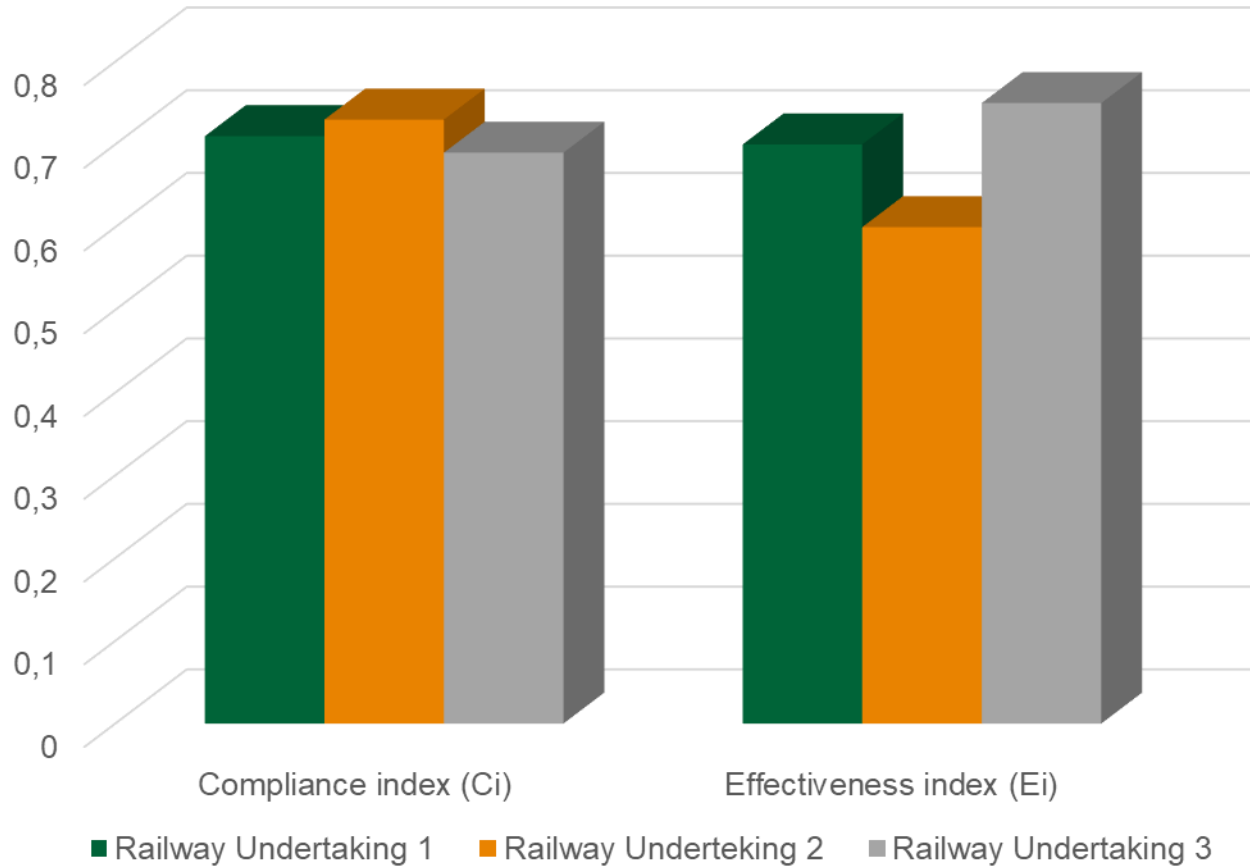
## PHASE TWO: A SYSTEMATIC APPROACH TO CONDUCTING AN ON-SITE AUDIT

A semi-structured interview was administered to a sample of operative staff on shift during the audit, investigating the following requirements: *(Regulation (EU) 2018/762)*

- 2.1.1 Safety Culture
- 2.4.2 Consultation of staff and other parties
- 4.3.1 Awareness
- 7.2.3 Improvement



# EARLY AUDIT RESULTS



Early results of ANSFISA Audits on HOF and SC implementation in three Railway Undertakings

Compliance index (Ci) =  
0,71  
0,73  
0,69

Effectiveness index (Ei) =  
0,70  
0,60  
0,75



# COMPLIANCE INDEX: LET'S HAVE A CLOSER LOOK...

## Where the Compliance index come from?

It is derived from the verification of the concordance between the activities scheduled in the implementation strategy of the HOF and SC and the activities effectively carried out (activities completed or nearing conclusion)

## What is its main goal?

Verifying during on-site audits the correspondence between planned and accomplished actions

## How is it determined?

Analyzing the documentation proposed by the railway organization with the questionnaire in the first phase, and the evidence collected during on-site audit

## How is it measured?

The Compliance index (range 0-1) is the arithmetic mean of 13 activities identified on the basis of the answers received in the "implementation strategy section" of the questionnaire. 0 = activity not started or partially carried out, up to 50% excluded; 0.5 = activity in progress and completed in a percentage greater than or equal to 50%, 1 = activity 100% accomplished.

$$C_i = x_1 + x_2 + \dots + x_{13} / 13$$

# EFFECTIVENESS INDEX (SUB-INDEXES): LET'S HAVE A CLOSER LOOK...

## Where does the Effectiveness index come from?

It is derived from semi-structured interviews with the operative staff

## What is its main goal?

Verifying statements and perceived implementations on HOF and SC by operative staff in the SMS: a quantitative evaluation of the effectiveness of the implementation strategy

## How is it determined?

Combining the following sub-indexes values:

- lcs = implementation index HOF related to *Safety Culture* requirement
- lcv = implementation index HOF related to *Consultation of staff and other parties* requirement
- lcp = implementation index HOF related to *Awareness* requirement
- lm = implementation index HOF related to *Improvement* requirement

## How is a sub-index value measured?

Through positive responses on a «1 to 6 Likert Scale»

e.g., «In your opinion, on a scale 1 to 6, (1=totally disagree, 6= totally agree), how much do your colleagues feel free to express their opinions and evaluations on the organization's safety levels, using formal means (emails, reports...)?»

Totally disagree 1\_\_2\_\_3\_\_4\_\_5\_\_6 Totally agree → Positive

# BOTTOM-UP PROCESS: THE IMPORTANCE OF LISTENING TO THE OPERATIVE STAFF

During the semi-structured interviews, the interviewee is asked to comment and motivate his/her answers to specific multiple-choice questions, and he/she is invited to provide opinions to open questions

## Ex. Qualitative question and answer

“Do you have any thoughts you would like to share on this topic?”

*“I hope that there will be future occasions and other interviews of this type where we can express our opinions, to have more points of view to share. I hope there are other occasions not due to operating problems, but for prevention activities”*

## Ex. Quantitative question and answer

“On a scale of 1 to 6, (1= little, 6= very much) how much do you feel involved in the operational safety processes (e.g., request for opinions, consultations in case of introduction / revision of new regulations or procedures ...)?”

Quantitative response: Little 1\_\_2\_\_3\_\_4\_\_5\_\_6 Very much → Positive

**DOUBTS?**

**...we are working on it**



# CHAPTER 3

## NEXT STEPS (PHASE THREE) AND CONCLUSIONS



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## PHASE THREE: NEXT STEPS

1. To keep on carrying out audits on HOF and SC (auditing all the railway organizations)
2. To monitor and check the resolutions of the non-conformities that eventually come from the audits (follow-up)
3. To release a revised version of the questionnaire for checking the improvements of HOF and SC in SMS



## CONCLUSIONS

The supervision activity on HOF and SC needs new tools to measure the effectiveness of the actions taken by the railway operators

This process allowed us to develop and validate the questionnaire (as a tool) to achieve satisfactory and reliable results for supervision activities conducted “remotely”

From preliminary results, the identified indexes seem to be effective in providing a quantitative measure of the implementation level and effectiveness of the actions taken by the operators

At the end of the whole cycle (estimated time: 2-3 years), the effectiveness and efficiency of this new approach in the railway sector will be measured and the results published and shared with the railway community

That is a very long journey, but remember:

*Rome wasn't built in a day*

and

it is certain that:

*“safety culture will not be built in a day”*

However, we look forward to sharing with you our subsequent results and what we hope will be further improvements in safety culture





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