

POLITECNICO
MILANO 1863

Railways as Critical Infrastructures

RESILIENCE OF CRITICAL INFRASTRUCTURES

- T. GIORGESCHI

PROF. GRETA NASI

29-03-2023

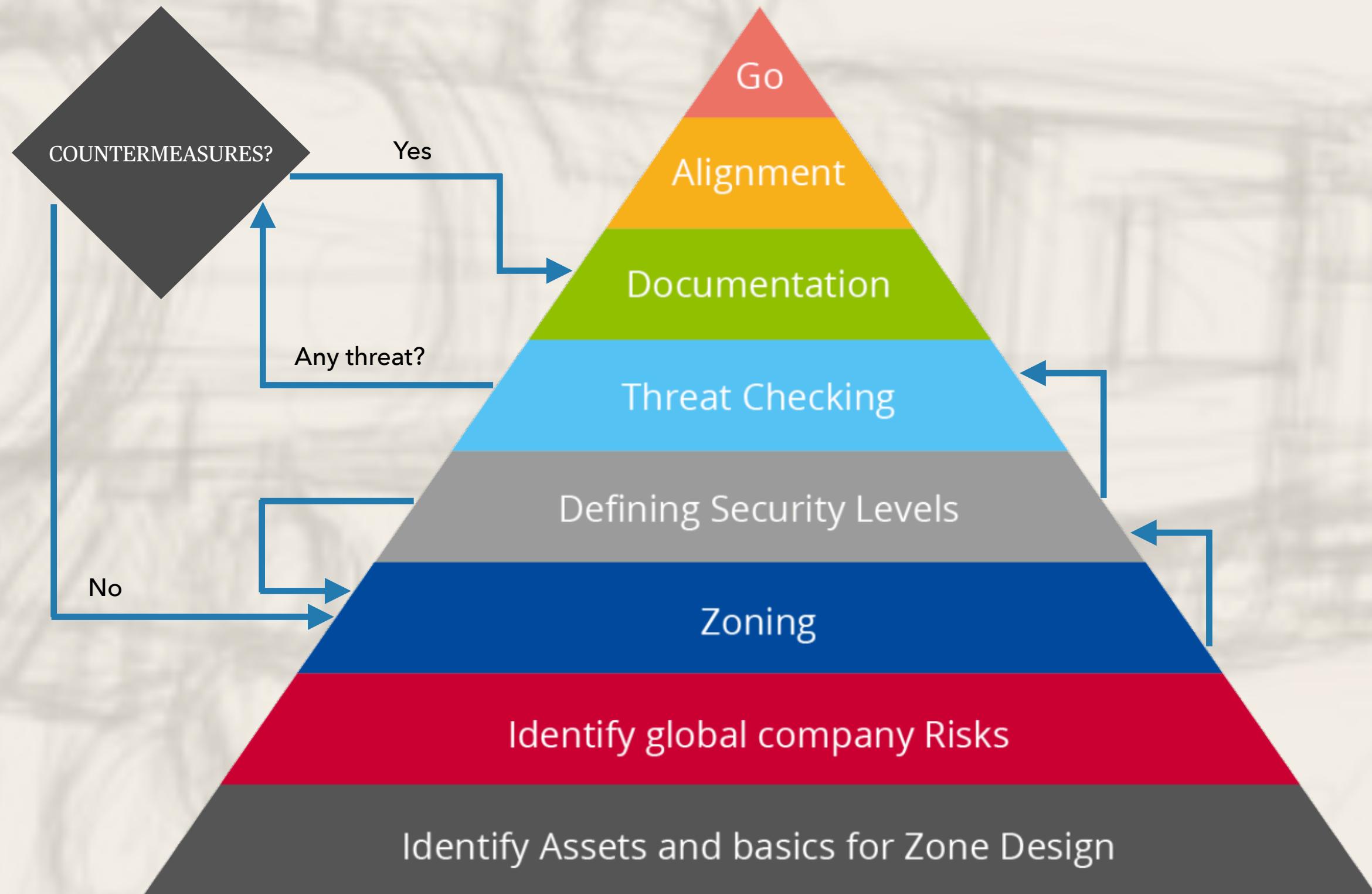


AGENDA

- Introduction to railways as critical infrastructures
- Threats, actors and targets
- Stakeholders
- Market analysis



ZONING AND CONDUIT METHODOLOGY



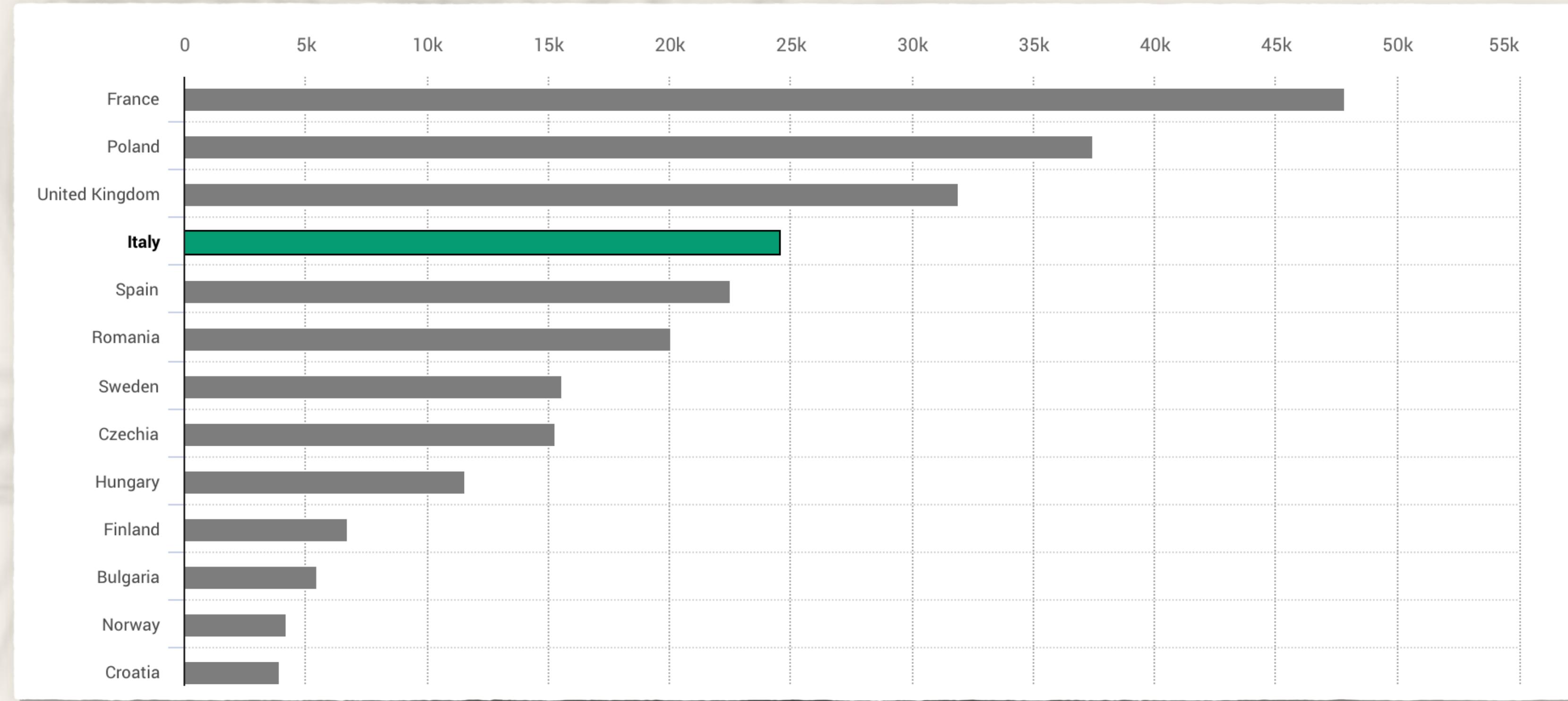
Ref. <https://www.enisa.europa.eu/publications/zoning-and-conduits-for-railways>



WHY IS IT A CRITICAL INFRASTRUCTURE?



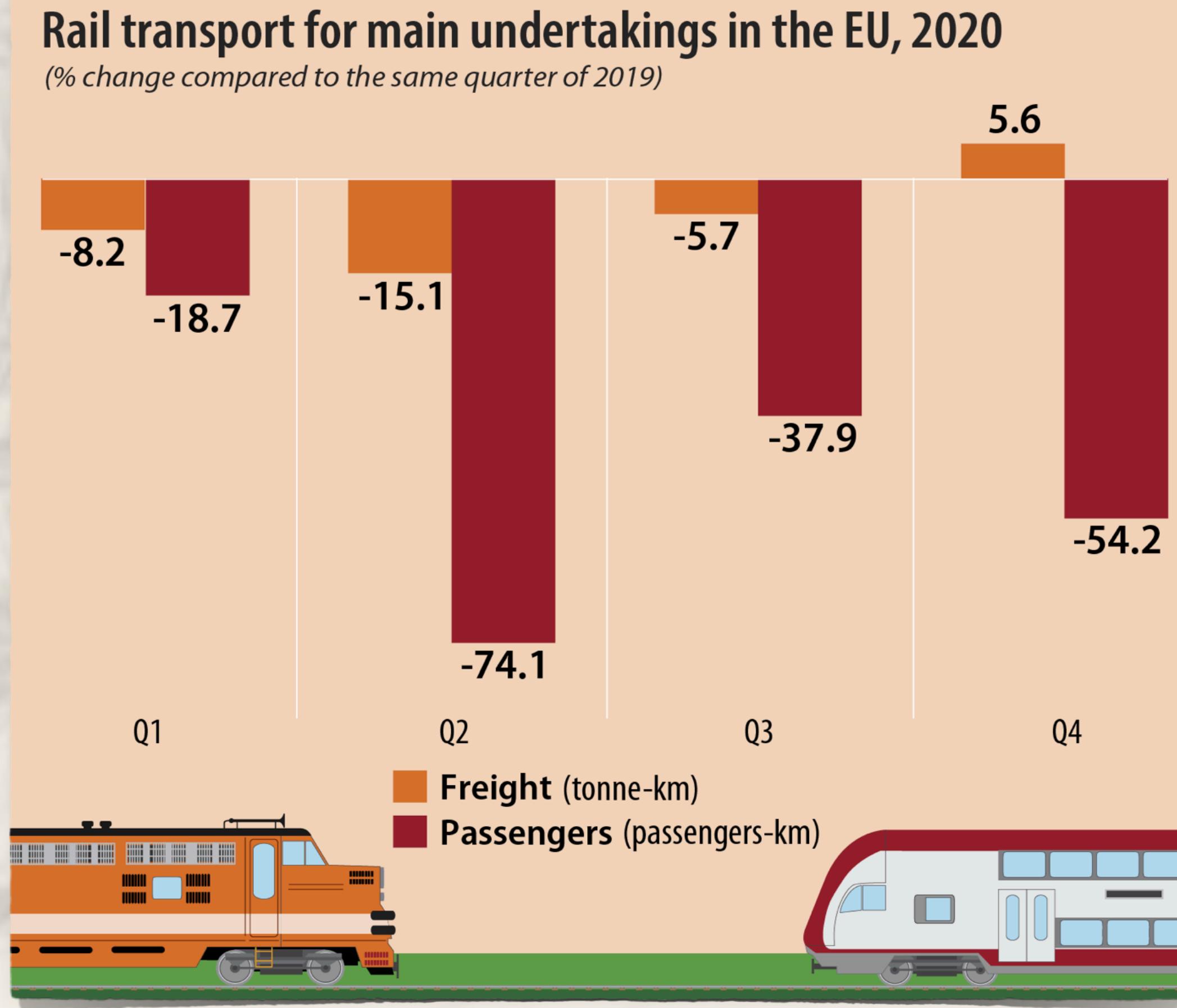
RAILWAYS KM PER COUNTRY (2021)



Ref. <https://ec.europa.eu/eurostat/web/transport/data/database>



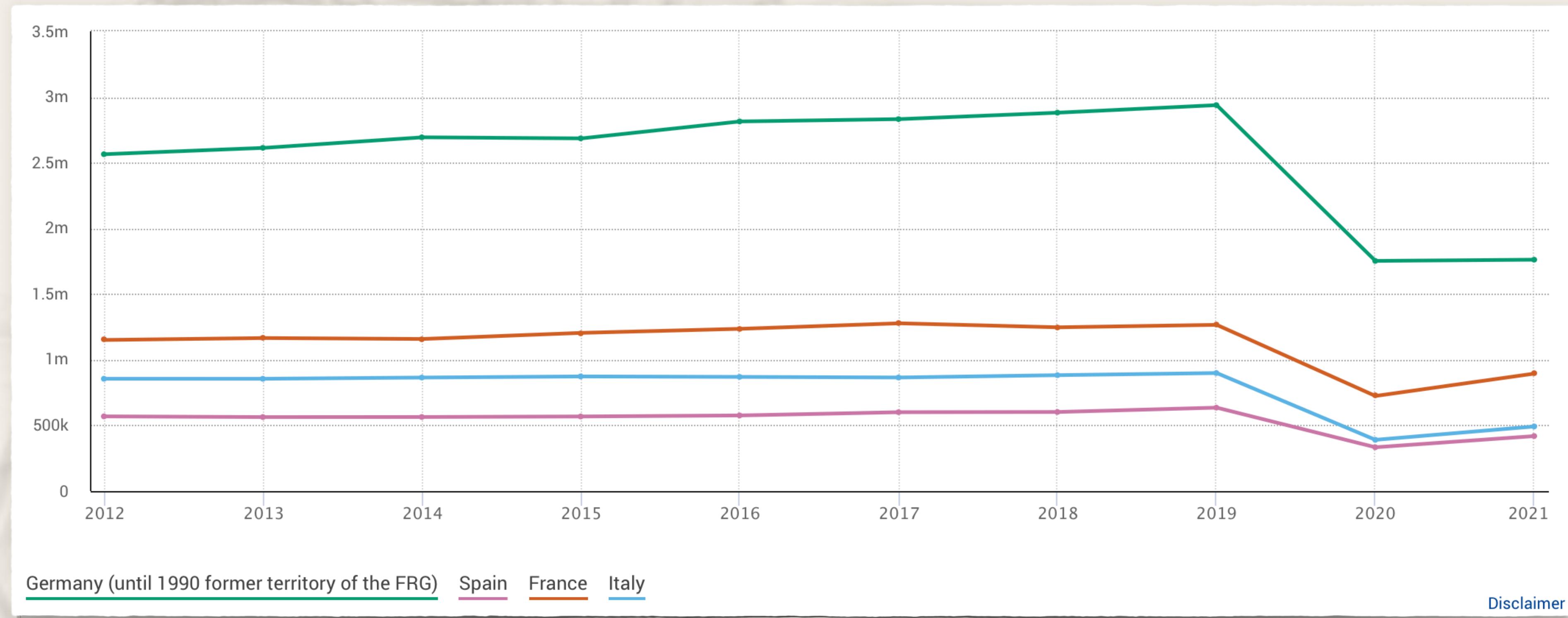
EU FREIGHT AND PASSENGERS IN 2020



Ref. Statista



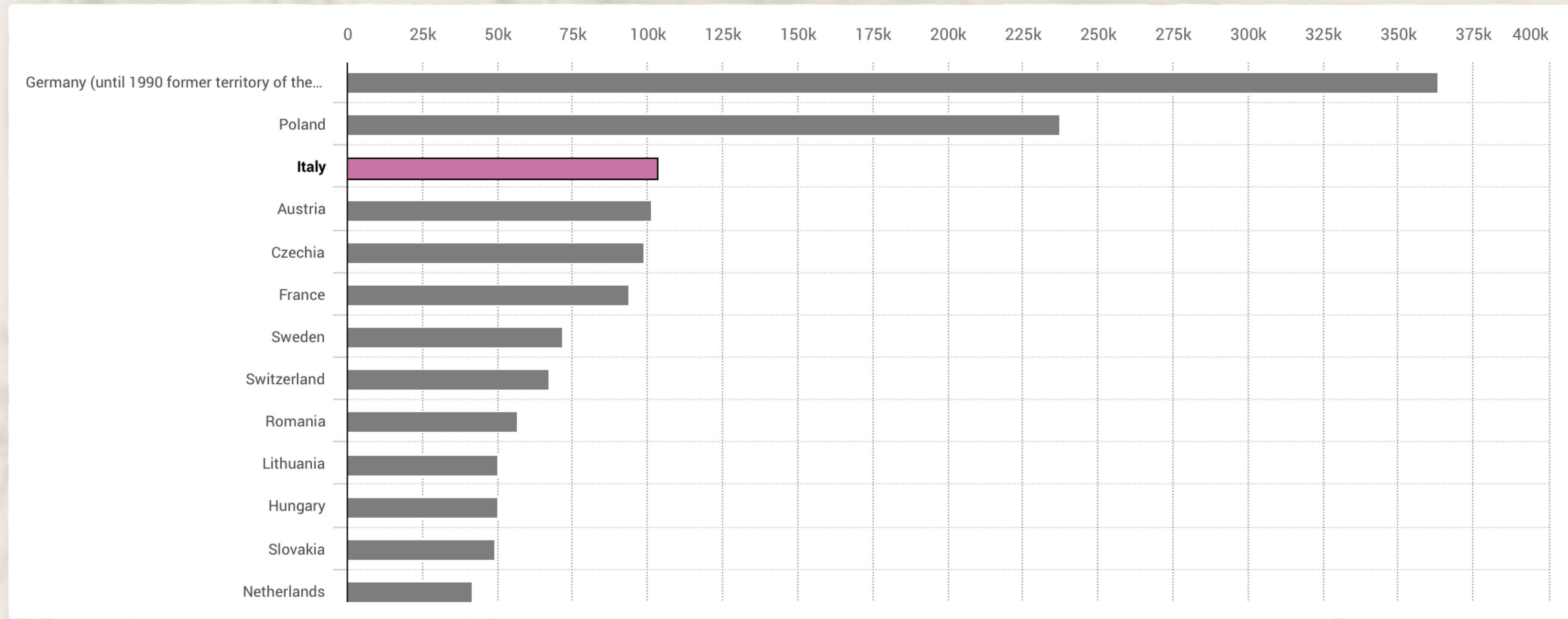
NUMBER OF ANNUAL PASSENGERS



Ref. <https://ec.europa.eu/eurostat/web/transport/data/database>



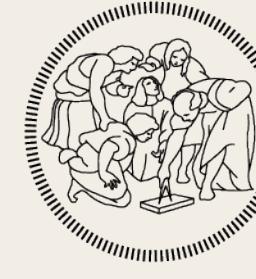
VOLUME OF GOODS TRANSPORTED (2021)



Ref. <https://ec.europa.eu/eurostat/web/transport/data/database>



European Commissioner for Transport, Adina Vălean said: "Rail has shaped our rich, common history. But, rail is also Europe's future, our route to mitigating climate change and powering economic recovery from the pandemic, as we build a carbon-neutral transport sector."



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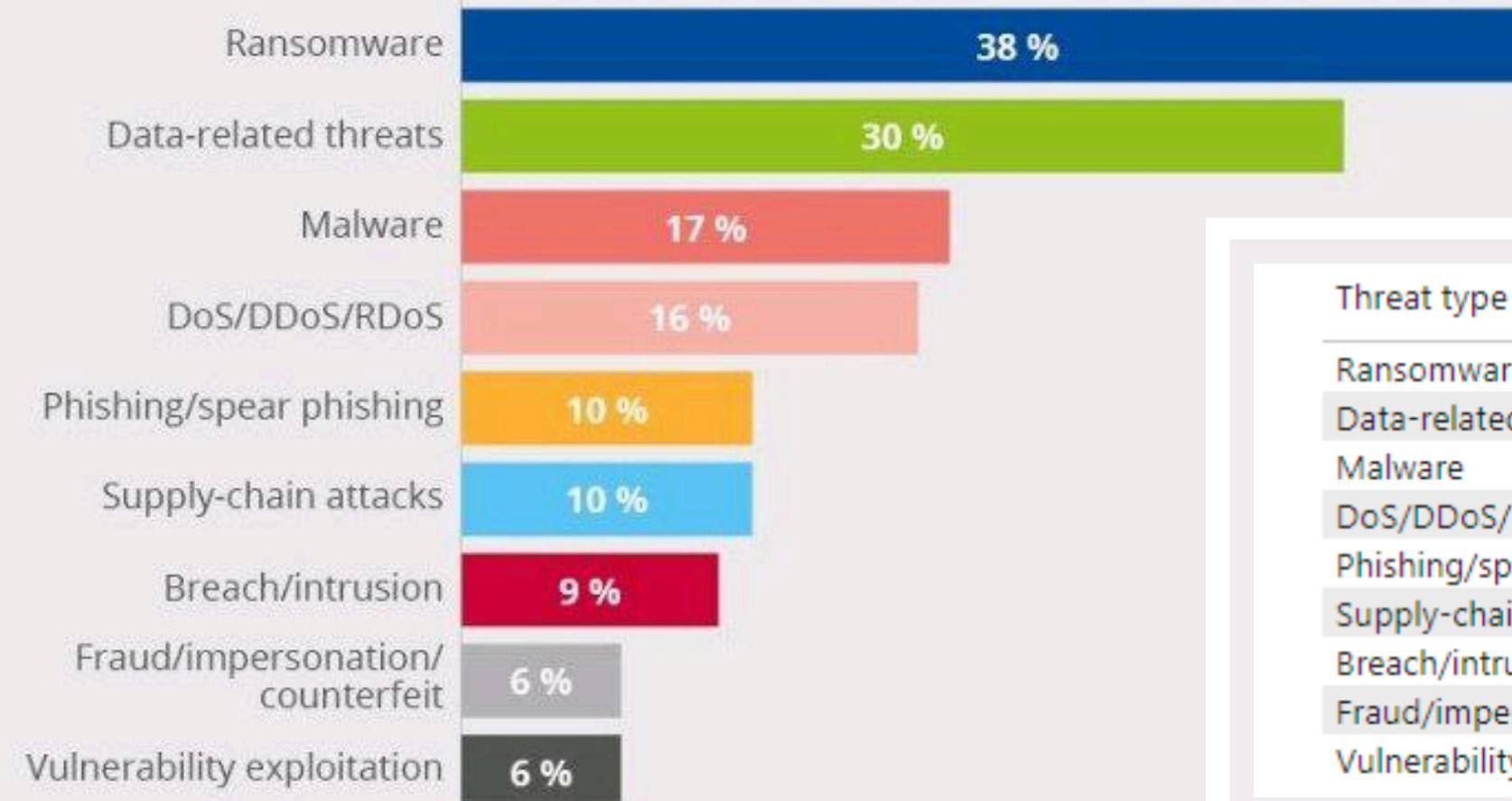
CYBERSECURITY CONTEXT



THREATS

PRIME THREATS TO THE TRANSPORT SECTOR (JANUARY 2021 TO OCTOBER 2022)

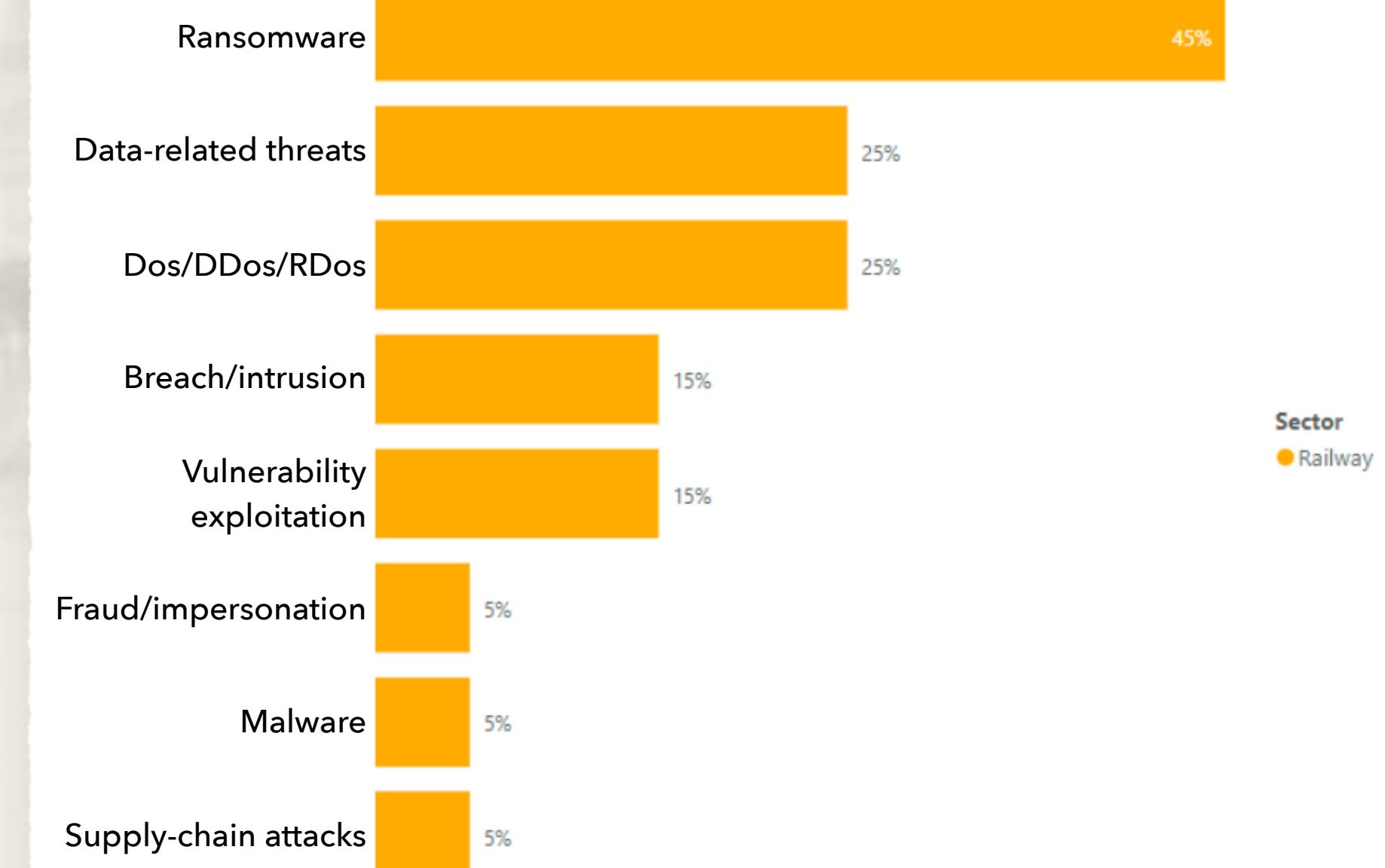
ENISA Threat landscape report: Transport sector



Threat type	Incidents
Ransomware	34
Data-related threats	26
Malware	15
DoS/DDoS/RDoS	13
Phishing/spear phishing	9
Supply-chain attacks	9
Breach/intrusion	8
Fraud/impersonation/counterfeit	5
Vulnerability exploitation	5

Railways

Railway - prime threats



Ref. ENISA Transport Threat Landscape



EUROPEAN ATTACK CASES

Rail station wi-fi provider exposed traveller data

© 2 March 2020

Swedish transport agencies targeted in DDoS cyber attacks

October 15, 2017 By Pierluigi Paganini

A woman with long hair, wearing a blue hoodie, is seen from behind, looking at her smartphone.

By Zoe Kleinman
Technology reporter, BBC News

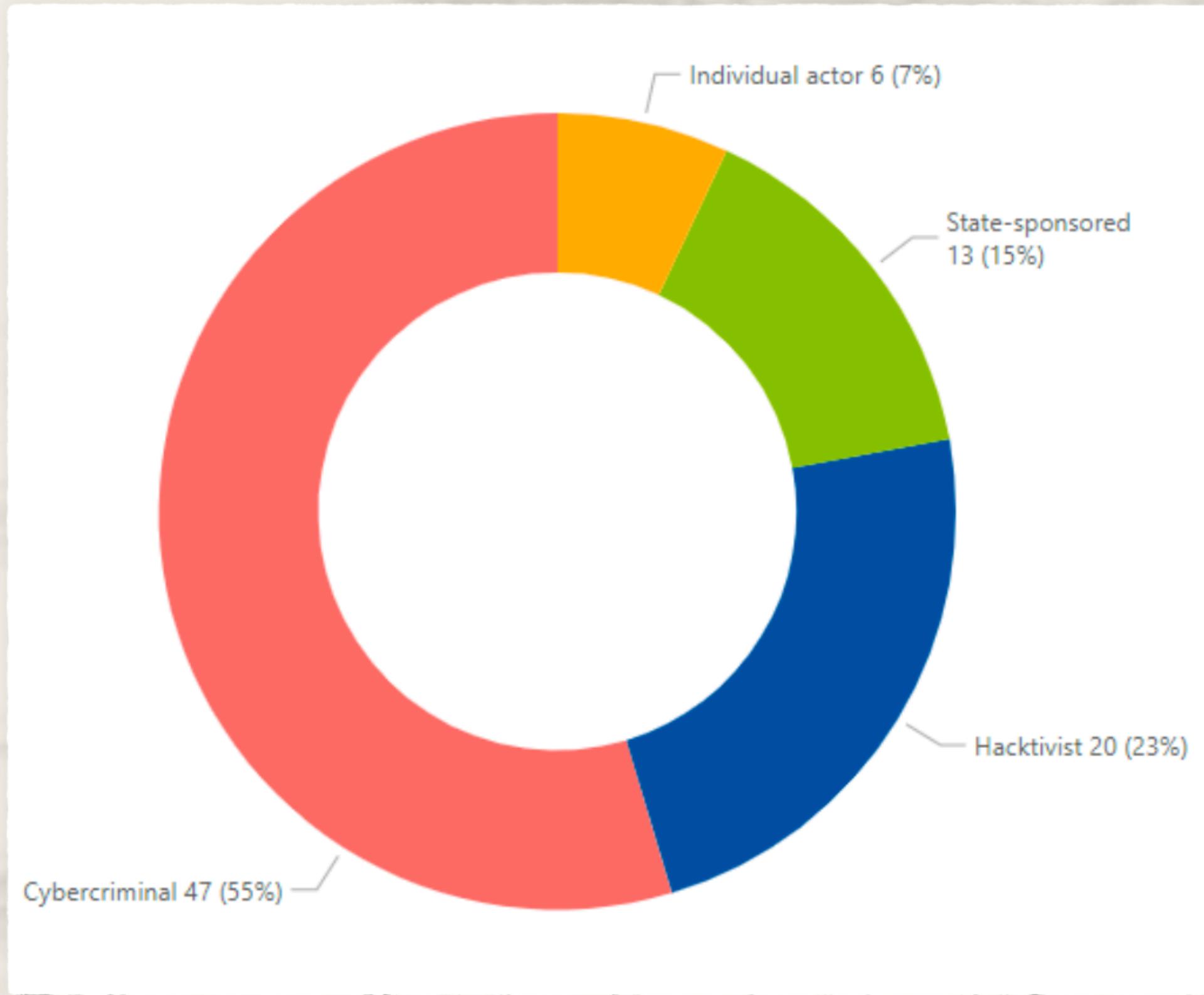
The email addresses and travel details of about 10,000 people who used free wi-fi at UK railway stations have been exposed online.

Ref. <https://www.bbc.com/news/technology-51682280> - <https://securityaffairs.com/64317/cyber-warfare-2/swedish-transport-agencies-ddos.html>

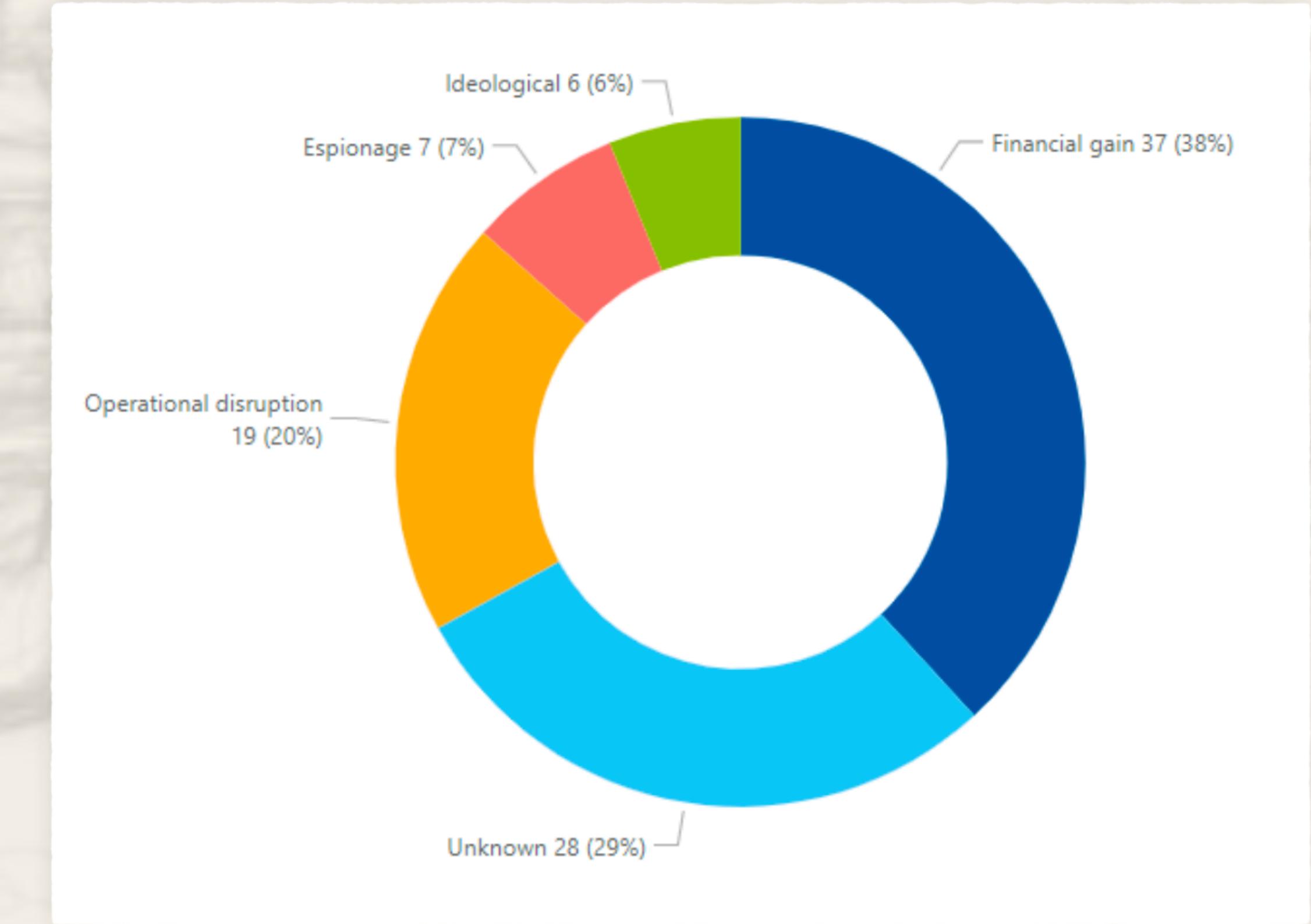


ACTORS AND MOTIVATIONS

WHO?

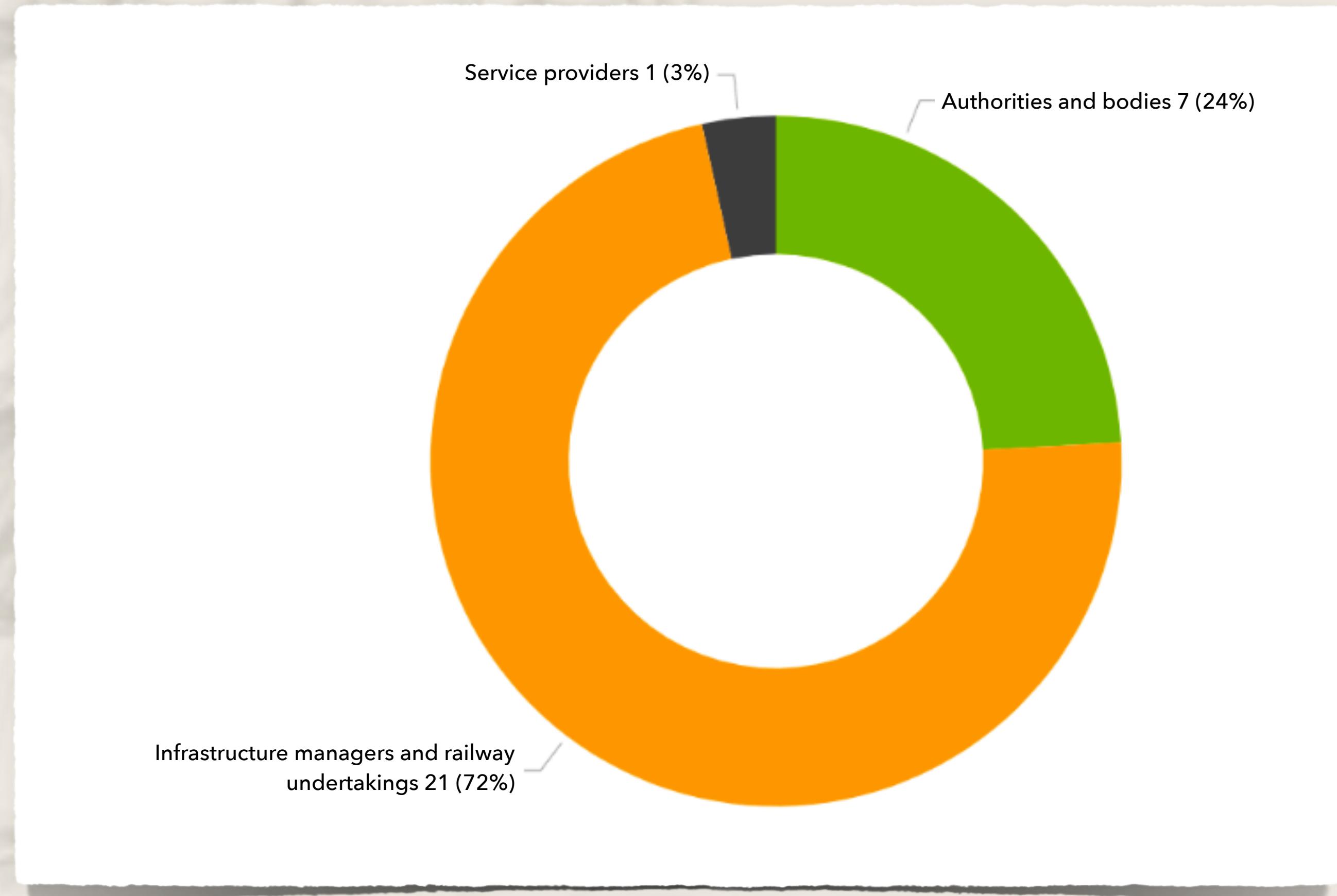


WHY?



Ref. ENISA Transport Threat Landscape

TARGETS



Ref. ENISA Transport Threat Landscape



TRENITALIA ATTACK CASE

MENU | CERCA

la Repubblica

ABBONATI GEDI SMILE | R | ACCEDI

Attacco hacker alla rete di Trenitalia e Fs, in tilt le biglietterie. "Riscatto di 5 milioni"

di Giuliano Foschini



L'azienda smentisce: "Mai chiesto né pagato". L'assalto con un cryptolocker: esclusa la mano di uno Stato estero, ma c'è l'ombra della criminalità russa



Ransomware on RFI

The screenshot shows a live chat interface between a user and the Rete Ferroviaria Italiana (RFI) sales department. The user asks about decrypting data and the ransom amount. The RFI representative responds with a demand for \$5,000,000 in Bitcoin if paid within 3 days, increasing to \$10,000,000 after that. A yellow sidebar on the right offers decryption software, featuring a folder icon with a key symbol and a download button.

Hive

Rete Ferroviaria Italiana

Rete Ferroviaria Italiana (RFI) is the Italian railway infrastructure manager, subsidiary of Ferrovie dello Stato (FS), a state-owned holding company. RFI is the owner of Italy's railway network, it provides signalling, maintenance and other services for the railway network. It also operates train ferries between the Italian Peninsula and Sicily.

Website www.rfi.it

Revenue \$2 500M

Employees 26 400

Live Chat

Sales dept.

will revise your company profile

09:48 How much for decrypt data? 11:40

How much is the ransom? 11:43

how much 11:52

? 13:31 Read

If you agree to pay within next 3 days then \$5,000,000 in Bitcoin. After this - \$10,000,000. 13:34

To decrypt your file you will also need to upload a key file "vMeURii3.key" which usually locates at C:\ or root of shared folders. 13:40

Decryption Software

Contact our sales department first via Live chat to get an offer please.

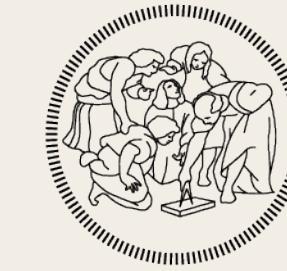
Download

Ref. <https://www.redhotcyber.com/post/hive-ransomware-colpisce-ferrovie-dello-stato-5-milioni-di-riscatto/>



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STAKEHOLDERS & MARKET ANALYSIS



STAKEHOLDERS

- Infrastructure managers
- Railway undertakings
- Supply chain
- Service providers
- Delivery chain
- Authorities and bodies
- Public areas
- Other entities



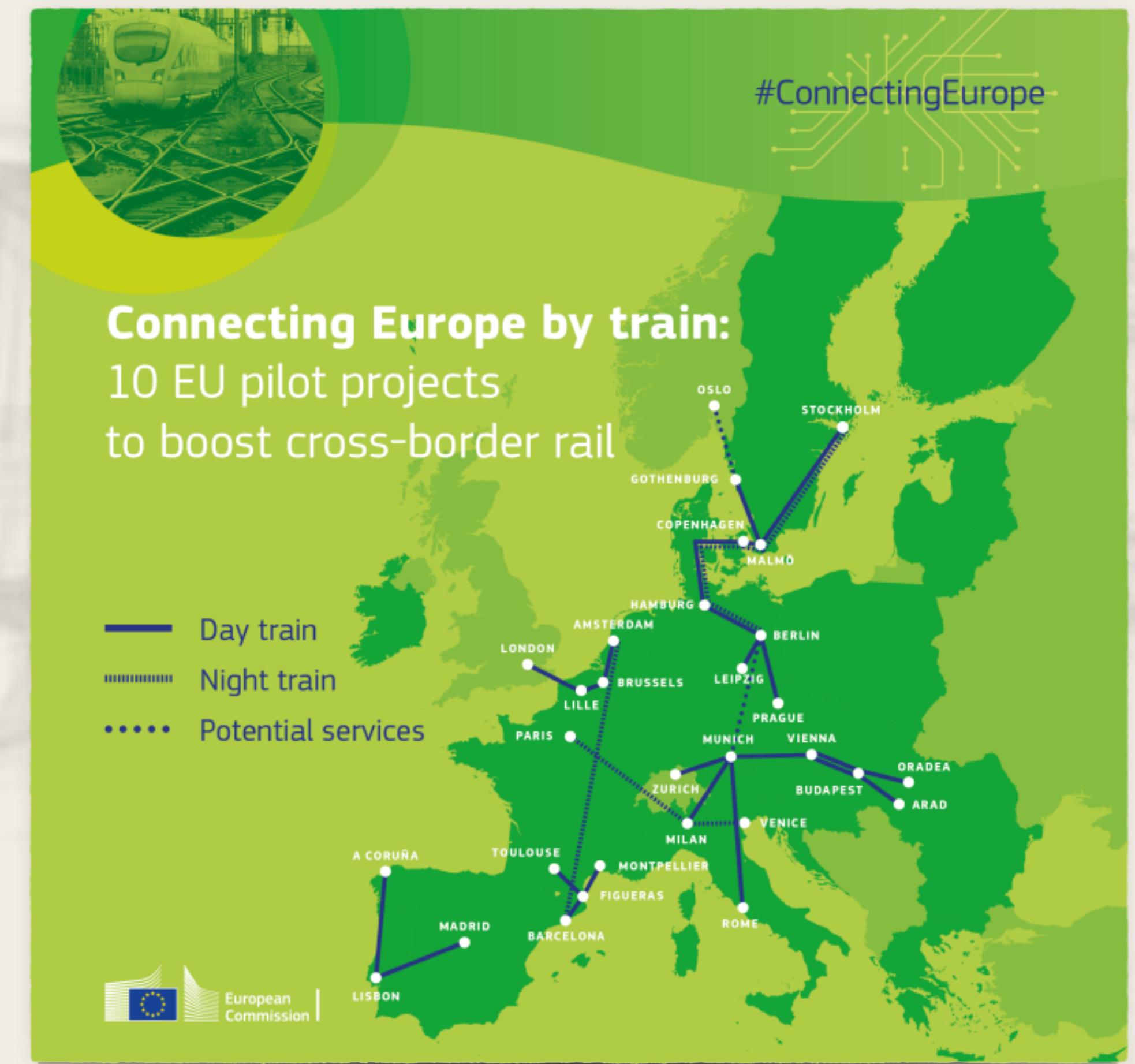
EUROPEAN ROADMAP

By 2030:

- High-speed rail traffic will double across Europe
- Scheduled collective travel for journeys under 500 km should be carbon neutral
- Automated mobility will be deployed at large scale

By 2050:

- Rail freight traffic will double.
- A fully operational, multimodal Trans-European Transport Network (TEN-T) for sustainable and smart transport with high speed connectivity.



Ref. Sustainable and Smart Mobility Strategy - European commission

CYBERSECURITY MARKET PROJECTION (2021-2027)

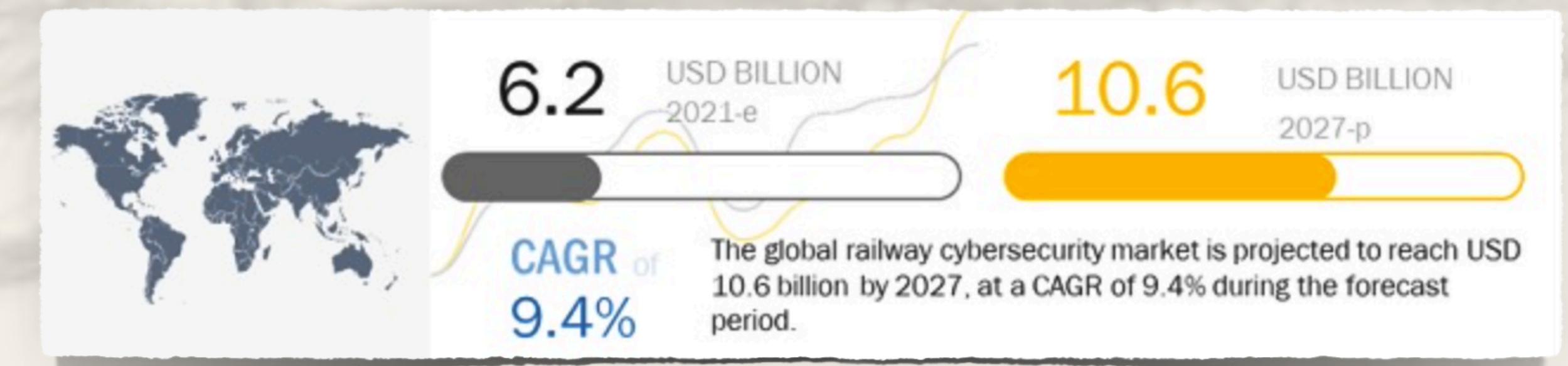
MOST VALUABLE PLAYERS IN THE MARKET:

Thales Group (France), Siemens AG (Germany), Alstom (France), Wabtec (US), and Nokia Networks (Finland) have strong portfolio of railway cybersecurity offerings and a huge presence across the globe.

By Region: Asia - 28%, North America - 30%, Europe - 42%

MARKET TRENDS:

- Plans for the advancement of driverless train networks.
- Technology manufacturers are working to improve connectivity.
- Europe is improving the safety and security of railways by retrofitting trains and replacing existing systems with advanced systems.





RAIL FREIGHT INDUSTRY

In 2020, the global rail freight industry was worth 247.4 billion U.S. dollars, projected to grow to 270.1 billion U.S. dollars by 2025, up from 235.1 billion U.S. dollars in 2019, making it the second largest mode of transport.

Explainer

Why is Russia attacking Ukraine's railways and are they failing?

Experts say that if Russia's objective is to paralyse the supply of Western weapons in Ukraine, it has failed - pointing to two key reasons.

A sector dominated by China, India, and the US.
Rail freight is growing rapidly in Poland, Hungary and Slovakia.

ITALIAN RAIL INVESTMENT



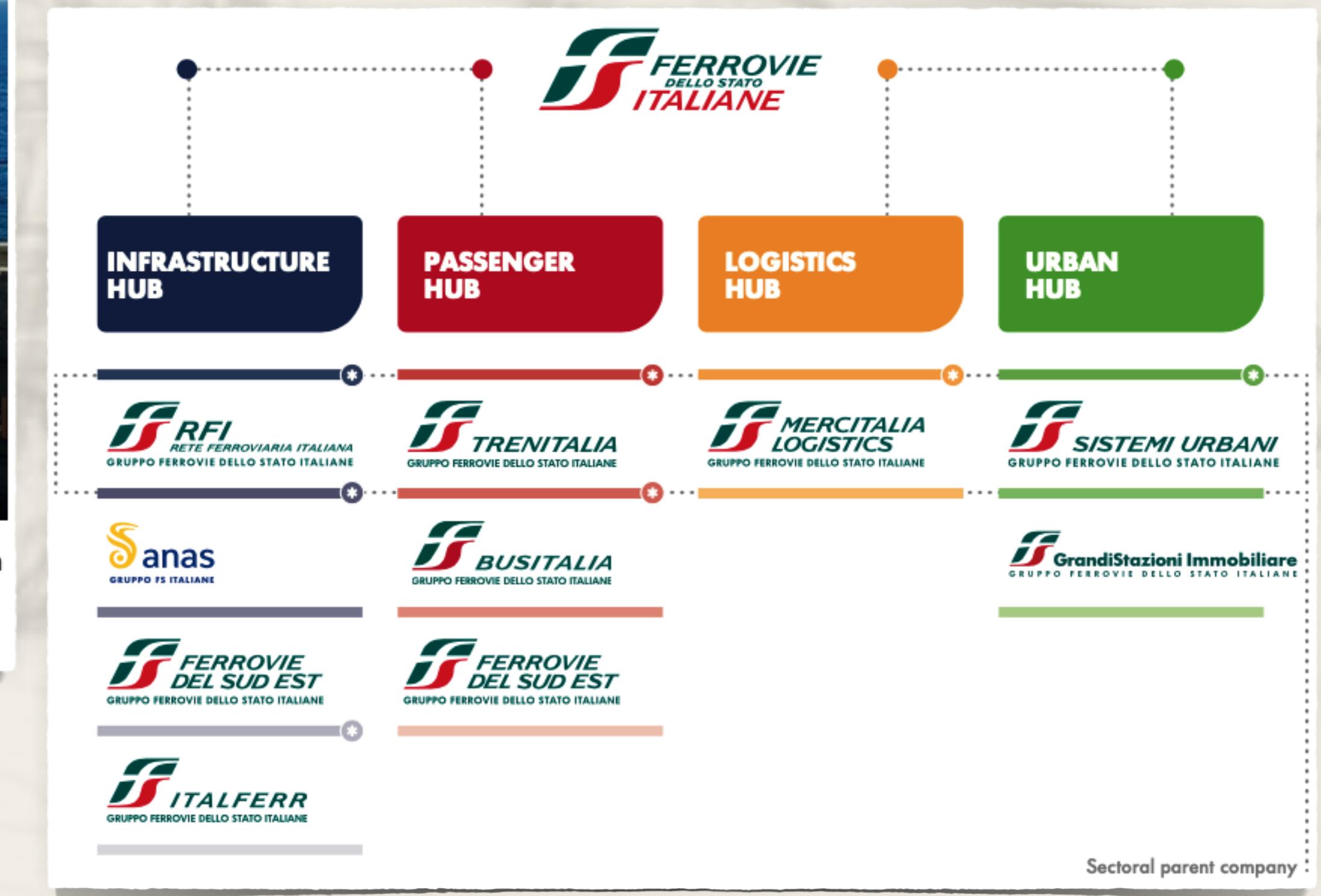
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Italy invests 160 billion in infrastructure, a 'true gamechanger'

Published on 17-05-2022 at 13:07

In the next ten years, the Italian railway company FS will invest 160 billion euros in infrastructure, and 190 billion euros in overland transport overall. This is part of the 2022-2031 Industrial Plan, a new vision towards rail transport that should be a gamechanger in Italy, according to CEO Luigi Ferraris.



Ref. fsitaliane.it - www.railfreight.com



TO SUM UP...

Issues with opening of new lines,
foreign investments/interests in
other countries

Politics

Economics

Social

Technology

Environment

Legal

Awareness of cybersecurity
attacks and consciousness of
attacks impacts on railway
services

More investments to add
interconnections between state
members

Digital and Automated Train
Operations through the
integration of IT/OT to SuC

Zoning and Conduits for
Railways guidance to
achieve compliance



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Thank you for your attention

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