Generating reports using RAILISA data

Powering UIC reports

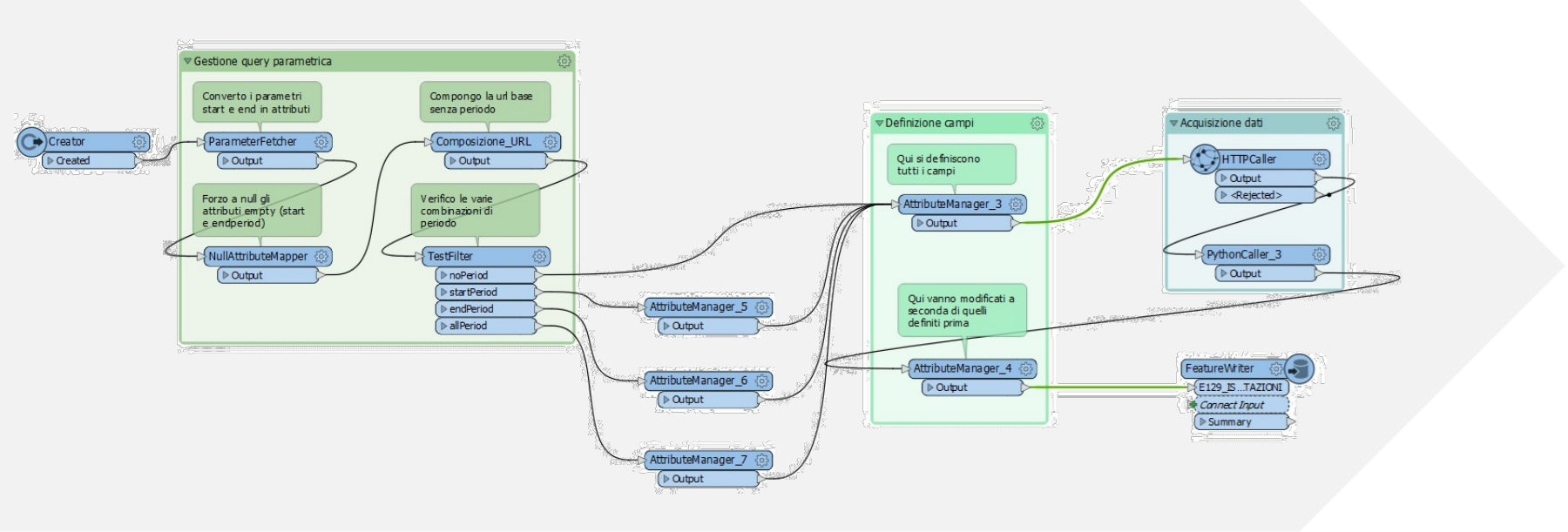
28 May 2024

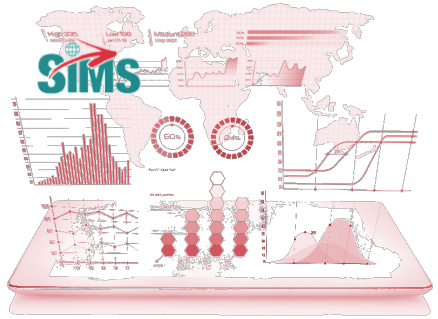
FERROVIE DELLO STATO ITALIANE

PREMIUM PARTNER

How RAILISA connects to the UIC database to extract real-time data

In FS Group, we have implemented an ETL (Extract, Transform, Load) process using the SDMX standard to periodically download statistical data from the UIC source into our SIMS system.

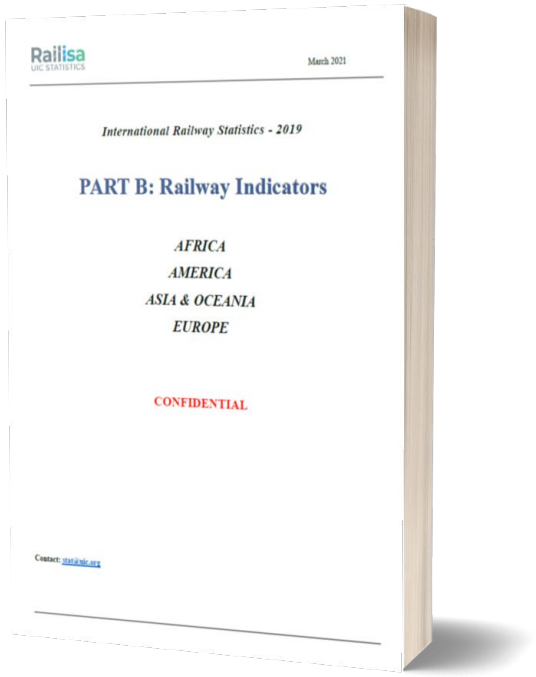




Opportunities offered by Railisa webservice

It’s possible to produce reports directly from the data source supplied by the SDMX webservice

FROM THIS



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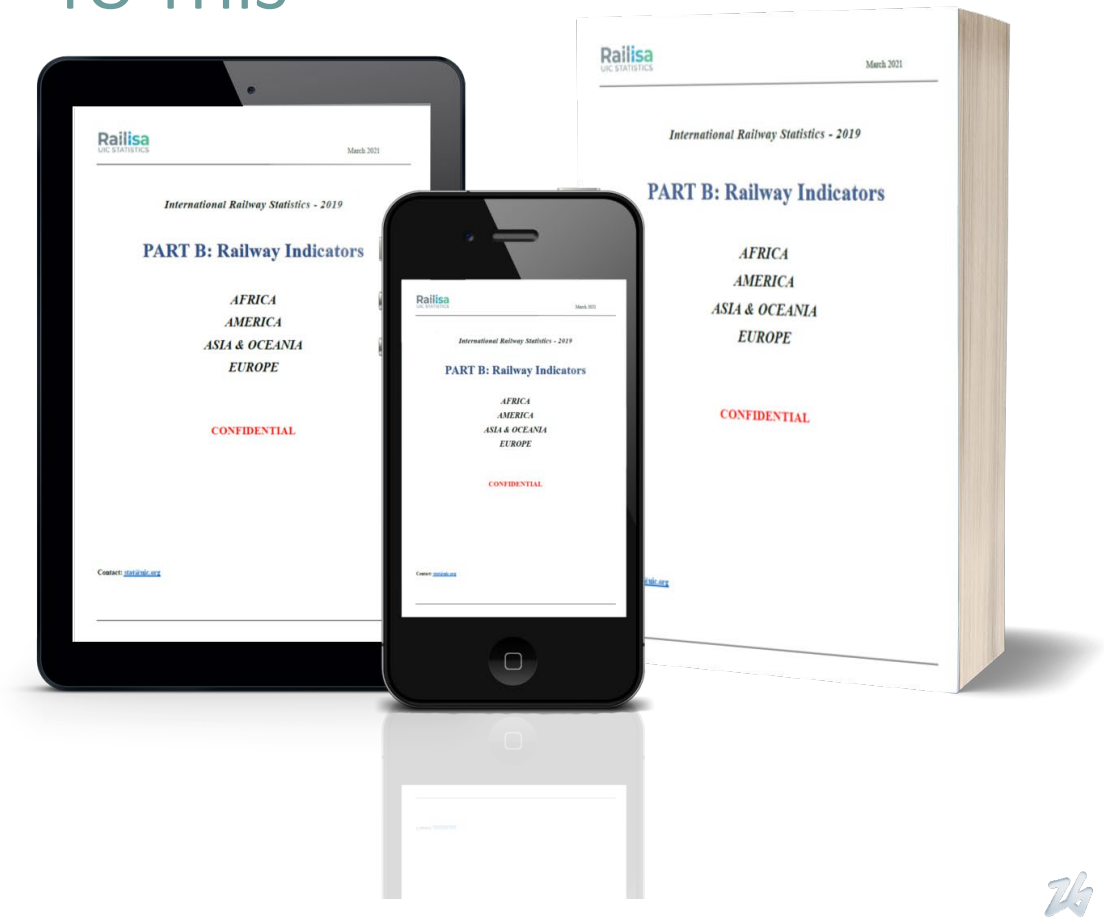


Practical demonstration

Creating a dashboard that mimics the UIC exposure, but linked to a data source

1. We conducted a preliminary analysis on the indicators by extracting data from Railisa webservice SDMX, and it emerged that, ath the time of the analysis, 9 out of 24 indicators cannot be calculated due to missing values in the variables*.

2. Then we connected a data visualization software to the database and created **7 dashboards, each with two indicators** (among those calculable) **with the UIC print layout** (already in A4 format).

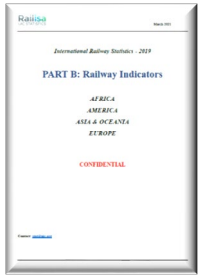
3. We have added **a filter by year** (top right) **in the dashboards to make it functional, not only for printing but also for dynamic web use.**

* updated December 2023

Cleaning and pre-processing

Preliminar analysis on available data

1.2. List of Railway Activity Indicators
Indicator 1: Proportion of Electrified Lines (%) Length of electrified lines (var 11.10) / Total length of lines worked (var 11.12)
Indicator 2: Proportion of lines with double tracks and more (%) (Total length of not electrified lines (var.11.05) – Length of lines not electrified with single track (var.11.06) + Length of electrified lines with double track or more (var.11.11)) / Total length of lines (var.11
Indicator 3: Proportion of high-speed lines (%) Length of high-speed lines (var.10.06) / Length of lines (var. 11.12)
Indicator 4: Mean distance between passenger stations (km) Length of lines (var. 11.12) / Number of passenger stations (var.14.10)
Indicator 5: Mean distance between level crossings (km) Length of lines (var. 11.12) / Number of level crossings (var.15.14)
Indicator 6: Number of train paths (in thousand) per km of line and per year Train.km (var 12.04) / Length of lines (var 11.12)
Indicator 7: Number of passenger train paths (in thousand) per km of line and per year Train.km (var 12.05) / Length of lines (var 11.12)
Indicator 8: Number of freight train paths (in thousand) per km of line and per year Train.km (var 12.06) / Length of lines (var 11.12)
Indicator 9: Proportion of electric traction - On the network of the IM (gross hauled t.km, %) Total Gross hauled t.km – Electric traction (var 13.10) / Total Gross hauled t.km (13.04)
Indicator 10: Proportion of electric traction – operator (gross hauled t.km, %) Total Gross hauled t.km – Electric traction (var 42.40) / Total Gross hauled t.km (42.04)
Indicator 11: Locomotive Productivity (in thousands of km per unit) Distance worked by locomotive (var 43.05+ var 43.06) / Number of locomotives (var 21.04 + var 21.06)
Indicator 12: Railcars and Multiple Units Productivity (in thousands of km per unit) Distance worked by multiple units (railcars + multiple units, var 43.07+ var 43.08 + var 43.32 + var. 43.33) / Number of multiple units (railcars, var 21.08 + var 21.09 + var. 21.37 + var. 21.40)
Indicator 13: Average Weight of a Freight Train (in tonnes) Gross hauled tonne.km worked by freight trains (var 42.06) / Train movements by freight trains (var 41.06)
Indicator 14: Proportion of International Passenger Traffic (%) International p.km (var 55.11) / Total p.km (var 55.13)
Indicator 15: Proportion of short distance journeys (%) Short distance p.km (var 52.04) / All services p.km (var. 52.04 + var. 52. 07 + var. 52.10)
Indicator 16: Proportion of High-Speed Train Movements (%) High Speed train.km (var 40.04) / Total train.km (var 41.05)
Indicator 17: Proportion of International Freight Traffic (%) International t.km (var 67.58) / Total t.km (var 61.56)
Indicator 18: Proportion of Intermodal transport (%) Intermodal t.km (var 61.65) / Total t.km (var 61.56)
Indicator 19: Staff required for Infrastructure (number of employees per km of lines) Staff strength for infrastructure (var 31.03) / Total length of lines worked (var 11.12)
Indicator 20: Staff required for Train Operations (number of employees per 1000 train.km) Staff (var 31.05) / Total train movements (var 41.04)
Indicator 21: Proportion of Women (%) Number of women (var 32.06) / Total staff (var 32.04)
Indicator 22: Relative balance (saldo) of staff movements (%) [Arrivals (var 33.03) – Departures (var 33.04)] / Total staff (var 32.04)
Indicator 23: Staff structure per age (%) Age < 30 years (var 32.07), Age between 30 and 39 years (var 32.10), Age between 40 and 49 years (var 32.13), Age between 50 and 59 years (var 32.16), Age > 60 years (var 32.19)



List of Indicators from pdf document

1.1 List of variables used		Tabella Flusso 151
UIC data		variabile presente/a
Variable ID	Description	
10.06	Length of high speed lines	presente
11.05	Length of not electrified lines	presente
11.06	Length of not electrified lines with single track	presente
11.10	Total length of electrified lines (km)	presente
11.11	Length of electrified lines with double tracks or more	presente
11.12	Total length of lines (km)	presente
12.04	Total train kilometers	presente
12.05	Passenger train kilometers	presente
12.06	Freight train kilometers	presente
13.04	Total gross hauled tonne-kilometers of trains – All types of tractions	presente
13.10	Total gross hauled tonne-kilometers of trains – Electric traction	presente
14.10	Number of passenger stations	presente
15.14	Number of level crossings	presente
21.04	Total diesel locomotives	presente
21.06	Total electric locomotives	presente
21.08	Total diesel railcars	presente
21.09	Total electric railcars	presente
21.37	Number of diesel MUs	presente
21.40	Number of electric MUs	presente
31.03	Total infrastructure staff	presente
31.05	Total operation staff	assente
32.04	Staff: Total	assente
32.06	Staff: Total women	presente
32.07	Staff age structure: < 30 years	presente
32.10	Staff age structure: 30 - 39 years	presente
32.13	Staff age structure: 40 - 49 years	presente
32.16	Staff age structure: 49 - 50 years	presente
32.19	Staff age structure: > 60 years	presente
33.03	Staff: Total arrivals	presente
33.04	Staff: Total departures	presente
40.04	HS train movements (thousand train.km)	assente
41.04	Total trains movements (thousand train.km)	presente
41.05	Passenger trains movements (thousand train.km)	presente
41.06	Freight trains movements (thousand train.km)	presente
42.04	Total Gross hauled t.km (million gross t.km)	presente
42.06	Gross hauled tonne-kilometres of freight trains (million gross tonne.km)	presente
42.40	Total Gross hauled t.km – Electric traction (million gross tonne.km)	assente
43.05	Rolling stock movements – Diesel locomotives (thousand km)	presente
43.06	Rolling stock movements – Electric locomotives (thousand km)	presente
43.07	Rolling stock movements – Diesel railcars (thousand km)	presente
43.08	Rolling stock movements – Electric railcars (thousand km)	presente
43.32	Rolling stock movements – Diesel MUs (thousand km)	presente
43.33	Rolling stock movements – Electric MUs (thousand km)	presente
51.06	Total passengers (thousand) on the national territory	presente
51.13	Total passenger.km (million) on the national territory	presente
52.04	Short distance passenger kilometers (million)	presente
52.07	Long distance passenger kilometers (million)	presente
52.10	High speed passenger kilometers (million)	assente
55.11	Total international passenger.km (million)	assente
55.13	Total passenger.km (million) domestic + international	assente
61.56	Total tonnes.km (million) domestic + international	assente
61.65	Total tonnes.km (million) domestic + international - Intermodal	presente
67.58	Total tonnes.km (million) - International	presente

List of Variables from Railisa database

To calculate the Railway Indicators as represented in Part B of the STI, we approached the topic through a preliminary analysis of the data available in the database table which highlighted the absence of 8 variables which, being used in the calculation formulas of the indicators in fact prevents the calculation of 9 Indicators.

Updated December 2023

Data analysis

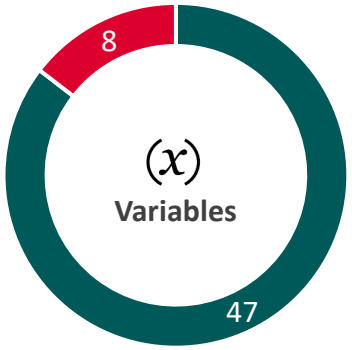
Data not yet present in the Railisa database

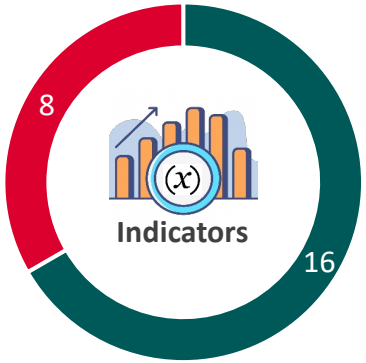
To be updated and discussed

List of missing variables (8/53)

(at the time of analysis)

		Linked indicators that cannot be calculated
31.05	Total operation staff	20
32.04	Staff: Total	21 e 22
40.04	HS train movements (thousand train.km)	16
42.40	Total Gross hauled t.km – Electric traction (million gross tonne.km)	10
52.10	High speed passenger kilometers (million)	15
55.11	Total international passenger.km (million)	14
55.13	Total passenger.km (million) domestic + international	14
61.56	Total tonnes.km (million) domestic + international	17 e 18





List of Indicators that could not be calculated (9/24)

Indicator 10: Proportion of electric traction – operator (gross hauled t.km, %)
~~Total Gross hauled t.km – Electric traction (var 42.40)~~ / Total Gross hauled t.km (42.04)

Indicator 14: Proportion of International Passenger Traffic (%)
~~International p.km (var 55.11) / Total p.km (var 55.13)~~

Indicator 15: Proportion of short distance journeys (%)
Short distance p.km (var 52.04) / All services p.km (var. 52.04 + var. 52. 07 ~~+ var. 52.10~~)

Indicator 16: Proportion of High-Speed Train Movements (%)
~~High Speed train.km (var 40.04)~~ / Total train.km (var 41.05)

Indicator 17: Proportion of International Freight Traffic (%)
International t.km (var 67.58) / ~~Total t.km (var 61.56)~~

Indicator 18: Proportion of Intermodal transport (%)
Intermodal t.km (var 61.65) / ~~Total t.km (var 61.56)~~

Indicator 20: Staff required for Train Operations (number of employees per 1000 train.km)
~~Staff (var 31.05)~~ / Total train movements (var 41.04)

Indicator 21: Proportion of Women (%)
Number of women (var 32.06) / ~~Total staff (var 32.04)~~

Indicator 22: Relative balance (saldo) of staff movements (%)
[Arrivals (var 33.03) – Departures (var 33.04)] / ~~Total staff (var 32.04)~~

Updated December 2023

Reporting

The ability to filter and print dashboards as you do..

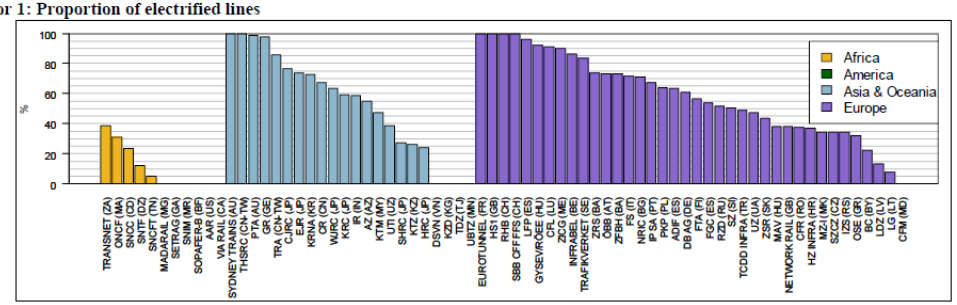
FROM THIS

Railisa
UIC STATISTICS

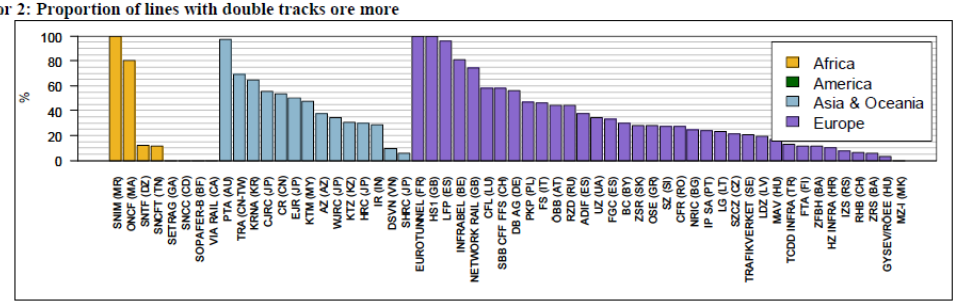
March 2021

2. Indicators

2.1. Indicator 1: Proportion of electrified lines



2.2. Indicator 2: Proportion of lines with double tracks ore more



4

The filter is currently set to 2019 to display the same content of the pdf reproduced across all dashboards (setting it to 2022 now would result in some being empty).

TO THIS

With the ability to **download a pdf file** and **filter by year <u>in real time</u>**

FERROVIE DELLO STATO ITALIANE

FS Research Centre
Il Centro Studi di Ferrovie dello Stato Italiane

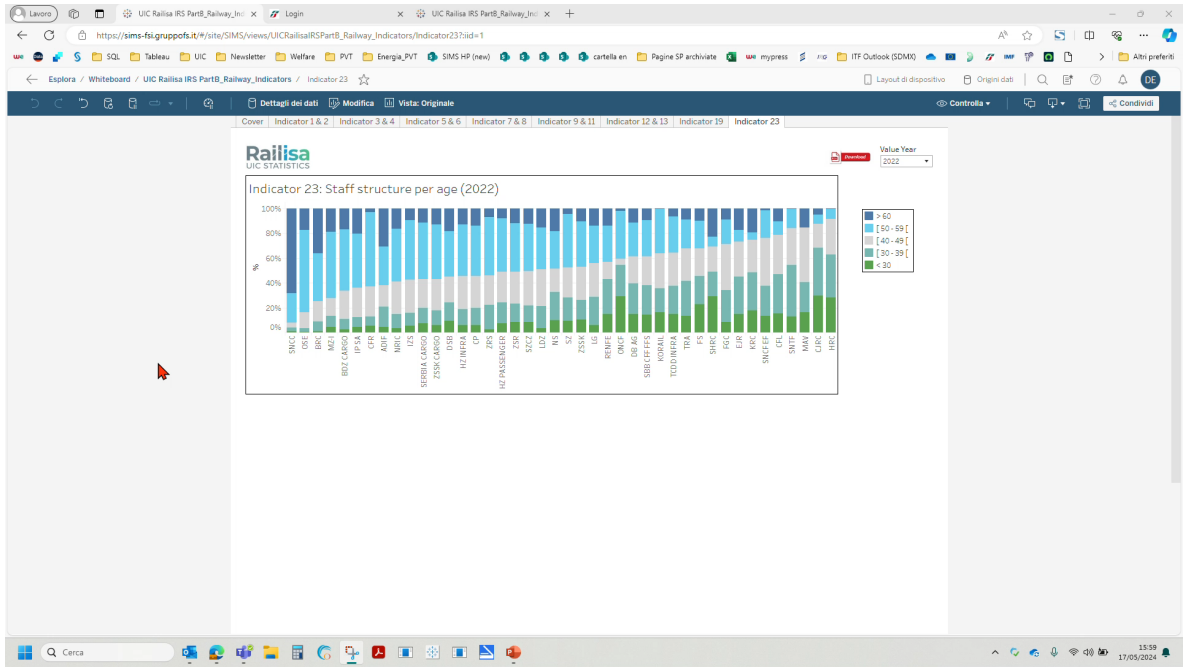
A practical live demonstration

Link to the dashboard in SIMS

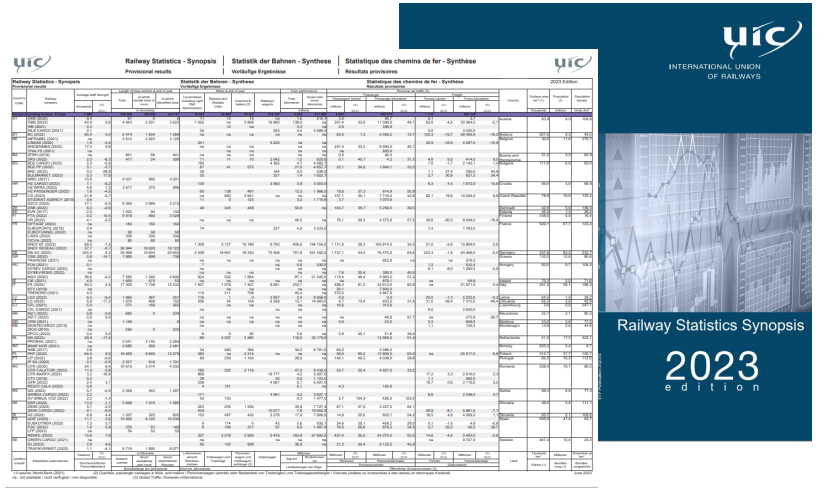
sims-fsi.gruppofs.it/#/site/SIMS/workbooks/3284?:origin=card_share_link

Only for UIC associates who have completed the login procedure

Demo video clip



Other potential uses



SYNOPSIS

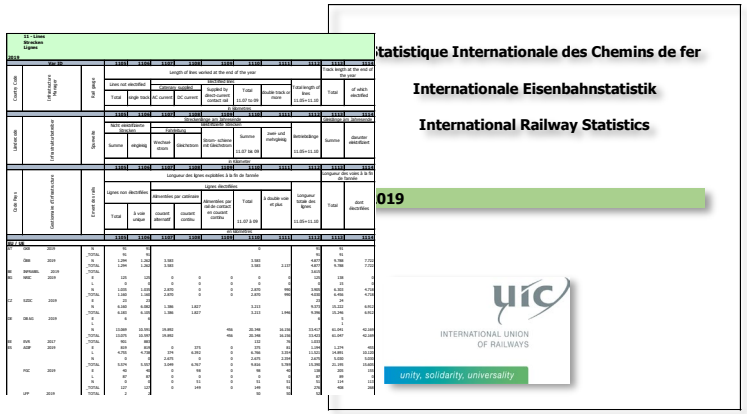
Synopsis layout

Last update: 9/10/2023

Year	Region	Country	Company
2022	EUROPE	Tutti	Tutti

		Staff	Infrastructure				Transport Stock		
		Mean annual staff strength	Length of lines worked - end of year	Length of electrified double track lines - end of year	Length of double-tracked lines not electrified	Length of electrified lines - end of year	Electric locomotives - end of year	Diesel locomotives - end of year	Electric strength
Country Name	Company Name	Full Time Equivalent	kilometre	kilometre	kilometre	kilometre	number	number	number
Totale complessivo		1.136.773	224.021	79.507	7.607	128.090	9.988	9.054	
Austria	ÖBB	42.941	4.843	2.137	64	3.622	801	251	
	WB								
Belarus	BC								
Belgium	INFRABEL		3.619	2.817		3.207			
	LINEAS	1.863					103	138	
	SNCB/NMBS	17.249							
Bosnia Herze...	ZRS	1.964	417	24	0	308	33	38	
Bulgaria	BDZ CARGO	2.277					83	107	
	BDZ PP	5.114					73	14	
	BRC	166					21	5	
	BULMARKET	330					22	13	
Croatia	HZ CARGO	1.063					52	78	
	HZ INFRA	4.773	2.617	271	4	995			

Processing on UIC Railisa Webservice data



STI

STI layout

Last update: 9/10/2023

Year	Domain	STI Table	Region	Country	Company
2022	Infrastructure	11	EUROPE	Tutti	Tutti

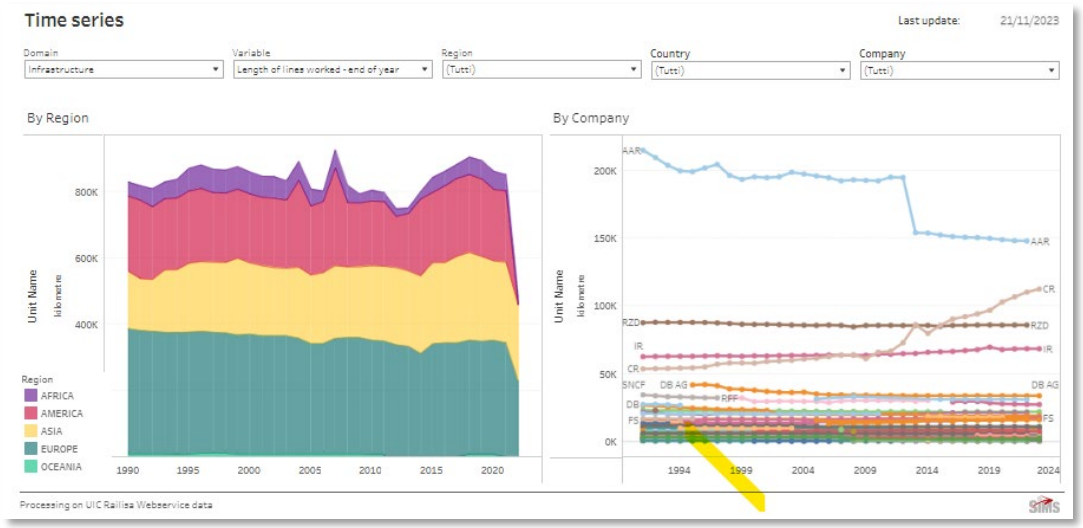
		Infrastructure							
		1105 Length of not electrified lines - end of year	1106 Length of not electrified single track lines - end of year	1110 Length of electrified lines - end of year	1111 Length of electrified double track lines - end of year	1112 Length of lines worked - end of year	1113 Length of tracks - end of year	1115 Length of double-tracked lines not electrified	1116 Length of electr
Country Name	Company Name	kilometre	kilometre	kilometre	kilometre	kilometre	kilometre	kilometre	kilometre
Totale complessivo		92.897	84.464	128.090	79.507	224.021	7.023	7.607	
Austria	ÖBB	1.221	1.157	3.622	2.137	4.843		64	
Belgium	INFRABEL	412	296	3.207	2.817	3.619			
Bosnia Herze...	ZRS	109	109	308	24	417		0	
Croatia	HZ INFRA	1.622	1.618	995	271	2.617		4	
Czech Repub...	SZCZ	6.140	6.062	3.215	1.990	9.355		78	
Finland	FTA	2.490	2.490	3.428	692	5.918		0	
France	EIFFAGE	0	0	182	182	182		0	
	EUROTUNNEL	0	0	58	58	58		0	
	LISEA	0	0	339	339	339		0	
	OCVIA	0	0	80	80	80		0	
	SNCF RESEAU	10.822	8.109	16.122	13.915	26.944		2.713	
FYR of Mace...	MZ-I	449	449	254	0	683		0	

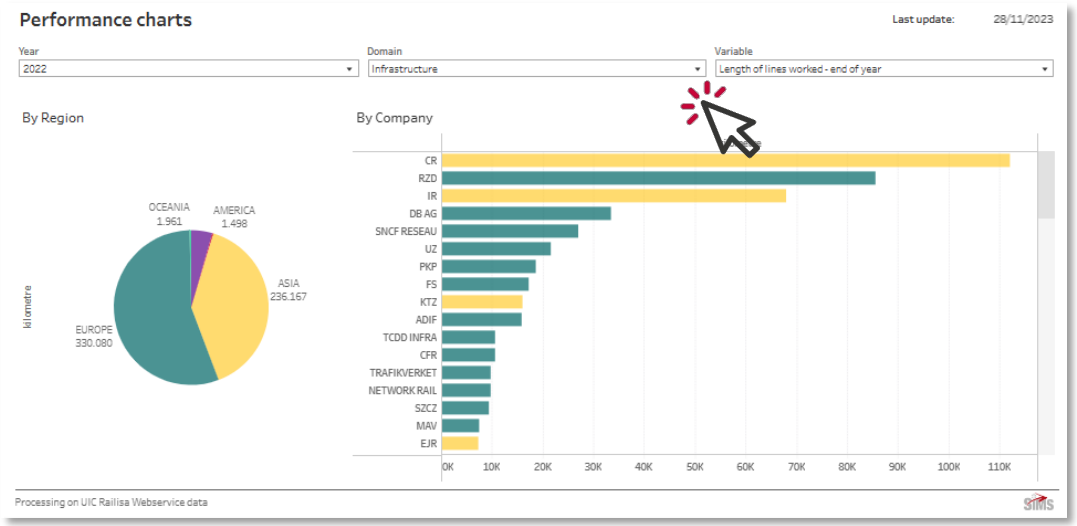
Processing on UIC Railisa Webservice data

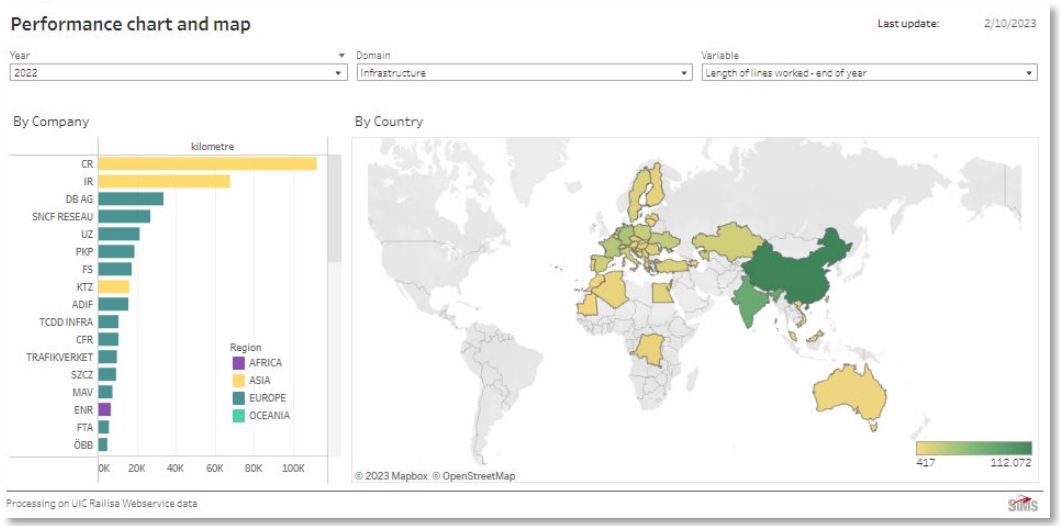
Additional case studies

Data visualization

We have tried the Railisa webservice to extract crucial data on rail traffic, train punctuality and infrastructure conditions, developing examples of data visualization through advanced tools to make the performance of the railway sector accessible **in a clear and intuitive way**, with a simple click.







Additional case studies

Putting together multiple variables

By combining multiple variables, such as *"Length of Lines worked"* with *"Length of not-electrified single-track lines"* it is possible to create graphical representations that can be used for quick comparisons.

Future useful developments

Complete the insertion of the missing indicators to make the database as usable as possible through the Railisa web service. This would allow us to reproduce all the UIC reports.

It's possible to generate an automatic reproduction of reports already published by the UIC.

There will be the possibility to directly print the report pages with the same layout as the UIC.

Thank you