



Economic Commission for Europe**Inland Transport Committee****Eighty-fourth session**

Geneva, 22-25 February 2022

Item 9 (g) of the provisional agenda

Strategic questions of a horizontal and cross-sectoral policy or regulatory nature:**Analytical work on transport****International Transport Infrastructure Observatory/ITIO - Purpose, functions, user groups and operational modalities****Note by the secretariat*****I. Background and mandate**

1. During its twenty-eighth session (Geneva, 7–9 September 2015) the Working Party on Transport Trends and Economics (WP.5) organized a workshop on “Road and rail transport corridors along Europe and Asia”. The participants agreed that despite the numerous initiatives that exist and operate for transport corridor development along Europe and Asia, cooperation among these initiatives is very low or non-existent. During its twenty-ninth session (Geneva, 5–7 September 2016, ECE/TRANS/WP.5/60, para. 37) the Working Party approved the development of a transport infrastructure observatory in Europe and Asia which should include all existing initiatives on transport infrastructure development in the region with main objective to foster cooperation among these initiatives. During its thirty-first session (Geneva, 3–5 September 2018) the Working Party was informed that the preparation of the observatory was being funded by the Islamic Development Bank in the framework of an Extra-Budgetary project entitled “Strengthening regional connectivity with the establishment of a Geographical Information System (GIS)” (ECE/TRANS/WP.5/60, para. 37).

2. Three partner organizations so far, the Economic Cooperation Organization secretariat, the UN Economic and Social Commission for Western Asia (ESCWA) and the Centre for Transportation Studies for the Western Mediterranean (CETMO), are supporting the secretariat on the geographical expansion of the observatory and the collection of relevant data, while promoting its usage among their member States. The Inland Transport Committee (ITC) at its eighty-third session (February 2021) requested the secretariat to prepare an official document about progress regarding the development of the International Transport Infrastructure Observatory, providing information about methodology, data sources, algorithms of actualization and mechanisms of data protection as well as responsibilities of stakeholders involved in this process. The present document provides such an overview. It

* This document was scheduled for publication after the standard publication date owing to circumstances beyond the submitter's control.



contains many figures and maps directly derived from the Observatory. Any user of the Observatory needs to acknowledge the following disclaimer before being able to enter it: “The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by the United Nations.” This disclaimer also applies to the figures contained in this document.

II. Main objectives of ITIO and the services it provides

3. The Observatory (hereafter referred to as ITIO) offers a multi-stakeholder, web-based Geographic Information System (GIS) platform which hosts data on a large variety of transport infrastructure networks and nodes across different modes including road, rail, inland waterways, ports, airports, intermodal terminals, logistics centres and border crossing points. A geographic information system (GIS) is a system that creates, manages, analyses, and maps all types of data. GIS connects data to a map, integrating location data with all types of descriptive information. GIS solutions thus help users to understand patterns, relationships, and geographic context. The benefits include improved, more effective communication as well as better management and decision making. (Esri, 2021).

4. Bearing the above in mind, the main objectives of ITIO are to:

(a) Support the implementation of pillars 1, 2 and 4 of the ITC Strategy until 2030, envisaging the role of the ITC as: a United Nations Platform for regional and global inland transport conventions, a United Nations Platform for supporting new technologies and innovations in inland transport and a United Nations Platform for promoting sustainable regional and interregional inland transport connectivity and mobility, respectively.

(b) Support the implementation of Sustainable Development Goal (SDG) 9 on “Building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation”; SDG 11 on “Making cities and human settlements inclusive, safe, resilient and sustainable; SDG 13 on “Taking urgent action to combat climate change and its impacts”; and SDG 17 on “Strengthening the means of implementation and revitalizing the global partnership for sustainable development”.

(c) Offer to the United Nations system and Governments an innovative and inclusive tool that further facilitates transport infrastructure financing and enhances regional and interregional connectivity.

5. The main pillars of services that the observatory provides are being summarized in the schema below:

Figure 1

ITIO pillars of services



Source: ECE

(a) Offering an electronic repository of ECE inland transport conventions, project outputs, and deliverables of designated Groups of Experts:

- ITIO offers a digital environment that helps visualize specific outputs and deliverables, such as the work done in the framework of TEM¹, TER² and EATL³ projects but also the tangible outputs produced by the Group of Experts on Assessment of Climate Change Impacts and Adaptation for Inland (GE.3) and the Group of Experts on Benchmarking Transport Infrastructure Construction Costs (GE.4).
- ITIO provides an electronic platform that will be catalytical for the ongoing digitalization of different United Nations inland transport agreements and conventions, especially those covering infrastructure (AGR⁴, AGC⁵, AGTC⁶ and AGN⁷) but also border crossing facilitation instruments such as TIR⁸/eTIR (customs systems location).

(b) Financing transport infrastructure:

ITIO operates as a virtual marketplace for financing transport infrastructure by providing an electronic interface between Multilateral Development Banks (MDBs) and Governments. Governments can upload their transport infrastructure projects in need of funding as well as select which MDBs they wish to reach out to. By adding or removing GIS layers, data on transport infrastructure networks can be combined with data about the national and/or regional ratification and implementation rate of specific transport legal instruments or with the impact that climate change may have on planned infrastructure projects. For MDBs, ITIO functions as a clearing house granting them direct access to a centralized information platform assisting them to decide which projects to consider for funding. A secured electronic communication platform will be provided enabling all users to reach out to each other and exchange information.

(c) Promoting sustainable regional and interregional connectivity:

The observatory provides the possibility to all regional and interregional organizations to create their own maps illustrating their transport infrastructure initiatives, corridors, projects, reports and studies and anything else they consider useful for the purpose of further enhancing regional connectivity. This will enhance cooperation among the different transport infrastructure initiatives in Europe, Asia, and Africa.

III. User categories, profiles, and functionalities

6. Four user groups are foreseen in the observatory:

- (a) Governments
- (b) Multilateral Development Banks (MDBs)
- (c) Regional Cooperation Organizations (RCOs)
- (d) The wider public

7. Each of these user groups have access to a distinct set of functionalities, services, and possibilities. For Governments, MDBs and RCOs access will be granted to officially nominated/ accredited representatives only. A username and password will be provided only after receipt of nominations by the secretariat. The public, academia, private sector, independent experts, and others will not have to register but will only have access to high-level data and information. Upon entering ITIO, they may be invited through an optional

¹ Trans-European Motorways project.

² Trans-European Railways project.

³ Euro-Asian Transport Links.

⁴ European Agreement on Main International Traffic Arteries.

⁵ European Agreement on Main International Railway Lines.

⁶ European Agreement on Important International Combined Transport Lines and Related Installations.

⁷ European Agreement on Main. Inland Waterways of International. Importance.

⁸ Convention on International Transport of Goods Under Cover of TIR Carnets.

online survey to provide some background and profile information for statistical purposes (reasons for using the observatory, their location, professional affiliation etc.).

IV. Navigate to the ITIO home page⁹

8. Access the ITIO home page:
 - Web address: <https://gis.unece.org/portal/apps/sites/#/international-transport-infrastructure-observatory>

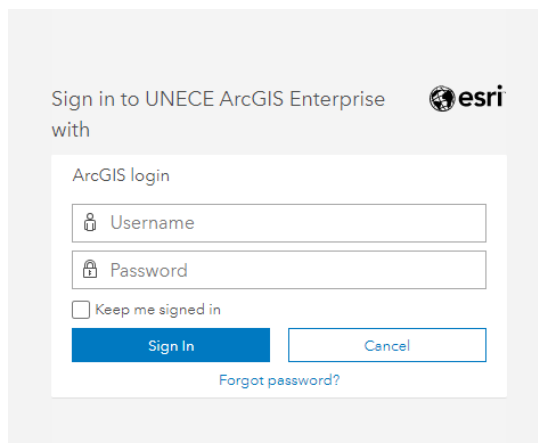
Figure 2
ITIO Home page



The International Transport Infrastructure Observatory is an initiative of UNECE Sustainable Transport and Islamic Development Bank. It is a multi-stakeholder, web-based GIS platform which hosts data on a large variety of transport infrastructure networks and nodes across different modes including road, rail, inland waterways, ports, airports, intermodal terminals, logistics centers and border crossing points.

Source: ECE

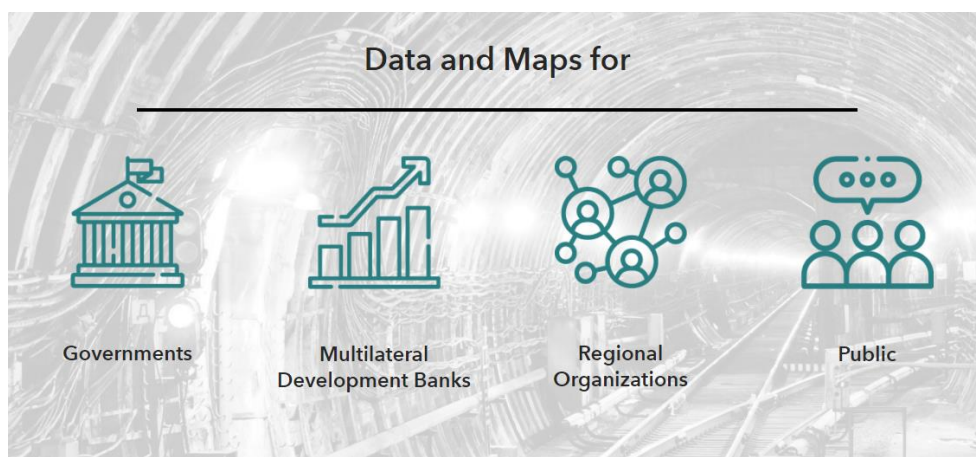
- Sign in (right upper corner) with your personal username and password



9. Access the data and maps relevant to your user profile:

⁹ The design and layout of ITIO has undergone further improvements since its initial presentation at the thirty-fourth session of the Working Party on Transport Trends and Economics (WP.5) in September 2021.

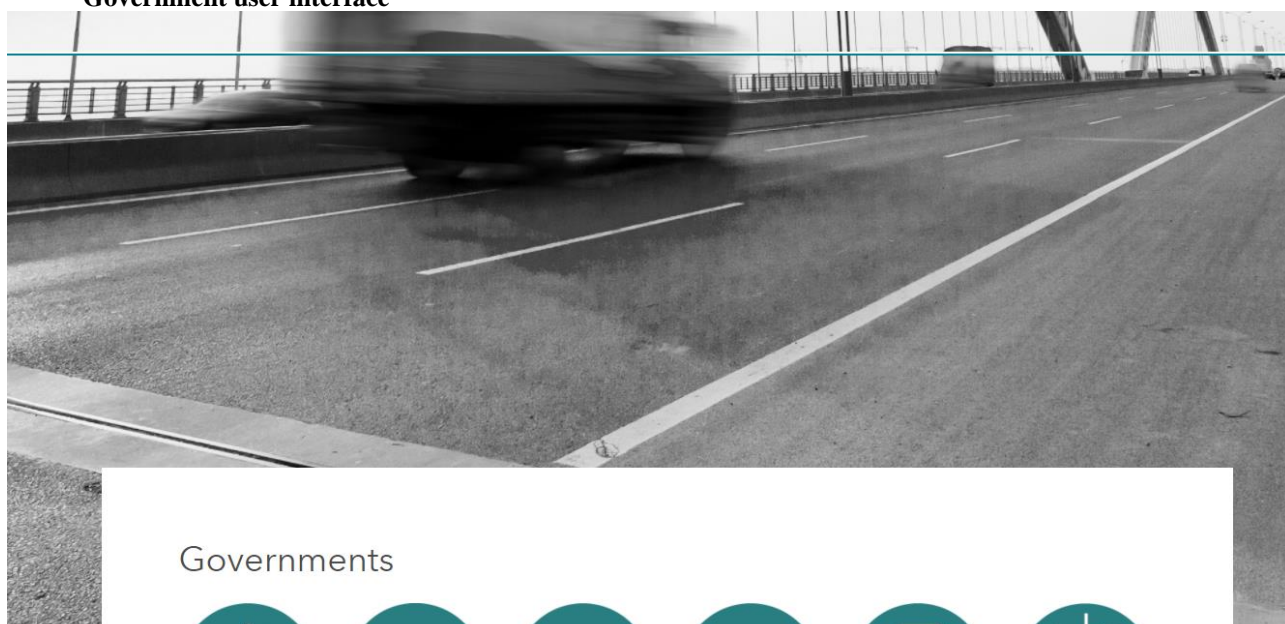
Figure 3
Illustration of ITIO interface and visualization of the four user groups



Source: ECE

V. Government users

Figure 4
Government user interface



Source: ECE

10. Government users include accredited representatives from Government agencies (e.g. Ministries of Transport, Infrastructure, Public Works and/ or Investment Agencies). Only accredited Government representatives/ national focal points are granted access to the observatory with a username / password.

11. Government users benefit from the following functionalities:

A. Access and edit national data

- Step 1: select the transport networks and nodes button



- Step 2: a map is automatically generated which visualises a large variety of transport infrastructure networks and nodes across different modes including road, rail, inland waterways, ports, airports, intermodal terminals, logistics centres and border crossing points in the Euro-Asian region, the Middle East and North Africa.

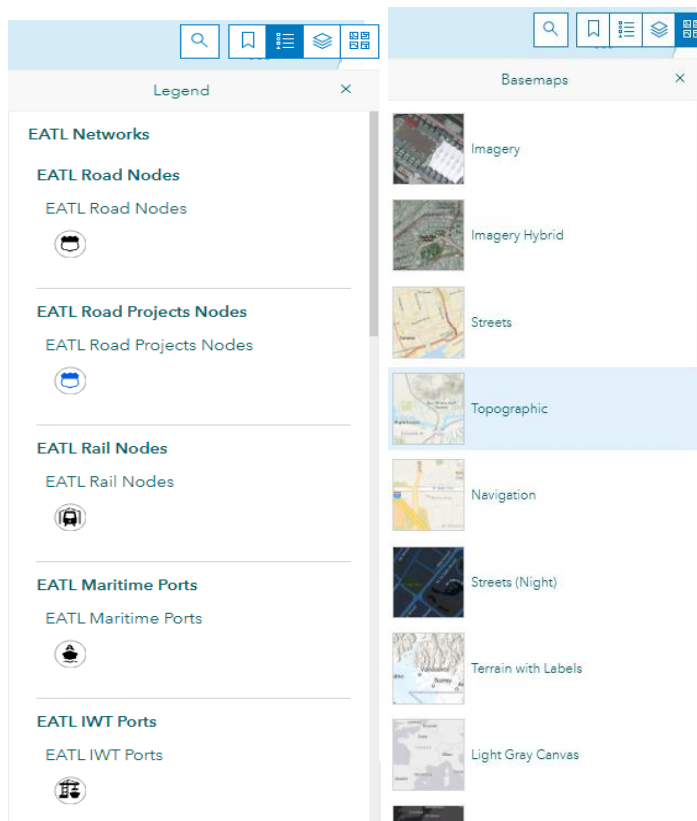
Figure 5
Visualization of the transport networks and nodes application via the Governments user interface



Source: ECE

- Step 3: In the right upper corner of your screen, select the legend to understand the different map symbols and signs and/ or select your base map, i.e. the background against which you wish to display content.

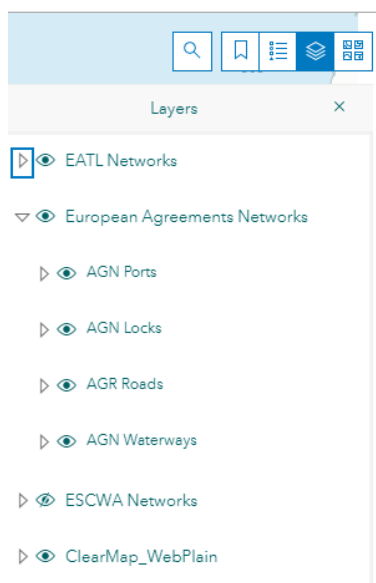
Figure 6
Legend and base map selection menu



Source: ECE

- Step 4: Select the layers you wish to visualise on the maps (e.g. AGN networks, EATL data, ESCWA data on ports etc.).

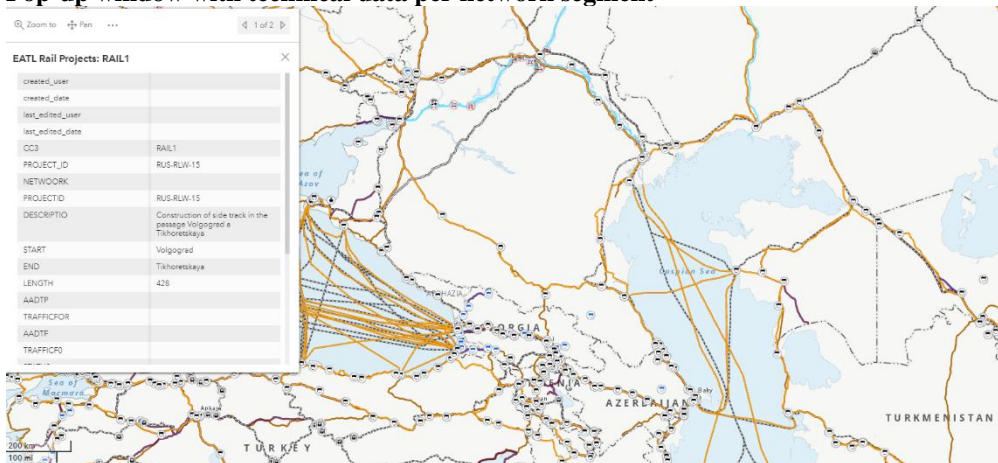
Figure 7
Layer selection menu



Source: ECE

- Step 5: When clicking on specific infrastructure segments, a pop-up window appears with technical data relating to the route

Figure 8
Pop-up window with technical data per network segment



Source: ECE

B. Visualize rail and road corridors

- Steps to be followed include:
 - Step 1: sign in on the home page (as above)
 - Step 2: access to the Government user interface (as above)
 - Step 3: select the “transport corridors” button



- At this stage ITIO hosts all data related to the nine rail and nine road corridors identified in the framework of the EATL project. It also hosts data on the main rail and road arteries in the ESCWA region as well as data on transport networks in the Western Mediterranean region provided by CETMO.

Figure 9
Transport corridors map



Source: ECE

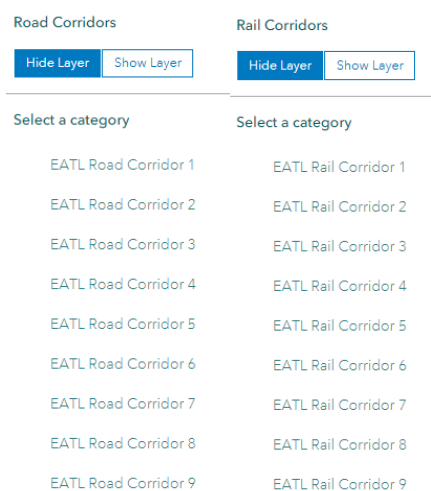
Figure 10
Main rail and road arteries in the ESCWA region (Middle East, North Africa, Western Mediterranean region)



Source: ECE

- Step 4: Road and rail corridor layers can be hidden or activated individually

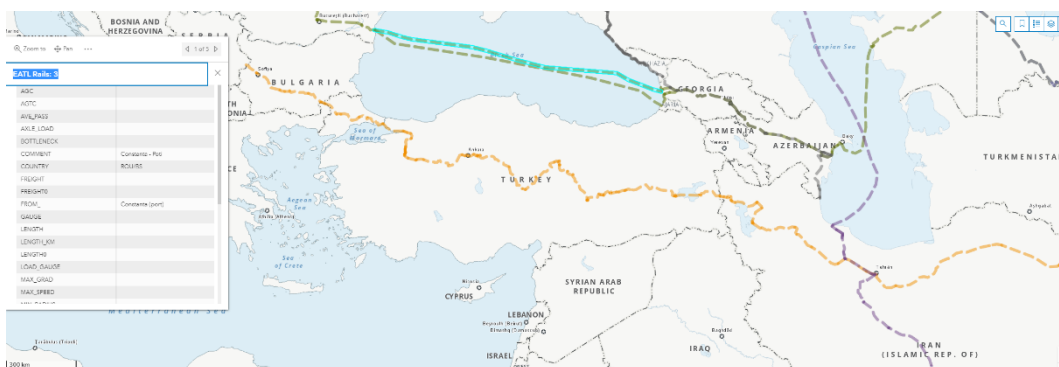
Figure 11
Transport corridors map



Source: UNECE

- Step 5: by clicking on any given (rail or road) corridor, a list of technical data appears

Figure 12
Corridor specific technical data



Source: ECE

- Corridor specific technical data may include:

- Whether or not the rail or road link is part of one of the ECE infrastructure agreements (AGC, AGR, AGTC or AGN) or any of the corridor initiatives.
- Start and end point of the route (from/ to) as well as its total length, average daily passage, and the countries it transits through.
- Maximum axle load, gauge width, number of tracks, maximum speed, maximum train length etc.

C. Create new transport infrastructure projects to be uploaded for fundraising purposes

- Steps to be followed include:
 - Step 1: sign in on the home page (as above)
 - Step 2: access to the Government user interface (as above)
 - Step 3: select the “submit new transport infrastructure projects” button



Add new Transport Infrastructure Projects.

- Step 4: a dashboard application shows where the Government user can select any of the following modes.

Figure 13

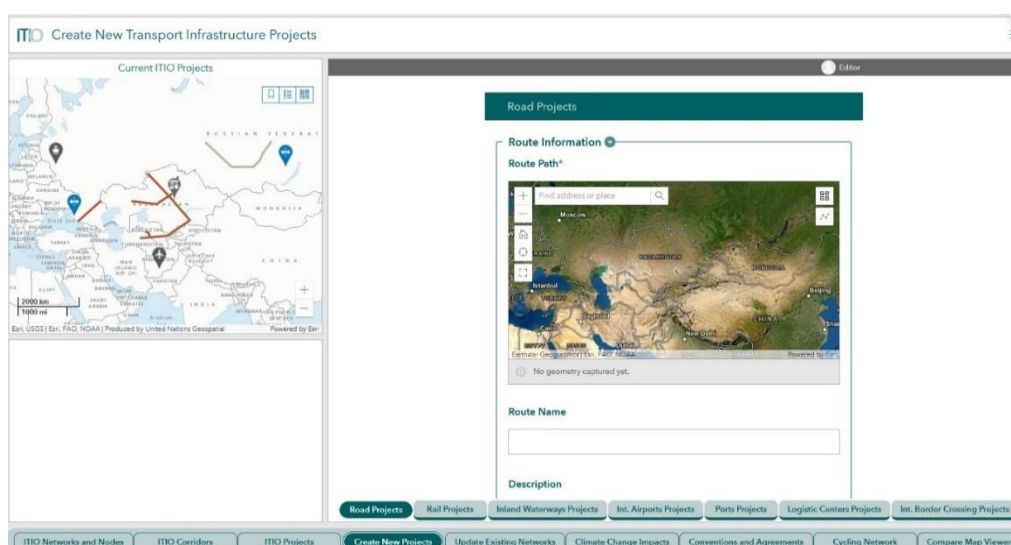
Selection of buttons on the dashboard function



Source: ECE

- Step 5: Once a mode has been selected from the options above, a pop-up window appears requiring specific data fields to be filled.

Figure 14
Application to upload new transport projects, data fields to be filled pop-up



Source: ECE

- Step 5a - Data fields to be filled for road projects, includes Section 1 “Route technical characteristics” and Section 2 “Project information”. While section 2 is identical for project proposals relating to all modes of transport, section 1 differs by mode.

Section 1. Route Technical Characteristics:

1. Location (latitude/longitude)
2. Start point/node/city
3. End point/node/city
4. Major intermediate (economic) centres
5. Road Classification
6. Length (in km)
7. Number of carriageways
8. Number of lanes
9. Design Speed/Average speed (km/h)
10. Annual Average Daily Traffic
11. Estimated percentage of freight vehicles
12. Annual Average Daily Traffic (passengers)
13. Annual Average Daily Traffic (tons)
14. Minimum overbridge height clearance
15. Maximum axle load
16. Road toll implementation

Section 2. Project Information

17. Project cost (USD)
18. Expected Starting Date
19. Expected Completion Date

20. Internal Rate of Return (IRR)
 21. Project's stage: Construction Tendering Study/Design
- Planning Identification
22. Expected Funding Sources (and the percentage of funding for each one)
 23. Importance to regional connectivity, national economy, and social needs
 - Step 5b - Data fields to be filled for railway projects, include:

Section 1. Route Technical Characteristics:

1. Location (latitude/longitude)
2. Start point/node/city
3. End point/node/city
4. Length (in km)
5. Track gauge (mm)
6. Number of tracks
7. Traction: Electrified Non-Electrified
8. Signalling type: Automatic/Manual
9. Maximum allowed speed - passenger trains
10. Maximum allowed speed - freight trains
11. Average Daily Train Traffic - Passenger trains
12. Average Daily Train Traffic - Freight trains
13. Volume of cargo moved (tons and TEUs)
14. Number of passenger journeys
 - Step 5c - Data fields to be filled for inland waterway projects include:

Section 1. Route Technical Characteristics:

Route Name: Waterway name: Network e.g. (a) EATL Route: (b) other international route: (c) national importance: (d) combination of (a), (b), (c).

Route Description:

Section 1. Project Technical Characteristics:

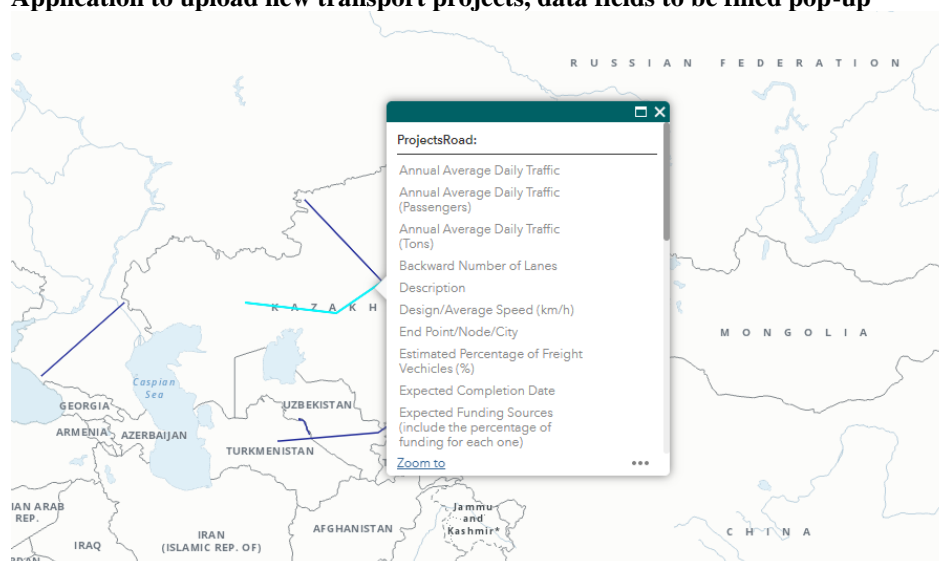
1. Location (latitude/longitude or alternatively a map)
2. Start point/node/city
3. End point/node/city
4. Length (in km)
5. Maximum admissible at Low Navigable Water Level (LNWL)
6. Minimum bridge clearance at High Navigable Water Level (HNWL)
7. Lock dimensions
8. Permitted operational speed (km/h)
9. Annual vessel traffic
10. Annual freight tonnage

Specific data fields also need to be filled for ports, airports, logistics centres and border crossings.

- Step 6: Right after all data fields have been filled, a new project immediately becomes visible on the map, when clicking through on this new link a pop-up box appears with relevant technical data.

Figure 15

Application to upload new transport projects, data fields to be filled pop-up



Source: ECE

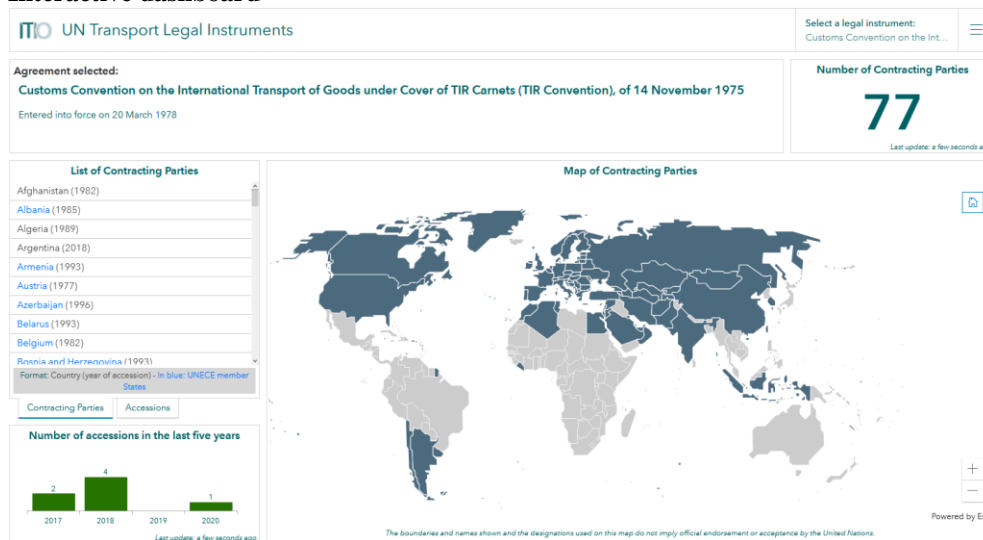
D. Visualise on a map the international legal instruments they are party to

- Step 1: sign in on the home page (as above)
- Step 2: access to the Government user interface (as above)
- Step 3: select the “International Conventions and Agreements button” button



- Step 4: an interactive dashboard function appears with different functionalities

Figure 16
Interactive dashboard



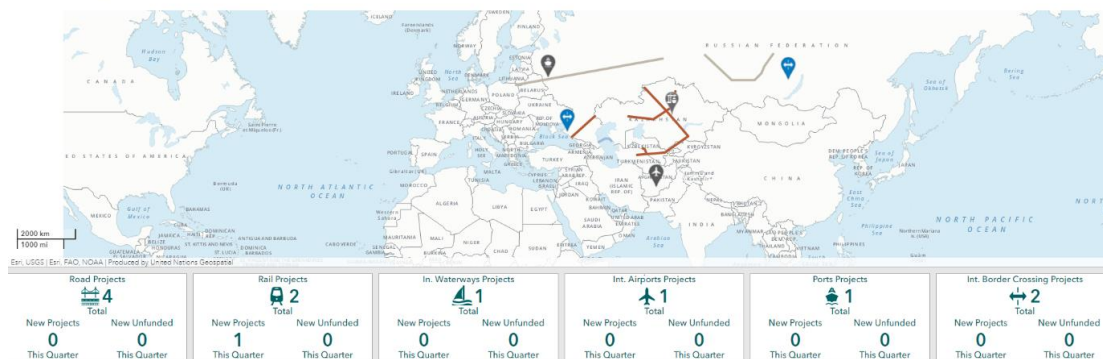
Source: ECE

- Step 5: in the right upper corner, select a legal instrument and the list of contracting parties appears both on the map and in a written, click-through list. A chart also shows indicating the number of accessions to that particular instrument over the last 5 years etc.

E. Take stock of the funding status of project proposals

- Step 1: sign in on the home page (as above)
- Step 2: access to the Government user interface (as above)
- Step 3: select the “submit new transport infrastructure projects” button
- Step 4: as a sub-function click through and get access to an interactive dashboard function showing all information related to project proposals and their funding status. At this stage, for Government users it will also be possible to see which MDBs have accessed their proposals/ left comments, raised questions or left contact data for follow up.

Figure 17
Dashboard function with all information related to project proposals (at national and regional level) as well as their funding status



Source: ECE

F. Climate change impact

Step 1: sign in on the home page (as above)

Step 2: access to the Government user interface (as above)

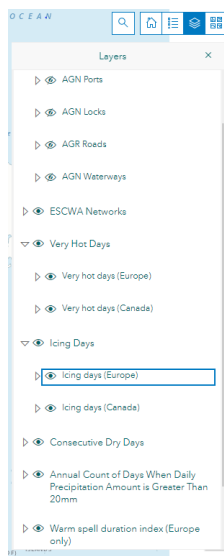
Step 3: select the “adaptation for transport networks and nodes” button



Step 4: select the different transport infrastructure and climate related layers you as a Government wishes to assess

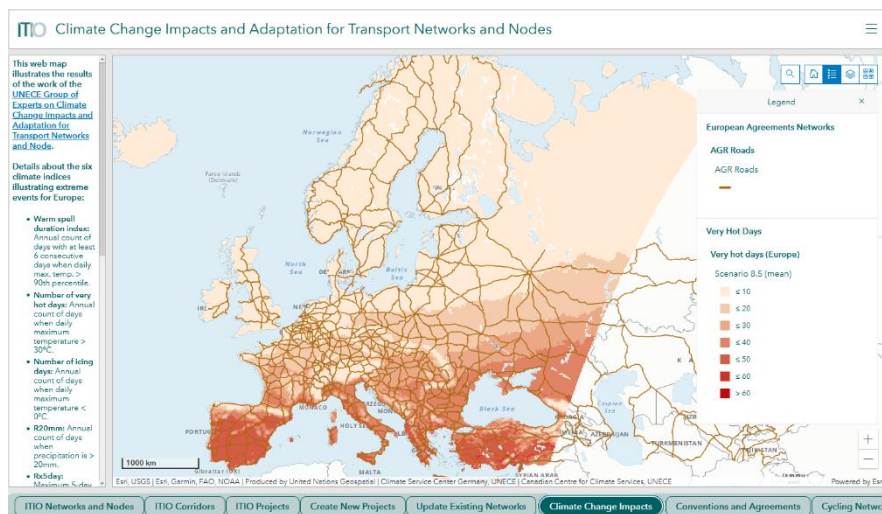
Figure 18

Drop down menu for Government users to select which transport infrastructure and climate related layers they wish to visualise



Source: ECE

Figure 19
 Based on the selected layer a map with hot spots appears



Source: ECE

- Step 5: In the Observatory, changes in indices as proxies for impacts of climate change are overlain with transport infrastructure data. In this way, areas in which infrastructure may be at risk due to climate change and extreme weather events can be visualized. Based on this risk assessment Governments and/ MDBs can then either suggest or introduce additional technical measures adapting their infrastructure projects to these climate change impacts or relocate their project(s).

G. Other initiatives and applications

- GIS data of national cycling networks is being collected in the framework of the ongoing efforts on the development of an infrastructure module of the Transport, Health and Environment Pan-European Programme (THE PEP) European Cycling Master Plan. All the gathered data so far has been made available.
- In the user dashboard function a cycling network tab is available (see below), when clicking through, data on national cycling networks from a number of countries in the region appears

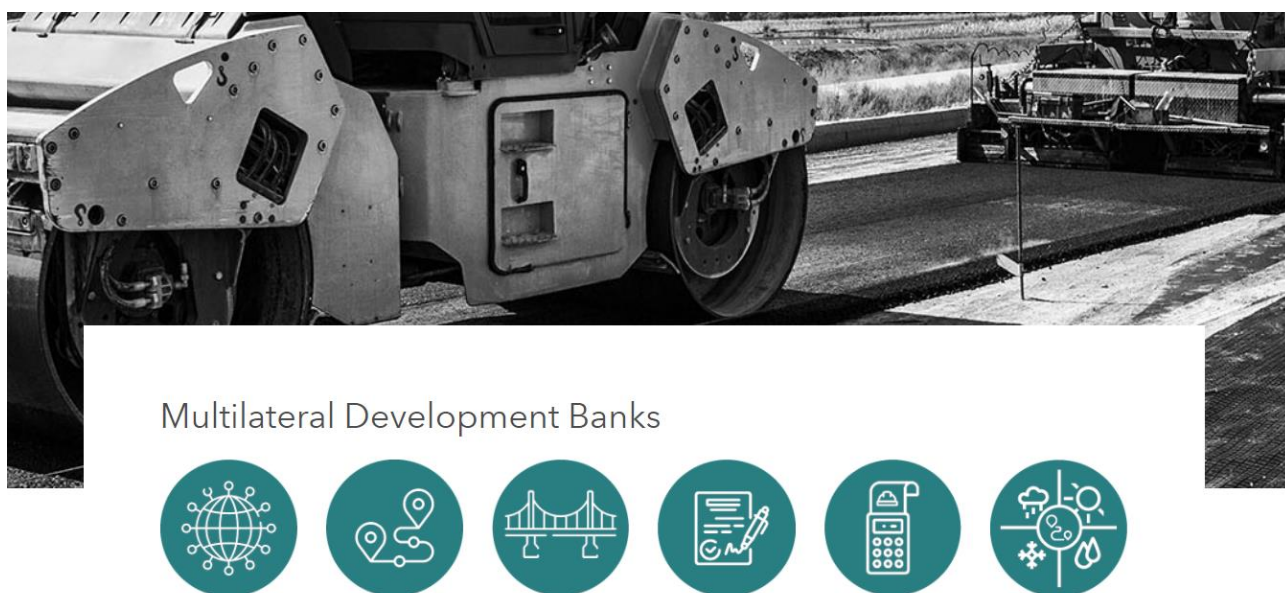
Figure 20
All GIS data of national cycling networks collected so far is visible in this map



Source: UNECE

VI. Multilateral Development Banks

Figure 21
Multilateral Development Banks user interface



Source: ECE

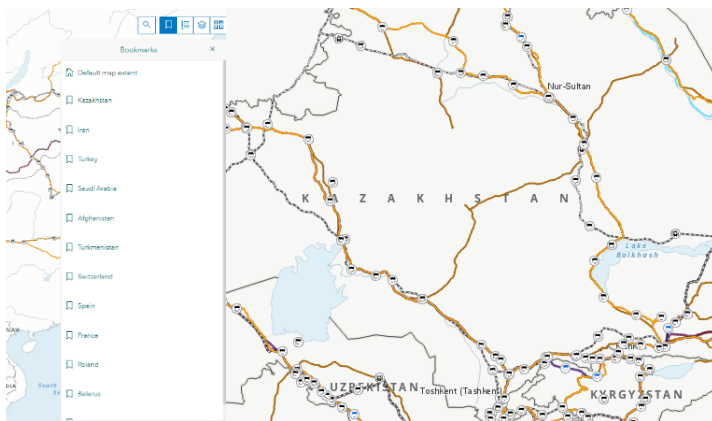
12. Similar to Government users, also accredited users from MDBs and other interested donors will receive their own password / username in order to access and navigate the observatory and use its functions. This user category has access to all information made available by Government users and Regional Cooperation Organizations but without being able to edit data.

13. An interface exists for each MDB user tailored to their needs and specific funding criteria with an overview of all functionalities available to them, including:

- Access to country profiles, providing general statistical information for each country.
- Access to Governments / Regional Cooperation Organizations submitted information about new transport infrastructure projects.
- Access to fully developed infrastructure projects available for funding.
- Creation of an MDB funding portfolio (projects already funded by the bank).
- Access to other MDBs funding portfolios in a specific country or region.
- Communication channels with National Focal Points per country.
- Communication channels with counterparts in other MDBs.

Figure 22

MDBs can select from a drop-down menu the countries in which they have a funding interest, the national network of that specific country then visualises on the map



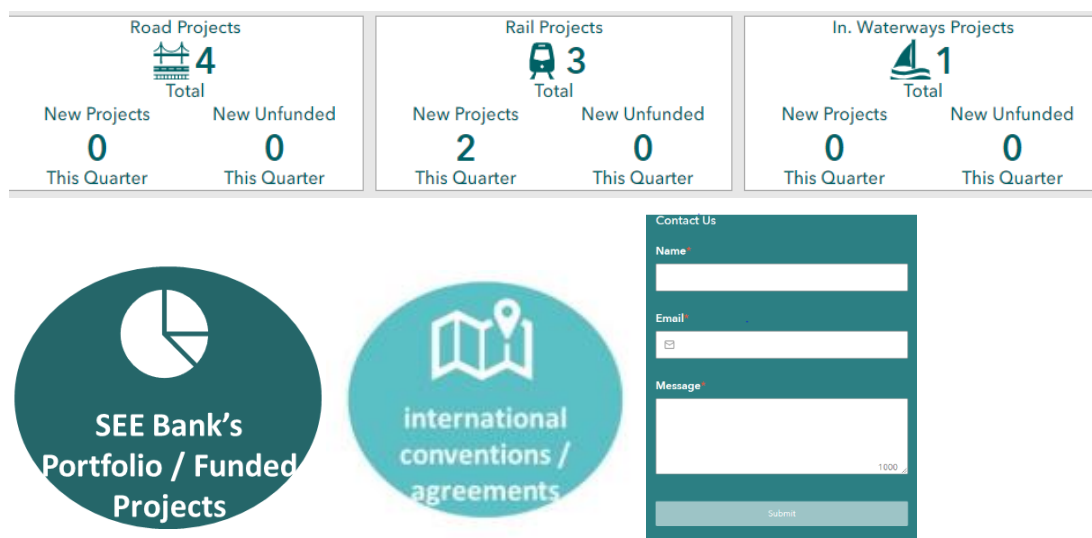
Source: ECE

14. For MDBs a functionality is available enabling them to compare studies and project proposals of different countries in order to understand:

- Estimated cost/ price differences among projects of a similar nature.
- Economic viability of specific projects vis-à-vis other projects.
- Infrastructure standards used at national/regional level.
- International legal instruments in use at national/ regional level.

Figure 23

Multilateral Development Banks access to new projects available for funding, its existing portfolio as well as projects funded by other MDBs and designated contact forms to reach out to other users



Source: ECE

VII. Regional Cooperation Organizations

Figure 24

Regional Cooperation Organization interface



15. Similar to Government and MDB users, also accredited users from RCOs will receive their own password / username and credentials for the Observatory.

16. This user category has access to all information made available by Government users and Regional Cooperation Organizations but without being able to edit this data. They are however able to upload their own infrastructure initiatives.

17. RCOs can:

- Upload geo-coded data (directly onto the corridor application);
- Access to country profiles in their region;
- Access to region specific profiles;
- Access to fully developed infrastructure projects available for funding (in their region);
- Projects being funded by MDBs in a specific country or region;
- Communication channels with National Focal Points per country;
- Communication channels with counterparts in other RCOs/ MDBs.

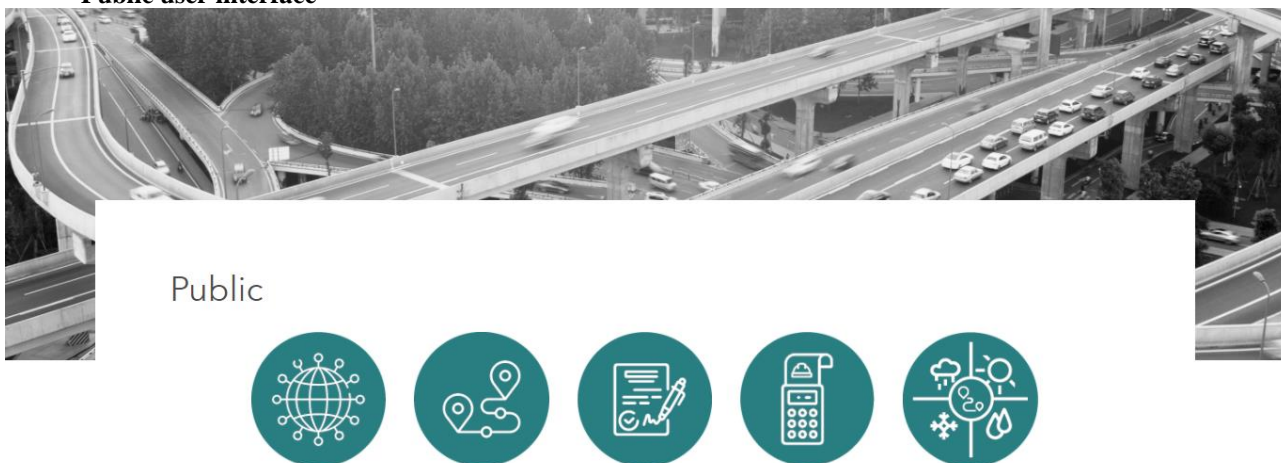
Figure 25
In addition to the currently available corridor initiatives, additional RCO networks could be uploaded as well



Source: ECE

VIII. General public

Figure 26
Public user interface



Source: ECE

18. General public: the observatory and the illustration of transport infrastructure data is available to all interested users, also including academia and the private sector.

- For the general public no security level/ permissions are required since they only have access to high-level data and maps vetted and approved by Governments. Depending on Government consent, an overview of already funded/ongoing infrastructure projects (including data on nature and technical parameters of the project, estimated timescales and associated budget as well as donors) could be made available publicly.
- General public users would not be able to edit the data or access technical data fields. To a limited extent they will be able to generate charts and tables comparing infrastructure investments by region or mode.

Figure 27
For public viewers only high-level network data is available



Source: ECE

IX. Hosting and security measures of ITIO

19. The technical solution currently relies on two servers hosted at ECE premises and on a cloud solution provided by the GIS software vendor (ESRI). At this stage, there is no service level agreement or a warrantee of service with a provider but this option, if needed, will be added at a later stage.

20. The two servers located at ECE premises are the following ones:

- A data server (SQL server) which hosts and registers all Observatory data (transport networks, edits made by the users, etc.).
- An application server (ArcGIS Enterprise) which hosts the web services and applications (the user interface that allows to manipulate the data mentioned above).

21. The cloud solution provided by ESRI consumes the data hosted on the ECE server and offers additional features for their visualization.

22. An optional maintenance application for the ArcGIS Enterprise solution has been installed on the application server to allow to benefit from the latest improvements of the product. This maintenance must be paid on an annual basis. Currently, the secretariat owns 5 licences for editors (users having permission to edit data), 1 licence for ArcGIS Enterprise, 2 licences for ArcGIS Desktop Standard. This number of user licenses will need to be increased for the future.

23. ESRI solutions are part of United Nations ICT approved standards, and there is a Direct Marketing Agreement between United Nations and ESRI.

24. As of November 2021, the secretariat has secured the Esri GIS user license for the next three years as well as 30 Esri GIS editor licenses enabling Governments, and other users, to add data on their networks and projects and edit their existing information.

X. Guidance received from the Working Party on Transport Trends and Economics so far

25. On the occasion of the thirty-fourth session of WP.5, the ECE secretariat, jointly with the secretariats of ESCWA and the Economic Cooperation Organization (ECO) held a joint presentation on ITIO providing a detailed description of the Observatory, its purpose, functions, user groups and operational modalities.

26. WP.5 took note of the information concerning the further development of the Observatory and invited interested stakeholders (including national Governments and MDBs) to participate in a test phase. The Working Party invited the secretariat to provide necessary assistance to national delegates and representatives of other stakeholder entities in conducting these tests, including through providing dedicated accounts for testing. It also requested the secretariat to inform the ITC Bureau and the Committee on the development of the Observatory and possible outcomes of the tests once they are completed.

27. In response to this request, the secretariat is expected, in the course of January 2022, to officially inform in writing, the 56 ECE member States, inviting them to start using ITIO in a test phase. The secretariat is also expected to reach out to additional MDBs encouraging them to start exploring the opportunities offered by ITIO and to make active use of its functionalities. Furthermore, the secretariat has continued to increase its efforts aimed at that the development of additional ITIO applications, in the framework of the Group of Experts on Benchmarking Transport Infrastructure Construction Costs (GE.4) for instance it is actively working with the Governments in identifying ways to visualise construction cost data on the ITIO platform. Adding a GIS layer to ITIO that would provide such information would increase the attractiveness and usability of the platform and would also add value to Governments and MDBs since the benchmarking of transport infrastructure construction costs is a critical step for having realistic construction costs and a stable investment programme without unexpected cost increases. Moreover, the use of benchmarking of construction costs could also be useful for cost estimates as well as for control of project costs.

XI. Guidance by the Committee

28. The Committee may wish to consider the above information and provide guidance on how it wishes to promote the use of ITIO and/ or engage additional national Governments, United Nations Regional Commissions, MDBs and RCOs to become active users of this ECE-led transport GIS platform.
