

Connectivity Tools in UNECE Member States 11th ITF Transport Statistics Meeting







Background

- At its 2024 session, the UNECE Working Party on Transport Statistics decided to establish Informal Group of Experts on Connectivity Tool to share the UK's experience and explore similar initiatives from other countries.
 - 1st meeting: November 2024 \rightarrow UK experience
 - 2^{nd} meeting: February 2025 \rightarrow Ireland and Eurostat
 - 3^{rd} meeting: May 2025 \rightarrow Canada and Israel (planned)



https://unece.org/transport/statisticstransport/informal-group-expertsconnectivity-tool

UNECE

Disclaimer



All content in this presentation is the intellectual property of the UK Department for Transport and the National Transport Authority of Ireland. It is shared with permission for informational purposes only.





UK Connectivity Tool

- A tool designed to:
 - provide a consistent, UK-wide metric showing how 'connected' a place is
 - assess the impact of investments on connectivity
 - support informed decision when planning new sites or transport routes
- Connectivity measures how easily someone can reach important destinations using different transport modes.
- The tool generates a connectivity score (e.g., 0-100), representing the relative accessibility for a given location.







Access to network vs connectivity to destinations





ITC2025

Successes and Challenges for Inland Transport





UK Connectivity Tool

How it is calculated

- Destination value: locations are weighted based on their importance (e.g., more jobs = higher value for employment trips)
- Willingness to travel: based on National Travel Survey data, which reflects how far people are willing to travel – varies by time of day, mode of transport, purpose.
- Routing algorithm: written in Rust (based on Dijkstra's method), calculates travel times, reachable destinations within a given timeframe, final scores (broken down by mode, time, purpose)









UK Connectivity Tool

High-level concept	Lower-level concept	Data provided	Data Source	(3余)。
Where do people want to go?	How, where, and when people travel	Self-reported number of trips by mode and purpose at different times of the day	DfT (National Travel Survey years 2011 – 2020)	Department for Transport
Where can people go?	Destinations that people may want to travel to	Locations and types of buildings	Ordnance Survey	
	Value of reaching destinations	Height and footprint of buildings	Ordnance Survey	Ordnance Survey
	Employment opportunities	Number of jobs in each postcode for all sectors	Office for National Statistics	Office for National Statistics
	People living within the area for social visits	Population estimates at the Output Area level (England & Wales) and Small Area Data Zones (Scotland)	Office for National Statistics, National Records of Scotland	National Records of
How can people get there?	Travel infrastructure: public transport	Public transport locations and travel timetables	BaseMap	Scotland
	Travel infrastructure: active travel & driving	Road and walking networks, including restricted access to certain paths	Ordnance Survey	CBasemap
	Efficiency of travel by road for private drivers	Congestion data for road links in England, Scotland and Wales	DfT (Congestion Statistics)	\mathcal{D}







Technical platform

Entirely built on Google Cloud Platform

Tool functions

1) Analytical: view the connectivity score of an area



2) Propositional: simulate changes (e.g. new routes) and evaluate their impact on connectivity

UK Connectivity Tool









- Development of a quick and user-friendly tool to measure connectivity, particularly by walking and cycling
- Aim to introduce a standard methodology that can be adopted by all agencies and local authorities.
- Inspired by Transport for London's (TfL) suite of connectivity tools:
 - Public Transport Accessibility Levels (PTAL)
 - Travel Time Mapping (ATOS)
 - Catchment Analysis
- Considerations for Ireland:
 - TfL's methodology was designed for large metropolitan areas.
 - National Transport Authority (NTA) of Ireland adapted the tools for smaller urban settings
 - Emphasis on annual review and refinement of the methodology







NECE

Ireland Connectivity Tool

Public Transport Accessibility Level (PTAL)

- Combines walk/cycle journey time to public transport stops with the level of service at those stops.
- PTAL is higher when
 - stops are nearby
 - services are frequent
 - there are multiple services or a nearby major station
- Calculation method
 - Based on a 100m grid across counties
 - Uses GTFS (General Transit Feed Specification) and Journey Planner for destination/service data
- Use with Development Plans to:
 - align zoning with accessibility
 - identify gaps in the public transport network



- Calculate walk/cycle time to nearby stops (640m for bus, 960m for rail)
- Determine waiting times
- Compute Access Index
- Convert to PTAL score

9



Ireland Connectivity Tool





PTAL	Access Index range	Map colour
0 (worst)	0	
la	0.01 - 2.50	
IЬ	2.51 - 5.0	
2	5.01 - 10.0	
3	10.01 - 15.0	
4	15.01 - 20.0	
5	20.01 - 25.0	
6a	25.01 - 40.0	
6b (best)	40.01+	

Light yellow zoned for new residential development



PTAL calculated from existing frequency shows low score









Access to Opportunities and Services (ATOS)

- Measures how well areas are connected to local services and employment.
- Focus on walking and cycling access.
- Relative scoring compared to other areas in the study region.
- Service types: employment, primary and secondary education, retail, GPs, open spaces
- Data sources: CSO, Department of Education, GeoDirectory, Development Plan zoning
- Example ATOS criteria:
 - Primary schools: access to 2 schools within 10 min walk
 - Supermarkets: access to 2 within 15 min walk
 - Employment: number of jobs accessible within walk/cycle time







ATOS Calculation Method

Journey time to a service

- Calculates the Journey Time for each grid origin
- Calculates the average Journey Time for all grids
- Calculates the standard deviation
- Lower journey time = better score

Ireland Connectivity Tool

Number of accessible jobs

- Calculates the #jobs within a chosen walk/cycle journey time
- Calculation uses the same grid covering the study area
- Creates a Network Service Area within the journey time from each grid centroid
- Using the employment information from the CSO Workplace Zones, the #accessible jobs is calculated
- More accessible jobs = better score

Α	0 - (Mean – stdev)
В	(Mean – stdev) to Mean
с	Mean to (Mean + stdev)
D	(Mean + stdev) to (Mean + (2 X stdev))
E	> (Mean + (2 X stdev))

ATOS Score	Map colour
A	
В	
С	
D	
E	
NULL	

Α	> (Mean + stdev)
в	Mean to (Mean + stdev)
с	(Mean - stdev) to Mean
D	(Mean - (2 X stdev)) - (Mean - stdev)
E	0 - (Mean - (2 X stdev))



Ireland Connectivity Tool





ATOS Criteria:

- Access to 2 Primary School
- 10 minute walk time

ATOS Score	Map colour
A	
В	
С	
D	
E	
NULL	

0 - (Mean – stdev)	
(Mean - stdev) to Mean	
Mean to (Mean + stdev)	
(Mean + stdev) to (Mean + (2 X stdev))	
> (Mean + (2 X stdev))	





1180

Ireland Connectivity Tool





UNECE





ATOS with Development Plan Data









ATOS Analysis and Permeability

- Poor ATOS scores can guide permeability improvements:
 - Formalising walk links
 - Removing barriers (e.g. walls in culde-sacs)
- Can be combined with census walk mode share or planning data.







Knocking a cul-de-sac end wall improves the level of accessibility, with grids moving from a "B" score to an "A" score.

© agenturfotografin/Adobe Stock









Future Connectivity Analysis

- Expand ATOS to include public transport
- Integrate future schemes into GTFS for PTAL testing.
- Combine PTAL/ATOS results with additional datasets.
- Maintain annual updates, publish results as open data
- Develop a connectivity analysis portal







Thank you!

Fadiah Achmadi Economic Affairs Officer I Sustainable Transport Division

Date 15 | 04 | 2025, Paris