An Introduction to the Use of Transport Modelling by the NTA, and a Framework for Modelling Nationally

Eoin Farrell
10th July 2013
Outline of Presentation

• Overview of National Transport Authority
• Modelling and Land Use Analysis in the NTA
• Overview of the current NTA Model for the Greater Dublin Area
• Moving Towards a All Island Transport Model Framework?
• Using a Model to Support Policy and Planning
• Conclusions
Who we are...

- National Transport Authority established on 1st December 2009
- Responsible for a range of functions including:
  - transport planning and investment in Greater Dublin Area
  - delivery of PT nationally
  - bus regulation nationally
  - taxi regulation nationally
- We manage for the Department of Transport
  - The Regional Cities Grants for traffic management
  - Smarter Workplaces travel programme
  - Green Schools programme
Planning and Modelling Integration

Policy Development

Transport Modelling
Current Work Programme

- Commence development of a National Trip End Model to inform transport policy nationally - 2014.
- Ongoing use of the model as an assessment tool to influence integrated land use and transport policy.
Overview of the existing Transport Model for the Greater Dublin Area
The GDA model continuously iterates between the mode choice, time of travel choice and trip assignment stages of the model – until an equilibrium of travel costs across travel modes, time periods and travel routes is achieved.

Travel costs derived from the trip assignment stage can also impact on trip distribution.
GDA Model – Software Used

- **Trip Generation & Trip Distribution**
  - OmniTrans

- **Mode Choice, Hour of travel Choice, PT Route Choice**
  - TRIPS / CUBE

- **Car & HGV Route Choice**
  - SATURN

- **Model Outputs / Evaluation**
  - ArcGIS, Accession, MS Office Tools
The GDA model continuously iterates between the mode choice, time of travel choice and trip assignment stages of the model – until an equilibrium of travel costs across travel modes, time periods and travel routes is achieved.

Travel costs derived from the trip assignment stage can also impact on trip distribution.
Trip Attraction and Generation Model

Raw Data Input
- Household Survey
- POWCAR
- SAPS
- School Survey
- Other

Data Cleaning
- Trip Rates All JPs
- Employ Destins
- Population SEG PES
- Trip Rates Education
- Other

Data Cleaning Output

Processing & Analysis
- Generates equations for TAGM e.g CO*SEG1*FT
- 24 Categories
- Pop * Cat
- * Agreed TR

Output from TAGM
- Trip Prods • Per JP • Per Zone

Processing & Analysis
- Generates equations for TAGM

Output from TAGM
- Trip Attractions • Per JP • Per Zone

Create Variable:
- Pop
- Retail
- Op Space
- Hos Emp

Variables * Weightings

Validate Against

Planning Sheet

Target Matrices Row/Col Tots
Drivers of Travel Demand – Planning Sheet

Section of ‘Planning Sheet’ in GDA Model – (first 12 columns only shown)

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Spatial Scale of GDA Model
Standard Model Outputs

- Mode share – i.e. Trips by Mode.
- Journey times and accessibility by mode.
- Traffic flows and levels of congestion on highway network.
- Passenger flows on bus and rail networks.
- Junction and Link Details.
Development of a Framework for Modelling Nationally
Moving Towards a National Transport Model

- Feasibility study (jointly undertaken by EPA, DoT and NTA) and completed in 2011.
- Found that it would be feasible and desirable to develop an NTM and that most of the data required to develop it already exists.
- Set out the proposed structure of an NTM to meet the needs of the NTA and other stakeholders.
- Set out a roadmap for its development.
Outline structure of the National Transport Model

(1) Planning and Location Model
   - Spatial forecasting: Households, Population, Employment etc.
   - Trip generation and attraction.

(2) Vehicle Modelling
   - Car ownership model
   - Vehicle stock model
   - Fuel consumption / emissions

(3) Passenger Demand Model
   - Variable demand model: Mode choice, trip distribution, Time of day choice.

(4) Analysis
   - Economic Appraisal
   - Environmental Appraisal
   - Transport statistics

(5) Assignment
   - Highway Assignment
   - Public Transport Assignment
   - Walk / cycle accessibility

(6) Freight Demand Model
   - Goods trip end model
   - Freight logistics & distribution
Agreed to develop a National Trip End Model

This will provide a common basis for trip forecasting nationally

Modular approach has been agreed, with NTA working with Local Authorities to develop Regional City Models

- GDA Model
- 4 City Region Models

Inter-regional Modeling capabilities

(Potential to Integrate with a Northern Ireland Model)
Spatial Analysis of Land Use Inputs

Development of Trips Rates
Other Points of Interest

- Planning and location module would input Census data at a ED or SA level – i.e. 3,440 ED’s to cover the country.
- A number of zones (perhaps representing counties) will be used to represent travel to and from Northern Ireland.
- Irish Trip End Model will require special zones to represent destinations such as Airports and Ports.
- Highway assignment module could operate with coarser zoning system, but public transport assignment module would be greatly enhanced by retaining the ED level of detail.
- Trip End Model could potentially have up to 15,000 zones!
Uses of the GDA Model as a Policy and Planning Tool
The draft NTA Strategy was fully tested using the GDA Transport Model

Overall the Strategy performed positively in delivering the established objectives, headline findings included:

- Public transport usage increased – peak passenger kilometres up by 46%
- Road congestion reduced when compared with do-minimum
- Car kilometres down from 13.7m. kms to 8.5m. kms – (2006 figure is 7.9 m.kms.) (AM peak travel period)
- Walking / Cycling significantly increased
- 7% decrease in Greenhouse Gas emissions (annualised)
Public transport journey times 2030 – without Strategy
Public transport journey times 2030 – with Strategy
Model Outputs – Bus Boardings

ROUTE 10 BELFIELD --> HEUSTON 2030 MODELLED BOARDINGS AND ALIGHTINGS
Assessment Tool for Major Infrastructural Projects

- Introducing LUAS to Dublin
- Two-way running of St. Stephen’s Green East
- Making the case for Metro and DART underground in Dublin
- The need for tolling in the Port Tunnel
- Proving the need for Quality Bus Corridors
Assessment Tool for Multi Agency Projects

- Assessment of Land Use Proposals and Plans
- Allows Land Use Development to be Analysed Strategically to illustrate:
  - Strategic Impact on existing networks
  - Potential Phasing of Development
  - Potential Success of Transport Solutions
- Numerous Examples of this type of Analysis
  - E.g. North East Dublin Study
North East Dublin Study
### 2011

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North East Dublin Study

- 2006 select link analysis of 2 Clongriffin zones
- 8-9 AM Peak
North East Dublin Study

- 2018 select link analysis of 2 Clongriffin zones
- 8-9 AM Peak
- Illustrates substantial increase in the network
Benefits of the Framework for Modelling Nationally for Policy and Planning Analysis
Potential benefits of this Framework

- Deciding on public transport investment priorities at a national and regional level
- Providing a consistent national framework and a consistent set of national forecasts for its GDA model and for other regional city models
- Informing the development of national and regional policy (e.g. Freight Movement)
- Informing decisions on licensing of bus services nationally
Additional Benefits

- Facilitate the monitoring of key transport trends against central government objectives and policies
- Tracking trends in transport energy consumption and in meeting national transport emissions targets
- Testing the impacts of policy interventions (e.g. financial, regulatory, fares etc.) on the transport system
Conclusions

• Agreed Framework is Key
• Common Structure
• Standardised / Agreed Assumptions
• Normalised Output

• Developing a framework for agreement and collaboration between multiple stakeholders, will determine the success of our work
Thank You

Any Questions?