Gleaning fresh insight from BIG data

Amey

The Challenge

- Analyse and contextualise millions of rows of mobile network data
- Provide client with insight into demand for bus services

The Benefits

- Abstract big data turned into valuable business tool
- Clear visualisation of 850,000 daily journeys
- Improved decision-making using dashboards
- Rapid, cost-effective project delivery

In an award-winning new approach to public transport planning, Amey has used ArcGIS to glean fresh insight from big data. It conducted advanced geospatial analysis of anonymised mobile phone data to reveal changes in demand for bus services in Plymouth and shared this information with its client in highly visual, interactive and meaningful dashboards.

The Challenge

The sustainable infrastructure company Amey was approached by a client with a data analysis and data visualisation conundrum. Go Ahead Group, the operator of Plymouth CityBus, wanted to instigate a data-driven approach to public transport planning in the city of Plymouth to help it plan future bus services and encourage more sustainable travel choices.

Amey used its Citi LogikTM capability and mobile network data to show people movements, consisting of many millions of individual trips in Plymouth, but this pivotal dataset extended to tens of millions of rows. Recognising the challenges of working with big data, Go Ahead Group then asked Amey to help it gain insight from this vast dataset and present the findings visually in a format that could be easily understood.

The Solution

Amey first narrowed down the feature classes within the dataset, focusing on the types of information that would be most useful for Go Ahead Group, including the time of travel and age bands. It then used a Feature Manipulation Engine (FME) to convert the raw data provided by Citi LogikTM into a coherent geospatial dataset and began to process and analyse it with Esri's ArcGIS Pro software.

Amey took advantage of powerful tools within ArcGIS Pro to build links between journey origins and journey destinations, enabling it to visually represent journeys as "desire lines" on digital maps. It also leveraged spatio-temporal data, to highlight when people travelled, by time, day of the week and school term or school holiday period. In this way, Amey was able to analyse and learn from the movements of thousands of mobile devices and five million observed trips undertaken in Plymouth in a single month.

Next Amey created three ArcGIS Dashboards, to enable its clients at Go Ahead Group to easily interact with the ArcGIS maps and filter the data to view, for example, journeys to a specific location or journeys near an existing bus route. Using this insight, Go Ahead Group can now plan bus routes in the right locations and vary its services by time and season to capitalise on demand. The dashboards are hosted on Amey's ArcGIS Enterprise platform, making it easy for Amey to share them with its client in a secure and controlled way.

In recognition of the project's innovative approach, Amey received the Public Transport Award at the Intelligent Transport Systems UK 2023 Award Presentation Ceremony. Judges commented: "The project showed the impact of using data to support increasing ridership. A very worthwhile project with a clear outcome and impact!"
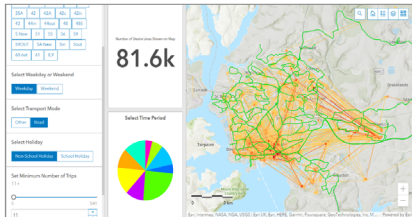
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Kieran Fitzsimmons, GIS National Lead, Amey

An ArcGIS dashboard allows users to understand trip patterns for any time period, considering mode, type of day and holiday period

The Benefits

Abstract big data turned into valuable business tool

Amey has successfully taken a vast amount of abstract data and turned it into a highly valuable transport planning tool for Go Ahead Group. "The project was technically challenging due to the enormous volume of data to process, but ArcGIS enabled us to remove the complexity and make millions of rows of data understandable to everyone," says Kieran Fitzsimmons, GIS National Lead at Amey. "ArcGIS adds value to big data by giving it a geographic context."

Clear visualisation of 850,000 daily journeys

Mobile network data for 850,000 daily journeys is now displayed on interactive maps, so it is easy for Go Ahead Group to identify patterns in journey types and understand the need for bus services, by location, time of day and time of year. According to Fitzimmons, "The most important part of this project was visualising the data. ArcGIS enables our clients to see journeys on a map of Plymouth and surrounding areas and compare them to existing bus routes."

Improved decision-making using dashboards

The clarity provided by the ArcGIS Dashboards enables transport planners at Go Ahead Group to make evidence-based, data-driven decisions about the future of bus services in Plymouth. They can easily use the interactive charts and maps on the dashboards to focus on specific locations and bus routes and plan new services in the right places to meet the needs of customers and encourage greater use of buses. Mark Anderson, Customer and Commercial Director at Go Ahead, says: "This is an excellent project which helps us to shape services to meet our customers' needs. It is a good example of the way big data can be used in an imaginative, visually striking, accessible way."

Rapid, cost-effective project delivery

By taking advantage of pre-built tools, included as standard in ArcGIS Pro and ArcGIS Enterprise, Amey was able to complete this entire project in around six weeks for Go Ahead Group. What is more, Amey now has a repeatable process that it can use to help more transport providers evaluate their bus services and better meet passenger requirements. "There is a definite appetite for data-driven solutions like this that help transport companies to understand demand for bus services," Fitzsimmons says. "What we have is a proven methodology for using mobile network data to gain insight into transport needs that we can now offer to other organisations in more cities and regions around the country."

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