Space Technology Solutions for Urban Transport
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Transport Challenges: City of Leicester

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- Local Transport Authority
- Leicester Urban Traffic Control Centre
- Local Transport Plan 3 (2011-2026) “Planning for People Not Cars”

- Transport Vision for Leicester:
  “To help transform Leicester into Britain’s sustainable city that will be a great and prosperous place to live but also somewhere that does not place a burden on the planet in future years”.

- Realising this Vision:
  - Many more residents walking and/or cycling the shorter journeys in and around the City
  - Many more residents using the bus for longer journeys, particularly into Leicester city centre, instead of using the car
Traffic Health Environment: Intelligent Solutions for Sustaining Urban Economies
“To exploit new technologies, particularly from the fields of Information and Communication Technologies (ICT) and Downstream Space Data Products and Services...

...to deliver major advances towards the operational implementation and market growth of innovations in intelligent traffic management and urban mobility...

...that address key challenges arising from the impact of transport on the economic, environmental and social health of cities and regions
The City of Leicester – A Strategic Location

- Excellent road access to wider Midlands area and rest of UK – M1 and M69 Motorways
- Midland Mainline Railway – Leicester to St Pancras Station: 70 minutes away
- East Midlands Airport – UK’s largest freight airport for dedicated freight aircraft
Leicester’s Transport System

Key characteristics:

• City of Leicester population of 330,000 (2011 Census)
• At the heart of a wider urban area, which comprises a dense population of 509,000
• Largest city in the East Midlands and the tenth largest city in the UK

• Very tight and compact urban road system
• Classic City Centre hub and spoke (radials) arrangement for car, bus and freight transport
• Inner ring road (dual/single carriageway) and outer ring road (single carriageway)
Leicester’s Transport System

Key issues:

- Shares the same characteristics as many other urban areas: congestion, parking issues, air and noise pollution
- Road network close to capacity at morning (8-9am) and evening peaks (5-6pm) leading to congestion, delay, reduce reliability
- Unplanned events on/near inner ring road can lead to significant disruption
- Higher average delays on inbound radial routes than in Nottingham and Derby
- 82% people who live in Leicester also work in Leicester
- 89% of all trips within the Leicester urban area remain within it
- Average journey is between 2-3 miles (worst part of journey for car pollution)
- More than half the trips are made by car
- Transport is the main source of NO$_2$ emissions in City
Leicester’s Key Transport Goals

• Support economic growth
• Reduce carbon emissions
• Promote equality of opportunity
• Contribute to better safety, security and health
Support Economic Growth

- **Key challenges:**
  a) Addressing issues associated with the reliability and predictability of journey times – particularly on key strategic routes and in City Centre
  b) Tackling recurrent/non-recurrent delays in the transport system
  c) Ensuring future population, housing and economic growth does not lead to demand for travel that has an adverse operational impact on transport system

- **Current situation:**
  a) Traffic flows on the City’s roads has been rising strongly in recent years
  b) Road network capacity exceeded at peak periods
  c) Peak period congestion on arterial routes, ring roads and key Motorway junctions
  d) Issues with reliability and predictability of journey times
  e) Accidents and incidents can cause significant congestion, especially on arterial routes and ring roads
  f) Forecast show continued increase in number of personalised motorised trips in(fossil-fuelled) cars: cheaper and more convenient and reliable that public transport
  g) Strong population growth and significant growth planned in new housing development
  h) Housing is expected to grow by 25% by 2026 – creating further challenges for the road network
Reduce Carbon Emissions

• Key Challenges:
  a) Reducing the levels of carbon dioxide emissions from transport
  b) Encouraging individuals, businesses and schools to take more action to reduce levels of transport-related emissions
  c) Ensuring the transport system is resilient and adaptable to the impacts of climate change

• Current situation:
  – Transport is the main source of NO₂ emissions in City
  – Level of NO₂ on City’s main road network well above European Directive threshold
  – Transport is also a significant source of CO₂ emissions in Leicester
  – Population, housing and business growth placing additional demands on transport network – increasing CO₂ and NO₂ emissions
  – Barriers to changing travel behaviour to more sustainable modes (reliability, cost, convenience, safety)
  – Potential effects of climate change on highway network from heat and floods (damage to roads, bridges and other parts of the infrastructure)
Promote Equality of Opportunity

• Key Challenges:
  a) Providing an accessible, integrated, affordable, efficient and viable transport network that meets the future needs of business and citizens
  b) Addressing gaps and weaknesses in the provision of information on public transport and cycling opportunities in the City

• Current situation:
  – Potential to increase usage of public transport and unlock suppressed demand for cycling and walking trips:
    • 36% of Leicester’s commuters don’t use public transport or walk/cycle **BUT**: Vast majority of Leicester residents live within 400m of a bus stop
    • 82% of Leicester's residents work within Leicester
    • Significant proportion of trips of less than 3 miles by car could potentially be targeted in behavioural change programmes aimed at increasing walking and cycling
  – Demand from residents for more information on public transport and cycling opportunities throughout the City
Contribute to Better Safety, Security and Health

• Key Challenges:
  a) Identifying cost effective ways to further reduce the number of deaths and injury from accidents on roads
  b) Addressing barriers currently inhibiting people from using public transport, and choosing to walk and cycle as physically active modes of travel
  c) Reducing the levels of NO\textsubscript{2} emissions from transport

• Current situation:
  – Concerns over personal safety and security acting as barriers to walking and cycling (congested roads, poorly maintained surfaces, consideration of other road users)
  – National research: if people feel more secure – 11.5% increase in use of public transport
  – Transport is the main source of NO\textsubscript{2} emissions in City
  – Level of NO\textsubscript{2} on City’s main road network well above European Directive threshold
  – Transport is also a significant source of CO\textsubscript{2} emissions in Leicester
  – Population, housing and business growth placing additional demands on transport network – increasing CO\textsubscript{2} and NO\textsubscript{2} emissions
Leicester’s Overarching Transport Priorities

• To achieve a more effective and efficient use of road network by delivering major transport schemes that improve ease of movement around the City and support business activity.

• To reduce greenhouse emissions from transport in Leicester by promoting sustainable methods of travel.

• To improve quality of local bus and rail services through investment in new highway infrastructure and the use of technology: such as smart and integrated ticketing, real time bus passenger information, enforcement of bus lanes, etc.

• To build on the City’s good reputation for supporting cycling and walking, by investing in infrastructure and through promotional activities such as the annual Sky Ride and bike training for young people.

• To improve road safety, reduce the number of people killed or injured in road accidents and to encourage walkers and cyclists: through more investment in road safety and speed reduction schemes, improvements to the physical infrastructure (roads, bridges, footways, traffic signals) and provide safer and more accessible environments.
## Future Sustainable Transport and Intelligent Mobility Priorities in the East Midlands

### Addressing Congestion and Traffic Induced Air Pollution

<table>
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<tr>
<th>Dynamic, integrated ITS systems that improve road network route planning, reduce congestion and reduce emissions</th>
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<tbody>
<tr>
<td>Real-time data collection networks to provide aggregated data to central traffic management systems</td>
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<tr>
<td>Informed travel planning by improving the availability of real-time information at strategic locations and enhancing availability of positioning, tracking and timing information</td>
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<tr>
<td>Improving city-wide mapping of areas of poor air quality against the road network, including real-time measurement of pollutants</td>
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### Making the Existing Urban and Regional Road Network More Efficient, Reliable, Resilient and Effective

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<th>Traffic management systems that can give priority to public transport, provide real-time traffic information and enable fast response in emergency situations.</th>
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<td>Open Data Platforms for the collection, assessment and monitoring of multi-modal transport data</td>
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<tr>
<td>Advanced real-time information services and intelligent road equipment systems for drivers and other road users: real-time traffic situation reports and options for choosing the best means of transport</td>
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# Future Sustainable Transport and Intelligent Mobility Priorities in the East Midlands

## Improving the Planning and Development of the Road Infrastructure Network

- Advanced tools and measures to acquire, integrate, access and share traffic data and travel data information (for all modes of transport), to improve transport systems analysis and modelling

- New models and tools to study, model and plan future scenarios for the movement of people and goods, taking into account multiple sources of information

## Increasing Efficiency and Improving the Effectiveness of Public Transport Services

- Improving the competitiveness, performance, reliability and affordability of public transport services, including improving travel times and accessibility of services
Future Sustainable Transport and Intelligent Mobility
Priorities in the East Midlands

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<th>Promoting Multimodal Integrated Travel Information, Planning and Ticketing Services</th>
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<td>Developing standards for technology and collective and multimodal data to allow better integration, interoperability, comparison and accessibility between different users and services</td>
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<tr>
<td>Smart, multi-modal integrated ticketing systems to promote seamless mobility and ease of use in urban areas</td>
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<td>Innovative forms of travel information e.g. interactive end-to-end journey planning and assistance through online tools/personalised travel planning; real-time journey advice; pay-as-you-go car clubs and sharing schemes; online and SMS messaging travel information services.</td>
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<td>Fully integrated one-stop-shop user interface for travellers, offering true door-to-door multi modal journey comparison of real-time travel information including true financial costs, timings, and health and environmental impacts, as well as ticket purchase and redemption and interactive real-time notifications of incidents and delays.</td>
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## Future Sustainable Transport and Intelligent Mobility Priorities in the East Midlands

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<th>Developing advanced safety and security measures to help reduce accidents, make roads safer (especially for Vulnerable Road Users) and create a better urban environment</th>
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<tr>
<td>New automatic data collection and monitoring systems, to provide a more in-depth understanding of accident causation and possible countermeasures and their impacts</td>
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<tr>
<td>Improving the design and quality of road networks to enhance road safety</td>
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### Improving the Health of Citizens

- Increasing the level of information available about the presence of pollutants and noise levels
- Identifying, piloting and evaluating the most efficient and cost-effective measures to reduce exposure to pollutants and noise, and to help decision makers to find specific solutions
Conclusions

• Searching for innovative solutions to address key transport and urban mobility challenges facing cities and sub-regions

• Solutions that match the vision and interest of markets as well as the highest priority needs of transport, urban mobility and environmental impact policy makers.

• Evidence from THE ISSUE Project and a priority for the European Commission:

  • Adoption of a “triple-helix” approach and philosophy

  • Closer engagement, cooperation and collaboration between business, particularly SMEs, universities, local government and other public bodies
Conclusions

A “triple-helix” approach provides the opportunity to:

a) Bring together key transport and urban mobility stakeholders to develop a common vision for the future traveller experience.

b) Share this vision with local business, particularly SMEs as well as research institutions, user groups and citizens.

c) Create new collaborative partnerships and consortia to exploit new and emerging RTDs, identify new markets, promote technology transfer and address barriers to market uptake.

d) Develop new innovations and products that increase regional
Conclusions

As a result:

a) Industry becomes better placed to support the commercialisation of new and emerging research and technology
b) Universities become more aware of market forces and user-needs
c) Business becomes more enabled to support policy delivery
d) Local and national government needs and market opportunities become more visible to business and research institutions
e) Public authorities become better informed of the economic, social and environmental potential of new and emerging RTDs
f) Greater synergies develop between economic development strategies, local transport plans and research policies and strategies.
g) Leading to the operational implementation and market growth of innovations in intelligent traffic management and urban mobility.
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