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Transformation through Digital Innovation

Towards Flexible Integrated Transport Systems: Requirements Analysis for Vibrant Communities

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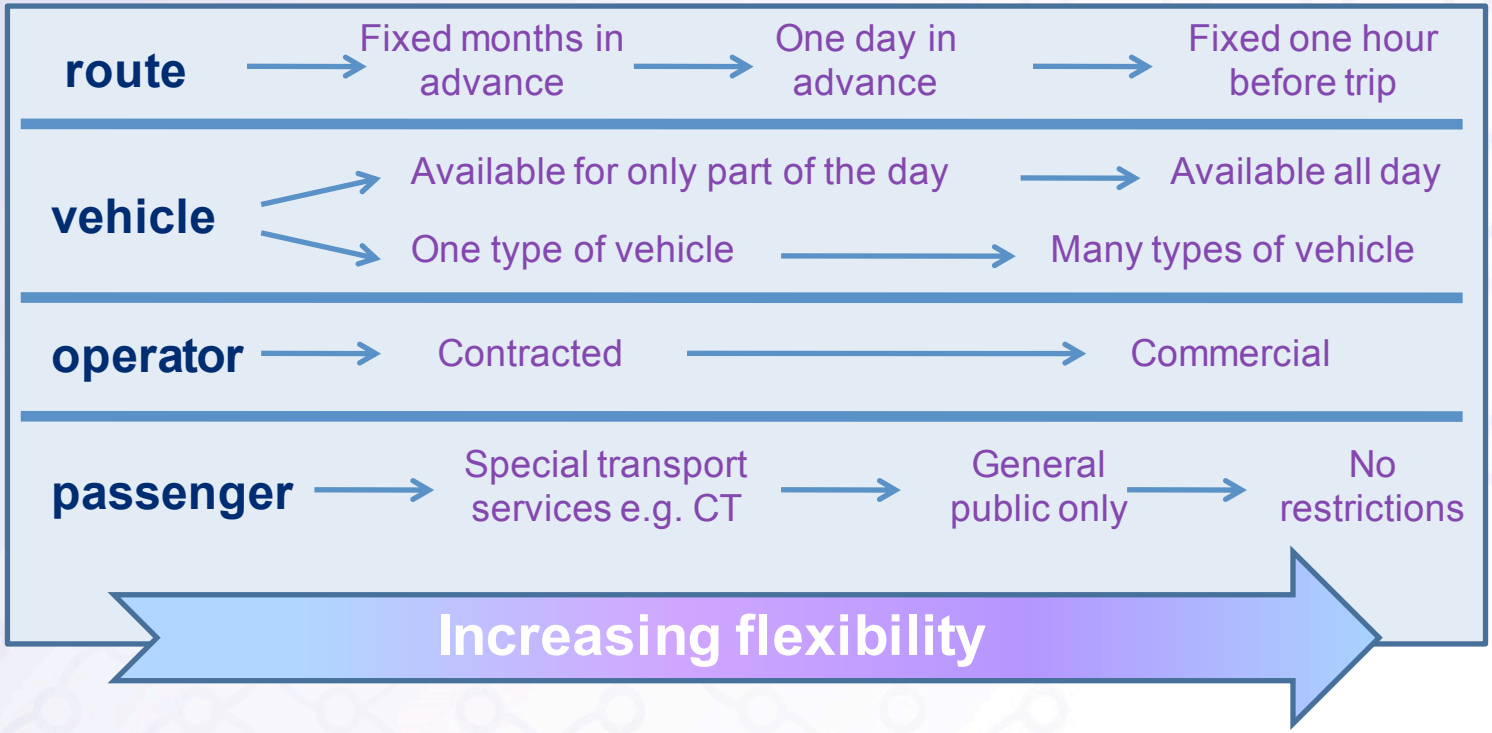
Outline of Presentation

- The rural transport challenge
- What are Flexible Transport Services (FTS)?
- Case study: Transport to Health and Social Care
- Stakeholder data collection and findings
- FITS prototype platform
- Summary and Conclusions

The rural transport challenge

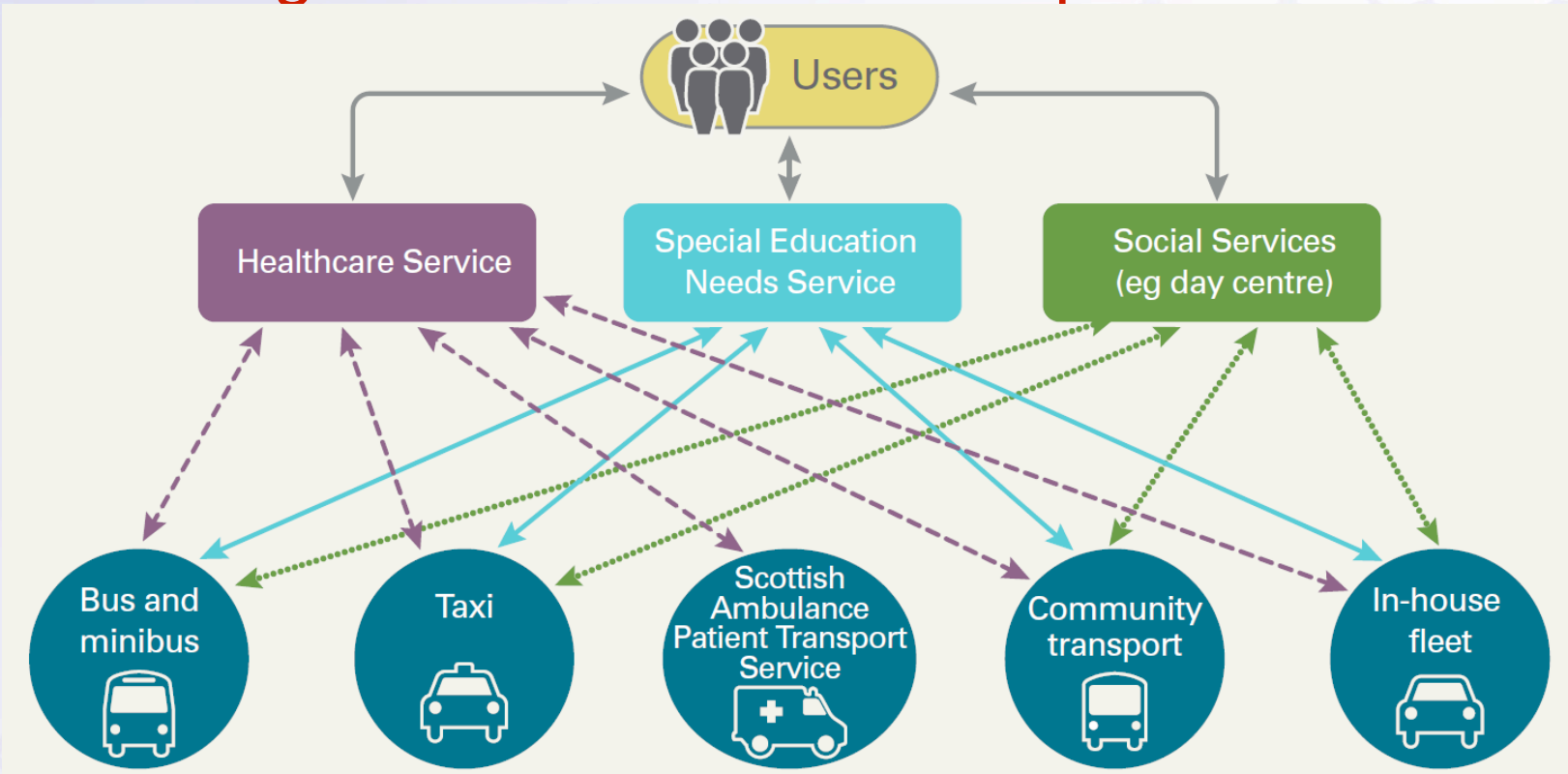
- Accessibility to / from and within rural areas
- Limited transport service availability
- Highly uncertain demand and supply
- Physical Infrastructure
- Digital Infrastructure: real-time communication to and from users

What are Flexible Transport Services?



"services provided for passengers (and freight) that are flexible in terms of route, vehicle allocation, vehicle operator, type of payment and/or passenger category"

Growing the FTS market: Integrated multi-modal transport services



Source: Audit Scotland, 2011 (adapted from *Integrated Transport Units – Good Practice Paper*, North West Centre of Excellence, September 2006)

- The development of co-operative frameworks for multi-modal services has been successful. However, there is still a need for ITS systems to "broker" the needs of the user within the context of the supply chain. The ability to use smaller vehicles eases access in narrow roads and has less environmental impact as they use less fuel

Case study: Transport to Health and Social Care

- High demand for transport to health
- Limited resources and transport services (especially in rural areas)
- Many individual taxi arrangements – very costly
- 5.5M medical appointments are missed annually
- Many of these are due to transport limitations

"[P]atients who miss hospital visits cost the NHS **£700m** [...] Millions of appointments are missed in each one year " -

Excerpt from Daily Express (August 27, 2012)

Research Challenges: Transport to Health

- How do we utilise available resources efficiently to meet diverse demands for accessibility to / from and within rural areas?
- What novel approaches are appropriate to effectively integrate multiple modes?
- How can we optimise transport options with regards to passenger preferences?

Data collection

Event type	Date	Number	Area / Organisation	Aim/Objective
Interviews	Between July and Sep 2012	6	Various councils in rural Scotland	• To understand individual service provision, passenger profiles and requirements.
Consultation with software developers and transport providers	Between Jan and June 2011	3	Trapeze Group; local councils in rural Scotland	• To learn more about existing software systems and their capability to support integrated and flexible transport services.
Workshop	16th Aug 2012	1	Various transport service providers; local authorities and transport agencies	• The discuss how to develop an effective flexible and integrated transport system.
Field visits to FTS travel dispatch centre; and Ambulance service dispatch system	March 2011 and Aug 2012	2	Aberdeenshire	• To understand practical working systems and how trips are reserved and assigned to fleet, and understand practical integration of different services.
Demonstration / round-table discussion sessions	Between Jan and Aug 2012	5	NHS, Scottish Ambulance service; local authorities; transport agencies; flexible transport service providers and operators	• To discuss various issues to integrated a range of transport services • To discuss and evaluate our platform development to support integrated and flexible transport services.

Main findings

1. **User requirements, preferences and limitations:** It is essential to understand end users requirements and preferences better. Consideration of passengers' requirements, preferences and limitations is particularly required in integrated transport.
2. **Service boundaries:** Most of the existing service boundaries for FTS are based on local requirements, target population (e.g., elderly) and local governance and policies. One provider or sector's service boundaries may ignore those of alternative services.
3. **Existing software support for integrated transport:** Most existing software concentrates on scheduling vehicles on optimal routes and allocating a group of passengers to the available fleet. In practice existing software solutions can't completely support the scheduling process for integrated FTS.
4. **Collaboration between service providers:** Service providers may be competitors and might not want to work together.

Main findings (Cont..)

5. **Understanding the service constraints and policies:** Currently, each service has certain constraints in their operation. It is necessary to understand the service constraints, rules, regulations, eligibility criteria and policies before designing an integrated transport system. These should be incorporated in the integrated transport design.
6. **Level of integration:** The integration of services should follow a step-by-step approach.
7. **Issues with booking system and fares:** Currently, individual transport service providers use a range of booking systems and the fare structure and model vary with each service. For integrated transport, the booking/ reservation system should be simple (e.g. a direct call or one step online booking) and ideally incorporate payment for the complete journey.
8. **Fairness among operators:** There may be several operators who are willing serve a specific trip request. In integrated FTS operators work collaboratively; the question of fairness on selecting an operator for a trip is an important issue.

Objectives of the FITS project

- To identify key requirements for developing Flexible Integrated Transport Systems (FITS) in rural areas
- To develop a prototype FITS platform using a multi-agent system.
- To evaluate the platform in a real world case study of transport to health

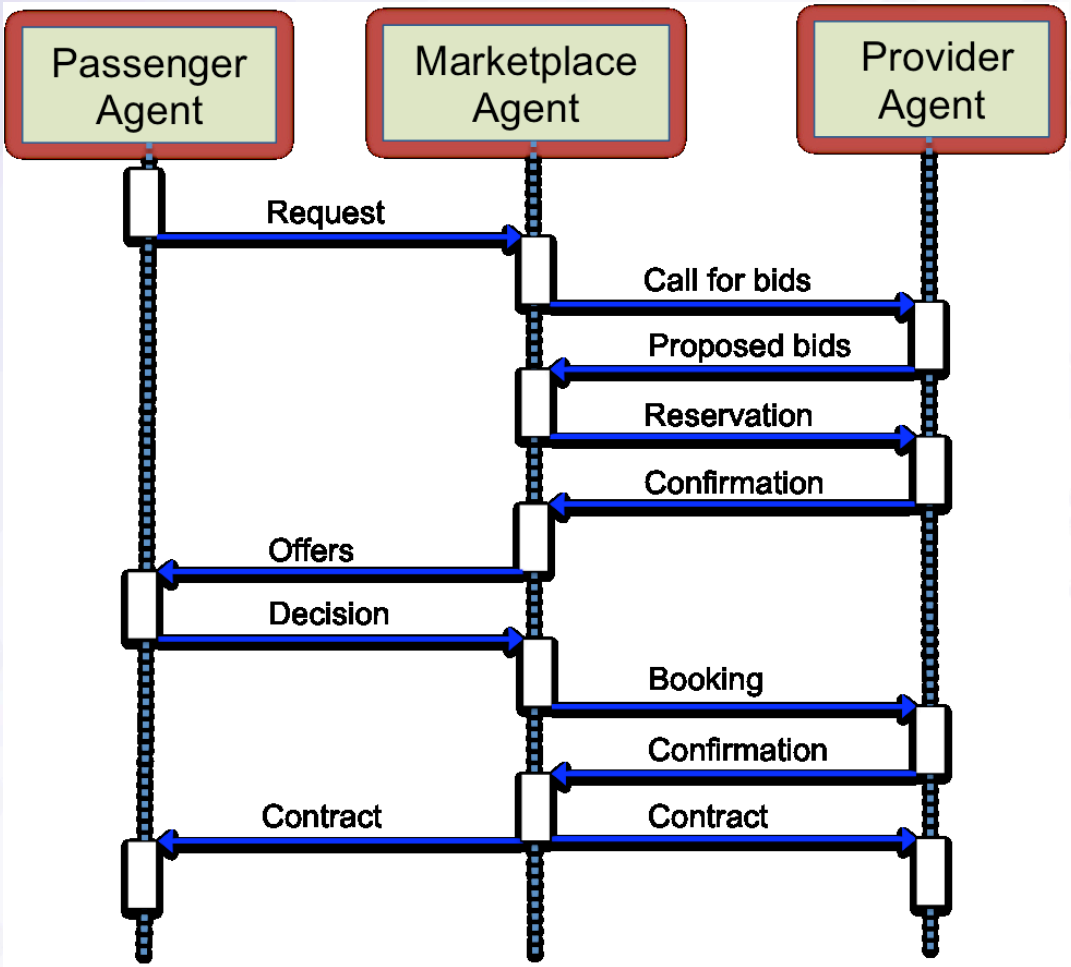
Users / Stakeholders

- Grampian Health Transport Action Plan (HTAP) team
  - NHS Grampian
  - Local Authorities
  - Scottish Ambulance Service
  - Nestrans
- Community Participation: Buchan Dial-A-Bus
- Public transport operators – Buses, Trains, etc.
- Taxis

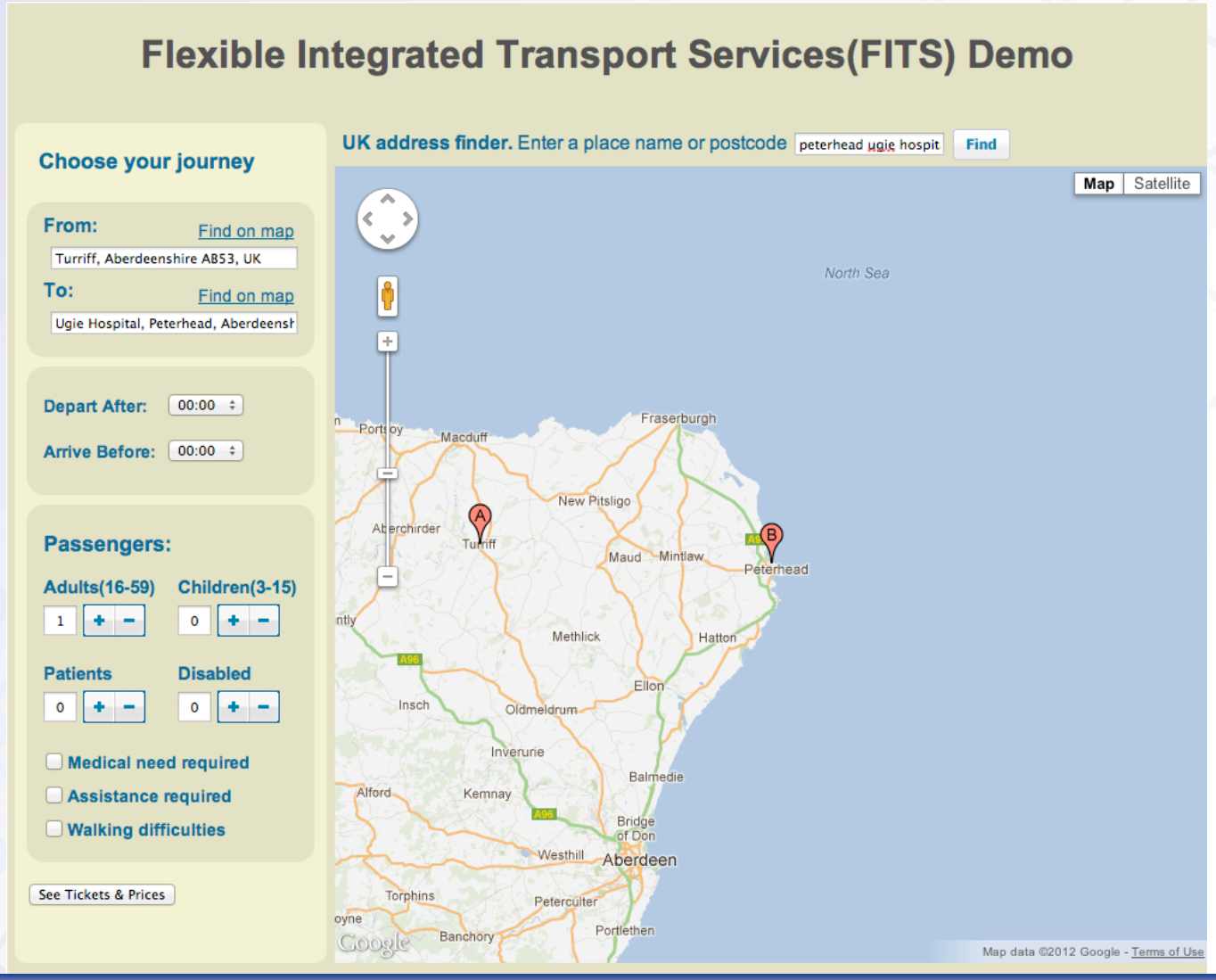
Features of the FITS Virtual Marketplace

- Considers passengers' requirements, preferences and limitations in the system
- Creates co-ordination and collaboration between service providers by appropriately addressing fairness on selecting an operator for a trip
- Considers service constraints, boundaries and policies during booking, reservation and scheduling process
- Addresses issues with existing software support for integrated transport etc.

FITS Contract Net Protocol



Screenshots



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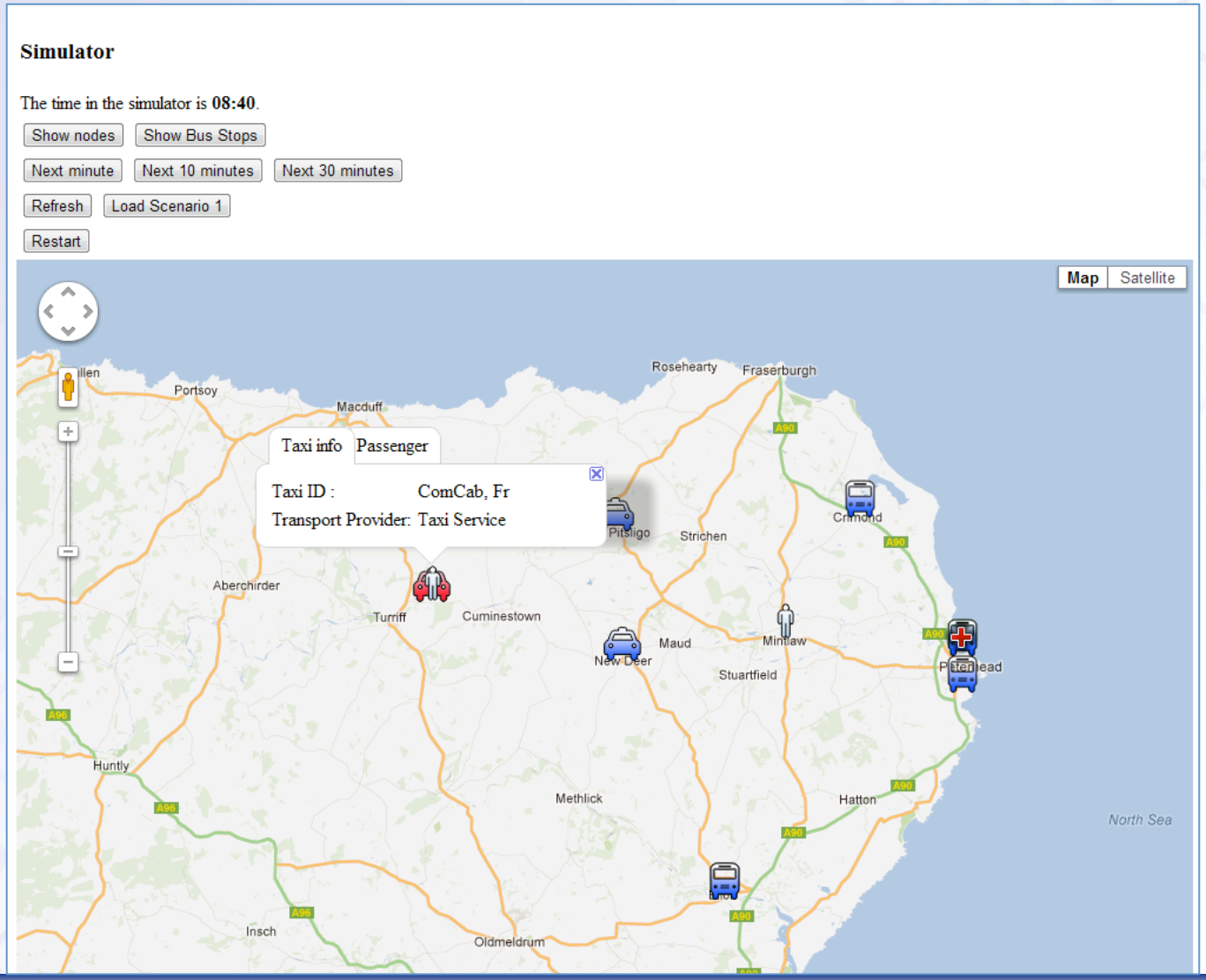

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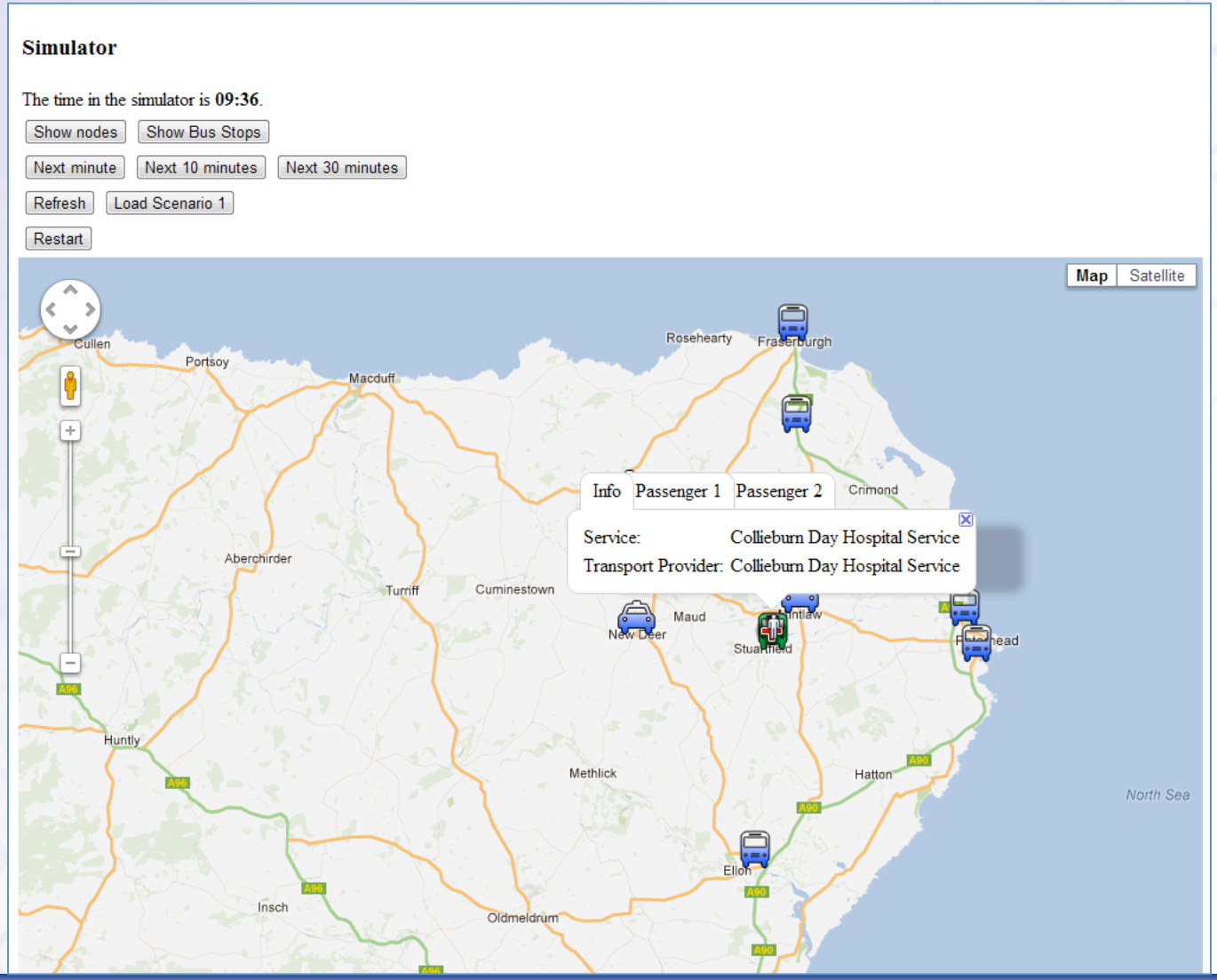

Summary and conclusions

- In rural areas, where there is limited transport service provision, integration of transport services and introduction of a certain level of flexibility could enhance the rural transport system.
- FTS are an integral component of the public transport offer
- Various user requirements for achieving multi-service integration in rural areas have been identified.
- dot.rural is developing a passenger-centric FITS platform.
- The FITS platform will be trialled/tested with the help of the Grampian Health Transport Action Plan team.

Project team

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