NICHES+ Champion City
Trondheim

Implementing mobile travel information services for the public

NICHES+ is a Coordination Action funded by the European Commission under the Seventh Framework Programme for R&D, Sustainable Surface Transport

The City and NICHES+

The project

NICHES+ is a FP7 co-ordination action aiming to network key actors actively engaged in developing **innovative urban transport concepts** and to facilitate the co-ordination of their activities across Europe. The project duration is from 2008-2011.

Trondheim is a Champion City within the project that aims at implementing Mobile Travel Information Services for the Public (MTIS). This document summarises an **implementation scenario** that gives advice on how to realise the given concept in the specific context of the city. This also provides an example to other cities interested in the uptake of the measure.

The city

Trondheim is the fourth most populated city in Norway and is the administrative centre of Sør-Trøndelag county. The city of Trondheim has 165,000 inhabitants at a density of 458 people per km^2.

Trondheim currently experiences an **adverse environmental impact from excess car use** in the city centre: 44% of journeys in the CBD are made by private car. The re-introduction of road tolling was a strong recommendation of the Norwegian Department for Transport but has enabled Trondheim's objectives to become self-financing through the hypothecation of revenues to finance improvements to Public Transport.

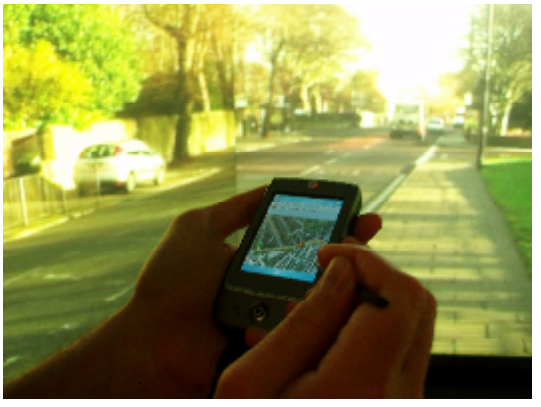
The city's **Public Transport networks** (train, bus and tram) are currently used by 40,000 people on a daily basis (23% of journeys in the CBD). The local bus company, AtB, operates 42 routes in the Trondheim area, and there is one tram line, with a 20 minute journey time from end to end that serves around 800,000 customers each year. The main objective is to increase the attractiveness of Public Transport by reducing travel times and improving the range and quality of services on offer.

Traffic Congestion in Trondheim
Photo: Public Roads Administration

The innovative concept

Of the NICHES+ innovative concepts, Trondheim focuses on **Mobile Travel Information Services for the Public (MTIS)**. MTIS enhance convenience and confidence when travelling by various transport modes, particularly Public Transport.

MTIS provide a more reliable, convenient service to end users, contribute to improved operational practice, and permit more efficient network management. Within Trondheim, MTIS are viewed as an important component of the wider strategy to promote Public Transport use, through the delivery of real time information on Public Transport on vehicles, at stops/stations and to **mobile devices**, delivering integrated ticketing and communications solutions, and bus priority.



Navigation Information on a PDA
Photo: Newcastle University

The Challenge

The broad economic situation in Trondheim, as in the rest of Europe, is one of reduced budgets and the need to do "more for less". However, Trondheim aims to **reduce the impact of excessive car use** not only in the CBD, but also in the wider metropolitan area.

This commitment has been demonstrated by the approval of the **2008 environmental package** ('miljøpakken') which adopts a 'carrot and stick' approach to reducing the impact of the car and enhancing the attractiveness of Public Transport.

Policy measures included increased funding for Public Transport, reduced free car parking and an increased environmental tax on petrol. Infrastructures have been upgraded, notably the city's tram terminal, and in 2009 a further set of objectives were identified, designed to encourage car pooling and the reintroduction of road tolling.

Specific local transport **policy objectives** include:

- A reduction in CO_2 of 20%
- A 25% increase in public transport speed in the CBD
- An 8% reduction in car travel
- A 15% drop in noise levels
- A 20% reduction in accidents

"Ubiquitous, seamless, multi-modal real-time information services are to be delivered on screen and to mobile devices… This forms part of our objective to deliver a fully sustainable transport system."

Mr Birger Elvestad, Trondheim Kommune

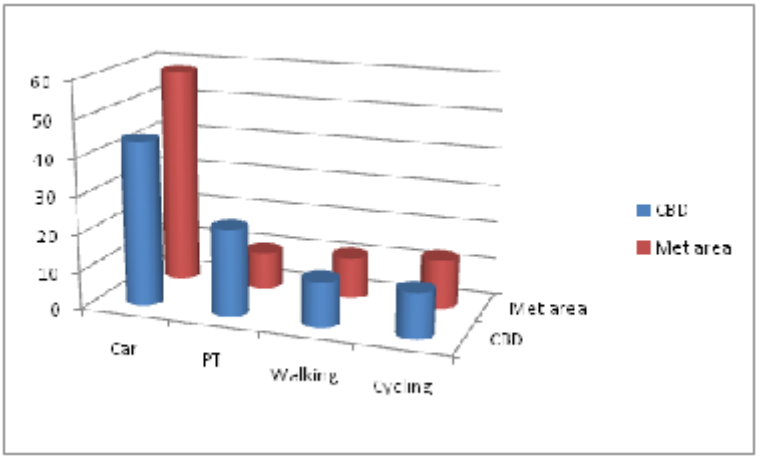
The Vision

Trondheim's vision is **"Daring Environment Quality Management in Urban Transport"**. It aims to:

- Ensure safe and environmentally-friendly transport
- Increase speed and availability of public transport
- Meet environmental targets by reducing car use in the CBD and wider Trondheim area
- Employ innovative funding methods to make transport implementations self-financing
- Support local businesses and the local economy
- Move towards an integrated approach to mobility management

Trondheim is proactive in **supporting local businesses** such as Wireless Trondheim, Vision Tech and Miljoedrift, who **supply innovative intelligent transport systems (ITS)**. The aim is to harness their skills and expertise to employ a more integrated approach to mobility management.

Modal Split (%) in Trondheim (Trondheim Kommune, 2008)



Stuttgart Integrated Traffic Management Centre (IVLZ)

In December 2010, Ms Gisa Gaietto from Stuttgart visited Trondheim and presented the Stuttgart Integrated TMC (*Integrierte Verkehrsleitzentrale* - IVLZ).

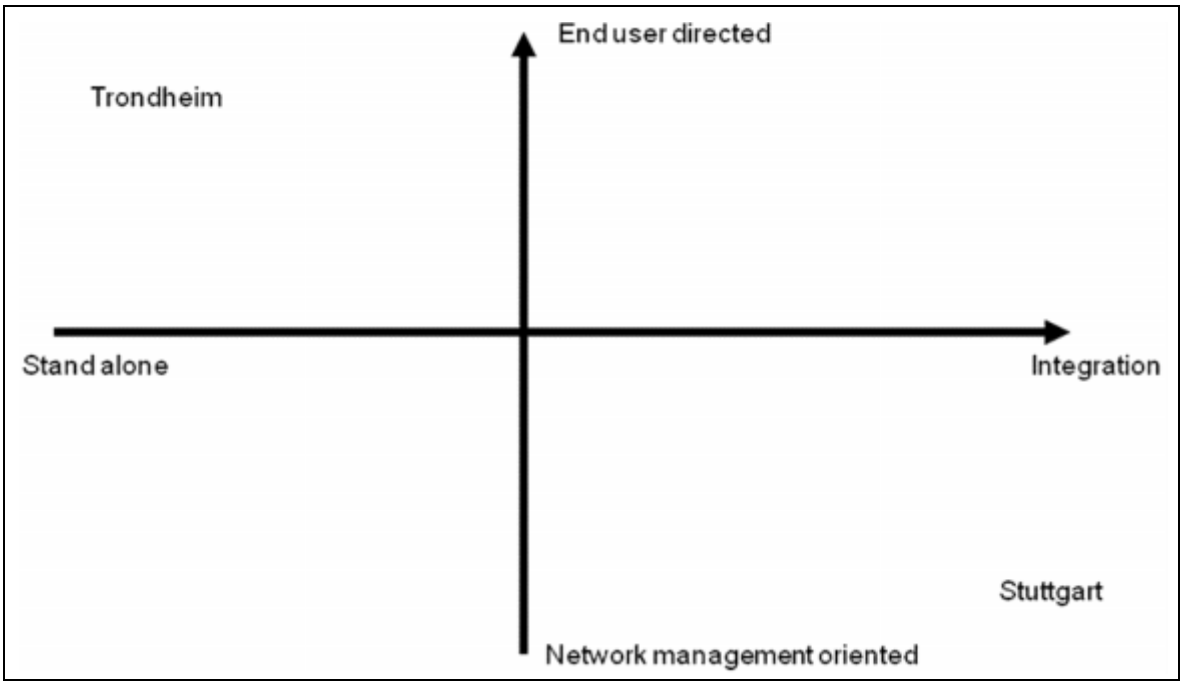
The IVLZ system in Stuttgart manages and **controls traffic flow in a proactive manner**, anticipating commuter traffic, work activities or big events as well as unforeseeable events such as accidents. It also promotes **intermodality** to avoid congestion and to reduce travel times and emissions by means of optimal information and guidance of the road user.

The IVLZ serves 390,000 cars and 700 buses making 600,000 trips per day. Data is received from loops, as well as taxis and buses in the traffic.

Overall, the integrated TMC in Stuttgart is regarded as a model of good practice through its **integration of different actors and instruments**, including city traffic management, the headquarters of the police traffic department, the fire department, emergency services, and the Stuttgart public transport operator (SSB).

The figure below represents, in simple form, the different approaches to mobility management in Trondheim and Stuttgart. Trondheim has been highly successful at deploying specially developed stand-alone systems (e.g. the hospital campus bus) which are developed with target groups of end users in mind. Stuttgart presents a very successful integrated, network management-oriented approach.

As Trondheim moves towards integration, Stuttgart will be used as a benchmark. For end user-based system provision, Trondheim is itself a fine benchmark for other cities.



Trondheim and Stuttgart: A Stand-Alone versus Integrated Approach

The Users and Implementers

The user needs

'Users' are those people who actually benefit from a transport service. This is usually the travelling public, however users can also be intermediaries, for example a city administration that collects data to manage the overall transport network.

All relevant user groups must feel empowered. This is particularly relevant for the travelling public who have a low influence on the project. End user consultation is especially important when considering the delivery of personalised or user-specific information.

Transport operators and Local Authorities need comprehensive, multi-modal, real-time, and reliable information in order to address planning and operational issues, as well as determine and implement policies to address the aforementioned issues of future car ownership amongst young people.

Commuters and Tourists (using both Public Transport and private car modes) require comprehensive, multi-modal, real-time, and reliable information (e.g. arrival and departure times, mode switch options).

Targeted end users in Trondheim are mainly young people. This category includes people aged between 16 and 26 who already use Public Transport, who do not have regular access to private car, but may cycle or walk.

The aim is to encourage them to avoid car ownership for some of the early years of their professional lives. Alternatively they may avoid becoming two car households in their family lives.

The key stakeholders for implementation

The stakeholders in a project include those responsible for delivery, that is, the core project team.

Stakeholders also include the target end users and co-operation partners or outside influencers. A group of key stakeholders already exists in Trondheim from previous initiatives including the introduction of real-time information to the hospital campus bus service and the piloting of WiMAX on the tram network.

The core project team should be small and focused, comprising key stakeholders, and adding further stakeholders as and when necessary. Roles should be clearly stated, and a clear, comprehensive contract drawn up. The core project team in Trondheim is:

- Public Roads Administration (Champion)
- Nettbus, Team Trafikk and Veolia Transport Norway (local and regional bus operators)
- City of Trondheim (introduced Miljøpakken)
- Wireless Trondheim (infrastructure owner and operator)
- AtB (contractor for public transport in Trondheim and the Sør-Trøndelag county)
- Swarco Norge As (install display units on buses and at stops, and the algorithm for message service of delays)

Co-operation partners and outside influencers will vary in their stake in, and influence on, the project over time. They support key stakeholders, and for Trondheim include:

- ITS Norway
- Miljoedrift AS
- VisionTech AS
- Veolia Transport
- WapThe Web AS

The key issues for implementation

The measure implementation

MTIS will be implemented in Trondheim through the following **key measures**:

- GPS-based bus localisation and priority
- Real time information on buses and at bus stops
- Real time information delivery by text message (SMS)
- Smartphone-based map application with real time information

Tram customers currently enjoy real time information, e-ticketing and payment on mobile phones. The ability to communicate with transport operators by mobile phone is being investigated in order to enable passenger feedback to the operator.

Implementation of MTIS in Trondheim will benefit from the fact that the **key stakeholders** are in place and strong working partnerships established. Finance is also available until 2025 through the re-introduction of road tolling finance and hypothecation of revenues.

Design of Bus Information
Image: Public Roads Administration

Barriers and Success Factors

NICHES+ identified six success factors and barriers for MTIS. Four of the six are **success factors**. These are:

- Dedicated marketing
- User friendliness
- Response time of the system
- Political support

The two **barriers** are: the problem of scale for the service provider and bandwidth/capacity challenges.

Scope of action	
Activity or key element of implementation	***Comments***
GPS-based bus localisation and priority	GPS-based bus positioning enabling traffic controller to authorise bus priority at 50 signalised intersections
Real time information on buses and at bus stops	Time to arrival information displays installed on 180 buses and at 35 bus stops in phase 1 and 65 in phase 2
Real time information delivery by sms	Next arrival service covering all buses and stops
Smartphone-based map application with real time information	Map application with clickable bus stops accessing real time bus location information. Available to smartphones only

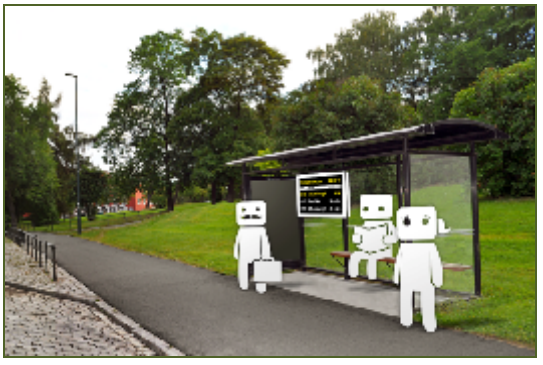
The measure justification

The main goal of MTIS is to **make public transport more attractive** by implementing real time information for bus travellers and priority of Public Transport at traffic signals, as well as an overall minor fare reduction within Trondheim and an extra fare reduction for travelers with origin/destination in neighbouring municipalities.

It is anticipated that these measures will **increase the numbers of bus travellers by 33% by 2018**, reduce waiting time by providing better passenger information at bus stops, and will improve travel time for Public Transport services.

Trondheim's commitment to **reduce the environmental impact of car use** and promote public transport as an attractive alternative is already demonstrated by the 2008 environmental package. As well as environmental benefits, social and economic benefits are also envisaged

Extensive **MTIS innovation** has taken place in Trondheim in recent years, driven by innovative local technology companies, notably Wireless Trondheim, VisionTech and Miljoedrift. The measures described in this document are the next step towards a more integrated real time information system for Trondheim's Public Transport network.



Real Time Information at Bus Stops
Image: Trondheim Kommune

The implementable measure

The **real time bus information system** is a next bus/time-to-arrival system which is being implemented at 35 stops and on 180 buses. Selection of bus stops to receive the system is based on patronage. AtB (the contract company for public transport in Trondheim and the Sør-Trøndelag County) provide the data and server, which is based on Mizar/ Swarco software. However, the patronage at most bus stops in Trondheim and the surrounding areas is too low to make real-time information screens viable.

Mobile phones are therefore considered a vital alternative information technology for providing travel information to the end user. The real time bus information is initially being made available by **SMS** to provide information about any bus anywhere on the network, however it is anticipated that eventually this service will be superseded by **Smartphones**. A map-based application with real time information is under development with a pilot installation at the University of Trondheim. By clicking on a bus stop, users can access next bus data.

Statistics from Trafikanten (an Oslo bus operator) show that in early 2010, 47% of requests for real time traffic information were carried out by SmartPhone. The popularity of Smartphone technology for obtaining these real-time information services is expected to be similarly high in Trondheim.

Smartphone Applications
Image: Wireless Trondheim

The Implementable Measure

The finances

The re-introduction of road tolling in March 2010 means that revenues are hypothecated to finance improvements to Public Transport. Trondheim's MTIS measures are funded by **35 million NOK (approx. 4.5 million EUR) hypothecated from the road tolling** component of the environmental package.

These revenues will be used for the **implementation of MTIS on the bus network**, with Trondheim's MTIS objectives guaranteed until 2025. This enables long term planning with a high degree of flexibility, with an additional one third of revenue set aside to be spent as required e.g. to meet new demand or to develop new concepts.

The timing

Trondheim has already commenced the MTIS programme, with the deployment of **information display screens** at 35 bus stops and on 180 buses throughout the city during December 2010.

In March 2011, the information displays will be integrated with **GPS-based bus priority system** leading to the delivery of a full system with real time information provision.

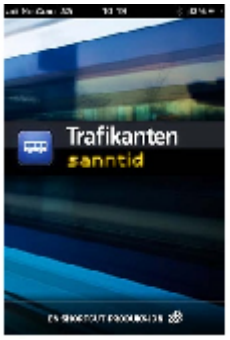
The next stage of development will focus on the dissemination of real-time information to **mobile devices**, with the provision of real time information to Smartphones occurring in late 2011, followed by Smartphone-based map applications in early 2012.

The long-term perspective

Long-term sustainability of MTIS in Trondheim will ultimately be measured by a number of indicators. Key to this will be achieving the specific local transport **policy objectives** including a 33% increase in the number of bus travellers, a 4% reduction in car traffic, a reduction in CO_2 of 20%, a 25% increase in Public Transport speeds in the CBD, an 8% reduction in car travel, a 15% drop in noise levels and a 20% reduction in accidents by 2018 (from 2008).

Funding for Trondheim's MTIS is available until 2025 which means that **financial sustainability** exists. This should not preclude identification of additional sources of funding for future schemes.

Nurturing innovation, which has been instrumental to Trondheim's existing success, is seen as important to Trondheim's future growth and development. The main driver of future sustainability of MTIS in Trondheim may well be a move towards harnessing the innovative skills and expertise of local technology businesses towards provision of a **more integrated mobility management concept**, bringing together different technologies into integrated packages, engaging a wider cohort of end users, and combining innovative concepts (including non-ITS initiatives) into strong, efficient, smart local transport strategies.



Examples of Information Delivery to a Mobile Device in Oslo
Image: Public Roads Administration

There are a number of useful lessons that have been learnt through the introduction of MTIS in Trondheim. It is crucial to maintain **stakeholder relations**, in particular ensuring that all members of the core project team are engaged in the operational phase.

A **marketing strategy** should be developed, and modified where required, to ensure that MTIS will be used. It may be valuable to develop a dedicated marketing strategy aimed at the travelling public at large, to enhance attractiveness of the new services and thus Public Transport. It will be worth exploring **new communication channels** e.g. social networking sites, and also to conduct consultations with end users, and widen the consultations beyond existing target groups.

Connected to this is the importance of periodic **evaluation** of the MTIS as a tool to fine-tune operations. User surveys can help optimise concept performance and encourage support amongst funders and politicians. Involvement of operators is important in order to monitor patronage and user feedback. Technical/operational partners should continue to be engaged to ensure optimised technical performance. Risk of unreliability can be quite high after introduction of a new concept and unreliability can put off customers from using the service in the future.

It may be useful to retain a mechanism for **knowledge exchange** i.e. a network of experts. This will be valuable in terms of moving towards an integrated mobility management concept.

Check list

The following check-list summarises **key aspects for implementing MTIS** and intends to give the reader advice on whether the concept is suitable for the own context.

Check list	
City size	Citywide, but should be compatible with any nationwide MTIS
Key conditions for imple-mentation	• Understanding of end user needs and requirements • A viable business model • Identification of appropriate technologies and outputs • Strong political support
Resources	Economic conditions have led to uncertainty in terms of financing all objectives
Implemen-tation time	2-3 years between planning and system implementation
Stake-holders involved	• Local authorities and Government departments • Public Transport operators • Technology suppliers (e.g. network operators, computer specialists) • Passenger groups • Data owners • Emergency services
Undesirable secondary effects	If MTIS include enhanced road traffic information services new car-based trips may be generated

For further details on how to implement Mobile Travel Information Services for the Public please see the **NICHES+ Guidelines for implementers** (available from www.niches-transport.org).

The more detailed **full version of the Implementation Scenario** for Mobile Travel Information Services in Trondheim is also available on the NICHES+ website.

Photo on title page

Overview of Trondheim from the West:
Mr Birger Elvestad, Trondheim Kommune
ITS4Mobility system showing at-stop information provision: © Volvo Buses

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Further information on NICHES+

www.niches-transport.org
www.osmose-os.org

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