

Editorial

Lessons learnt from CityMobil and considerations for future research

CityMobil will soon come to a close. It is always difficult to find things to improve in a project which received so many awards as a success story and which undertook so many different initiatives all over Europe.

CityMobil's approach has been to cover all possible automated road transport systems in very different initiatives. Four automated transport system categories have been investigated:

- dual mode vehicles: normal vehicles with automated driving capabilities;
- cybercars: fully automated road vehicles supplying a collective taxi-like service;
- PRT: small vehicles supplying a taxi-like service on a dedicated infrastructure; and
- advanced buses: flexible bus services with advanced driving capabilities.

Three main kinds of activities have been carried out:

→ **city studies** to assess scenarios in different cities with different characteristics. Madrid (ES), Vienna (AT), Gateshead (UK), Trondheim (NO), Uppsala (SE) and Sophia Antipolis (FR) have all been studied with different techniques to assess how best to use automated transport there;

→ **showcases** to disseminate automated transport to members of the public allowing them to ride on the vehicles. Daventry (UK), Vantaa (FI), Trondheim (NO), La Rochelle (FR) and Orta (IT) have all hosted a showcase and the initiative was so successful that a spin-off project, CityNetMobil, extended this initiative to 5 further showcases in Clermont-Ferrand (FR), Formello (IT), Brussels (BE), Sophia Antipolis (FR) and Reggio Calabria (IT);

→ **demonstrators**: a PRT system in Heathrow (UK), an advanced bus in Castellón (ES) and a cybercar system in La Rochelle (FR) have been successfully demonstrated

and a cybercar system in Rome (IT) was long supported but ultimately did not lead to a demonstration.

All these initiatives in the different cities have been evaluated and the results were put together with a common approach. Many general results were obtained from this approach, the most important being the identification of which advanced transport systems are most suitable to solve different transport problems, such as PRT as the main transport system for small mono-centric cities and a combination of cybercars as a feeder service and advanced buses as the main transit line for the peripheries of large cities.

However, even if CityMobil has been such a successful initiative, some lessons for future research projects can be drawn.

1. **Legal framework**: despite CityMobil's efforts on certification procedures, automated systems still remain a legal mystery; each country follows its own certification procedures. For example PRT in England is certified under the rail directive and cybercars in France under the machinery directive (if on a protected environment) and for the La Rochelle demonstrator (on an unprotected road) the mayor had to sign an "Arrêté" (a decree). To kick-start a market for automated systems, it is imperative to create a common legal framework allowing automated transport on the roads (under precise conditions).

Final CityMobil event

The closing event of the CityMobil project will take place in Brussels on 1 December. The one-day event will build on the exciting programme and discussions of the CityMobil conference in La Rochelle (see next article). An update on the automated systems operating in Heathrow, Rivium (Rotterdam), Masdar and La Rochelle will be given and a roundtable bringing together automated system experts and transport practitioners will debate the future perspectives of these innovative systems. More information on www.citymobil-project.eu

2. Huge investments have been necessary from the city side to set up the demonstrators; several tens of millions of Euros for both Heathrow and Castellón. Though such investments are low compared to those necessary for a metro or a tramway, would any city official invest such a sum of money in something not necessarily certifiable? A future project will need to decouple the demonstration from the huge investments; the cities can still invest in the infrastructure (which can then be recycled for conventional transport systems if the demonstration is not successful) but the technological and legal risks have to be lifted from them.

3. Each manufacturer of an automated transport has its own technology for vehicles and the infrastructure and these systems are not interoperable. Work is needed to make these systems interoperable enabling cities to change vehicle manufacturer when needed without having to change the infrastructure.

One of CityMobil's early results was the need for a paradigm shift to change from manual to automated driving. From "why should I BUY a car" to "why should I USE an automated car". If a full scale adoption of automated road vehicles were to reduce the number of circulating vehicles in Europe by a factor five (if not ten); would European car manufacturers, and therefore the European economy, be able to sustain such a market contraction? And how? A socio-economic study on this issue could help reduce the pressure placed by many European economic sectors to discourage the wide-scale take-up of automated transport systems.



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Project update

'Smart mobility for better cities'

More than 120 representatives of public authorities, industry and research centres attended the CityMobil conference 'Smart mobility for better cities' in the French

coastal town of La Rochelle on 13-14 May 2011, which is the site of the new CityMobil demonstration of an automated system operating in a mixed traffic environment. The conference marked the launch of the demonstration by the Mayor of La Rochelle and President of the La Rochelle conurbation, Maxime Bono.

The conference offered a broad and interesting programme of speakers, drawn from within and outside the CityMobil consortium, showing the latest developments and future plans with regard to the development and deployment of automated transport systems. Some of the systems presented during the conference were on display in the exhibition set up alongside the conference.

The conference opened with an inspiring and anecdotal account by a leading professor of a research team's efforts to 'ride' an automated vehicle from Italy to China. This was followed by a contribution from the European Economic and Social Committee offering some useful tips and hints on where to focus future efforts regarding the deployment of automated systems. From the research and academic side, there were presentations on the opportunities and barriers to the deployment of automated systems and on the potential role and contribution of (semi)automated transport systems to urban mobility, based on real city simulations.

The session showing the main systems in public operation was a highlight of the conference programme. The systems presented by the developers themselves in most cases were the Heathrow and Masdar Personal Rapid Transit schemes, launched in April 2011 and November 2010 respectively, the Rivium Group Rapid Transit service operating for many years in a Rotterdam suburb, the La Rochelle demonstration which had commenced just one day before, and the Hi-tech bus service in Castellón.

The main issues emerging from the lively discussion revolved around the inter-connected issues of cost, funding, business case and procurement. The unit cost of Heathrow's ULTra and Masdar systems are high, compared to a bus for instance, due to the significant development costs involved in such a new transport concept and the small-scale nature of the network. However, the unit cost would drop significantly were the network to be upscaled. Furthermore, automated systems have the advantage of being able to introduce additional

capacity at little extra cost. Procuring such advanced transport systems is not easy due to the general lack of awareness and/or scepticism among public authorities (or the consultants advising them). This is compounded by the uncertainties about lifetime costs and the risk averseness of the public sector and general preference for tried and tested solutions with low risks. These factors lead some to believe that private developers or land owners may be more likely to invest in advanced transport systems, in the short to medium term at least.

There are nevertheless many public authorities who do recognise the potential of automated systems and some of these attended the conference to present their experiences and future plans. The municipalities represented came from Scandinavia: Vantaa (Finland), Trondheim (Norway) and Uppsala (Sweden). In all cases, the interest in advanced transport systems dates back many years and each had benefited from the support of CityMobil to move this interest forward: Vantaa and Trondheim were the sites of a CityMobil cybercar showcase whereas Uppsala was the subject of a PRT feasibility study. Today, all three cities still enjoy significant municipal support for advanced transport systems and this is being pursued through further studies and/or seeking investment partners.

It was only possible for a small selection of the many results from CityMobil to be presented during the conference. These included technological developments and operational issues as well as tools designed to guide a potential customer who is considering automated systems, namely, the City Application Manual and the business case tool. The work of CityMobil on certification was also introduced and this sparked some debate. The certification procedure developed within CityMobil is



based on an acceptable safety threshold that is twice as stringent as for the car. The developed procedure was adopted by the former CityMobil demonstrator in Rome and a substantial amount of knowledge has been built up through this application.

The panel session brought together representatives from the public sector, research and industry to debate the prospects for the deployment of automated systems in the next 10 years. The main points raised by panel members and during the discussion included the following:

- i. Whilst some technical issues remain, they do not constitute a substantial barrier to deployment.
- ii. Greater care needs to be taken to relate the automated applications to real problems for which they provide the most appropriate solution. They must be an integrated part of a sustainable transport chain.
- iii. The key to success will be convincing the population that the new technology is a sound, practical, affordable and desirable way forward.
- iv. Unless speeds are very low, automated vehicles will have to have dedicated lanes and this will require new infrastructure.
- v. Fundamental changes in transport options enabled by increased automation will lead to new behaviour. This may result in new approaches to enforcement, etc.
- vi. The problems which automation will address will primarily relate to congestion and energy security. Safety and climate change problems will be reduced by the increasing deployment of driver support systems and electric/hybrid/hydrogen power.
- vii. The complexity of transport problems and uniqueness with respect to each city will not lead to simple one-size-fits-all solutions.
- viii. The problems of accepting new technology may be compounded by a general resistance to change, and a single event, such as a job or residential change could trigger a personal review of circumstances.
- ix. There is evidence that the car is no longer the status symbol that it once was. The future will have much less car ownership in urban areas, and this will release money for other transport alternatives. The on-demand potential of new automated systems together with enhanced personal communication systems will provide a sustainable future.
- x. It was considered that automated systems will become a significant part of future urban transport. However,

there was some disagreement between panel members as to the pace of potential change because of the barriers which need to be overcome.

The final presentations of the conference were very apt for the closing session as they presented opportunities for moving forward with advanced transport systems from both a demonstration and deployment perspective. A representative of the European Investment Bank outlined the funding and investment schemes offered by the European Investment Bank for energy efficient transport solutions. A presentation by the European Commission's DG RTD on future EU research and development opportunities indicated that there would probably be a research topic on automated systems call in the next FP7 transport call.

News from the demonstrators

PRT at Heathrow

The last six months at Heathrow has seen the ULTra system complete final operational testing and enter passenger service. On Monday 18 April 2011, T5 Business Car Park passengers started using the Heathrow Pod. In the weeks that followed, operating hours were increased, with the system operating a (22 hour) full service from the 7th May.

By the start of June, nearly 20,000 journeys had been completed. Indeed, performance has been such that BAA has withdrawn the bus service from this car park, ensuring all passengers travel to and from T5 by the Heathrow pods.

Feedback from the T5 Business Car Park users has been overwhelmingly positive, with passengers

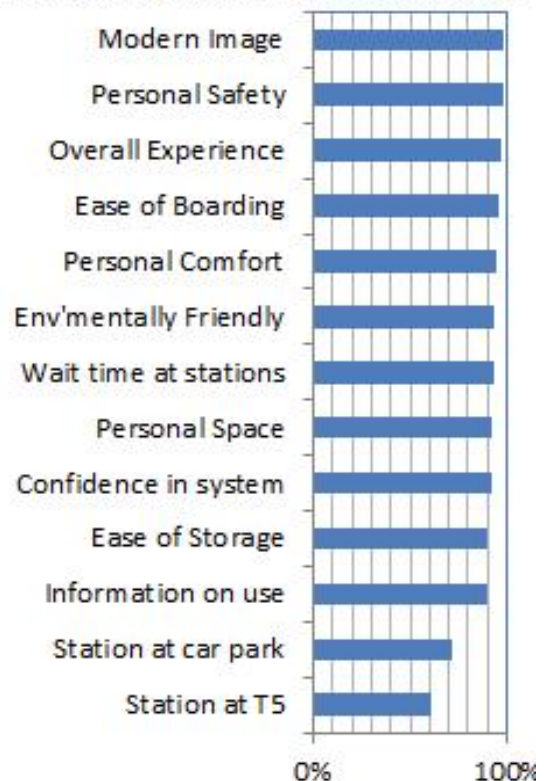


undertaking the five minute ride to/from the T5 Business Car Park to T5 describing it as "futuristic", "rapid" and "a transport revelation". This feedback has been seen both informally, in comments to staff and through posts on twitter. It has also been captured in the independent CityMobil survey of passengers, undertaken 18th-20th May, which compared passenger views against the survey of transit bus passengers made in March 2009.

The results of the survey and corresponding operational performance data is still being compiled into the final reports for CityMobil, but as can be seen on the chart below the results reveal high levels of satisfaction and a very positive reaction to this new way of travelling between car park and terminal at Heathrow.

Feedback from passengers, combined with analysis of the technical performance data will be used to maintain and improve the Heathrow pod experience over the coming months and years. But as this initial feedback shows, it's already a hit with the passengers.

% Users rating ULTra as good or excellent



La Rochelle cybercar small demo launched

On 12 May 2011, La Rochelle's Mayor and President of La Rochelle's Urban Community, Mr. Maxime Bono, launched La Rochelle's cybercars demonstration, during a press conference that gathered main French media. Just a few minutes before, Mr. Bono had given the opening speech of the CityMobil Final conference. The first users of INRIA's cybercars system were the assistants to the CityMobil conference, to whom a series of guided tours were organized.

The cybercars, named "Cybus", started operating on May 16th, and after some technical issues, full operation started early June. Today, inhabitants of "La Ville en Bois" area can call a cybercar from any of the 5 stations installed by the City. Once a user gets to a station, he must just press a call button and indicate the destination he wants to go to. This call is then transmitted to the Vehicle Management System (VMS), which forwards the call to the vehicle. Based on the vehicle's position, the VMS informs the users (via the station's touchscreen) the expected waiting time. Once the vehicle arrives to the station, the user can get on board and, if necessary, indicate again his destination. All the communication is based on a full-IPv6 ad-hoc network over Wi-Fi.

In the partially open environment in which the vehicles operate, the presence of cyclists, pedestrians and light traffic is the most critical safety issue. To cope with this, two different safety systems equip the vehicle: the first one for active safety and the second one for passive safety. The active safety system measures the distance to objects around the vehicle, and if an object happens to be in the vehicle's trajectory, the vehicle starts reducing its speed and, at the same time, it triggers an audio warning to alert pedestrians or cyclists about the silent vehicle's presence. If the obstacle remains in position, the vehicle will come to a complete stop. The passive safety system is a built-in speed profile system, which indicates to the vehicle the places in which the speed must be reduced because there is a risk, as assessed in the Safety Analysis carried on by TNO. This is especially useful in the road intersection that the cybercar must cross to reach the *Technoforum* station, Hughenotte street, which has a high amount of car traffic. In this crossing in which priority has been given to the cybercars through stop signs, the vehicle's speed is reduced in

order for drivers to assess correctly the cybercar's speed and respect its priority.

A whole set of data on the system's performance, as well as users reactions has been collected. This will provide valuable information for the University of Rome and its partners to assess the cybercar demonstration. After the positive results, an extension of the demonstration is under discussion.



News from related initiatives



Final showcases

CityNetMobil aims to raise awareness of automated transport systems in order to increase their acceptance. The project hopes to convince politicians, local mobility planners, and the general public that such transport systems can provide better access to public transport for all and that they are environmentally friendly, can reduce urban transport's share of energy consumption and CO₂ emissions, and are safer than conventional transport modes.

The best way to convince people of the value of such a new form of transportation is to show them what it can do. To this end, CityNetMobil is organising five showcases, each in a different European city. Members of the public are able to ride the vehicles and ask questions and can take home some printed material and souvenir gadgets. To maximise visibility, the events are held, where possible, at the same time as other scientific or cultural events in the same city.



The cities hosting the last two CityNetMobil showcases have now been selected; after Clermont-Ferrand, Formello and Ixelles the last two showcases will be in Sophia Antipolis on 28-30 October and in Reggio Calabria on 10-13 November.

Sophia Antipolis is the ancient Greek name meaning wisdom (Sophia) and Antibes (Antipolis) of the technology park northwest of Antibes and southwest of Nice in France. The CityNetMobil event there will feature the showcase of automated vehicle in Antibes and a number of meetings with the local stakeholders to present the results of a transport study made by GEA, one of CityNetMobil partners, to improve the accessibility of the area improving public transport quality largely through automation.

Reggio di Calabria is the “toe” of Italy, a mountain in the sea; Aspromonte is 1300 meters high at just 30 km from the sea. Literally Reggio is squeezed between mountain and sea. Reggio is undergoing huge transformation of its urban texture and its mobility. Steep city slopes make it difficult to move on foot even for short distances to reach a public transport stop. Therefore, among the many different initiatives to improve public transport, the Reggio municipality is studying innovative and automated transport systems. The CityNetMobil showcase will show to the citizens of Reggio such new technologies and allow them to become familiar with them.



NICHES+: Tools, Strategies and Guidance for Urban Transport Innovators

From April 2008 until April 2011, the NICHES+ team – assisted by selected experts - studied and promoted twelve innovative urban transport concepts and supported six Champion Cities with the development of implementation scenarios. In order to encourage further take-up, NICHES+ also organised site visits and national seminars and published practical manuals, which have been collected in an “Urban Transport Innovation Box”.

NICHES+ organised its final event in London, where around 120 urban transport professionals and decision makers gathered to experience and discuss the most promising innovative concepts. The project also presented the winners of the 2nd edition of the OSMOSE awards on urban transport innovation, including Aalborg, Barcelona, Essex, Madrid and San Sebastian.

Four NICHES+ brochures are dedicated to automated transport: the guidelines for implementers for PRT, GRT and innovative bus systems give brief information on how to start the implementation process of such schemes. The Daventry implementation scenario gives advice on how to realise the given concept in the specific context of a city.

Although the NICHES+ project has now officially ended, it is clear that – in order to meet the ambitious objectives of the recently published EU Transport 2050 strategy – urban transport innovation will remain a European priority. We're therefore confident that the NICHES+ results and findings will help to further improve mobility at the local level.

➔ NICHES+ final conference video report: <http://www.youtube.com/watch?v=xPa-Asm9BLs>

➔ NICHES+ website including all project publications: www.niches-transport.org

➔ For print copies of the project publications and further information contact icre@polisnetwork.eu

➔ Daventry's NICHES+ homepage: <http://www.niches-transport.org/index.php?id=231>

Relevant events

- 19th World ITS Congress, 16-20 October 2011, Orlando (USA)
- CIVITAS Forum 2011, Funchal (P), 17-19 October 2011,
- Automation in road transport workshop, 26 October 2011, Brussels, http://ec.europa.eu/information_society/activities/esafety/2011/automation_workshop/index_en.htm
- 2011 Annual Polis Conference, Brussels, 29-30 November 2011, www.polisnetwork.eu
- CityMobil closing workshop, 1 December 2011, Brussels, www.citymobil-project.eu
- TRA2012, Athens, 23-26 April 2011,

What is CityMobil?

CityMobil is an Integrated Project, co-funded by the Sixth Framework Programme for RTD (FP6), whose main aim is to achieve a more effective organisation of urban transport by developing integrated solutions based on advanced concepts for innovative autonomous and automated road vehicles for passengers and goods.

