

*Measure title:* **Integration of the demand responsive transport as a complementary service to PT in Toulouse**

*City:* **TOULOUSE**

*Project:* **MOBILIS**

*Measure number:* **8.4**

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## **A Introduction**

The low density areas of the Toulouse conurbation are poorly served by the present public transport services. The transport-on-demand services exist already in a number of these areas, even if this involves only a few communities. The aim of this measure is to standardise and increase the efficiency, to improve the connection with the core public transport network, to improve the services of the reservation centre and to extend the transport-on-demand services to other low density areas.

### **A1 Objectives**

The measure objectives are:

- **Objective 1** Develop an integrated solution for the transport on demand management complementary to the PT services and other mobility services.
- **Objective 2** Propose an efficient transport / mobility solution for the whole conurbation level, including for the lowest density area of the urban transport perimeter

### **A2 Description**

**Demonstration activities:**

- Assess the overall efficiency of the transport on demand services (from the point of view of the final users and of the PT operators) and identify the potential improvements to realise with the perspective of its extension to the whole urban area.
- Define and develop a centralised and improved system for the demand-responsive services management at the level of the whole conurbation. This new system would permit an easiest access to the service (reduction of the reservation delay ...) and an optimisation of the route planning (dynamic approach) ... in order to reduce the operational costs of the service, while increasing its attractiveness.
- Propose an innovative and integrated mobility service based on the integration of the whole mobility offers (car-pooling – transport on demand – public transport offer - ...) proposed on a dedicated area (SICOVAL). Implement and evaluate it.
- In depth analysis of the demand-responsive use and of the synergy created with the PT and other mobility mode use.

### ***Expected results and targets***

- Improvement of the demand-responsive offer at the level of the whole conurbation.
- Development of an innovative management tool for the transport on demand service.
- Definition of a new organisation for the management of the transport on demand service.

## B Measure implementation

### B1 Innovative aspects

#### Innovative Aspects:

- New conceptual approach
- Use of new technology
- New mode of transport exploited
- Targeting specific user groups

The innovative aspect of the measure is:

**Innovative aspect 1 – Flexibility** : the measure intend to develop and implement new flexible demand-responsive public transport services for low-density areas and low-traffic periods, in connection to the most important intermodal nodes (metro terminus).

### B2 Situation before CIVITAS

The Urban PT Perimeter, where Tisseo-SMTC is responsible of the transports, is very wide, composed of 95 towns and villages around Toulouse. On the peripheral area, the average density is very low and did not justify (for economical reason) the operation of a regular bus line.

Since the end of the nineties, a demand responsive service has been created (called Taxi bus) that consists in ensuring an on-demand transport service performed by a taxi for the same price of a PT course. This system that has been developed originally for 3 different services (in the East and South part of the conurbation) has permitted to reduce the operational costs of transport (reduction of bus frequency or suppression of a non efficient bus service) while ensuring a qualitative transport in connection to the metro terminus.

Following the extension of the Urban PT Perimeter in 2002, this service has been extended and covered 14 dedicated services. The ways of operating these services were quite different (Taxi-bus and special light PT services).

It appeared that these services needed to be integrated in order to continue the extension and the overall improvement of this service.

### B3 Actual implementation of the measure

The measure was implemented in the following stages:

- **Stage 1:** Identification of the potential improvements of the existing transport on demand services (December 2005 to December 2006) – Tisséo-SMTC has carried out a reorganization of its TAD services in order to optimize and improve the transport offer in low density areas where a TAD service is the appropriate solution.
- **Stage 2:** Development of an innovative tool for the management of the transport on demand services at the level of the Toulouse conurbation (December 2006) – Tisséo-SMTC has given its TAD booking services to a company which is now in charge to manage the whole central booking system for all the TAD users (before this, each TAD line had its own booking service and phone number).

- **Stage 3:** Implementation of the integrated mobility service at the scale of the SICOVAL area (November 2007) – Tisséo-SMTC has launched new TAD services in the SICOVAL area. This TAD have been connected to major public transport infrastructures (metro and High Quality Bus Corridors).
- **Stage 4:** Results of the assessment of the integrated mobility service (February 2008) – On the basis of the reorganisation of the bus network (linked to the opening of the line B of the metro), Tisséo-SMTC has launched a continuous assessment analysis of its subcontracted services (such as the TAD services) in order to improve and optimize them.

Here is the map of the municipalities which are served by the TAD 106 line. The TAD 106 is the line which is subject to all evaluation activities which are being presented in the following sections of the present measure evaluation results sheet.



#### **B4 Deviations from the original plan**

Not concerned

## B5 Inter-relationships with other measures

The measure is related to other measures as follows:

No.	Measure title	Relation
7.1.T	Innovative multimodal PT contracts, services and electronic ticketing in Toulouse.	The development of the new PT ticketing system would integrate the transport on demand service.
9.1.T	Promotion of car-pooling and integration with PT services in Toulouse.	The development of the car-pooling and of the transport on demand would be integrated within the development of the Mobility Agency and experimented at the level of SICOVAL area.
11.3.T	Set-up of a mobility agency and customised services in Toulouse.	



## C Evaluation – methodology and results

### C1 Measurement methodology

The evaluation of the measure is mainly based on the results of a satisfaction survey which has been carried out in June 2008 on the TAD 106 line. This survey has been carried out in the TAD vehicles with the support of the drivers.

The objective of this survey is to assess how satisfied are the customers with the transport on demand services through its different aspects such as the system of booking, the vehicle, the journey or the TAD system as a whole.

300 questionnaires have been collected and analysed. These results are presented in the following section.

In addition and for transport and environmental related issues, only the TAD 106 has been assessed in order to have some significant results to be discussed. The results must be interpreted in a context where there is a necessity to compare on a certain area a TAD service vs a regular bus service.

#### C1.1 Impacts and Indicators

No.	Impact	Indicator
1	Society	Satisfaction about new booking system
2	Society	Satisfaction about transport offer
3	Society	Satisfaction about the journey conditions
4	Transport	Evolution of use of transport on demand services
5	Economy, Energy, Environment	Number of km covered
6	Economy, Energy, Environment	Cost-benefit analysis

- **Indicator 1** (*Satisfaction about the new booking system*) – Issue addressed in the frame of the satisfaction questionnaire distributed to the TAD 106 users.
- **Indicator 2** (*Satisfaction about transport offer*) – Issue addressed in the frame of the satisfaction questionnaire distributed to the TAD 106 users.
- **Indicator 3** (*Satisfaction about the journey*) – Issue addressed in the frame of the satisfaction questionnaire distributed to the TAD 106 users.
- **Indicator 4** (Evolution of use of transport on demand services) – Evolution of use of the TAD services.
- **Indicator 5** (Number of km covered) – Annual mileage of the TAD 106
- **Indicator 6** (Cost-benefit analysis) – This indicator aims to compare the operational costs of a TAD service vs a regular bus service by taking into account financial and environmental dimensions.

## C1.2 Establishing a baseline

In 2004, transport on demand services were « taxi-bus » services. They were operating on a certain area where stops and timetables were fixed and determined in advance. The customer had to call the chartered taxi company in order to indicate them the place where he wanted to be picked up, the place where he wanted to go and the timing.

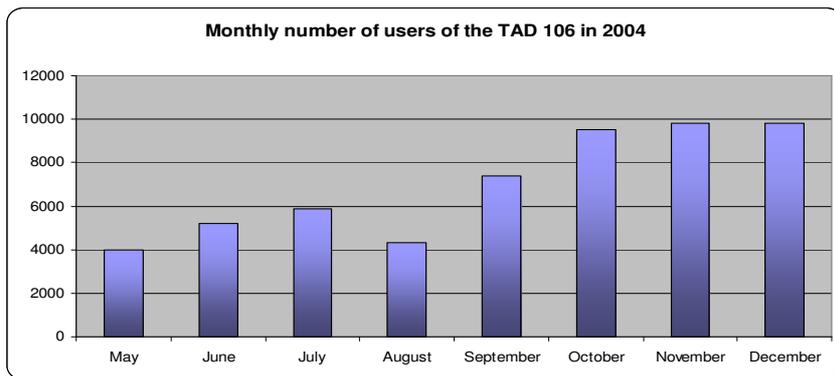
The issue of transport on demand has been addressed when public transport dashboards highlighted that for several bus lines, there was less than 3 customers per hours in off-peaks periods (former bus lines 51, 53, 55, 60 and 69). Transport on demand has also been developed because there are some very low dense areas in the Urban Transport Perimeter (Tisséo-SMTC is managing public transport over an area of 84 municipalities).

Distribution of modal share in 2004:

- Car: 50%
- Bus: 22%
- 2 wheels: 4%
- Others (walking, taxi, etc.): 24%

Some figures about TAD 106 in 2004 :

- Equipment : 3 to 9 seats vehicles ;
- Average number of customers per run : 4,
- Km covered: 52 000



## C1.3 Building the business-as-usual scenario

Without this MOBILIS measure, transport on demand services would have continued to work through the use of different booking centres (each one dedicated to one taxi company), there would not have any program for the assessment of the quality of service and there would have been some areas where there would not have any public transport services available.

## C2 Measure results

### C2.1 Society

Globally and according to the survey, the general level of satisfaction of the surveyed people is the following:

#### Overall, I am satisfied with the TAD 106 service

Completely agree	54%
Agree	41%
Disagree somewhat	3%
Completely disagree	2%

More in details, some indicators have been specified in the C.1.1 section and here are the results:

#### Indicator 1:

Surveyed people are happy with the new booking central system since only 21% of the customers consider that the waiting time on the telephone is too long.

#### Indicator 2:

For 64% of customers, TAD 106 is considered as a local service.  
68% of trips are considered as necessary journeys.  
Only 13% of customers are unhappy with the itinerary.

#### Indicator 3:

95% of customers consider that safety is ensured during the journey.  
96% of customers are satisfied with the welcome made by drivers.  
For only 12% of customers, arrival timetables were not met.

The different indicators which have been defined in order to assess the level of satisfaction of the customers of the TAD 106 show a very good level of appreciation of the service and this is particularly true for the consideration of the new booking centre, the trips and itineraries, safety considerations and timing. Generally, it can be indicated that the quality of service of the TAD 106 is considered as very good.

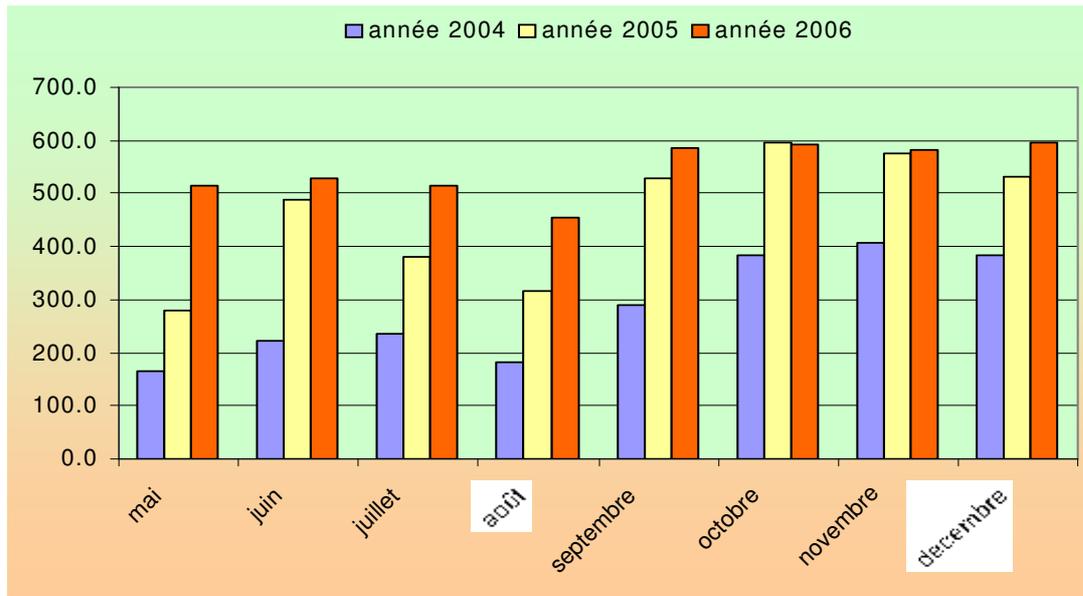
## C2.2 Transport

Over one year, from 2005 to 2006, the increase in use of TAD 106 was 21.5%.

Average daily traffic in 2008 was 4 times more important than in 2004.

As most of the TAD customers were using connections with the metro, the modal share of public transport was increased by the good service level provided by TAD.

The following graph indicates how the use of the TAD 106 has evolved between 2004 and 2006 (number of customers per day).



It is important to consider that there has been a continuous increase of the use of the TAD 106 between 2004 and 2006 (almost multiplied by 3.5 in two years).

## C2.2 Economy, Energy and Environment

### Indicators 5 and 6 (operational costs):

In 2006 TAD 106 was using 15 seats vehicles. Its cost is 758,000 Euros over a year, covering 524,000 km of route. This is equivalent to a kilometre cost of 1.45 Euro. The same service operated by a bus costs 4.50 Euros per kilometre, including staff costs.

	cost/year	km	cost / km	validations	cost / val
<b>TAD 106</b>	758 000	524 000	1,45	202 350	3,75
<b>Bus</b>	2 358 000	524 000	4,50	202 350	11,65

The gains in terms of economic savings is 1,6 million Euros over the year 2006 for the TAD 106 service.

Indicators 5 and 6: (operational costs)

Fuel consumption of a TAD vehicle is about 16 litres/100km, while an urban bus uses 38 l/100km.

	km	l / 100km	litres/year	cost/year
<b>TAD 106</b>	524 000	16	83 840	75456,00
<b>Bus</b>	524 000	38	199 120	179208,00

Over a year, fuel consumption saving is therefore 115,000 litres of diesel. This is equivalent to a saving of 103,000 Euros for the year 2006.

Indicators 5 and 6 (cost-benefit analysis):

The same calculation can be done for pollution and CO2 emissions. The service will be performed by a Cito, specifications for which are as follows:

<b>MERCEDES CITO (euro3)</b>		
Engine power in kw	92	
Average speed (km/h)	30	
consumption (l/100km)	38	
consumption (l/h)	11,4	
	<b>g/kwh :</b>	<b>g/litre :</b>
Nitrogen oxides (Nox)	5	40,4
Carbon monoxide (CO)	2,1	16,9
Hydrocarbons (HC)	0,66	5,3
Particulates	0,13	1,0

For 115,000 litres saved, the mass of pollutants avoided in kg would be:

Nitrogen oxides (Nox)	4 640
Carbon monoxide (CO)	1 949
Hydrocarbons (HC)	613
Particulates	121

These unburned 115,000 litres also represent 180 tonnes less of greenhouse effect CO2.

Costs of the different pollutants in € / ton, according to the ExternE and Cleaner Drive projects ([www.cleaner-drive.com](http://www.cleaner-drive.com)):

CO	4
HC	2 000
Nox	8 200
Particulates	126 900
CO <sub>2</sub>	46

Using TADs represents the following environmental gain, calculated in Euros:

CO	7
HC	1226
Nox	38048
particules	15355
CO <sub>2</sub>	8280

The global saving for using the TAD 106 instead of a regular bus service is 62 916 Euros.

### C3 Achievement of quantifiable targets

No.	Target	Rating
1	Improvement of the demand responsive offer at the level of the whole conurbation	**
2	Development of an innovative management tool for the transport on demand service	***
3	Definition of a new organisation for the management of the transport on demand services	**
NA = Not Assessed    0= Not achieved    * = Partially achieved    **= Achieved in full ***= Exceeded		

### C4 Up-scaling of results

In 2004, there were only 5 TAD lines functioning in the Toulouse conurbation. During the CIVITAS MOBILIS project lifetime and thanks to all the works which have been carried out within MOBILIS, some new TAD lines have been created and there were 18 TAD line functioning at the end of 2008.

With the development of the TAD lines, 84 municipalities in the Toulouse conurbation are now served by public transport (vs 52 municipalities in 2004). The strategy of deployment of the TAD services is the following:

- when the density of population is not important enough, it is proposed to implement a TAD service,
- some regular bus services are being proposed at peak hours and they are being substituted by TAD services during off-peak hours when there is less than 5 customers per hour using these bus lines.

### C5 Appraisal of evaluation approach

The satisfaction survey has been carried out on only one TAD line (the TAD 106). Carrying out this survey at the level of others TAD lines would have maybe brought some different results. Nevertheless, the TAD 106 has been selected for evaluation since this TAD line is considered as a "standard" TAD line.

It also has to be highlighted that some TAD lines have been implemented over some territories where there were no public transport services available before. As a consequence,

it seems difficult for some TAD users (living over these newly served areas) to assess the quality of service of TAD with respect to the quality of service of a regular bus service.

Finally, the substituted bus services do not have the same criteria for costs calculation than TAD services since personnel costs are very different.

## **C6 Summary of evaluation results**

The key results are as follows:

- **Key result 1**

The satisfaction survey indicated that:

80% of the customers are satisfied with the new TAD booking system but a lot of customers would like to be able to book the TAD only one hour in advance (instead of two hours today)

- **Key result 2**

The satisfaction survey indicated that:

Customers were generally satisfied with the transport offer even if they would like to have some departures every 15 minutes (instead of every 30 minutes today) from the metro stations.

- **Key result 3**

The satisfaction survey indicated that:

87 % of the customers were satisfied with the trip and the itinerary of the TAD service.  
95 % consider that safety conditions are perfectly ensured.

- **Key result 4**

There has been an important increase of use of the TAD services during the CIVITAS MOBILIS lifetime. TAD usage has increased from 3 customers per course in 2004 customers to 6.4 per course in 2008.

- **Key result 5**

When comparing data for TAD services and bus services, it has been considered that:

- Economic gains are important (minus 1,6 millions of Euros) when using TAD instead of regular bus,
- Environmental gains is also significant since it is evaluated to 63 000 euros.

## D Lessons learned

### D1 Barriers and drivers

#### D1.1 Barriers

- **Barrier 1** – Wide variation in use depending on times, requiring the use of suitable vehicles: 9 or 15 seats.
- **Barrier 2** – Booking at least 2 hours before the trip. Demand to reduce this time limit is one of the major points of the survey.
- **Barrier 3** – No ticket checks in the TAD, which encourages fraud for customers not using public transport connections.

#### D1.2 Drivers

- **Driver 1** – Serving less populated areas with frequent services that would not be provided with buses.
- **Driver 2** – Connection speed to the metro and bus lines, which encourages the use of public transport.
- **Driver 3** – Acceptable cost for the local authority and the customer.

### D2 Participation of stakeholders

- **Stakeholder 1** – Not relevant

### D3 Recommendations

- **Recommendation 1** – Set up a service quality monitoring contract with the operator, both for the booking unit and for transport.
- **Recommendation 2** – Carry out a satisfaction survey every year to adjust service conditions to meet customer expectations.
- **Recommendation 3** – Plan for the replacement of TAD by a bus service in high use periods, for school children, for example.

### D4 Future activities relating to the measure

Tisséo will continue to optimize its transport offer through the development of new TAD lines. A continuous monitoring of the different bus and TAD lines will permit to optimize the public transport offer.

It is also foreseen to assess how the current booking system could also take care of car-sharing and car-pooling services in the future.