LiRa
International network of
Light Rail Cities

Buck
Consultants
International

LiRa Final report
The New Challenge for Light Rail in Europe
From Vision to Action

Written by:
Buck Consultants International
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LiRa: the International Network of Light Rail Cities

Preface

Many urban regions in Europe are confronted with accessibility problems, congestion and pollution, caused by still increasing individual car usage. Existing public transport systems (bus, tram, train) are often inadequately adapted to modern mobility patterns. Urban areas increasingly consider Light Rail, an innovative system of public transport, as the answer to these problems.

Light Rail vehicles can use both urban tram networks in city centres and rail mainlines. Maximum speeds up to 100 km/h enable passengers to travel fast and comfortably throughout the region. Light Rail can also improve well balanced urban development management. By using Light Rail as a planning tool, it can reduce social exclusion, combat urban sprawl and stimulate economic development. In many cities around the world, Light Rail has proved to be an answer to growing mobility, while enhancing quality of life in the city at the same time.

Set up in January 2000, LiRa stands for Network of Light Rail Cities, representing a total of 12 cities and regions in the United Kingdom, Germany, the Netherlands and Belgium. City Region of Haaglanden is leading partner. LiRa provides a knowledge platform for public authorities investing in Light Rail. The LiRa-network approaches the implementation of Light Rail schemes not only from a technical point of view, but also from an economic, financial, social and spatial perspective. For this reason we use a pragmatic definition of Light Rail: ’quality rapid transit on a regional scale’, no matter the technical system actually used.

The communication and exchange of information in the Network proved very valuable. Partners and many interested third parties, contact the Network to find information and support for their projects. After one year of learning and communicating, with 15 case studies carried out, and contributions and support from various public and private parties, the LiRa-network by now truly provides an international knowledge-platform on European Light Rail projects.

By working together in the LiRa-network, guidelines to successfully implement Light Rail projects in European cities have been developed based on the characteristics of actual cases throughout Europe. At the same projects all over Europe are confronted with similar constraints and problems. In this respect this initiative will not end here. We expect it to be an intermediate step towards further international exchange, by implementation of the proposed actions in an Action Programme. At the Steering Committee Meeting in December 2000 in Amsterdam partners expressed the wish to do so. We have found mutual interests and mutual goals, which can only be realised through joint actions on an international scale.

I would like to thank all the partners and persons who contributed to the study and success of the Network. Especially, I would like to thank NWMA/European Union for their support to

make this project possible. Without the continuing care of Hans van Engelenburg of Buck Consulting International, the happy end would not have been reached.

On behalf of the LiRa-network,

R.A.H.M. Sangen
City Region Haaglanden, lead partner of the LiRa-network

This report summarises the following LiRa reports:

LiRa: International Network of Light Rail Cities: State of the Art. Nijmegen: Buck Consultants International

LiRa Pilot 1: Exploitation models for Light Rail. Amersfoort/Nijmegen: Twynstra Gudde Management Consultants/Buck Consultants International

LiRa Pilot 2: Light Rail in a ~~Nutshell~~/Knotshell. Utrecht/Brussels: Holland Railconsult/ STRATEC

LiRa Pilot 3: Light Rail, economic impact and Real Estate Development. Nijmegen/Amersfoort: Buck Consultants International/Twynstra Gudde Management Consultants

LiRa Pilot 4: Light Rail: long term (modal split) impacts. Brussels/Utrecht: STRATEC/Holland Railconsult

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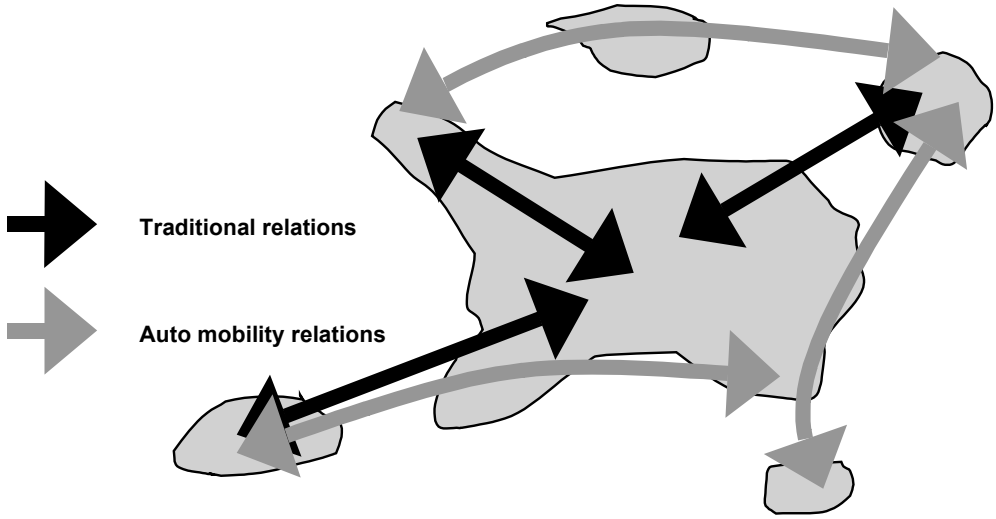
Chapter 1 Introduction

1.1 Background: the emergence of Light Rail

Many urban regions in Europe take up the challenge of maintaining accessibility, despite the growing demand for space by housing and working activities, along with the accompanying demand for mobility. The unprecedented freedom and mobility that the private car offers became the main input of urban planning after the Second World War. The nature of mobility changed: cars made a transition from 'mass transit-based' (public transport) to 'auto mobility-based' urban development possible. People could live further out and proximity of railways or any other public transport was not an issue anymore. Extensive decentralisation of both jobs and people started and the geographical nature of commuting changed dramatically (figure 1.1). Cities actually started to need auto mobility for their basic urban functions.

Figure 1.1 Changing home-to-work mobility patterns



In most European countries, the current phase of mobility growth will continue to the city regional level. Metropolitan areas are developing towards coherent networks. Within these networks, individual cities and zones have their own functional specialisation. Therefore, people will travel on a regional scale not only for commuter traffic, but also for shopping, social and recreational reasons.

The growing auto mobility causes problems in many European city regions. First, there is congestion. Accessibility from outside the region, but especially the 'internal' accessibility of functions (work, housing and urban facilities), is under pressure. This threatens further economic development.

Secondly, quality of life decreases because of pollution and nuisance of intensive car traffic. Also, the social exclusion of older (inner city) districts, is partly a result of the strong development of auto mobility-orientated suburbs.

Conventional public transport is inadequately able to meet the strong growing mobility demand on a regional scale. With the extensive investments in heavy rail, the metropolitan rail networks are largely fixed and established. Transporting people in from the suburbs, surrounding communities or any other settlement outside the main metropolitan centre is the main function of heavy rail. In cities all over the world, the main functions of public transport still largely lie in radial patterns. The density of the heavy rail network is too low for the regional level.

A need for new forms of public transport emerges, that:

- optimally serve the relations on the regional scale, rather than the (inter)national or local scale;
- can handle less concentrated travelling patterns, but still run on a cost-effective basis;
- has the speed and comfort to compete with the private car, on a door-to-door-basis.

Increasingly, Light Rail as a means of quality rapid transit on a regional scale is emerging as an innovative system of public transport, potentially able to unite the above requirements.

The (American) term 'Light Rail' is used for various kinds of transport techniques, in between railway and tram transport. This transport system combines the benefits of fast national long-distance railway transport with the intricate structure of local/regional transport facilities. Light Rail is highly appropriate in urban regions according to its positive features like: frequent services, fastness, in time operation, cleanness and moderate price.

In Europe, several Light Rail projects have been implemented in the past ten years. Successful examples are the systems in Karlsruhe (Germany), Strasbourg (France) and Manchester (United Kingdom). Regarding the ***planning*** and ***implementation*** of Light Rail in these and other city regions, the following aspects play an important role:

- Infrastructure and equipment : both in Europe and the USA, numerous techniques are developed and utilised;
- Choice of lines and stops : the integration of traffic-generating concentrations, the location of stops and the integration with other forms of (public) transport largely determine the number of passengers and thus the success of the concept;
- City development : which connections exist between Light Rail, spatial planning, economic development, land use and real estate development?

- Integration with heavy rail : especially from the point of view of safety management, the combined use of rail lines for heavy and Light Rail could be complex;
- Public private partnerships : against the background of liberalisation of public transport in Europe, innovative exploitation models are emerging.

1.2 What is Light Rail?

Search through literature or the Internet and you will find several definitions of Light Rail. In various studies, policy plans and brochures different definitions are used. It is better to define Light Rail by the characteristics of the transport concept and the (technical) comparison to other types of rail transport, rather than to focus on a conclusive definition.

The main characteristics of the ***concept*** Light Rail are:

- high quality public transport;
- works on the local and regional scale between 10 and 40 km;
- stops are less then 1 to 10 km apart;
- can reach a speed of up to 100 km/h;
- can run on various kinds of infrastructure, possibly connected: inner city street level, inner city free-lying, 'normal' heavy railway tracks or underground (metro) tunnels.

Aside from the latter point, these characteristics are not exclusive for Light Rail. In some cases, high-quality bus concepts can also provide the aimed for public transport services on a regional scale. Because of the strong opportunities for successful implementation of Light Rail on a larger scale (a lot of new projects are planned), part of the study focuses on rail-based solutions.

Light Rail systems show a huge ***technical variation***. The only resemblance is the aspect of comparatively light vehicles (compared to trains) using various sorts of infrastructure. Actually, Light Rail combines tram, metro and heavy rail features. The variety in Light Rail systems concerns the infrastructure system, as well as the rolling stock. Based on technical specifications for both elements, Light Rail can be positioned amongst other types of rail transport.

Table 1.1 Light Rail compared to other types of rail transport

Characteristics	Tram systems	Light Rail systems	Metro	Heavy rail
Typical vehicle auto length	10 m	15 m	18 m	26 m
Typical vehicle train length	30 m	25 – 90 m	110 m	52 – 260 m
Typical vehicle width	2.35 m	2.65 m	3.00 m	2.80 m
Typical vehicle floor height	Low or semi-low	Variable	High	High
Platform height	0.15 m	Variable	0.90 m	0.75 m
Dedicated track	Partially	Partially	Completely	Completely
Min. Curve radius	18 m	25 m	150 m	250 m
Voltage/other propulsion	600/750 V	750/1.500 V (or diesel)	750 V	1.500 – 3.000 V (or diesel)
Transfer	Overhead	Overhead	Third rail	Overhead
Block security system	None	Partially	Fully	Fully
Max. speed	70 km/h	80 – 100 km/h	80 km/h	120 – 140
Average speed	15 – 25 km/h	35 – 70 km/h	30 – 35 km/h	60 – 70 km/h
Typical stop distance	0.5 km	0.75 – 3 km	1 – 3 km	5 km
Typical trip distance	3 – 15 km	10 – 40 km	5 – 20 km	15 – 50 km
Frequency per hour	4 – 10	1 – 12	4 – 12	2 – 6

Source: Dutch Ministry of Transport and Public Works (1995), (1997), SBO (2000)

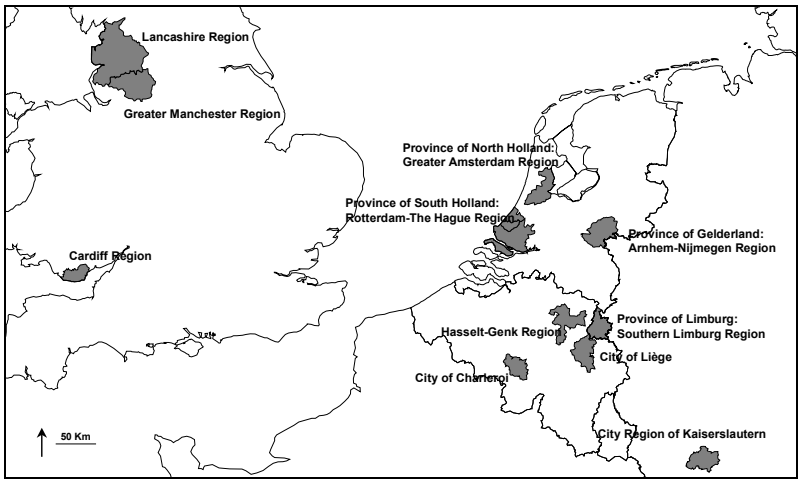
1.3 The LiRa-network

Although each Light Rail project has unique characteristics, the above mentioned (and other) general aspects are relevant in every case throughout Europe. ***The International Network of Light Rail Cities (LiRa)*** is set up to efficiently manage these aspects. LiRa is a transnational research project within the Interreg 2c European Development Fund (Community Initiative of the EU concerning transnational co-operation on Spatial Planning for the Period 1997-2001 in the European North Western Metropolitan Area NWMA).

The LiRa partners are:

City Region of Haaglanden (leading)	The Netherlands
Province of Noord-Holland	The Netherlands
Province or Zuid-Holland	The Netherlands
Province of Limburg	The Netherlands
Province of Gelderland/KAN-region	The Netherlands
GMPTE (Manchester)	United Kingdom
East Lancashire Partnership	United Kingdom
Cardiff County Council	United Kingdom
Ministry for the Walloon Region	Belgium
Ministry of the Flemish Region	Belgium
City of Kaiserslautern	Germany

Figure 1.2 LiRa partners



Furthermore, the initiative is supported by partners who showed a keen interest in the network. This was the case for the Province of South Holland (Projectbureau Rijn Gouwelijn), ATM Barcelona, London Borough of Newham, Docklands Light Rail, South Yorkshire Transport Executive, City council of Wolverhampton, Transport for London, Stadt Saarbrucken, Dutch Ministry of Transportation and Public Works, Province of Vlaams-Brabant in Belgium, Railinfrabeheer (Railtrack of the Netherlands) and other European Interreg projects: COFAR and HST Urban Regions.

The ***objectives*** of LiRa are defined as follows:

- the exchange of ideas and best practices in cities in the NWMA region, with (plans for) Light Rail systems (from plans in a starting stage to systems already running);
- the design of a mutual vision on the relations between urbanisation, the structure of public transport and the development of polycentric regions;
- the development of an action program: guidelines for Light Rail development, implementation projects.

From these objectives it is clear that the LiRa-network (apart from treating technical aspects) takes a strategic approach from the objectives behind such projects. These objectives are:

1 Mobility objectives

- to solve traffic problems on a regional scale, supporting sustainable accessibility;
- to increase use of public transportation.

2 Sustainability objectives

- to increase spatial and living qualities of cities;
- to reduce pressure on the living environment caused by car use.

3 Spatial and socio-economic objectives

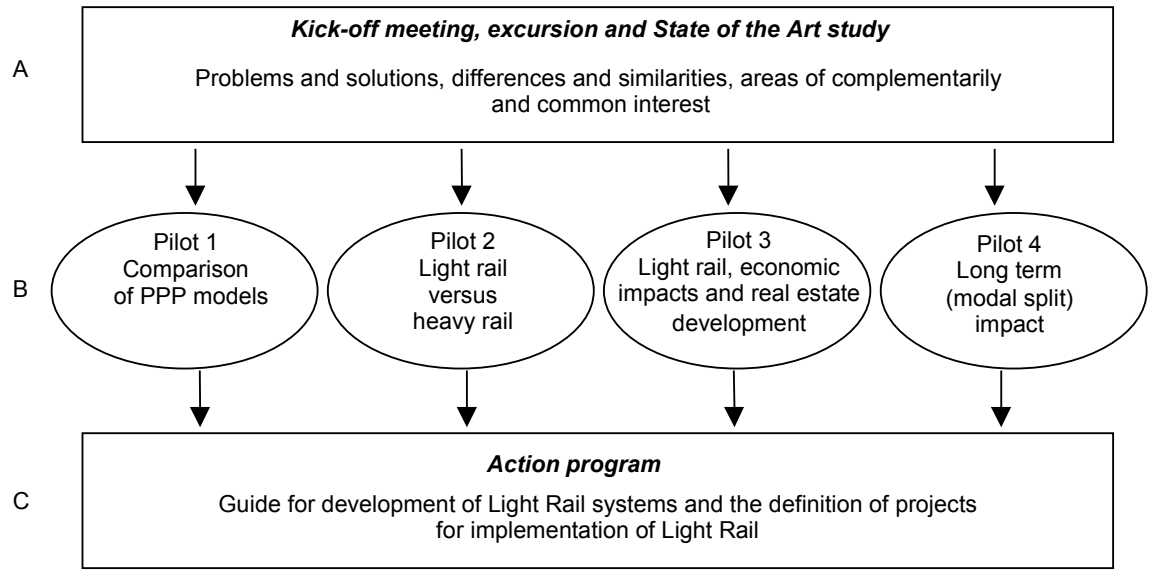
- to develope new economic potentials of cities;
- to create new real estate opportunities around public transport nodes;
- to introduce a powerful element in urban renewal- and city planning strategies.

The project has been carried out in three phases (see figure 1.3). The first phase resulted in a ***State of the Art report,*** integrating relevant existing knowledge, and introducing the subjects for further study.

The second phase consisted of four ***pilot studies.*** In these pilots, altogether fourteen Light Rail cases in Europe were studied to get a clear view of four main topics of interest. This has opens up a wide range of information and experiences. All fourteen cases studied, although different, are interesting examples of public transport on a city regional scale. The cases are described in more detail in the pilot studies.

In this ***Action Program,*** the cases are used to illustrate the guidelines and emphasise the importance of implementation projects. The pilot studies resulted in lessons learned, best practices and recommendations for the successful implementation of Light Rail. In this last phase of the project, the results of the state of the art report and pilot studies are integrated. Also, implementation projects are defined and described, providing stepping stones for next phases for LiRa.

Figure 1.3 LiRa project structure



1.4 Structure of the final report

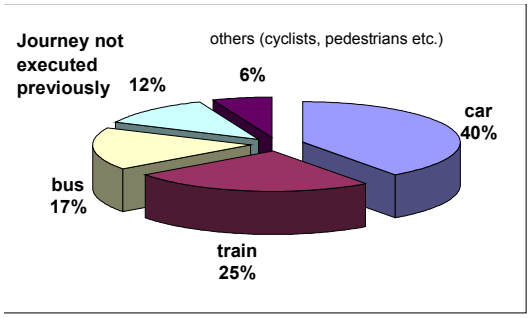
A modal shift in favour of public transport is often the main goal of Light Rail. Other objectives of Light Rail concern stimulation of spatial, social and economic development. Light Rail's possible contributions in reaching these goals are described in chapter 3 and 4. In ***chapter 2***, the possible contribution of Light Rail to a sustainable mobility development is elaborated. In ***chapter 3***, the effects of Light Rail on urban planning, city development and city economics are analysed.

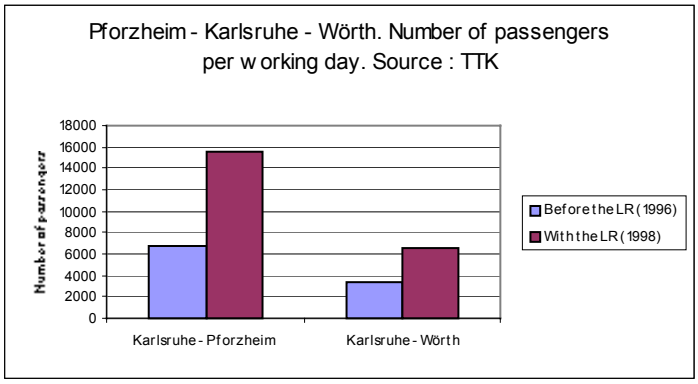
After the description of the main objectives of Light Rail and how to reach them, ***chapter 4*** brings up one of the major 'hardware' problems: how to combine heavy and Light Rail on the same infrastructure. It turns out to be mere organisational item in stead of a technical item. In ***chapter 5,*** the funding of Light Rail projects is the central theme. Especially, strategic considerations for the procurement strategy and possible public private contracts are elaborated.

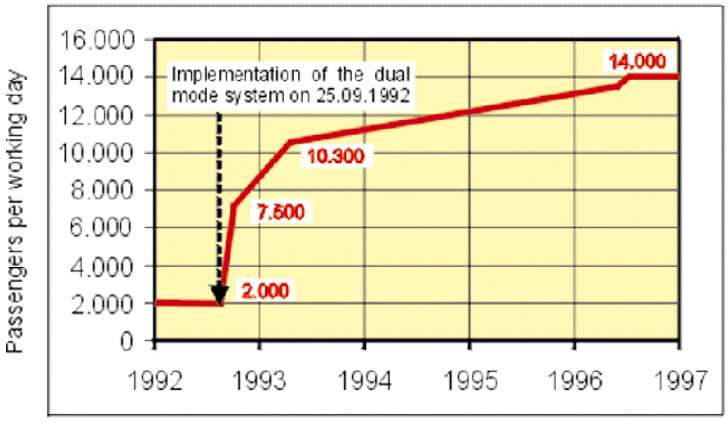
Finally, the results of the pilot studies, as described in the chapters 2 to 5, are integrated in a strategic vision on the development and implementation of Light Rail projects in Europe. This chapter also states the LiRa-network future ambitions ***(chapter 6).*** From this vision, several actions can be derived to support successful implementation of Light Rail in the NWMA region / Europe ***(chapter 7).***

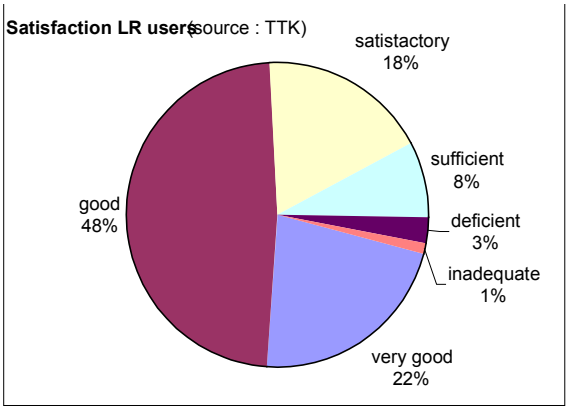
Case focus: Karlsruhe Stadtbahn (1)

- Huge integrated public transport system, 7 Light Rail lines, several branches, several tram lines
- On certain corridors considerable Modal Split changes and increases in patronage; conclusion: Light Rail can be a serious alternative for the car
- More passengers than with former Heavy Rail operations
- However: no real accompanying policies!
- High satisfactory rate among users









Chapter 2 Sustainable mobility

2.1 Introduction

Light Rail is presented as a possible solution for the strong growing short- and medium-distance mobility. Besides that, public transport is a more sustainable (environmental) transport mode than private car. The initiators and promoters of Light Rail might therefore expect important traffic effects from the introduction of these systems. Expectations that are too high however, might turn the public and political opinion against Light Rail, when it appears that the effects aimed for are not feasible. In most French cities that implemented a new Light Rail system, the market share of private car has continued to increase; in the UK, few operational systems seem to have met their objectives in terms of changing traffic flows.

One of the first questions that should be answered, considering the implementation of a Light Rail project, is: ***when is the system successful?*** Should the market share of public transport increase in favour of private car transport? How important is the actual modal shift from car to Light Rail really? Long-term traffic forecasts can contribute in finding answers to these questions (section 2.2). Case studies show that Light Rail can induce modal split effects and strengthen the position of public transport (2.3). An important condition for reaching these goals concerns the use of an integrated project design, in which accompanying measures support the Light Rail service (2.4).

2.2 Long-term traffic forecasts

When looking at traffic forecasts before and after the opening of a new system, it is clear that a gap may exist between the expectations and reality. There is clear evidence from the ***United States*** of proposals for rail-based schemes in which the forecast levels of patronage were well in excess of what actually occurred. Actually, the Light Rail system of Saint-Louis is the only North-American system, which has recorded a patronage higher than the a priori forecasts.

Table 2.1 Light Rail systems travel forecasts in US-cities

	Forecast		Actual			Actual		
	Year	Patronage	Year	Patronage	% difference	Year	Patronage	% difference
Washington (metro)	1 977	569.6	1 986	411.6	- 28	1 993	526.6	- 8
Baltimore (metro)	1 980	103.0	1 987	42.6	- 59	1 991	45.2	- 56
Miami (metro)	1 985	239.9	1 988	35.4	- 85	1 992	48.4	- 80
Buffalo (Light Rail)	1 995	92.0	1 989	29.2	- 68	1 995	29.0	- 68
Pittsburgh (Light Rail)	1 985	90.5	1 989	30.6	- 66	1 992	31.3	- 66
Portland (Light Rail)	1 990	42.5	1 989	19.7	- 54	1 995	24.0	- 43
Sacramento (Light Rail)	2 000	50.0	1 989	14.4	- 71	1 995	23.0	- 54
Miami (people mover)	1 981	41.0	1 988	10.8	- 74	1 992	9.5	- 77
Detroit (people mover)	1 985	67.7	1 988	11.3	- 83	1 992	8.8	- 87
Saint-Louis (Light Rail)	1 994	17.0	1 994	44.4	+ 161			

Source: Mackett and Edwards (1998). Patronage expressed in thousands of passengers on a weekday

In the ***United Kingdom***, traffic forecasts were underestimated in Manchester, but overestimated in Sheffield and Newcastle-upon-Tyne.

Table 2.2 Light Rail Travel forecasts in the UK

	Forecast		Actual			Actual		
	Year	Patronage	Year	Patronage	% difference	Year	Patronage	% difference
Manchester Metrolink	1 996	35.7	1 995	43.5	+ 22	1 996	44.5	+ 25
Sheffield Supertram	1 996	70.7	1 995	7.8	- 89	1 996	18.7	- 74
Newcastle (Tyne and Wear)	1 985	219.1	1 985	208.9	- 5	1 996	126.9	- 42

Source : Mackett and Edwards (1998). Patronage expressed in thousands of passengers on a weekday

To reduce as much as possible differences between long-term traffic forecasts and actual developments, particular attention should be paid to a number of aspects:

- Take into consideration that the implementation of a Light Rail system might have network effects, that appear outside the transport corridor.
- Choose the adequate forecasting model: for insight in the long-term development of traffic flows, integrated land use – transport models are most suitable.

Make adequate use of forecasting procedures: because of the relatively long period between designing and implementing a Light Rail system, various spatial-economic developments may affect the passengers potential.

Managing expectations primarily concerns the use of ***realistic goals*** for traffic flows. Measured in terms of passengers travelling Light Rail, modal shift from car to public transport or market share of public transport, the objective of introducing Light Rail should be achievable.

Case focus: Nantes

- First new tram operation in France as from 1985, in 2000 2 lines and 36 km, serving 54 stations
- Extensive accompanying measures, including public space refurbishment.
- During the same time, many investments in road network
- Car usage continued rising
- Fairly successful trend setting system

Modal split ***Before and After Analysis***

- 1980-1990: increase of the car modal split and stagnation of the PT modal split, despite the opening of the first LR line;
- 1990-1997: reduction of the car modal split and increase of the PT modal split, thanks to the opening of the second LR line and appropriate accompanying measures;

With and Without Analysis

- the market share of PT is slightly higher along LR lines than along bus corridors offering a similar level of service;
- People living along LR lines and in situation of modal choice are much more likely to use the LR line for their home-work trips if they do not have a reserved car park at destination.

PT usage ***Before and After Analysis***

- significant impact on total PT use, at city level:1984-1986 (line 1): +19%, 1992-1994 (line 2) = +6.3%

With and Without Analysis

- Public transport use and walking are much higher within the city than in peri urban areas;
- 57 to 78% of the inhabitants are PT users (regular or irregular); the higher percentage is found in the sectors that are best served.

Secondly, merely focussing on the traffic effects in most cases is a too limited view. The implementation of Light Rail might as well affect economic development, land and real estate value, spatial planning, liveability, etc. Straightforward calculations of the costs per passenger of a new Light Rail system therefore only form a part of the social balance of costs and profits.

2.3 Contribution to sustainable mobility in practice

Although expectations should be realistic, Light Rail of course primarily is assessed on traffic effects. Within the LiRa-project, three European cases are analysed for their modal split effects (public transport use versus private car use). The analysis compares the modal split before and after the implementation of Light Rail in a specific region, as well as the modal split in corridors with and without Light Rail.

The case studies have demonstrated that a good Light Rail supply is able to induce a sensitive reaction in ***public transport demand***. Especially in Karlsruhe, a significant impact on the number of Light Rail passengers is measured. But also the two tramway lines in Nantes and the pilot line in Brussels show a strong increase in public transport use.

Long-term ***modal split*** impacts include effects induced by the improvement of the city accessibility. The new Light Rail service brings about a better accessibility of the city and its suburbs by public transport. However, if Light Rail succeeds in attracting former car drivers and if no car-restraining measures are taken, there might also be a better accessibility of the city for cars, resulting from the reduction of car traffic. This phenomenon is likely to stimulate a new demand for car travel (induced trips), counterbalancing (at least partly) the benefits in term of modal split of the implementation of the LR scheme.

Nevertheless, modal split effects in favour of public transport have occurred in the studied cases. In Nantes, the modal shift was realised after the opening of the second line. The short term modal split effects were negative. In Karlsruhe, 20% to 40% of the Light Rail system are former car users.

The traffic effects in the three cases justify the conclusion that Light Rail can contribute to a sustainable development of city regional mobility.

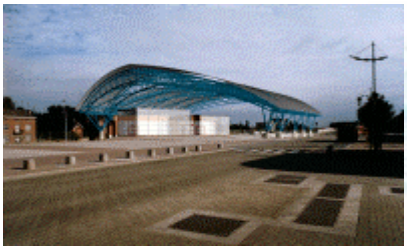
Table 2.3 'Before and after' comparison (PT = public transport, LR = Light Rail)

	Nantes	***Karlsruhe***	***Brussels***
PT usage	Significant impact on the total PT use, at the city level : 1984-1986 (line 1) : + 19% 1992-1994 (line 2) : + 6.3%	Significant impact along the corridors served : Karlsruhe – Bretten: + 600% (1992-1997) Karlsruhe – Wörth: + 94% (1996-1998) Karlsruhe-Pforzheim: +129% (1996-1998)	Significant impact along the corridor served by pilot line : + 154% (1993-1997)
Modal split	1980-1990: increase of the car modal split and stagnation of the PT modal split, despite the opening of the first LR line 1990-1997: reduction of the car modal split and increase of the PT modal split, thanks too the opening of the second LR line and appropriate accompanying measures	Evidences of modal shift in favour of PT: Karlsruhe – Bretten line: 40% of LR customers are former car users Pforzheim – Karlsruhe – Wörth line: 20% of customers are former car users	Pilot line: no noticeable impact at the Brussels scale, data not available at the corridor level. Simulation results for the whole LR network project: PT market share for trips going to the Brussels Capital Region: - in 1991 without LR : 38% - in 2005 without LR : 32% - in 2005 with LR : 45%

Table 2.4 'With and without' comparison

	Nantes	***Karlsruhe***	***Brussels***
PT usage	Public transport use and walking are much higher within the city than in peri-urban areas 57% to 78% of the inhabitants are PT users (regular or irregular); the higher percentage is found in the sectors that are best-served by the LR.	On the line Karlsruhe – Bretten, LR has shown to be much more successful than heavy rail	
Modal split	Market share of PT is slightly higher along LR lines than along bus corridors offering a similar level of service	LR or regional railway lines have a market share of 50% For most successful routes, the market share rises to 67%	Before implementation of the LR network: for home-to-work trips less than 30 km, car has greatest market share. Objective of the LR network is to counterbalance this trend.
Car context	People living along LR lines and in situations of modal choice are much more likely to use the LR line for their home-work trips if they do not have a reserved car park at destination		Use of PT is highly dependant on difference in door-to-door travel time between cars and PT, hence on road congestion Car parking restrictions and / or road pricing are likely to induce a modal shift from car to PT.

Case focus: Brussels line 26



- Pilot project Light Rail-like operation on Heavy Rail tracks on the road to a Regional RER-like network in conjunction with urban planning issues
- Extensive accompanying policies investigated and planned: road tolls, parking schemes
- In pilot period, significant growth in patronage

Modal split ***Before and After Analysis***

- Pilot line: no noticeable impact at the Brussels scale. Data not available at the corridor level.
- Simulation results for the whole LR network project: PT market share for trips going to the Brussels Capital Region: in 1991 without LR: 38 %, in 2005 without LR: 32 %, in 2005 with LR: 45 %

With and without Analysis

- Before the implementation of the LR network: for home-to-work trips less than 30 km, the car has the greatest market share; for other trips PT have the greatest market share.
- The objective of the LR network is to counterbalance this trend.
- The use of PT is highly dependent on the difference in door-to-door travel time between cars and PT, hence on road congestion.
- Simulation results show that car parking restrictions and / or road pricing are likely to induce a modal shift from car to PT.

PT usage ***Before and After Analysis***

- significant impact along the corridor served by the pilot line: + 154 % (1993-1997)

With and without Analysis

- a “Stated Preference” survey has shows the value that line ‘26’ users attributed to different characteristics of the service: frequency, organisation of the network, comfort in term of access to the station
- models carried out for the IRIS plan has provided with the relative values of different elements of public transport services by trip purpose of which frequency, organisation of the network, comfort in term of access to the station

2.4 Guidelines for an integrated project design

Developing a Light Rail system itself is not enough to create a sustainable development. An integrated project design and accompanying measures are essential for high-quality public transport services, that actually reduce (the growth of) private car use.

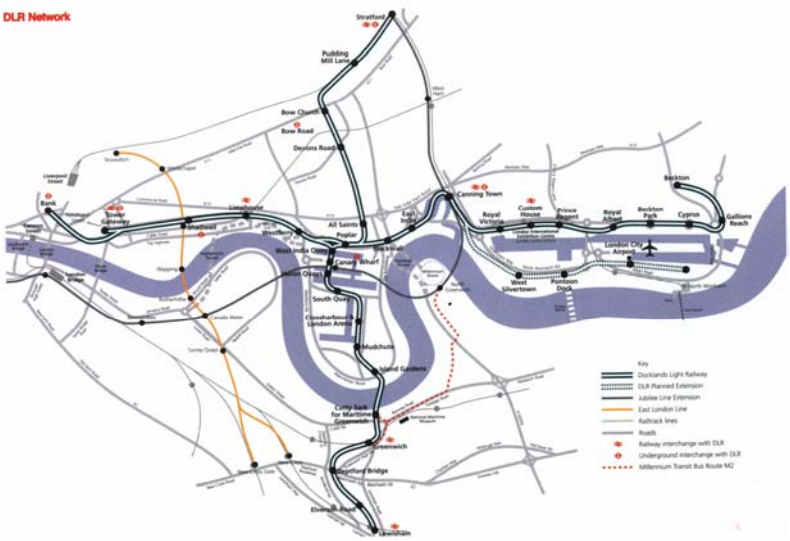
An integrated project design implies the transport technical functioning of the system, as well as customer-related features such as fare structure and traveller's information. Accompanying measures amongst other concern parking, road pricing, transferia and land use-related aspects.

Guidelines for successful implementation of Light Rail concerning traffic development are given below and structured towards three main goals.

If your aim is….	***Important aspects are:***
• To increase use of PT services…	→ Provide a good Light Rail level of service in term of travel time, frequency and number of interchanges in order that it is competitive with the door-to-door private car trips. → Ensure a good co-ordination of the LR service with the whole transport area: other transport modes, fares, timetables. → Be aware of the importance of the comfort of the rolling stock. → Use marketing methods to let LR become popular.
If your aim is….	***Important aspects are:***
• To reduce car use…	→ Use LR as a transport policy tool. → Define appropriate accompanying measures: • reduce car parks capacity at destination points; • implement park & ride facilities; • reorganise the urban and interurban public transport services and provision of right of ways; • develop attractive Light Rail stations; • restrict the capacity of the road network; • consider road pricing as an efficient tool.
If your aim is….	***Important aspects are:***
• To serve sustainable development…	→ Use LR as a integrated land-use environment policy tool. → Define appropriate accompanying measures. → Control the location of household and employment activities within the transport system area. → If necessary, reinforce concentration of activities.

Case focus: London Docklands Light Railway

- Light Rail system emphatically meant as regeneration catalyst for (office) development
- Immense success: DLR set off development (in conjunction with favourable economic upswing and huge demand for office space.
- Successful use of Light Rail system for public transport-oriented planning, offering connections to nearby deprived neighbourhoods (social inclusion)
- Stations carefully integrated in area and buildings
- However: with such transport volumes, Light Rail could become a victim of its own success.



DOCKLANDS LIGHT RAIL®

Chapter 3 Spatial and socio-economic impacts

3.1 Introduction

Light Rail needs an integral approach in order to obtain considerable modal split effects. Accompanying land use and transport policy actions should be taken. ‘Simply’ developing a Light Rail system is not enough. On the other hand, Light Rail is also seen as an important tool to get to targets in the economic, social and spatial planning domain. This means that also indirect transport-related problems, e.g. socio-economic exclusion of deprived districts, can be tackled with Light Rail.

In political decision-making processes for Light Rail projects, spatial, social and economic arguments can play an important role. Therefore, ex ante techniques to identity possible economic effects are identified within LiRa (section 3.2). A number of cases is analysed (ex post) for the realised indirect effects (3.3). Special attention is paid to real estate development and how to include (land) value increase in the Light Rail project. The lessons learned from these cases are combined to guidelines for optimising indirect effects (3.4).

3.2 Identifying economic impact

The economic impact of Light Rail projects can be identified by the use of models. A range of models and methodologies are available. They all have special characteristics and differ in nature (quantification or qualification), their input variables and the research time. Ten ***economic modelling techniques*** have been assessed as to their applicability for the evaluation of Light Rail projects. It turns out, a ***combination*** between revealed preference models (based on precedents of the effects of new infrastructure. It is assumed effects will occur again in a similar situation), stated preference models (focus on assumptions on the effects of new infrastructure, based on stated consumer perforations), interviews and surveys (measuring the effects by poll opinions) and expert judgement (judgement on the expected effects by experts) will offer the best opportunities for identifying the impact of

Light Rail. This combination is appropriate since it offers a direct link with precedents (previous experience) and can be set up depending on the data available.

The overall aim of investments in infrastructure is the improvement of public wealth (prosperity). The effects, aimed for, can relate to the eventual outcome in a number of ways:

- What is the impact within and outside the studied region?
- Is there a market price for the effects?
- Are the effects of a generative or of a distributive nature?
- Do the effects arise within the project itself (i.e. Are they direct effects) or are they derived from the direct effects (i.e. Indirect effects)?
- Which parties benefit?

On this foundation, it can be concluded that there are ten important categories of infrastructure effects. This is displayed in figure 3.1 below: an integration of the dimensions along which economic impacts can be structured. The focus of LiRa has been on so-called 'strategic effects' and effects on social structure of cities ('inequality effects').

Figure 3.1 The ten most important categories of effects of Light Rail infrastructure

Public Welfare		Region				Outside Region
		Market prices		No prices		
		Redistribution	Efficiency	Redistribution	Efficiency	
Direct Effects	Operators Users Third parties	***1*** ***Profits Light Rail operator*** ***Cheaper or better urban/regional transportation*** ***Accessibility***	***2***	***5*** ***Travel time savings*** ***Safety*** ***Air pollution*** ***Noise pollution***	***6***	***9*** **Travel time** ***Savings*** ***Air pollution***
Indirect Effects	Third Parties	***3*** ***Effects on other modalities*** ***Strategic effects***	***4***	***7*** ***Congestion relief*** ***Inequality: served or not?***	***8***	***10*** ***Congestion relief***

Source: Dutch Ministry of Transport, Public Works and Water Management, adaptation BCI

Case focus: Strasbourg Tramway

- Strasbourg's Light Rail system: actually a very modern tram network using well-designed low floor-Eurotrams.
- 4 routes (from September 2000), 38 km, linking near suburbs to centre.
- Much attention given to (aesthetic and functional) integration into public space, turning out a huge success. This has helped the city centre regain its force of attraction, resulting into raised real estate value of shops and houses 'en route'. Also, car traffic to the centre has decreased by 17%.
- Quote: 'The tramway (…) has given us back our city'.
- Extensive accompanying policies (car restriction, P+R policies, investments in public space) have made a significant contribution.
- But be careful: other factors at work as well!

3.3 Indirect effects of Light Rail in practice

Four Light Rail cases in Europe are analysed for their economic, social and spatial effects. The cases are visited, key figures are interviewed and existing data are analysed. New economic modelling analyses are not carried out. The case studies are oriented at the ***indirect effects*** of the Light Rail schemes:

- spatial impact : quality of public space, structuring spatial development;
- social impact : social inclusion, image and identity;
- economic impact : investment climate, employment and real estate development.

The case studies show a mixed picture. Some cases are very successful in generating spatial and socio-economic effects. Although regarded an objective in all cases, the integration of Light Rail and in city development did not turn out the same way in every region.

Light Rail turned out to be an actual ***spatial planning tool*** for Strasbourg and London Docklands. In these cases, stations are carefully integrated in public (built) environments. Besides architectural integration, the Light Rail network is the structuring framework for the development of the Docklands. In both other cases, integration with town planning is less strong. Cross-case conclusions concerning spatial impact are:

- Careful integration in public space turns out to be a very important quality aspect. Giving aesthetics an important place is better than solely aiming for austerity and efficiency.
- It is furthermore essential to take good care of practical embedding of Light Rail stops within the urban environment.
- Quality in accompanying policy (e.g. park and ride facilities, parking regulation policy, car-routing, fares) deserves close attention if indirect effects are pursued.
- Transport-oriented urban planning strategies can give a significant contribution to Light Rail's spatial effects. A functional station-wise approach of the area served (what will (not) happen where) can maximise effects.

Social effects are considerable for Lille and London Docklands. Physical, mental and social distance form deprived areas to the (thriving) city centre has shortened and the overall image has significantly improved. From the cases, the following conclusions are deduced:

- Light Rail systems can do a very good job on connecting deprived areas to (newly growing) centres of economic and other urban activities; note, however, that combining social inclusion objectives with economic development can be tricky.
- As to non-geographical aspects, house prices have proven to rise as a result of regeneration policies; this may cause feelings of alienation ('not for us…') and, in turn, social exclusion.
- Improvement of social image is also an aspect to which Light Rail can give a moderate to significant contribution.

Table 3.1 Summary case study results spatial and socio-economic impact

	London Docklands	Sheffield	Lille	Strasbourg
A Spatial effects				
• Public space	Stations carefully integrated in area and buildings	After a poor start, things are improving now	Hardly integrated: underground/elevated track	Perfectly integrated; a major goal from the beginning
• Structuring development	Light Rail Network as structuring framework for development: successful public-transport oriented planning	Mixed success; regeneration of Lower Don valley; furthermore hardly any integration in urban planning	Only incidental; not used as planning tool but as a means of transport	Mainly used for urban design; not to structure development. Gentrification existing facades
• Functional strategy stations	Various regeneration aspects per station	Aimed for, but not attained	Distribute development in region in a balanced way	(in some cases) enabler of development
B Social effects				
• Social inclusion; connecting deprived areas	Successful integration of deprived areas	Aimed for, but not attained: hardly any effects	Successful integration of deprived areas	Integration of deprived areas is a goal, not achieved yet
• Social image (mentality/identity)	Overall: significant improved image	Hardly any effects	Physically, mentally and socially distances shortened	'Mental map' changed, but not significantly
C Economic effects (only overall-impact!)		***++ : strong effect, + : noticeable effect, 0 : no or hardly any effect***		
• Housing	Rising prices (used to be low), new apartments ++	No impact 0	Rising prices in 'low-income areas' +	Rising prices in centre for small apartments ++
• Offices	Significant rises; almost 'city-level' ++	Some impact; only regeneration line +	Some impact in peripheral corridors +	No impact 0
• Shopping	Few examples +	Some impact +	Mixed success; success only in combination with other measures 0	Significant impact downtown area shopping real estate ++

Case focus: South Yorkshire Supertram

SOUTH YORKSHIRE PASSENGER TRANSPORT EXECUTIVE

Stagecoach SUPERTRAM

- Partly on-street 3-branched Light Rail system met extensive adverse conditions (macro-economic, bus deregulation, property market), causing disappointing patronage and bad image.
- One branch into regeneration area (Lower Don Valley) is more successful.
- Defective public-public partnership caused sub-optimal Light Rail development: planning, integration, building could be better, as well as exploitation. A remark in one of the interviews: 'who builds a tram stop at the back of the train Station'?
- Regarding social inclusion aspects: Supertram was not really 'needed'.
- Many impacts were aimed for, but not attained.
- Generally, things are improving so that SYS can start achieving indirect impacts; possibilities for extensions are being investigated. Finally, according to a local newspaper 'the tram is really super'.

The ***overall economic impact*** is noticeable in all cases. Overall conclusions are:

- In the cities where Light Rail was part of regeneration strategies, it is rather the overall regeneration package that has brought economic effects for the area; Light Rail can be an important part of this, but not on its own: it remains one of several tools. It has to be part of an integral plan and some economic potential (and luck) should be present. Then Light Rail can be seen as an 'enabler' of development, much more than a cause. Light Rail can be a powerful element in city development strategies or urban renewal plans. However, it can not do the trick on its own.
- Prices of especially low-priced houses can show an increase; for more expensive houses, the effect is less, probably due to the more important role of private car.
- Office real estate values can also rise; the effect is highest in peripheral (e.g. regeneration) areas (London, Sheffield, and Lille), where there is no other public transport (up to 10%).
- For shopping, effects are hard to calculate; for sure, Light Rail can significantly contribute to overall value (quality of life) of downtown shopping areas; peripheral shopping areas in the case cities do not show much real estate gain when they acquire Light Rail infrastructure (probably often because private car is preferred).
- Light Rail can have some generative economic effects in boosting the regional economy. From a city planning point of view the observed strong distributive effects might be much more interesting.

It turns out that the ***increases in land and real estate values*** can be considerable. When initiatives are undertaken for value capturing – using a part of the extra value for funding of the Light Rail project - it is crucial to keep two things in mind:

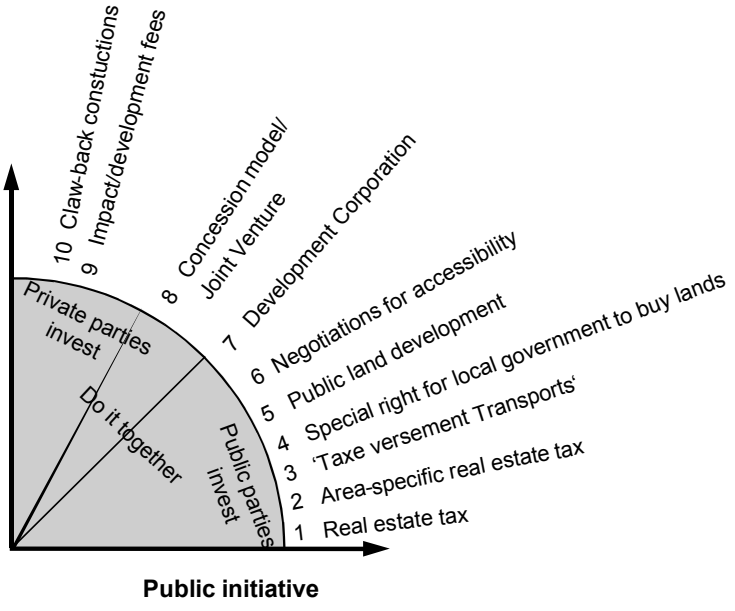
- Only through flawless public public partnership, government can be a serious partner for the private sector developing real estate.
- A focus purely on real estate and land value gains, although tempting, can impede the project as a whole; value capturing should thus be treated as an (important) side issue.

An inventory is made of possible ***instruments*** than can be used to capture the value increases. Nine instruments are listed, that can be used in (some of) the NWMA countries. These instruments are positioned in a continuum between 100% public initiative, public-private-partnership and the anticipation of private initiatives.

Table 3.2 Instruments

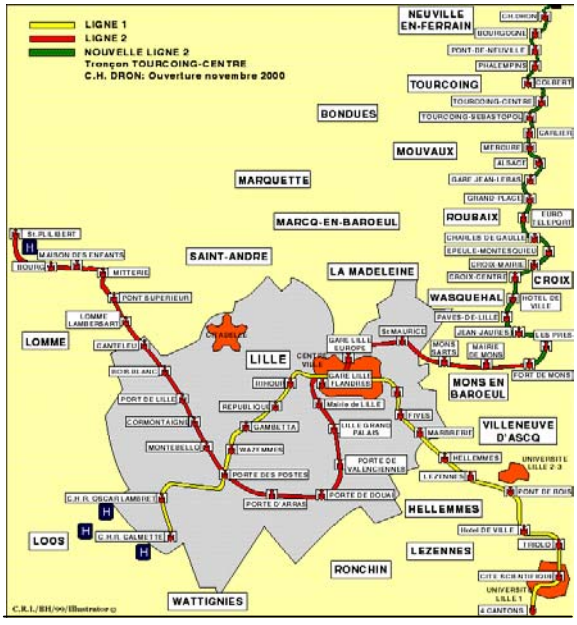
Instrument	How does it work?
1 General increase in local real estate tax	An increase in local real estate tax for inhabitants of a city benefiting from Light Rail. Most European countries have a form of local real estate tax.
2 Area specific increase in real estate tax	An increase in local real estate tax in the direct surroundings of a Light Rail station.
3 Tax Versement Transports	Tax law in France. All companies in an area benefiting from Light Rail pay this State levied tax.
4 Special rights for local Government to buy lands	Through ownership of the land and selling it to private parties for further development , local government captures value. Local government gets to first right of buying lands. Common system in the Netherlands.
5 Land Development by regional government	In stead of land development by local government or private parties regional government (f.i. a province in the Netherlands) owns and sells the land. By selling the land to private parties for further development value is captured.
6 Negotiations for private contribution	Project promoter and public parties make contracts with private parties regarding their contribution. In order to get a negotiation position, it is important not to be too clear about exact locations in the first stages of planning.
7 Development corporation	Public parties make a private corporation to develop station areas.
8 Joint ventures	Public and private parties from a joint corporation to develop station areas. By granting a concession public parties give private parties the right to develop and utilise the station area..
9 Development fees, impact fees	An obligatory development fee for private parties who want to develop buildings near Light Rail stations. Common system in U.S.A.
10 Claw back construction	Public parties subsidise projects under precondition that private parties pay back part of the obtained value increase.

Figure 3.2 Spectrum of instruments for value capturing



Case focus: Lille VAL and Tramway

- VAL: The world's longest driverless 'Light Metro' system: 43 km, 60 stations
- built to offer quality public transport to remote suburbs (a/o Villeneuve d'Ascq), but not really meant as spatial planning tool.
- However, the VAL system does have an economic development function and has caused limited value rises of commercial real estate (office, shopping).
- Important social inclusion function (connecting deprived areas) to city centre)
- Tramway: upgraded tram system



3.4 Guidelines for optimising indirect effects

The implementation of a Light Rail scheme can be more than 'just' building public transport infrastructure. Moreover, it can be a tool to reach a variety of targets within spatial planning, social development and economic development, through its possible indirect effects. Although Light Rail is not a magic means, it can help:

- generate investment, employment and thus income;
- create necessary conditions for area regeneration;
- stimulate social inclusion;
- improve image and identity of (certain parts of) the city/region.
- creating an integrated region.

Light Rail however, can not stimulate socio-economic development when there is no economic potential in the concerning region. Besides, Light Rail is often part of an overall package of (re)investments. In Lille for instance, the VAL-system in combination with other regeneration measurements, contributed to economic development in the region.
Guidelines for optimising indirect effects are given below.

Spatial impacts

If your aim is…	***Important aspects are:***
• To use Light Rail as a structuring element for development…	→ Make quality rapid transit an essential element of the urban planning process. → See to it that the infrastructure is in operation when the development gets finished. → Address all possible (public and private) partners in an early stage.
• To have a well-balanced and well-furnished public space…	→ Pay attention to practical integration of the stops: convenient and short walking distances. → Pay attention to design and integration aspects like green areas and art policy (aesthetic value). → Include the necessary 'accompanying policy', especially parking policy and park-and-ride stations.

Social impacts

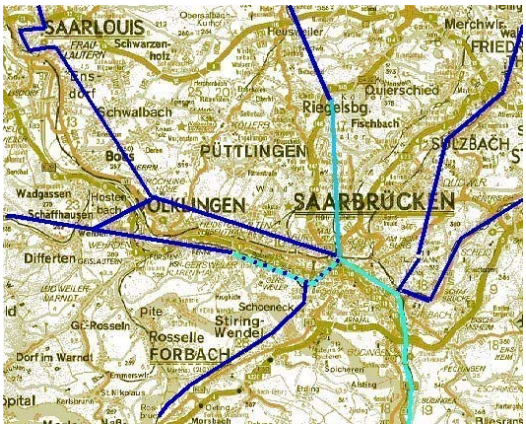
If your aim is…	*Important aspects are:*
• To promote social inclusion of all people in deprived areas…	→ (While planning,) think of all the social groups that you want the system to use. → Make a clear spatial/functional strategy for the areas and stations that will be connected by the system. → Take good care of the inhabitants of regeneration areas to prevent social exclusion (as in certain Docklands boroughs).
• To reach a balanced social regeneration of a certain area…	→ Include the area in the Light Rail network; the psychological distance to other areas within the region will shorten. → Not to give too much power to private developers (as in london). → Not to introduce Light Rail when transit might in fact not be a problem (as in Sheffield).

Economic impacts

If your aim is…	*Important aspects are:*
• To attract investment…	→ Invest in quality rapid transit to improve the image and/or identity of the agglomeration.
• To promote economic development, using Light Rail…	→ Not to think of Light Rail as a magic means; it is a tool, and additional tools will always be needed.
• To capture increased real estate value…	→ See to excellent public public partnership. → Plan the network in co-operation with private parties, so these are willing to contribute. → Levy taxes. → Avoid speculation: to ‘freeze’ land values in the Light Rail corridor during a number of years.

Case focus: Saarbrücken Saarbahn

- In operation from 1997, second phase 2000
- 44 km network length, 45 stations
- Second example of joint use in Europe: city tram network connected to seldom-used DB and SNCF lines
- Traditional exploitation, (regarded government responsibility) by company, Saarbahn GmbH, which is government-owned.
- Mainly government-funded (federal and Land)
- Extensions planned



Chapter 4 Joint use with Heavy Rail

4.1 Introduction

In theory, Light Rail can use various types of rail infrastructure. In most urban regions in Europe, relatively dense rail networks are available. Parts of these networks are not in use by heavy rail anymore. This provides a positive starting point for the implementation of Light Rail. With the transformation of existing tracks, the development of new stops and the purchase of modern rolling stock, Light Rail operation can be introduced. This still asks for substantial investments, but planning procedures and technical realisation are relatively easy.

The situation gets far more complex, when Light Rail uses existing track, that is still is use by heavy rail: joint use. The central themes in the discussions on joint use are capacity and safety on the tracks in question. Although Light Rail can be very successful without joint use, problems to realise joint use are central in various projects that are now being prepared. In some of these cases, joint use is almost inevitable, because investments for a dedicated Light Rail network would be insuperable high.

Within LiRa, the problems of joint use are explored (section 4.2). It turns out, solutions should be found in the organisation of a project, rather than in technique (4.3). Case studies show successful implementation in Germany (after long-lasting processes) and mixed results in other countries (4.4). The lessons learned are integrated in guidelines for new Light Rail projects (4.5).

4.2 Exploring the problems of joint use

It is clear that, when a high-frequency use by Light Rail is added to the existing use by heavy rail, problems might occur with regard to the capacity of the railway track. The vehicles will quickly disturb each other. The ***capacity*** problem can be solved in different ways. Reduction in frequency, refinement of the existing safety system of the concerned railway track and/or the vehicles (vehicles can follow each other quicker), separation of

existing tracks for both types of users or expanding the number of tracks. Some of these solutions are unwanted and others in practice lead to separate use instead of joint use.

Moreover, it is obvious that a tram or a Light Rail vehicle cannot run on a 'real' railway line just like that. This would lead to an unsafe situation. The limited public and political tolerance of safety risks in rail transport is remarkable, compared to the tolerance of the much higher risks in road transport. Nevertheless, in only the smallest collision, a tram would be completely damaged by the train, it would turn into scrap immediately, with heavy consequences for passengers.

The safety problem could be ‘solved’ by forcing the Light Rail to act as a train. Most of the time this invokes extensive technical discussions. This might easily turn into a rail safety discussion and it only takes little effort to heap up all technical problems of joint use and indicate the tremendous financial sacrifices that need to be made. However, it is very unlikely that the answers to the problems with joint use will be found in a technical approach. All technical problems can and will, though in an expensive way, be solved. Technical solutions however seldom solve organisational questions.

4.3 Process-oriented approach of joint use

To bring more balance in the discussion, on in which technical aspects now seem too predominant, a process-oriented approach is developed in the LiRa project. In this approach, of course technique plays a role, though not a central one. The studied cases for joint use, are evaluated on the basis of this ‘ideal’ process.

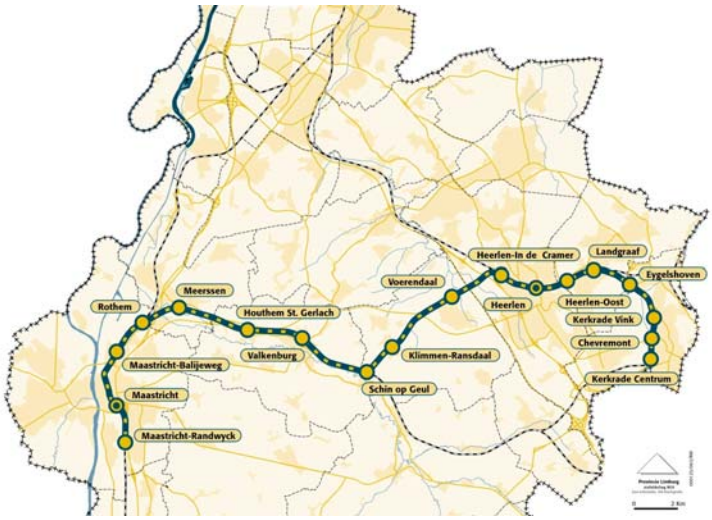
To deal with joint use problems in a project, the four following steps can be followed.

1 In the first place it should be examined whether the most important ***basic conditions*** have been fulfilled. What is exactly the problem, are there realistic possibilities to solve the problem, is there sufficient basis among the most important parties, etc. If that is not the case, the project does not stand a chance.

2 Important part of such an examination and planning is the question whether solutions are permitted according to ***law and regulations***. If it is impossible to find necessary solutions within the current regime, those solutions are out. Or the parties should go back to the level at which the basis was found; then the question is, whether there is a willingness to adapt the laws and/or the regulations.

3 If a basis is found and laws and regulations permit it, the parties will consider a ***project organisation***, which is set up to further develop ideas, in consultation with technical experts.

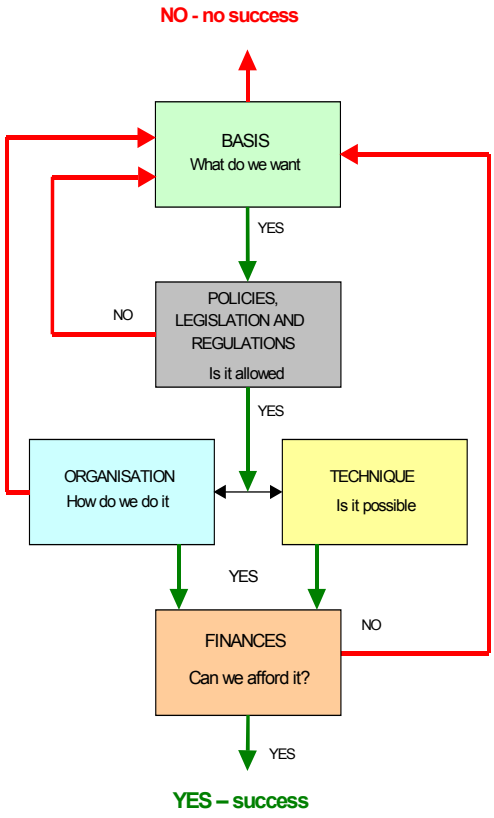
Case focus: Light Rail Zuid-Limburg



- Planned Light Rail vehicles on heavy rail tracks between Maastricht, Heerlen and Kerkrade
- Light Rail on Heavy Rail seen as valuable exploitation form
- More stops to be added, frequency to be raised
- Possibly extension into Maastricht historical city centre
- Difficulties in safety concept in conjunction with vehicles to be used; co-operation with national task organisations difficult
- High costs expected relating to safety

4 If solutions are technically feasible and legally possible, the question still remains whether a ***reasonable price*** matches the obtained solution. The price too needs to be tested at the level at which the original basis was found. Now the question is whether parties are prepared to pay the price. If this is the case, the project can be carried out. If not, the process will start anew, or will be terminated.

Figure 4.1 Process-oriented approach of joint use



This scheme illustrates the importance of starting at the strategic basis, in stead of starting off with technical discussions. Furthermore it implies a 'back to strategic basics' strategy, if the discussion is smothered in technical issues. Can we reach the same strategic goals in another way or even without the project?

4.4 Joint use approach in practice

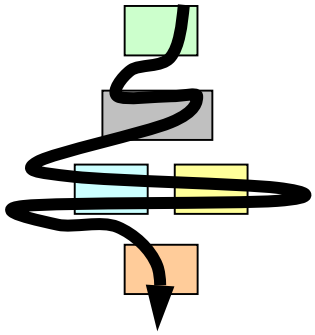
In Europe, right now there are only two examples of track use by heavy and light vehicles: Karlsruhe and Saarbrücken. Of course, these cases are analysed within LiRa. Also other cases, in which joint use is considered and might be brought into practice, are studied. It turns out that joint use is a less technical and more organisational problem.

Five cases are analysed for the way, in which joint use was or is discussed and, in the German cases, realised. These cases are evaluated on the basis of the 'ideal' process. The evaluation is reflected using eight criteria, as well as in a flow-chart through the successive steps. The more this chart looks like a knot, the less turn out with appropriate result. The results are presented case by case, starting with the 'inventor' of joint use: Karlsruhe.

The ***Karlsruhe*** model is the result of a growth process of forty years. During that time the objectives have always been clear and negotiations on the possibilities how to reach them, have been continuous (and tough). Throughout the years, the interests of Light Rail in Karlsruhe have been so continuous, that there has hardly been any interruption in the process.

Table 4.1 Karlsruhe case characteristics

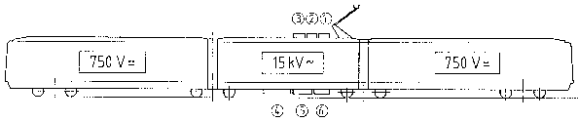
	Karlsruhe Germany
Basis	Increased
Transport value	Relatively small, is increasing
Targets	Grown in the process
Applied definition of Light Rail	Not applicable; Karlsruhe is the cradle
Applied definition of success	Opening up the centre; grows with the process
Role of the parties	Clear from the start
Division of the costs	No conflict
Total costs acceptable	Carried widely



Since the success in Karlsruhe, the accomplishment of the ***Saarbrücken*** system was relatively easy. The requirements, the vehicles and infrastructure should meet in order to use the Deutsche Bahn tracks, were clear. But, perhaps the most important argument for a fast realisation of the Saarbahn, lies in the financial possibilities for West German regions connected with the reconstruction laws of former East Germany; laws which the city council of Saarbrücken used quite attentively.

Case focus: Karlsruhe Stadtbahn (2)

- Pioneer in duo-system (Light Rail on Heavy Rail)
- Joint use in 'optima forma': Stadtbahn cars run on tram tracks, urban rights-of-way and (former) heavy rail track.
- But joint use was introduced as pragmatic way of reviving a deserted track, not a way to save money and still create a network so huge.
- Now 197,7 (plus 88 Deutsche Bahn) km track
- Formula proved very successful



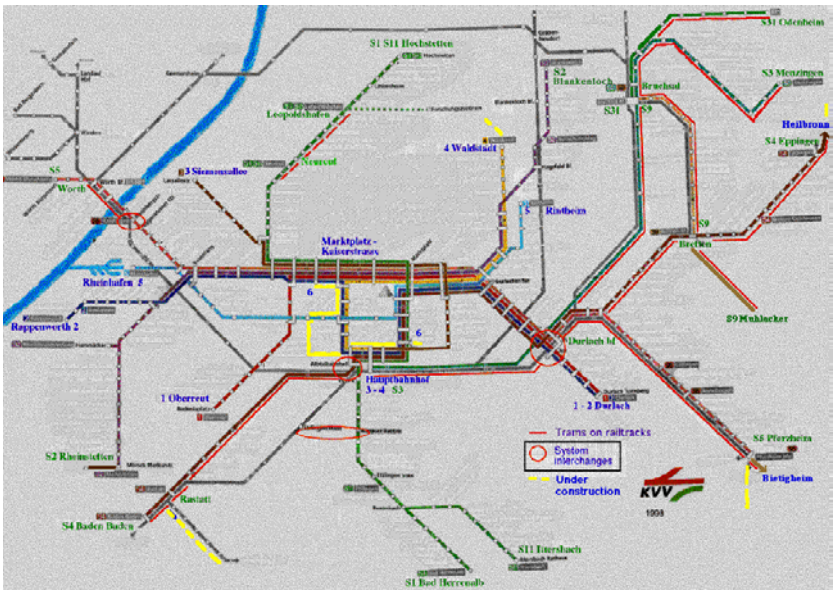
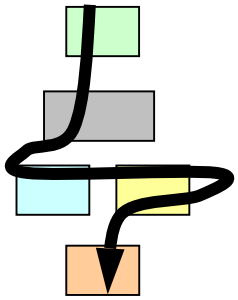


Table 4.2 Saarbrücken case characteristics

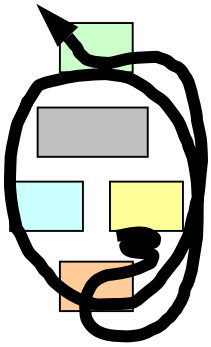
	Saarbrücken Germany
Basis	Not studied thoroughly
Transport value	Not studied thoroughly
Targets	Univocal
Applied definition of Light Rail	Univocal
Applied definition of success	Univocal
Role of the parties	Clear
Division of the costs	Clear
Total costs acceptable	Inventively (public) financed



RandstadRail is not accomplished in a streamlined process. Many preconditions had not, or only in a later stage, been fulfilled. Afterwards, it can be concluded that the original common thought was not based on a clear definition of Light Rail. The absence of a clear image of Light Rail has done no good to complex negotiations on RandstadRail. This is the main reason why it took relatively long before a practically feasible variant could be formulated.

Table 4.3 RandstadRail case characteristics

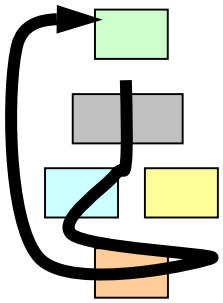
	RandstadRail Netherlands
Basis	Not studied in advance
Transport value	Studied repeatedly
Targets	Unequal
Applied definition of Light Rail	Not univocal
Applied definition of success	Not univocal
Role of the parties	No conflict
Division of the costs	No conflict
Total costs acceptable	Drastically revised



Light Rail ***Zuid-Limburg*** is still in an early planning phase, and a great deal is still uncertain. Nevertheless, it can be concluded that the project has a structured set-up. In advance, the basis received sufficient attention, it is more or less clear what kind of Light Rail vehicles will run (a light train-like vehicle, similar to the ones in Karlsruhe and Saarbrücken. Nevertheless, it is a concern that several governmental bodies and administrative levels are involved in the realisation of Light Rail Zuid-Limburg. This might delay the process.

Table 4.4 Zuid-Limburg case characteristics

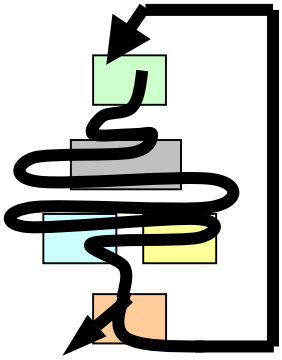
	Zuid-Limburg Netherlands
Basis	Studied
Transport value	Studied
Targets	Unequal
Applied definition of Light Rail	Not univocal
Applied definition of success	Not univocal
Role of the parties	Not clear
Division of the costs	Not applicable
Total costs acceptable	Not applicable



The integrated public private contract (DBOM) in ***Manchester*** has generally ensured low costs, but this has in some cases been achieved at the expense of quality. In particular, the stations on the former heavy rail part of the system now present a somewhat decayed appearance. The present holder of the operating concession has subcontracted the operation of the system. This may have resulted in some reduction in the quality of service, with an emphasis on minimising costs.

Table 4.5 Manchester case characteristics

	Manchester United Kingdom
Basis	Studied at governmental level
Transport value	Not studied
Targets	Univocal
Applied definition of Light Rail	Univocal
Applied definition of success	Univocal
Role of the parties	Univocal
Division of the costs	Univocal
Total costs acceptable	Drastically revised



4.5 Guidelines for facilitation of joint use of Light and Heavy Rail

It seems that, in practice, there are various obstacles that make joint use almost impossible. They concern the absence of necessary basic conditions, laws and regulation (especially safety), to complex project organisations and a too strong focus on technique.

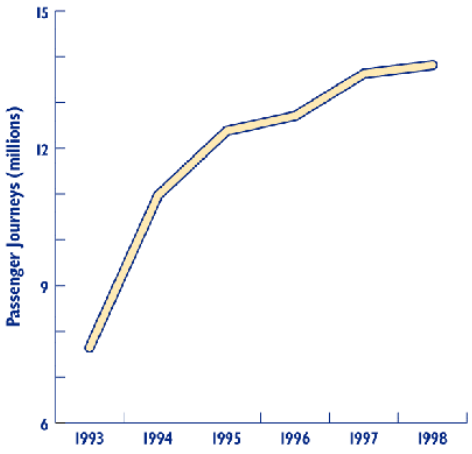
A process-oriented organisation of Light Rail projects might facilitate joint use. Guidelines for a smooth planning and decision process are given below.

Case focus: Manchester Metrolink

- No Light Rail on heavy Rail yet…
- Successful early Light Rail project (1992), already with several extensions built and others planned (Metrolink 2000 scheme)
- 37 km with 36 stops
- Partly on abandoned rail tracks, partly on-street, partly in exclusive right-of-way
- Successful planning on behalf of strong GMPTE (Greater Manchester Public Transport Executive)
- Innovative contracting (DBOM)
- Signalling a mix of heavy rail operation and automatic operation on-street

Patronage: Passenger Journeys on Metrolink

Year ending 31 March	1993	1994	1995	1996	1997	1998
Journeys (millions)	7.64	10.97	12.38	12.71	13.63	13.82
Annual % change	-	43.6	12.8	2.7	7.2	1.4

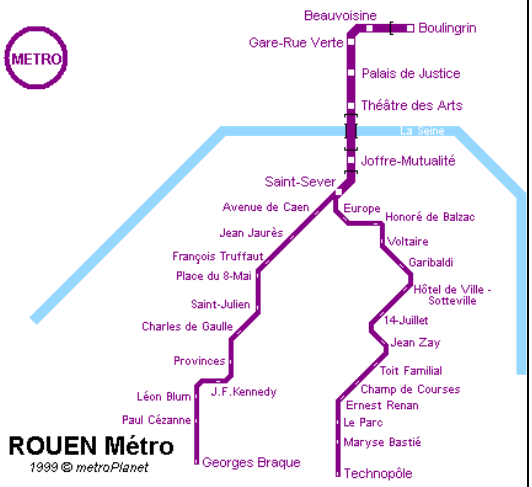


If your aim is…	*Important aspects are:*
• To find a basis as wide and sustainable as possible at any government level…	→ Make sure you are dealing with a widely recognised transport problem. → Explore whether Light Rail is the best solution for the problem. → Use a clear univocal definition of Light Rail and prevent a complex and long-lasting discussion about feasible variants. → Define success, use clear objectives and measurable output indicators.

If your aim is…	*Important aspects are:*
• To streamline laws and regulations in favour of joint use …	→ Strive for harmonisation of a European integral safety policy. → Do not focus on directives for technical instructions, because this minimises possibilities for inventive and less expensive solutions. → Do not give Light Rail a separate legal status, it would only complicate matters.
• To set up a smooth project organisation …	→ Keep the organisation as small and simple as possible. → Install one steering party, authorised to make decisions. → Define roles and responsibilities of the involved parties clearly and recognisable.

If your aim is…	*Important aspects are:*
• to develop a Light Rail system based on joint use with heavy rail …	→ Determine the objectives precisely. → Do not try to find solutions in technique in the first place; technically everything is possible, but usually expensive. → Let the project organisation co-ordinate the process. → Be willing to take a step back in the process, when it appears that basic conditions are not appropriately filled in.

Case focus: Rouen Metrobus



- In operation since 1994; network length (98) 18.3 km, 30 stations;
- integration with bus operations: avoidance of competition disadvantages;
- 16 km long, 31 stations (of which 5 are underground);
- Stadtbahn-like rolling stock, partly in tunnels
- DBFOM concession, after 30 years rolling stock and infrastructure are transferred to the public authority.

Chapter 5 Public private partnerships

5.1 Introduction

Implementing Light Rail concerns (re)building of infrastructure, investments in rolling stock, decisions on operation of transport services etc. Possible inefficiencies in a traditional, particular public sector oriented model for the development of new transport systems (e.g. Light Rail) might be overcome by transferring responsibilities and risks to private sector companies. This is the principle ***of innovative contractual arrangements*** or, in other words, ***public private partnerships*** (PPP).

The development of new public transport services is a responsibility of the public sector. Public authorities ***traditionally*** procure most works in an infrastructure project separately. In general, this may implicate ***inefficiencies*** in development and exploitation of the project. At first, the public authority will approach the project from the perspective of public responsibilities (such as high quality public transport, urban planning, etc.) and might therefore over-specify the system. Secondly, because of the public financial regime (budget-based, not commercially driven), governments have a bias for alternatives that are less expensive to realise, but expensive to operate and maintain. They do not have a strong incentive to develop (technical) optimisations, in order to reduce costs for operation and maintenance. Usually, less high investment costs, reflect in higher costs for operation and/or maintenance. Finally, the public sector might not be the best in managing certain (commercial) risks that are involved in developing and operating Light Rail.

Within LiRa, innovative exploitation models have been studied. In the first place, the characteristics of PPP contracting are outlined (section 5.2). Case studies show differences on the one hand (e.g. administrative setting), but also strong resemblance and general points of attention on the other hand (5.3). The lessons learned are integrated in guidelines for the implementation of PPP-like exploitation models (5.4).

5.2 Characteristics of PPP contracting

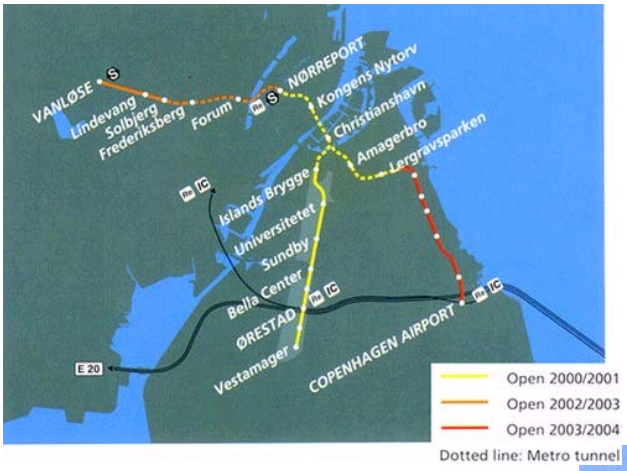
Respecting the public responsibility for public transport, a stronger private involvement in the development and operation of Light Rail can:

- ***Optimise total output.*** Private sector companies are more explicitly searching for commercial opportunities. By integrating various elements of a Light Rail project, the public authority gives private companies more degrees of freedom to implement innovations from a commercial point of view.
- ***Increase cost effectiveness.*** Infrastructure projects tend to cost more than estimated. One of the reasons cloud be, that public sector quality standards are higher then strictly necessary and marginal costs exceed marginal profits (e.g. extra passengers). Private sector companies have a commercial way of working and will therefore be more focussed on possible cost savings.
- ***Reduce risks by allocating them to the party, that can manage them best.*** When every element is contracted separately, the government will have to co-ordinate interfaces between all elements to make sure the system is build properly and maintenance costs will be reasonable, rolling stock and rail track commute, etc. In integrated contracts, especially risks that are connected to these kinds of interface management, and commercial risks, are borne by private sector companies.
- ***Form the basis for private finance.*** Because of the relatively high investment and operation costs, Light Rail (like all public transport services) is only feasible with financial contributions from the public sector. On the other hand, partial private financing has a multiplier effect, because the public sector can initiate more projects with the same budget, compared to the situation in which projects are 100% public financed.

A major characteristic of innovative public-private contracts is the ***integration*** of various elements of a Light Rail project into one contract with a consortium of private sector companies. Integration can concern two directions:

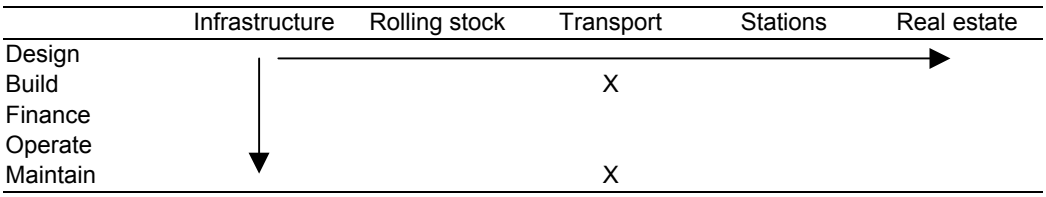
- horizontal integration: infrastructure, rolling stock, transport operation, stops and stations and real estate development near stations (or a selection of these elements) are procured together in one integrated contract;
- vertical integration: within infrastructure (or rolling stock or other capital intensive elements of the project) the following steps in the value chain are combined in one contract: design, build, finance, operate and maintain.

Case focus: Copenhagen Ørestad Metro



- In operation: end 2000
- Links a newly developed urban district to the existing city centre
- 21 km network length, 22 stations
- DBOM contract, excluding tunnelling
- Completely publicly funded, but a number of risks is transferred to the private sector by financial agreements
- Additional incentive agreements: bonus for vehicle kilometres made
- Targets for amounts of passengers after some time

Figure 5.1 Value chain approach for PPP



X = not relevant

Integrated contracts usually concern a relatively ***long period***. Especially when private sector companies make capital investments in the Light Rail system, a longer term is needed to make a return on investment. Concerning the transport operation (concession), this might conflict with European regulations.

The ***European Commission*** is preparing ***public service requirements*** in public transport (rail, road and waterways). One of the main requirements concerns competitive tendering for the award of operation contracts. 'Simply' imposing a public service obligation, without tendering, does not fit in the present market set-up anymore, according to the EU. Operation concessions should, according to the proposal of the EU, be awarded for a period with a five years maximum. A relatively short period provides flexibility to the public transport authority and stimulates the operator to perform well. A longer concession period is possible, if the operator invests in capital goods with specific characteristics, which can be used exclusively in the specific Light Rail project (for instance rail track or specified rolling stock).

5.3 Public private partnership models in practice

A number of Light Rail cases in Europe is developed in a PPP-manner. Innovative exploitation models are certainly not standard yet, but driven by privatisation trends in other sectors and the strive for a more market bases public transport, they are the centre of attention. Within LiRa, three Light Rail cases with an innovative PPP-like contractual arrangement are analysed. Although the cases (strongly) differ in constitutional and administrative setting, general points of attention are found.

The ***Copenhagen*** metro system is now being built. Civil works (tunnelling) are procured in a design-construct contract. The other infrastructure works (including design and maintenance) are procured in combination with provision of rolling stock and operation of the system: what came out is a ***DBOM*** concession (***D***esign-***B***uild-***O***perate-***M***aintain). The public authority finances all capital investments, because they have the money (from selling of land) and private finance is considered to be more expensive. The concession concerns a period of five to eight years.

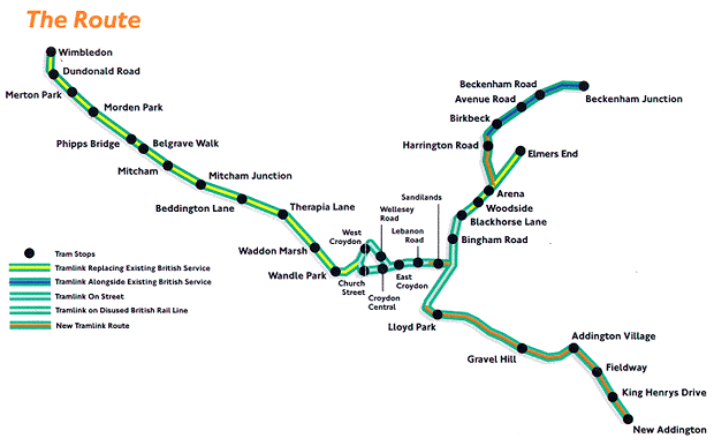
The ***Croydon Tramlink*** is already in operation. The public authority procured the system according to the PFI-principles. This means, in the form of a ***DBFOM*** contract (***D***esign-***B***uild-***F***inance-***O***perate-***M***aintain) for design, construction and maintenance of the infrastructure (excluding utilities such as cables), provision of rolling stock and operation of transport. The public sector contributed in capital investment at the start, but the private operator is now financially on its own. The concession concerns a rather long period of 99 years.

The ***Rouen Metrobus*** project is already operating as well. It concerns operation of the metro (which actually has more specifications of a tram, but is partly underground) and bus lines in the area. The metro line is contracted in the form of a ***DBFOM*** concession. There is one integrated contract, but the part concerning transport services is elaborated in a special subcontract. The greater part of the system is financed with town and state/region subsidies. About 1/3 of capital consists of a banking loan (publicly guaranteed) and some private capital. The concession is awarded for a period of 30 years. At the end, all assets will be transferred to the public authority for free. For operation, the contract foresees in an annual contribution by the local government.

Table 5.1 Outline of PPP contracts for Light Rail

	Rouen	Copenhagen	Croydon
Structure of the project			
Contract	DBFOM	DBOM, excluding tunnelling	DBFOM
Concession period in number of years	30	5 – 8	99
Ownership of infrastructure	Transferred to public authority after 30 years	Public authority	Private operator (lease)
Ownership of rolling stock	Transferred to public authority after 30 years	Public authority	Private operator (lease)
Transport operation			
Who sets fares	Public authority, operator advises	Public authority	Public authority
Who determines the schedule	Public authority	Private operator, public authority sets minimum	Private operator, public authority sets minimum
Income for the operator	Fare box revenues + fee per passenger	Fixed fee per kilometre	Fare box revenues
Incentive agreements	Surplus on fare box revenues	Penalties for non performance and bonuses for extra passengers	Surplus on fare box revenues
Accompagying policy	-	Competing bus services skipped	Competing bus services skipped
Allocation of risks			
Planning (construction phase)	Public	Public	Private
Technical (infra, rolling stock)	Private	Private	Private
Commercial (number of passengers)	Public/Private	Public	Private

Case focus: Croydon Tramlink



- Tramlink started in 1999, running a 28-km system, 3 routes, of which 17 km abandoned BR rail, 3 km on-street an 8 km exclusive right-of-way, with 38 stops.
- DBFOM contract with 99-year concession period
- Infrastructure and rolling stock privately owned
- Trams run on a one-way basis, clockwise around Croydon Centre
- The system connects 6 mainline railway stations (a.o. Wimbledon Station) and a number of bus lines.

5.4 Guidelines for PPP-based exploitation models

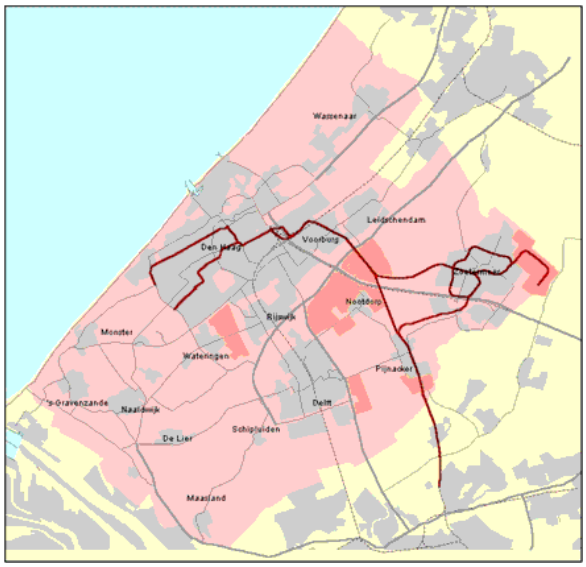
Exploring public private partnerships for Light Rail projects usually starts a discussion on the minimum of responsibilities that should remain with the public sector, to ensure an integrated high-quality public transport system. The cases studied show that government can transfer a greater part of control to private sector companies and still fill in their public responsibility for co-ordinating public transport. In principle, only those responsibilities (and thus risks) that cannot be managed by the private sector for a reasonable price (risk premium), can remain within the public sector. The choice to procure a PPP-contact is mainly based on ***strategic arguments***, such as a long-term private sector involvement (cost effectiveness) and private finance. The legal and policy frameworks can determine the eventual form of a PPP-contract, but they usually are no obstacles for implementing a PPP-approach.

What should be clear from the beginning, is which government body is responsible for the Light Rail project. In all three cases with a DB(F)OM contract, public responsibility for the Light Rail project lays with a ***Public Transport Authority*** (PTA). These PTAs are relatively lean management organisations. Core activities of these PTAs concern a/o. co-ordination of public transport (Light Rail and bus), managing the fare structure (through ticketing, collecting revenues) and promotion of public transport.

The one PPP-model that fits all Light Rail projects does not exist: each case has its own characteristics (technical, cost and revenue factors, parties involved, etc.) and therefore needs a tailor-made contractual approach. On the other hand, a number of ***common issues*** can be derived from the case studies, which should be taken into account when considering a PPP-procurement for developing a new Light Rail project.

These common issues or general points of attention are integrated in the following guidelines.

Case focus: Den Haag/Rotterdam Randstadrail



Randstad Rail

- Planned Regional rail-based transit system, between The Hague, Rotterdam and Zoetermeer
- Also meant to connect the urban rail systems of Rotterdam (metro) and The Hague (trams)
- Partly running on two railways to be taken out of heavy rail use, partly on urban tramway rights-of-way
- Very intricate administrative structure: too many parties involved that difficultly co-operate because of mixed interests. No powerful central planning & mediation agency.
- Various cost estimates through the years
- Full joint use abandoned to avoid technical problems

If your aim is…	*Important aspects are:*
• To seriously consider a PPP-procurement of your Light Rail project…	→ Overall co-ordination of public transport is a task for the public sector, even in a far-reaching PPP-contract. → Control and risks are tied together: the more aspects in developing the Light Rail system are set by the public authority, the less risks can be transferred to private contractors. → What risks the private sector companies are willing to take is not to decide by the government, but will result from the procurement process (and negotiations). → Procuring a PPP-contract still asks for a public authority with (technical) expertise to make up functional specifications for the system, assess bids of private sector companies and negotiate the contract.
If your aim is…	*Important aspects are:*
• To generate efficiency gains regarding the technical system (infrastructure, etc.)…	→ A division can be made between civil works (for instance tunnelling) and specific rail works (track, signalling, power supply, etc.). → The public authority still has to decide on strategic and functional specifications of the system (for instance the choice between tram and metro). → Functional specifications can be drawn up in co-operation with private sector companies in order to ensure private involvement form the start of the process. → Operational spatial planning procedures (after the decision to implement Light Rail is taken), can be co-ordinated by the private consortium. → The DBM-principle (life cycle cost en risk management) can be achieved with or without private finance.
If your aim is…	*Important aspects are:*
• To generate efficiency gains regarding the transport operation…	→ The shorter the concession period, the more arrangements have to be made for transferring the system and rolling stock to the government at the end of the concession period, through which the government might implicitly take over

some risks, that were actually meant to be in private hands.

→ The public authority can decide to procure a long-term concession at once, or bear more commercial risks for the first short-term concession period itself, to build up the system.

→ Even with a long-term concession period, government can to some extend decide on ticket prices, schedule, etc.

→ Introduce incentive agreements to make sure the operator perform well: bonuses or penalties based on kilometre supply of rolling stock, number of passengers, regularity of services, satisfaction, etc.

Chapter 6 Strategic Vision

The problem of traffic congestion in the North Western Metropolitan Area is unsolved. Various governments in European countries think simply building more roads is not the answer to traffic growth. Integrated solutions are necessary. Light Rail can provide part of the answer as case studies (Nantes, Karlsruhe, Strasbourg, and Manchester) have demonstrated. On the other hand, the LiRa -project has shown that Light Rail is not a panacea solving all mobility problems of urban regions.

In this chapter, an overview of main factors influencing success and failure of implementation of Light Rail projects is presented. From this, challenges to overcome at a transnational level are identified. Based on these general, European challenges for Light Rail projects, the strategic vision and future ambitions of the LiRa-network are stated.

6.1 A strategic approach to implementing Light Rail systems

Overlooking all the 15 case studies, overall success- and failure factors can be distinguished. These factors seem to be driving forces, no matter in which European country the project is located. In that sense we are talking about transnational issues.

Successful implementation of Light Rail systems needs a ***multi-dimensional approach*** from different angles. Next to sustainable mobility, other important objectives of Light Rail projects are ***socio-economic development and urban/spatial planning***. Light Rail technology fits well within an integral approach to regeneration projects and non-user benefits as LiRa-research indicates. In the decision-making process these 'strategic factors' should play an important role. Absence of such a spatial and economic strategy, worsened by a lack of ***public organisation*** seriously endangers the success of the project.

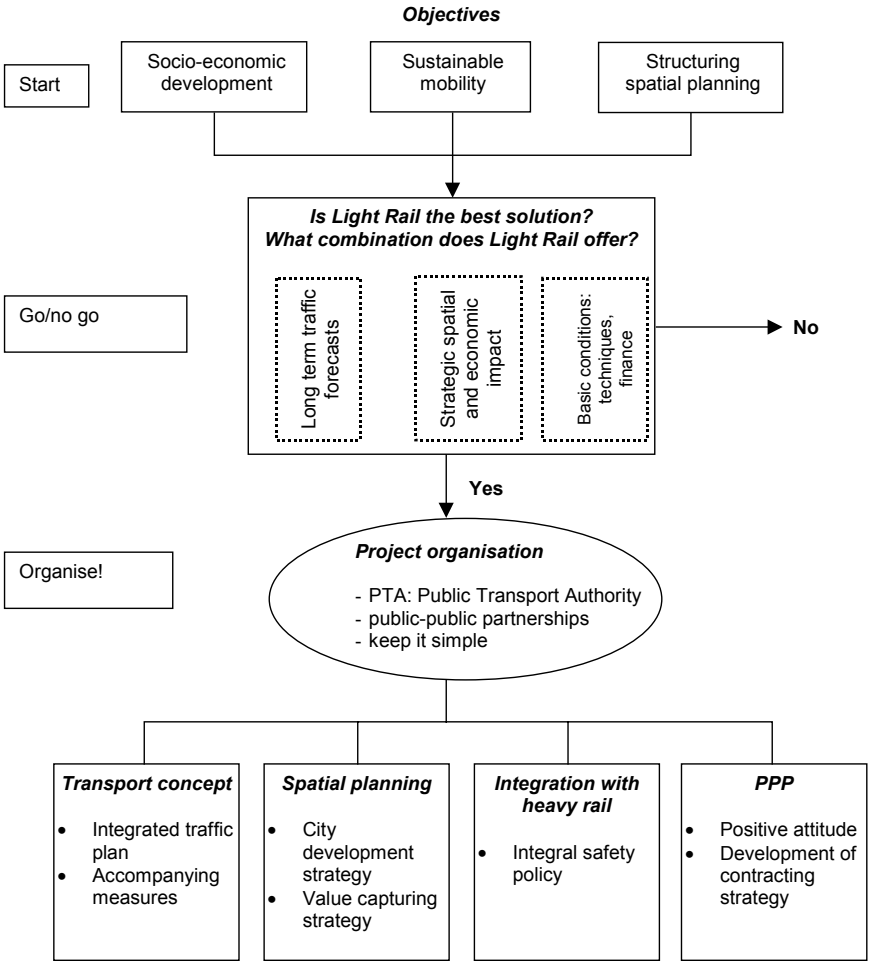
As LiRa-research demonstrates, a focus on purely technical solutions can seriously impede timely implementation of projects. Endless discussions on safety and co-use of tracks can be related to organisational problems and unclarities in the division of powers between national and regional/local authorities and the role of national rail track authorities. Introduction of an ***integral safety policy*** at an international level and ***better organisation of the public decision-making process*** provides a way out of this discussion.

LiRa-research shows that long-term traffic forecasts for a lot of Light Rail projects are too optimistic. Besides from a transportation point of view, Light Rail needs not always to be the best solution. A substantial modal shift can be reached, but ***an integrated traffic policy*** is needed, where implementation of Light Rail is accompanied by measures like parking policy, road pricing, transferia (park and ride), land use planning etc.

European countries have very different experiences with financing Light Rail projects. A positive attitude of public parties towards ***public private partnership and formation of Public Transport Authorities*** is essential to make successful projects.

All these elements play an important role in the decision making process surrounding the implementation of Light Rail projects. Figure 6.1 demonstrates some important considerations. The figure shows that a strategic approach is asked for, starting from the main objectives why the project should be implemented. These objectives are related to mobility, planning and economics and not to techniques. Furthermore, it shows that given the objectives it is by no means sure Light Rail is the best solution. Can we reach the same goals with other means of transportation or even, without the project? These are important questions in this phase. Subsequently, it comes to organisation and implementation.

Figure 6.1 Strategic approach to Light Rail projects



6.2 Challenges at the European level

By working together in the LiRa-network, guidelines to successfully implement Light Rail projects have been developed based on the characteristics of actual cases throughout Europe. It turns out that by no means, implementing Light Rail projects is easy! Projects all around Europe are confronted with similar constraints and problems. Transnational challenges to cope with can be identified for successful implementation of Light Rail projects in Europe/NWMA-area. These challenges are:

1 ***Track sharing and safety policy.*** Due to regulations, too technically focused discussions, positions taken by national railway authorities and lack of an integral view on safety, at the time of writing Karlsruhe and Saarbrücken are the only successful examples of track sharing in Europe. At this moment, experiments and demonstration projects are set up throughout Europe to find a 'modus vivendi' and practical integral safety standards. This calls for ***internationally co-ordinated actions,*** to profit from these experiences as much as possible.

2 ***Public management and organisation of regional transport and public public partnership***. In countries like Belgium, Germany and The Netherlands, where decentralisation and privatisation of public transport have just started, a lot of unclarity still exists in the division in responsibilities between national and local/regional government and between different local governments. From the LiRa studies, it has become clear that a sound organisation of the public tasks is indispensable for successful implementation and public private partnership. Continued exchange of experiences and knowledge is called for.

3 ***Development of public and private sector partnerships for funding, building and operating of Light Rail systems***. The UK experiences the first positive and negative results from 10 years of experiences with privatisation, contracting strategies and public private partnerships. Other countries (the Netherlands, France) only take the first steps now. In Belgium and Germany, private funding seems not to be an item yet. However, these countries have to catch up fast in view of the European liberalisation of public transport markets. The UK government is now developing a framework for determining value for money, while at the same time other countries have intentions in this direction. Innovative ways of contracting private parties at this moment is a big issue for Light Rail project promoters around Europe. This calls for intensive international exchange of knowledge.

4 ***Integration of different public transport modalities*** like Light Rail, buses, (high speed) trains and aeroplanes is a big issue. Privatisation of public transport in UK. has proven to be a drawback for an integrated approach. Feedering to airports and HST stations are important subjects of other Interreg study projects, like the Network of HST cities and COFAR. Light Rail might be the means. Experiments with electronic and integrated ticketing are for instance carried out in the Bonn-region. These items will have to be elaborated to make sound future solutions.

5 In European cities there is a great potential for improving public transport in the urban areas by ***integrating Light Rail systems with conventional rail.*** Vehicles suitable both for tram operation and for conventional rail are being developed. Successful solutions are found in a local or regional context, but only a ***European standard*** can

secure a potential market for these vehicles, resulting in substantially reduced cost per unit. The industry will benefit from this larger market. In addition to the CrossRail project (an EU DGTREN (Energy and Transport) study project), there is a clear need for a practical European initiative on this subject. This calls for a ***user/industry interface***, to be arranged at an international level.

6 ***Light Rail as a planning tool.*** LiRa-research has shown that Light Rail can have considerable effects on urban planning, city economics, real estate development and value capturing. The results are to be considered as first steps and rules of thump. This field is still largely unexplored. More research and experiments are necessary. For instance, legal and organisational instruments for value capturing have to be developed, maybe in an international context. Experiments on Light Rail and social inclusion can provide valuable information on this intricate relationship, useful for cities and regions all around Europe.

6.3 Ambitions of the LiRa-network

It can be concluded that the network idea has been very successful: (international) information exchange in the network is valuable. Not only through planned excursions, meetings and pilots, but also independent of 'official' LiRa-actions, LiRa-partners contact each other in practice to solve (joint) problems. Especially, the integral approach combining aspects of urban planning, economics, techniques, transportation and organisation add value to the information exchange in the Network.

In view of the challenges identified, the LiRa-initiative will not end with this final report. The LiRa-partners expect it to be an intermediate step towards further international exchange. They will take up these challenges and have therefore identified examples of possible follow-up projects to be jointly carried out (see next chapter). Because the actions take up the challenges identified, they are of interest to all the partners. The actions are meant to remove obstacles that impede successful implementation of Light Rail in North West Europe. In this way, we believe actions to be carried out in LiRa II can help successful implementation of Light Rail in European Cities. We have found mutual interests and mutual goals, which can only be realised through joint actions on an international scale.

The European Interreg 3b/c programme will be rather implementation-oriented and at this stage, this perfectly fits the LiRa network. During the summer and autumn of 2001, we intend to elaborate on the actions and make the preparations for a new proposal under Interreg 3b/c. New partners in the Network and other actions, based on the transnational challenges, are welcome. There are contacts with interested parties in UK, Ireland, Belgium, Netherlands, Norway, Spain and Italy.

The network structure of LiRa will be maintained. We foresee a central LiRa-platform to steer and communicate the results. For specific actions, carried out by one or more of the

partners, we foresee an organisational structure, which connects the actions to the central platform. Together specific interest groups and central platform form the network.

Therefore the LiRa-network also in the future continues:

- to create a ***platform*** for the exchange of ideas, knowledge, experiences, best practises and people, partner search and problem solving;
- to be a structure to carry out ***practical actions, studies, pilots, experiments and demonstration projects;***
- to disseminate the results to a ***larger public*** (for example reports, conferences, web site) and find support for light projects of the partners.

Chapter 7 Action programme

7.1 Scope of the Programme

The LiRa partners have identified examples of possible follow-up projects to be carried out together. The nature of this Action Programme is intentional or provisional and by no means definitive. There will be room for new partners and other projects to be incorporated in the proposal for LiRa II. The actions described are meant to inspire others. All the organisations involved still have to put in great effort to find the financial resources and political support at different governmental levels to carry out these projects. Finally, third parties, especially the European Union, also need to play their role to give quality regional transit the intended boost.

The proposed items in the Programme are examples of possible actions to be carried out in a follow-up of the LiRa-project under Interreg 3b/c. The actions are implementation-oriented, initiated by the partners and have a clear transnational component. In other words, they are of interest to all the partners. The actions are meant to remove obstacles, impeding successful implementation of Light Rail in North West Europe. In this way we believe the selected actions can help successful implementation of Light Rail in European Cities.

The following aspects are indicated for each proposed project:

- project title;
- project description;
- transnational relevance, contribution to the aims of LiRa;
- organisations involved, including lead partner;
- time frame.

7.2 Action programme

Possible actions can be categorised in three categories:

A Actions related to ***knowledge exchange*** between LiRa-members and functioning of the network;
B ***Implementation oriented projects,*** geared to challenges identified (track sharing, safety, integration, public organisation, public private partnerships, urban planning, city economy and value capturing);
C ***Dissemination and promotional actions.***

A Knowledge exchange actions

Action 1 Continuation and broadening of the LiRa-platform

Project description and transnational importance:
Experiences in LiRa 1 have shown that the introduction of a platform like this is a crucial step in terms of steering, communicating, initiating and attuning actions, pilot projects and studies. To guarantee the coherence between different follow-up actions and to realise a platform for communication we aim at a continuation of our LiRa-platform broadened with representatives of interested new parties.

This platform will focus on the following five goals:

- to promote an international approach to Light Rail projects;
- to develop and internationally exchange knowledge on Light Rail Projects, aiming at providing a European 'knowledge bank' on Light Rail;
- to attune different actions, including demonstration projects and experiments;
- to help implement developments, which are of mutual interest to all the partners involved;
- to promote projects of LiRa-members.

Parties involved:
- Leading Partner City Region Haaglanden.
- Partners: all LiRa-members.

Time frame:
As long as such a platform proves its right of existence.

Action 2 LiRa secondments scheme

Project description:
Aim of this action is to further explore the development of the 'Networking' concept to include short-term secondments (say 2-4 weeks) of personnel from one organisation to another, particularly where the people involved can offer skills and experience learnt in their own situation to assist a 'partner'.

This scheme gives LiRa-partners the possibility to work with highly skilled and experienced problem solvers from other cities and countries. The exchange can be co-ordinated through the LiRa-network.

Transnational relevance, contribution to the aims of LIRA:
This action is meant to internationally disseminate valuable information on the implementation of Light Rail projects all around Europe. Public public partnership all around Europe is enhanced.

Parties involved:
- Leading Partner: GMPTE
- Partners: all LiRa-members

B Implementation-oriented actions

Action 3 Light Rail safety case: demonstration project Haarlem-Zandvoort

Project description:
The Province of Noord-Holland, Dutch Rail Track (Railinfrabeheer) and regional public transport operators have initiated this experiment. The Province of Noord-Holland is leading. Goal of this project is to experiment with Light Rail operation in co-use with heavy vehicles (local and intercity trains) on the line Haarlem-Zandvoort for one or two years.

The experiment aims to finding the preconditions, in which joint use is possible, while especially focussing on safety aspects. An Integral Safety Analysis will be carried out. The outcome of the analyses gives an indication of risks, points of attention, best practices etc for Light Rail projects. The results of the Integral Safety Analyses can be reason to take appropriate measures in infrastructure, material, procedures and organisation. In this way the new developed 'Normenkader Veiligheid Light Rail', a national framework of safety regulations, will be tested. Different European countries are developing such a similar framework.

Furthermore, through combining heavy en Light Rail transport, new travel patterns in this region are possible. New (temporary) stops along the line are envisaged, which provides interesting test cases to study traveller's behaviour and spatial and economic effects of Light Rail.

Transnational relevance, contribution to the aims of LIRA:
As LiRa-pilot 2 shows, co-use of light and heavy vehicles on existing rail track is technically very well possible. But in fact, only few cases in Europe are known and in most cases frequency of track use by heavy vehicles is low. Furthermore, the results of pilot 2 show that implementation of an integral safety policies can put Light Rail projects into a higher gear. In the LiRa-Action programme, it is stated that an experiment/ demonstration on these safety aspects can be very valuable in the process of further implementation of Light Rail projects in Europe.

Although the experiment will take place within a Dutch technical context (detection and safety system), the results will have important transnational consequences. The 'safety-case' methodology to be used provides a framework for analyses of safety aspects, which can be used elsewhere. Furthermore, the experiment will provide important insights for an integral safety policies and national safety regulations. Also the practical safety measures to be taken on tracks with relative high frequencies are of international interest.

Apart from the technical setting, the experiment focuses on organisational aspects and integral safety policies. This might provide a break through in the impasse experienced all over Europe regarding the co-use of existing railway tracks by light- and heavy vehicles.

Organisations involved, including lead partner:
- Leading partner: Province of Noord-Holland
- Partners
  - Railinfrabeheer (Dutch Rail Track)
  - Platform of directors of public transport operators Amsterdam (NS Reizigers, Gemeentevervoerbedrijf Amsterdam, Connexxion)

Timeframe:
Start: not yet clear – second half of 2001 or first half of 2002

Action 4 Light Rail Demonstration project Rijn Gouwe lijn: light and heavy rolling stock on the same track

Project description:
Co-use of rail infrastructure by heavy and light vehicles in Europe proves to be difficult. To help solve this problem Projectbureau RijnGouwe Lijn intends to perform a demonstration project, using Light and Heavy Rail and rolling stock on the same track. Aim of the project is generate technical innovation in Light Rail rolling stock. Two Light Rail vehicles will be in operation on the existing rail track between Gouda, Alphen a/d Rijn and Leiden. The Ministry of Transport, Public Works and Water Management, public transport operators and industry will be working together to find these technical innovations. The aim is to provide in a user/industry interface, in a practical/experimental surrounding. This kind of practical and technical information is necessary for successful implementation of Light Rail projects in Europe.

Transnational relevance, contribution to the aims of LIRA:
In European cities, there is a great potential for improving public transport in the urban areas by integrating Light Rail systems with conventional rail. A vehicle, suitable both for tram operation and for conventional rail has to be developed and the corresponding operation rules have to be set up. A successful solution is seen within national context, but only a European standard can secure a potential big market for the vehicles, resulting in substantially reduced unit cost. The industry will benefit from a larger market. This demonstration project logically follows from the results of LiRa pilot 2. It is also additional to the European CrossRail project. The CrossRail project (1999RD.10843) was already mentioned: an EU DGTREN (Energy and Transport) study project. This European initiative promotes a standardisation of tramcar/Light Rail vehicles in Europe to make the solution more feasible in more European cities.

There is a clear need for a practical European initiative on this subject. In principle, the integration problems could be solved as national solutions. But that will result in vehicles for which the market is limited to one or few countries, resulting in expensive rolling stock, fewer cities which will have integrated solutions and an unstable market for the industry. In Germany there has been a successful development on using Light Rail technology and standard specification to make more competitive diesel rail-cars for conventional rail. A similar development on Tram-Train integration will give the European industry an attractive product to sell outside Europe, especially to the USA, where numerous Light Rail schemes are set up.

Organisations involved, including lead partner:
- Leading Partner: Province of Zuid -Holland
- Partners
  - Industry.
  - Dutch Ministry of Transport and Infrastructure.
  - Research institutions.

Timeframe:
P.M.

Action 5 Station Design Demonstration Project

Project description:
Key Output: Creation of a series of station/station hinterland designs and layouts optimising positive impacts of rapid transit and Light Rail. Design should deliver integration with other modes and fully exploit economic transport opportunities in the surrounding area. Design should also show the benefits of being integrated into a broader Spatial Plan for the area.

Research should include study of existing ‘successful’ and ‘unsuccessful’ designs and should consider ‘big’, ‘medium’ and ‘small’ stations environments.

Transnational relevance, contribution to the aims of LIRA:
Common interest on developing systems.

Organisations involved, including lead partner:
- East Lancashire Partnership.
- Greater Manchester Passenger Executive.

Action 6 Seamless Networks

Project description:
Building on a proposed joint study (GMPTE/East Lancashire Partnership), the project would examine barriers to ease passenger movement between separate networks. These barriers arise from:

- physical lay out/design issues;
- perception (boarding/information issues);
- financial (fares/ticketing issues).

By experimenting with simple measures best practices can be found to take these barriers away.

Transnational relevance:
There will be common interest in understanding how the three types of barriers can be removed/reduced and easy movement between networks can be enhanced.

Parties involved:
- GMPTE
- East Lancashire Partnership

Time Frame:
One year.

7.3 Transnational relevance

Table 7.1 states the contribution of the proposed actions to help solving the international problems and challenges identified.

Table 7.1 Challenges and actions

	1 LiRa-platform	2 LiRa-secondment scheme	3 Safety case Haarlem Zandvoort	4 Demonstration project rolling stock Rijn Gouwe	5 Station Design Demonstration Project	6 Seamless Networks
• Create a European knowledge platform on Light Rail	X	X				
• Track sharing and safety policy			x	X		X
• Public management and organisation of regional transport			X		X	X
• Public private partnerships				X	X	
• Regional integration of public transport modalities			X	X	X	X
• Creating an international user/industry interface				X		
• Light Rail as a planning tool			X		X	X

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