

LibeRTiN Light Rail Thematic Network

LibeRTiN is a thematic network aimed at the establishment of a truly European Internal Market for Light Rail Systems.

Its main goal is the search for a sector-wide consensus in fostering simplification, modularisation, interchangeability of light rail sub-systems.

This activity has the objective of increasing the cost effectiveness and reliability of light rail systems for Europe's citizens.

LibeRTiN is part of the EU 5th framework programme for sustainable growth and development. LibeRTiN is now starting to come to the end of phase II and will initiate the final consensus building phase III in June 2004.



ATKINS

Die Ingenieurwerkstatt

SEVALY



UNIFE

TTK

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LibeRTiN Co-ordinator
Transport Technologie-
Consult Karlsruhe GmbH
Gerwigstr. 53
D - 76131 Karlsruhe
Phone: +49 721 62 5030
Fax: +49 721 62 50333
E-mail: libertin@ttk.de
Website: www.libertin.info



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LibeRTiN Thematic Network – Phase II

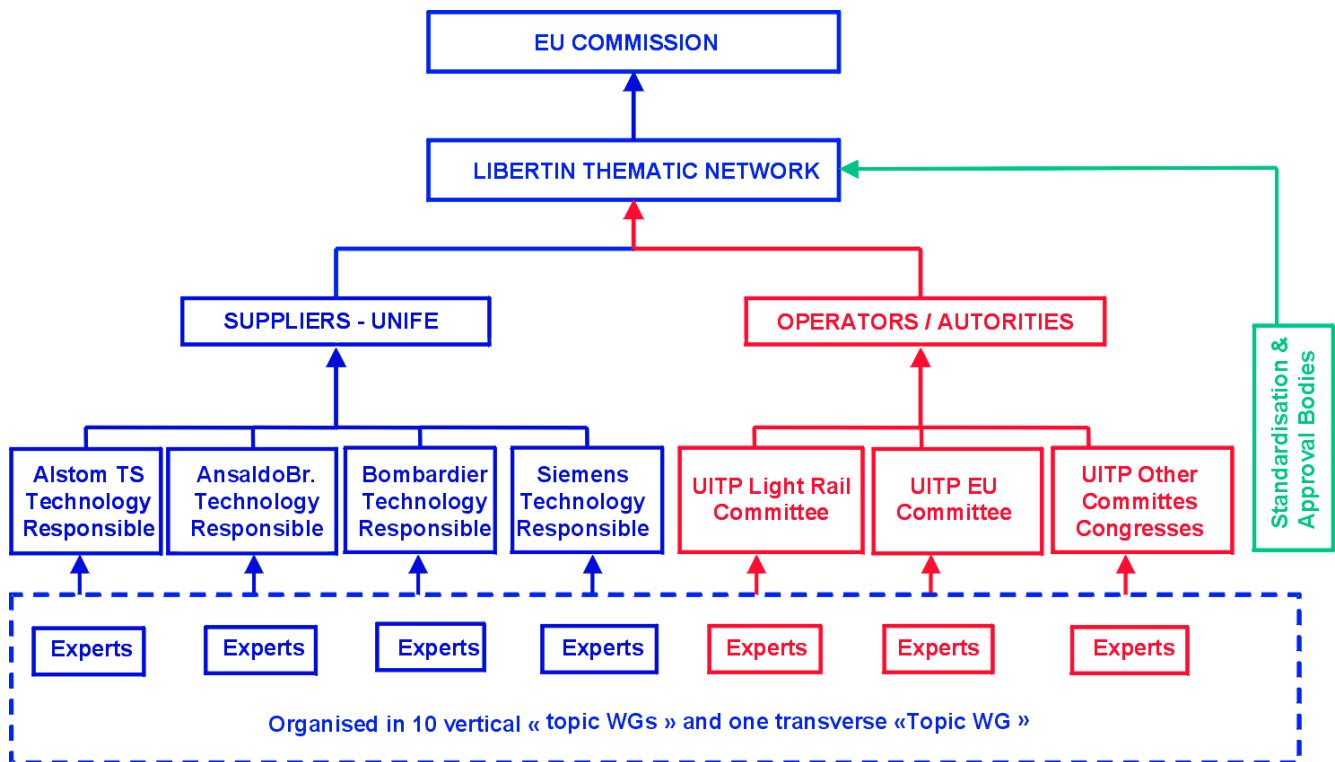
The second phase of LibeRTiN TN is well advanced, building consensus across light rail stakeholders: manufacturers, public transport authorities and operators, in order to achieve the following initial objectives:

- *simplification/harmonisation of standards and interfaces;*
- *modularisation where possible and based on a collaborative approach;*
- *interchangeability of components where possible and based on a collaborative approach;*
- *common basic operational principles.*

Experts, gathered in working groups, provide valuable inputs and feedback on the draft documents aimed at the fulfilment of the goals stated above. In this light, the LibeRTiN workshop held in Naples on November 20 and 21, 2003 was a remarkable event, facilitating ideas and giving direction to the activities of the consortium partners.

The consensus building is achieved through the process described in Figure 1.

Figure 1 - Consensus Building Phase 2



The major deliverables of phase II of the LibeRTiN project are:

- achieving consensus on possible harmonisation guidelines and amendments/revision of standards;
- revision of standards through the drafting of a “scope document” to be delivered to the European Standardisation bodies CEN-CENELEC-ETSI;
- guidelines and recommendations;
- providing inputs for possible EU Directives and Regulations;
- providing inputs for research projects in terms of modular approach and system architecture.

TOWARDS A SYSTEM APPROACH IN THE LRT DOMAIN

The LibeRTiN workshop held in Naples on November 20 and 21, 2003, marked an important step towards the consolidation of the second phase of the project. Following the last LibeRTiN workshop in Amsterdam in June 2003, an intermediate report was submitted to the European Commission including a valuable contribution from the LibeRTiN experts.

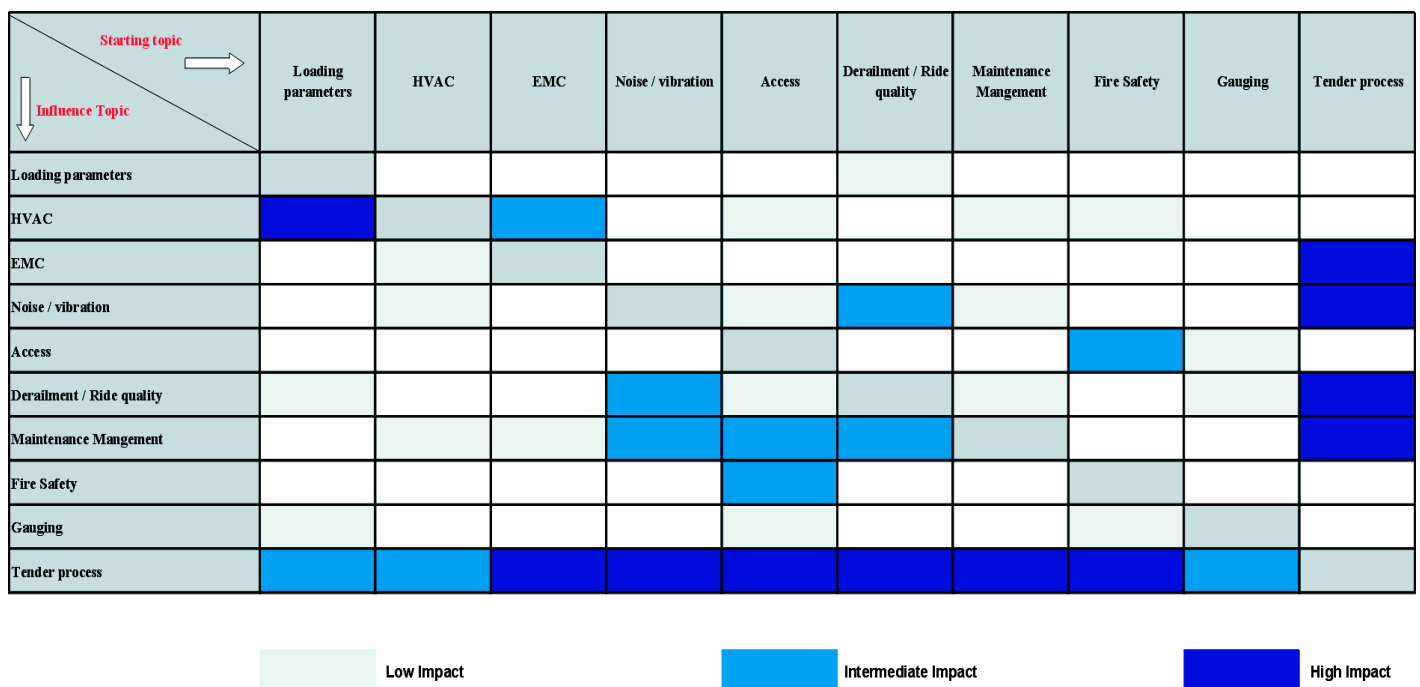
Experts are actively working in the following 10 areas (Figure 2):

Figure 2

TOPIC GROUPS	LEADERS
1. Fire Safety	SEMALY
2. Loading parameters	TTK
3. Derailment and Ride Quality	AEA Technology
4. Maintenance Management	DI
5. Structure Gauging	SEMALY
6. Noise and Vibration	Atkins
7. Access	TTK
8. EMC (ElectroMagnetic Compatibility)	Atkins
9. HVAC (Heating, Ventilation and Air Conditioning)	DI
10. The Tendering Process	AEA Technology

After performing a first analysis at the level of subsystems and identifying possible requirements and standards to be revised, changed or updated so as to foster a better harmonisation and provide for a good cost performance at the level of tendering processes, a *system analysis* has been performed. The result was a comprehensive matrix of interrelation (see Figure 3).

Figure 3 - LibeRTiN - Phase II - Naples 20-21 November 2003



The system analysis allows for the interaction of inputs coming from the several LibeRTiN working groups focusing on specific sub-systems. The methodology applied through the *system analysis and the matrix of interrelation* will avoid the application of too loose or too stringent requirements at the level of a specific sub-system; these requirements might otherwise negatively impact on other systems and increase costs for those letting and bidding against tenders.

BRIEFING ON LIBERTIN PRIORITIES



1. Fire Safety

Regarding current norms on fire protection for tramway vehicles, the experts participating in the meeting are not aware of any situation in recent years in their own countries or incidents occurring on these vehicles requiring tighter restrictions than the ones in place today.

Vandalism was recognised as one of the major risks of fire. Even if vehicles are constructed completely of “fire safe materials”, a risk will still remain associated with possible fire propellant materials carried by passengers. The risk of a fire starting after a crash with a car should also be envisaged.

Therefore, the Fire Safety topic group is requesting, provided UNIFE and UITP concur, to create a specific category within future standard EN 45545 which reflects the operational environment of light rail. This new category will refer to situations comprising:

- Vehicles with no on-board fuel storage;
- Efficient communication from passengers to driver, from driver to control centre, from control centre to fire brigade (either short vehicle, interphone calls or radio...);
- Very quick evacuation possibilities (several doors, easy exit, few passengers with luggage) to the nearest station or recognised evacuation point minimising walking distance and hazards.

This category would generally (but not necessarily) be additionally characterised by:

- Often not completely separated from road and pedestrian traffic;
- Short request time for intervention by the fire brigade.

Working Group Leader: Dominique Segquier - Semaly at d.seguier@semaly.com

2. Loading parameters

The Loading Parameters topic group has reached agreement on the fact that the existing standard (EN 12663) should include a fixed value for loading parameters in relation to LRVs. The aim is to help planners distinguish between loading parameters for vehicle structural design (value in kg/m^2), planning of line capacity (value in pass/m^2) and planning of timetables (no fixed value, allowing for passenger comfort during traffic peaks). Two options were discussed with the first taking the existing standard and allowing for a maximum loading capacity calculated from the number of available seats and surface area on the vehicles with the possible definition of loading parameters per square meter. This first option is also in line with BOStrab standards and DIN 25008 (on calculation of rail vehicle masses). A second option focused on the calculation of a single loading value across the whole vehicle.



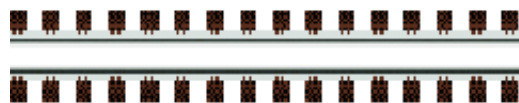
Possible next steps for this topic group entail the preparation of a “scope document” to be provided to the European standardisation body CEN (TC 256 WG 2). This topic group is also ready to provide inputs and suggestions for the compilation of the master plan for future research in LRT systems, especially in the field of dynamic loads for LRVs to be included in the next version of standard EN 12663.

Working Group Leader: Steffen Plogstert - TTK at steffen.plogstert@ttk.de

3. Derailment and ride quality

An outline vehicle-track interface specification was produced prior to the Naples workshop. The working group agreed on the following list of key parameters, along with a matrix of inter-relationships between them:

- Wheel diameter
- Wheel profile
- Wheel back to back
- Fixed wheelbase
- Vertical load
- Horizontal load
- Horizontal radius of curvature
- Transition curves
- Vertical radius of curvature
- Track gauge
- Alignment
- Gradient
- Longitudinal level
- Cross level
- Twist
- Rail profile



The objective for the period up to the next workshop in Prague in June 2004 is to seek consensus on suitable values for the parameters and inter-relations, so as to be compatible with a wide variety of vehicle designs and tramway networks. Hence, by complying with the specification, network operators can be confident that a good range of vehicle designs will run on their network and vehicle suppliers can be confident that their vehicles will be compatible with a good range of networks. This objective will be pursued by a series of meetings with vehicle manufacturers, network operators and other interested parties. The interface specification will be updated to hold the consensus values, and reviewed at the Prague workshop.

If sufficient time and budget are available, the working group will additionally consider a method of measuring ride quality in a tramway/light rail environment.

Working Group Leader: Edwin Marks - AEA Technology Rail at edwin.marks@aeat.co.uk

4. Maintenance Management

One major output of the maintenance management topic group is the draft guidelines on "Implementation and Use of Maintenance Management". These guidelines are intended to serve as a practical handbook regarding various aspects of the topic of Maintenance Management. They will provide relevant information regarding practical procedures and necessary tools and will summarise best practice.



Existing standards only focus on vehicles and do not consider the system as a whole. This gap will need to be filled by the topic group. Experts participating in the workshop, mainly coming from operating companies and local authorities, deem maintenance regimes based on life cycle costing as essential for the tendering process and would like to include these aspects in future contracts. This would encourage the industry to adopt a strategy aimed at implementing "design concepts for improved maintenance". These guidelines will be finalised by October 2004 after including relevant feedback from railway equipment suppliers, public transport operators and authorities and appropriate experts.

Working Group Leader: Lars-Erik Walther - Die Ingenieurwerkstatt at l.wather@ingenieurwerkstatt.de

5. Structure Gauging



The Structure Gauging topic group is focusing on the Gauging concept in terms of performing a comparison of light rail against railways. The experts have provided much comment and joint working group sessions with standardisation bodies (CEN) were held. The aim of this topic group is to feed into the work of CEN, for the preparation of future standards with European application, which will create a common language and clearly tackle light rail aspects (curve-dependant method for calculating the gauge included). This standard is also aimed at establishing a dividing line of responsibility between vehicle and infrastructure. The future standard under proposal will cover harmonised methodologies but will not entail a harmonised structure gauge. It will also not cover guided vehicles running on tyres, though common methodologies can be envisaged. The question whether LibeRTiN should work on harmonised gauging values for light rail is still open.

Working Group Leader: Dominique Segulier - Semaly at d.seguier@semaly.com



6. Noise and Vibration

Among the different possible sources for noise and vibration in the Light Rail domain, curve squeal, ground borne vibration and structure-borne noise were identified as having the highest priority. Impact noise and rolling noise are also being studied, particularly in relation to the prEN ISO 3095. However, LibeRTiN will not deal with noise produced on the crossing of bridges and viaducts. Also other noise sources such as gears, auxiliary systems, fan noise etc. will not be treated within LibeRTiN, but existing measurement standards for stationary sources can be used.

The main objectives for this topic group are to develop links to ongoing work in other institutions and to create recommendations and checklists focussing on LR-systems, such as:

- I. Recommendations to prEN ISO 3095 in order to take better account of Light Rail systems. The paper will take the form of a position paper.
- II. Curve Squeal Noise. One of the objectives is to clarify the "definition" of squeal noise, particularly in order to achieve common measurement parameters. Further work will involve the creation of a catalogue of good and bad examples of ways to eliminate squeal noise.
- III. Vibrations and structure borne noise. LibeRTiN has decided that further work in this field should be in close relation to the ISO work (ISO 14837 series). Further work will be input to the ISO working group and a checklist according to the table in ISO 14837-1 (A.2). The input from LibeRTiN should be the identification of relevant parameters for Light Rail systems and if possible influence the range of important parameters.
- IV. LibeRTiN has identified the importance of producing a paper identifying the relevant topics and describing the most important conflicts. No new guidelines/textbooks will be created, but the paper will refer to existing ones.

Working Group Leader: Per Finne - Atkins at per.finne@atkinsglobal.com

7. Access for Disabled

At the Naples meeting it was decided how the approximately 80 sub-themes to the topic Access for Disabled would be pursued further. They were categorised in four different ways according to how they will be dealt with by the LibeRTiN group.



The first two categories, "no" and "later", excluded sub-themes from further work because they are either:

- too complex;

- less relevant to the work group discussion;
- already studied by others;
- to be handled in the future.

The category “recommendation” will be included in the further work but not by the working group as a whole: individual LibeRTiN experts will perform the work, in such a way that the results are the basis for reaching consensus at the next joint meeting in Prague. The remaining sub-themes were given the category “yes” meaning that they will be handled within the Access topic-working group (Figure 4).

During the meeting in Naples, a discussion arose on how consensus could be reached for the latter category. The procedure will be an iterative process via email. A common format on the basis of single sub-themes will be used. TTK will make suggestions on the values of the sub-theme variables and process the answers from the LibeRTiN experts.

Working Group Leader: Nils Jänig - TTK at nils.jaenig@ttk.de

Figure 4

BOARDING & ALIGHTING	
Vehicle doorways	Co-ordination with boarding platform
<ul style="list-style-type: none"> • Minimum clear width of vehicle door opening • Minimum clear height of vehicle door opening • Threshold • Number of accessible doors • Signage • Closing doors • Visibility of doors, door entry • Door and boarding equipment control • Other Vehicle doorway aspects 	<ul style="list-style-type: none"> • Vertical gap (step) • Horizontal gap (gap) • Stepping distance • Gap between cars • Level-change mechanisms or boarding devices

Table: Example of the retained sub-themes to the main access theme “Boarding and Alighting” for setting up recommendations and guidelines for access in LRT.

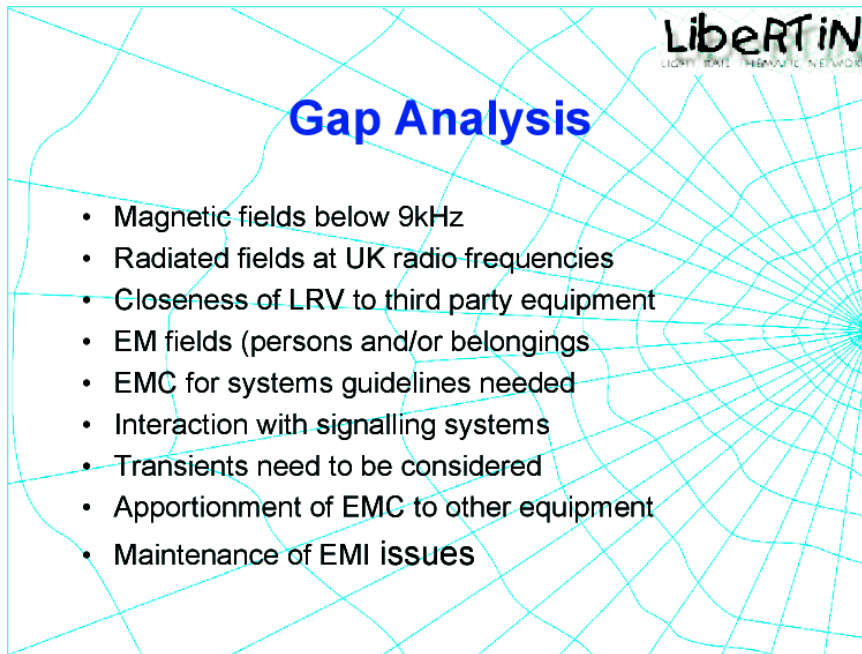


8. EMC

Prior to the Naples meeting feedback on this topic had been weak. The focus of the topic group is to assess whether current standards also cover the LRT domain. Most issues are dealt with within CENELEC (TC9X WG9). However, the topic group identified some gaps where the consensus by experts on their possible coverage is needed (Figure 5). Relevant EMC related standards are:

- IEC 62236 Railway Applications - EMC - Parts 1, 2, 3-1, 3-2, 4 & 5;
- EN 50238 - Railway Applications - Compatibility between rolling stock and train detection systems;
- EN 50122 - Railway Applications - Fixed Installations Parts 1 & 2 - Personnel Safety & Stray currents;
- EN 50162 (Draft) - Railway Applications - Fixed Installations - Protection against corrosion by stray currents caused by DC traction systems.

Working Group Leader: Paul Moore - Atkins at pmoore@fmaconnect.co.uk



9. "Heating & Ventilation and Air-Conditioning" - HVAC

Key issues for the topic group were the development of concepts for enhanced modularity in terms of standardised integration facilities for HVAC systems, harmonisation efforts regarding layout, climate control and measuring and system design. The main target for this topic group is reaching consensus between operators, manufacturers and suppliers regarding the modularity and harmonisation of system requirements.



The results of the topic group refer to the agreement about targets and further steps. Experts expect cost reductions due to reduced engineering efforts, documentation, type tests, life cycle costing and technical risks. The group will focus on two main concepts: a compact unit on the roof including complete HVAC systems, and a compact unit on the roof with fresh air heating and additional heaters located in the compartments.

The next steps for this topic group will entail the description of the mechanical interfaces between the HVAC unit and the vehicle. External conditions will be taken into account as well as vehicle characteristics and passenger capacity, allocation to different climate zones, calculation of necessary airflow rates and definition of the air supply profile.

Working Group Leader: Lars-Erik Walther - Die Ingenieurwerkstatt at l.wather@ingenieurwerkstatt.de

10. The Tendering Process

The Tendering Process topic group highlighted how in light rail procurement, non-technical but political pressure and methods of tendering used can lead to the success or failure of a project. Opportunities exist for new standards to encourage harmonisation and simplification of tendering processes. A benchmark analysis of different tender types was performed so as to identify appropriate and inappropriate aspects of the tendering processes and



contracts currently used throughout Europe.

The LibeRTiN experts in Naples carried out a SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) of the following types of tenders:

- a. Promoter's specification (traditional approach);
- b. Design and Build;
- c. Design and build plus Operate and Maintain (DBOM);
- d. Design, build, finance, operate (DBFO) and maintain;
- e. Design, build, finance and maintain (DBFM);
- f. Public Private Partnership (PFI/PPP);
- g. VDV153 type of tender;
- h. Build, operate and transfer; and
- i. The French Assistant à Maîtrise d'ouvrage/ Maîtrise d'ouvrage déléguée/ Maîtrise d'œuvre.

The conclusions from the Naples Workshop were as follows:

- The groups findings should be interchangeable across all light rail procurement (vehicles, systems, infrastructure);
- The general consensus from the SWOT analysis was that whatever form of contract is adopted, the promoter should retain control and manage the risk;
- Good relationships are critical between all parties in the procurement process;
- LibeRTiN can recommend and encourage best practice;
- LibeRTiN can consider how conformity with requirements is assessed in different countries in order to see what will be applicable to all of them;
- The French mechanism is worth considering further as it has advantages which can be applied across Europe;
- The UK approach attempts to transfer risk at substantial cost;
- The specification is the key to standardising the process, which should aim at interoperable light rail systems and vehicles (and ideally components), incorporating the standards from the other working groups;
- The result will be:
 - o Simpler documents;
 - o Shorter response times;
 - o "You know that what you get will work anywhere in Europe";
 - o Tenderers will benefit from using documents that are in a uniform format;
 - o Process costs reduced.

The group will carry out the following action prior to the Prague Workshop:

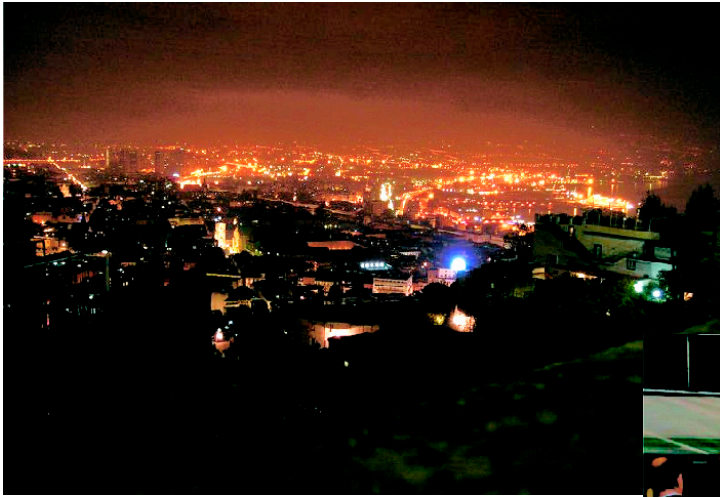
- o Produce a tender template;
- o Review the document with group members plus operators and suppliers;
- o Run a trial tendering exercise, hosted by Transport for London, and based on the requirements for the West London Tram Project;
- o Present the results of the trial at the Prague Workshop.

Working Group Leader: Ian Ambrose - AEA Technology Rail at ian.ambrose@aeat.co.uk

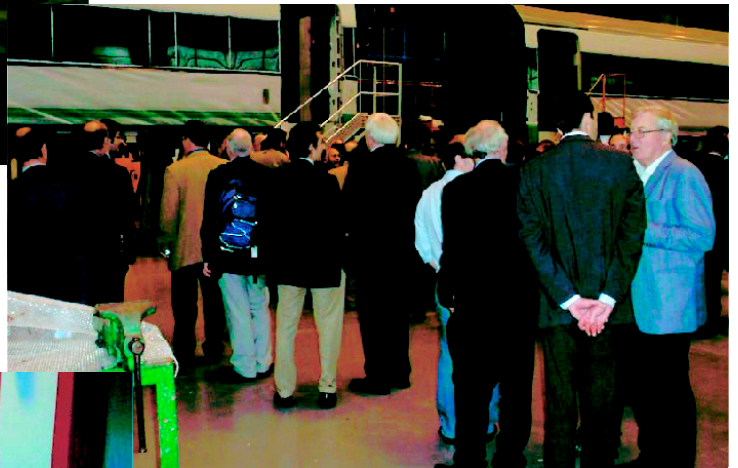
Next workshop: The next joint experts workshop will take place in Prague on June 7 and 8, 2004. More information on how to register as a LibeRTiN expert and for the Prague workshop can be found at:

<http://www.libertin.info>

NAPLES PANORAMA



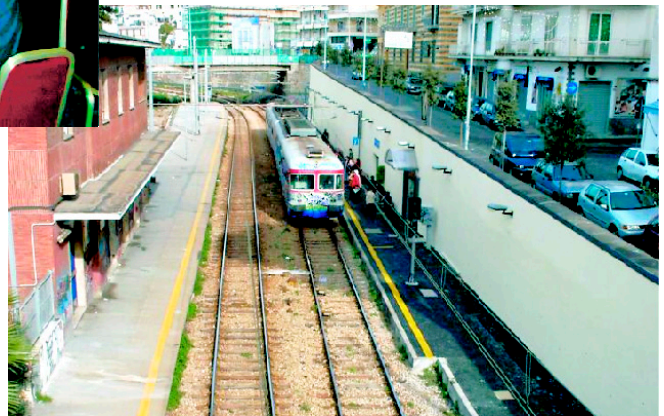
View of Naples



Visiting AnsaldoBreda



Group discussions



Transportation issues



... more transportation issues

Light Rail Thematic Network