European Rail
Infrastructure Managers

EIM

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EIM Report

Cost Efficiency in Building & Maintaining the European Rail Transport Network

Foreword

The opening of the EU railway market has led to an increasing demand being placed on infrastructure. This in turn is leading to a more intensive use of the available assets, requiring changes to Asset Policies. Following stricter legislation, infrastructure managers have to improve their performance in terms of environmental record, reliability and affordability.

The challenge is even greater in an environment where (long-term) financing conditions are unstable. This is why we - the infrastructure managers - together with the industry and the concerned public authorities aim to *make the rail system even more efficient*. By developing a strategic vision for the use of the network, and by building long term contracts for the financing of infrastructure maintenance and renewal such efficiencies may be achieved. In such an environment, employing modern technology can reduce the cost base and deliver improved performance.

This dossier aims at providing the concerned stakeholders with information on the cost-drivers for rail infrastructure, the role of the various parties involved, and the progress made by the infrastructure managers in managing their assets in an efficient way. The concerned stakeholders are the tax-payers, since the Member States and the EU are partly or totally financing rail development as well as renewal and maintenance of the rail network. The taxpayers are also the rail clients who are paying fees for using the infrastructure. The more efficiently the infrastructure managers maintain, renew and develop their network, the better it is for these stakeholders and more generally for a European sustainable transport policy.

EIM sees this dossier as a starting point in the debate and expects that it will help all stakeholders and the infrastructure managers to formalise and *share a common view of what are the challenges of improving cost-efficiency for rail infrastructure*. It also aims at establishing the best practices in the industry, as well as the processes needed in order to establish and monitor development. All these factors are needed in delivering reliable and cost-effective rail infrastructure for the benefit of the European citizens and economy

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Executive summary

Management of the rail industry is a complex balancing act, where budget and operational constraints, improvements and repairs are interrelated. It needs effective solutions for analysing life-cycle cost, detecting faults, and managing the condition of assets.

Infrastructure managers can make a substantial contribution to improving their own financial certainty by delivering cost-efficient asset management. This can be achieved in a variety of ways.

Modern technologies can clearly contribute to achieving a higher degree of cost-effectiveness:

- Modern communication technology and computerised measurement of the state of components allow more efficient planning and use of resources;
- The right management model creates better prospects for using the efficient technologies;
- E.U.- wide cooperation to reach truly harmonised standards can be achieved through application of global management principles, common technical specifications, and benchmarking of the technical network state, maintenance and renewal processes;
- Outsourcing may be another means to reduce costs.

Furthermore, a *predictable planning environment* for all stakeholders and especially the IM is eminent to achieve efficiency in long-term spending on the network. A strategy for the use of the network has to be in place, pointing out for instance the types of services allowed on each line and the horizon of their use for public services.

Multi-year infrastructure *planning forecasts* issued by the State can provide the IM with detailed information on the planned works to be carried out for the near future, impacting on its spending horizon and making efficient planning feasible.

Multi-annual contractual development plans between the Member State and the IM include performance and productivity objectives, monitoring provisions and sanctions in the event set indicators are not reached. They should provide an incentive to IMs to “produce” efficiently, and in conformance with set norms with regard to safety, reliability, etc.

General introduction

The rail infrastructure manager, just like any manager, has to efficiently make use of the means made available to him. The rail infrastructure manager (IM) however has to deal with a complex situation in terms of high and difficult to control cost structures. Also, the highly volatile level of funds to be collected from both public and private actors makes management difficult.

The challenge is to manage cost and revenue as a business and at the same time to take into account public service considerations. The infrastructure managers call for a maximum effort by all stakeholders to make the available funds transparent and controllable over multiple years in multi-annual financing contracts.

The larger challenge lies in the management of costs. Contributing to this aim should be the implementation of efficient production processes, and monitoring mechanisms to provide a maximum incentive to deliver these.

In chapter 1, an overview of financing issues in rail infrastructure management will be given to introduce the topic.

In chapter 2, three country examples illustrate the importance of sound and timely financing of the infrastructure.

In chapter 3, the various elements that constitute the cost basis for the IM will be dealt with.

Chapters 4 and 5 describe possible solutions through more efficient production processes and strategic planning forecasts. An efficient performance monitoring system between stakeholders will make it possible to create predictability and transparency in the long-term cost picture.

Chapter 1 - Financing the Infrastructure

1. *Infrastructure management* involves the following:

- Ensuring that the network as described in the Network Statement is delivered in terms of cost, reliability, and performance, either by maintenance works or by renewals.
- Developing the network.
- Carrying out the path allocation process.
- Managing the traffic and all related safety aspects.
- Maintaining the performance publicly offered to the operators through the delivery of the agreed timetable.
- Administrating the debt very often inherited from legacy state-owned railways.

2. The *infrastructure fees* that the infrastructure managers collect from the operators running trains on their network, represent in all European countries only a part of the expenditure to be covered (Baltic countries are an exception). The rest is covered by public grants (see chart 1).

The structure and level of the fees should be based on social marginal costs (EU directive 2001/14), but often reflects major national objectives:

a. The arbitration between tax-payers and users for the financing of the network, which in real terms means the national collective preference for rail transport.
b. The national vision of the markets' ability to pay or of the country interests (see chart 2).
c. The covering of public service obligations. There is a case for the financing of lines dedicated to regional services where very often the principle "the one who orders pays for it" does not apply (local authorities in this case): national grants are not sufficient for covering costs for all lines, both national and regional.

As a result, the structure and level of the national charging systems are frequently reviewed. This leads to unpredictable sources of income for the IMs.

Furthermore, in order to establish clear rules on access charging regimes, there is a need for sufficient and reliable information on the relationship between the access charge and marginal cost, and the costs of different types of users. Unfortunately, the access to and validity of information about E.U. railways is often inadequate for this task, since too rarely there is a sound measurement of the infrastructure manager cost-efficiency, except for specific investment projects. As a consequence there is a serious need for improved and harmonized accounting systems. If cost structures are more transparent, IMs have better insight into additional financing needs.

Chart 1

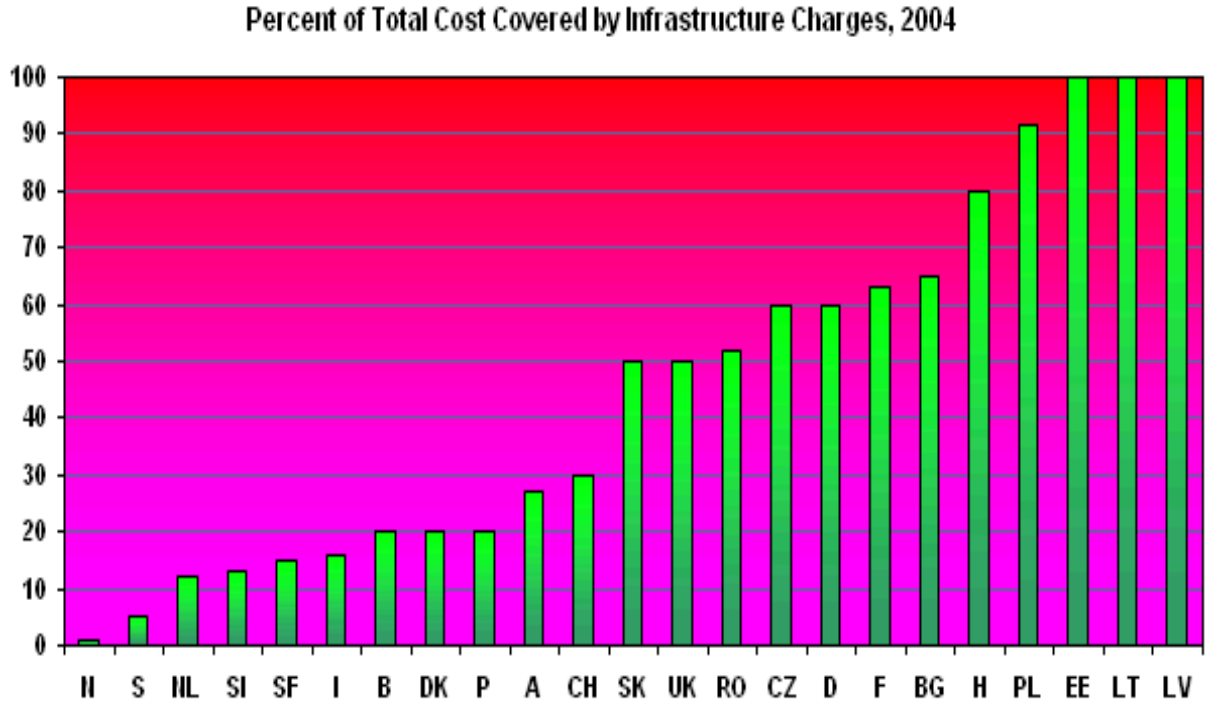
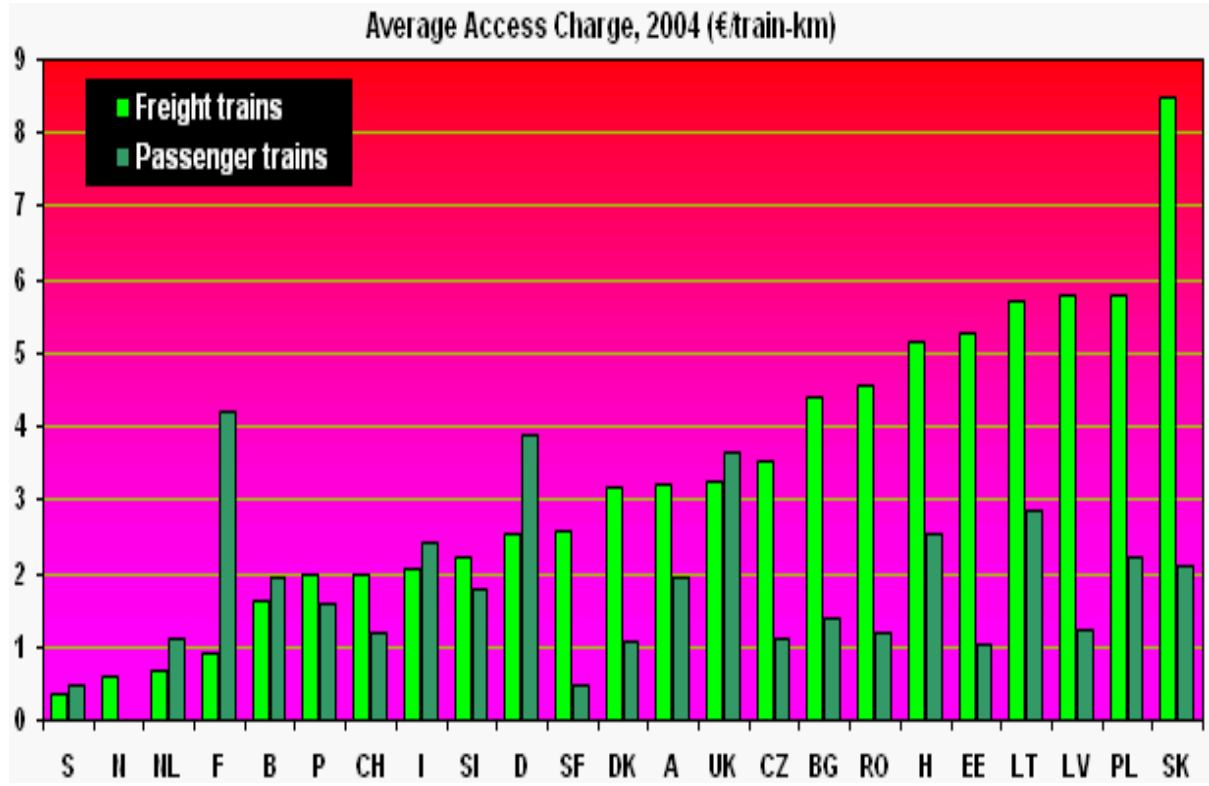


Chart 2



3. The infrastructure is operated over a long period of time and the average depreciation time of equipment is between 20 and 70 years. Therefore, the efficient management of infrastructure requires long-term commitments. The existence of a *"reasonably guaranteed funding scheme* on a multi-annual basis" is a basic need, even if some exceptional circumstances should be funded by exceptional means (Acts of God, terrorism etc.). Most rail infrastructure managers however, are facing unstable funding conditions. The financing responsibility is shared by at least two ministries: transport and finance. Very often the latter imposes short-term objectives (on the basis of state annual budget arbitrations), whilst the former may lack sufficient knowledge of the stakes to promote a more efficient long-term vision.

As a consequence, long-term commitments are still not given in many countries, which make funding an unstable factor. Long-term investment decisions have then to be made with the prospect of insufficient financial flows in future years. This situation ultimately leads to the creation of new debts and requests of huge grants, with the obvious related consequences of finance ministries slashing the budget. Examples of multi-year infrastructure planning forecasts, like in the UK and in The Netherlands, will be given in chapter 5.

4. Conclusions to Chapter 1

a. Due to the long depreciation time, infrastructure management requires long-term commitments and sufficiently reasonable state funding stability. Political decisions (annual budgets, frequent revisions of fee structure and level) make such commitment and stability difficult to reach.

b. The infrastructure fees (access charges) are too often set on the basis of national transport objectives rather than on marginal social costs. Moreover, there is a lack of reliable and consistent information in the EU market to analyse to relationship between real costs incurred by the IM and the access charge paid by the operators.

c. Unstable and unpredictable financing conditions cannot contribute in a sustainable way to a long-term development of the railway sector, owing to the inability to drive down costs through multi-annual financing contracts. Therefore, there is an additional need to further analyse how cost-efficiency improvements can positively contribute to the financial situation of the Infrastructure Manager.

Chapter 2 – Learning from experience

1. The British case

After the splitting of British Rail into 30 separate entities, the infrastructure management was entrusted to a private company (Railtrack). The situation from 1994 to 2000 can be characterised by issues and problems: Railtrack was accountable for, but not in control of engineering decisions, therefore the contract description of works was hard to define, fixed price contracts led to claims, and the contractor maximised short-term profit by doing the minimum of work possible.

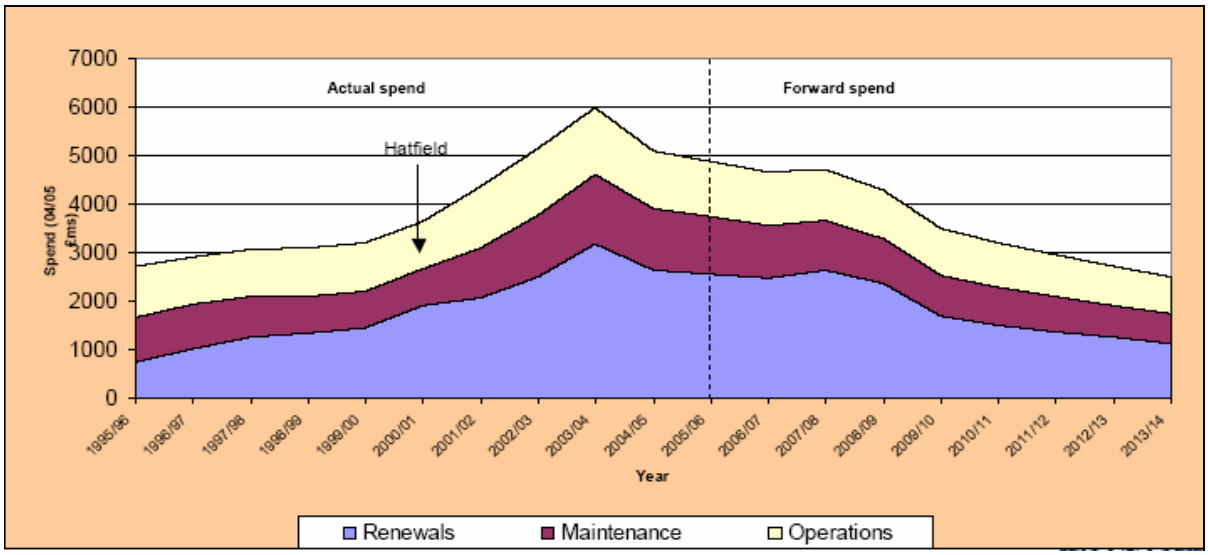
Furthermore the relatively short-term contracts (6 years) discouraged investment in people or equipment. Three accidents with fatalities, Ladbroke Grove in 1999, Hatfield in October 2000 and Potters Bar, led to several enquiries. It appeared that the infrastructure had suffered from decades of under-investment during the years of public ownership (on average from 1975 until 1995 €811m for renewals and €1622m was spent on maintenance).

The state of assets could be described as reaching the end of their useful life and in particular for the rails. The immediate result was the imposition of extensive speed restrictions, leading to a huge decrease in rail transport punctuality (average delays increased by 70%), to heavy penalties for Railtrack and finally Railtrack being taken into administration.

Network Rail (NWR), a not for dividend company, was created in 2002, and took over the management of the infrastructure from Railtrack. Major improvements have been undertaken since:

- The NWR engineering function has been strengthened and now specifies both technical requirements & standards;
- Maintenance works are carried out using Network Rail's own resources, delivering efficiency and productivity in view of long term optimisation (see chart 3);
- NWR has control over all engineering decisions and long term investments in people and plan;
- NWR has developed and implemented new technologies and processes to improve performance and reduce costs.

Chart 3: Railtrack/Network Rail OMR expenditure



2. The Danish case

The Danish rail market has been separated between rail network and train operators since 1997. The state owned enterprise Banedanmark is the infrastructure manager. It is in charge of allocating capacity, producing the annual timetable and operating and maintaining the Danish rail network.

The Government did not provide any funding for infrastructure renewals during the following three years. In the same time the money for maintenance was kept at a relatively low level.

Conscious of the risks of this situation, Banedanmark commissioned a consortium led by Atkins Rail, to undertake a study to understand the network's current condition, and to produce a set of key performance indicators to define the steady or "normal" state and develop a network model to predict track investment needs year-on- year. Their main conclusions at the beginning of 2003 were:

- They found a substantial backlog of renewals which needed to be addressed in order to return the network to an appropriate level of substance and performance.
- The current expenditure on track maintenance and renewals of € 80m a year for 4000 km of track would have to be doubled over the next seven years in order to reduce this backlog and bring the network up to the recommended standard. This meant bringing down the average track age from 30 to 20 years, or start replacing the signalling systems, parts of which date from the 1950s and cause two-thirds of the delays for which Banedanmark is responsible.

On this basis, the Government granted an increase in funding of € 48m a year as an interim measure. However, some ministries strongly criticised the report and this effort was not continued at the proposed level. In February 2004 a 2-meter section of the rail head disintegrated under a train which derailed, luckily without any fatality.

In 2004 a ten-year plan was adopted, granting € 308m a year for the first three years for maintenance and renewals, representing an increase of € 67m. But, this was not enough; the average age of the track could not be reduced and the measures came too late. In summer 2005, due to the detection of major defaults (rusted away bars in duo-bock sleepers) the train speed had to be reduced from 160 km/h to 40 km/h on one section for three weeks and numerous other severe speed restrictions were established, causing major delays, and forcing the operator to cut train frequency on the Copenhagen commuter network. A section was even closed in order to replace rails.

The lessons learnt from the previous are that there is a need for a clear, long-term strategy and improved funding for the network.

3. The French case

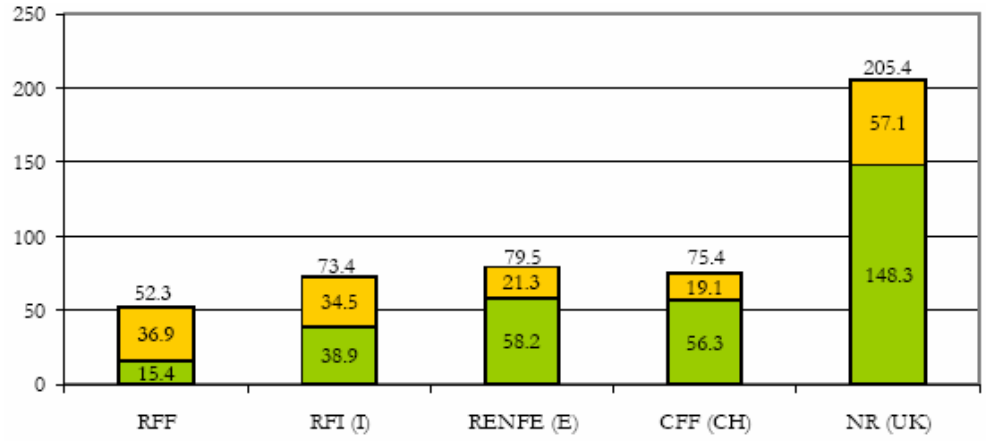
The infrastructure manager, RFF, was created in 1997. It is responsible for traffic management, maintenance, renewals and the development of the network. It finances these tasks, but the works are carried out by SNCF and the relations between the two public bodies, in particular the payment of these tasks, are governed by a contract (“convention de gestion”) between the two parties.

The majority of the network (except the most heavily used lines) has been worn down and many lines are facing their end-of-life of some or all components at a short -or medium term notice leading to the imposition of numerous temporary speed restrictions on secondary lines.

Contradictory opinions about the concrete needs of the network and the financing disputes between the two bodies, as well as an extension of speed restrictions on secondary lines, led RFF and SNCF to commission an audit of the network situation from a group of experts (Federal Polytechnic Institute of Lausanne, Switzerland – Prof. R. Rivier – September 2005). It was concluded that urgent measures were needed to halt deterioration of the network, putting forward three scenarios ranging from 'no change', leading to possible closure of 60% of the network, to an optimistic annual renewals spending schedule of over €3bn. RFF's and SNCF's response was based on the third scenario.

The current level of renewal corresponds for the most heavily used lines to a life duration of between 60 and 70 years, but experts estimate this life duration to a maximum of 50 years. In the following figure, an overview is presented of major expenses in network renewal (green) and maintenance (yellow) in 5 countries in 2004 costs are presented in K€/km of track.

Chart 4: Expenses on network renewal and maintenance in 5 countries



Source: Federal Polytechnic Institute of Lausanne, Sept. 2005

RFF suffers from an ageing network. Compared to other networks (Italy, Spain, Switzerland, and the UK), France spent less on average, but in proportion much more on maintenance and much less on renewals. According to the Swiss report, this will lead to an older network, and finally will result in the need to replace all parts of it.

The French audit also shows that when facing instability or lack of funds, infrastructure managers too often choose to “sacrifice” branch lines over less frequently used main lines, the process leading to general degradation of the quality of these lines and increasing costs, sometimes until the collapse (Danish example) of the line.

4. Conclusions to Chapter 2.

a. Too often with the restructuring of the state-owned railway attention has been focused on only short-term objectives which are not efficient and coherent with the proper running of a rail network.

b. Allowing the network assets to age has three consequences, clearly demonstrated by the three cases:
   i. The maintenance expenditure grows and the older the network, the higher the expenditure. At some point, performance is affected (speed restrictions, punctuality through lack of reliability, closing lines suddenly, derailments etc.).
   ii. The renewals will have to be made in any case (except if the Public Authorities accept to close the rail services).
   iii. If at one point a lot of renewals have to be done, then their cost grows, due to possession issues and lack of resources.

Chapter 3 – Cost of maintaining, renewing and managing the infrastructure

1. Wear

The main difference between rail and other transport modes is that rail has an intense and shared wear at the mechanical interface between train and track. In road and aviation transportation, roads and runways are incomparably more resistant and the tyres and their degradation rhythm totally different (rubber against concrete). Furthermore, the smoothness of the tyres softens the impact of vehicles loads as opposed to the impact of trains on track.

In rail transportation, rails and wheels have very close mechanical characteristics, they are made of steel and there are no means to soften the vehicle load impact on rails. Despite world-wide attempts to find other constituents, it is to be noted that all railways world-wide still use iron/steel rails and wheels. Wear is therefore a major issue for track and wheels, catenaries and pantographs, and not surprisingly constitutes a very large part of renewals and maintenance expenditure.

2. Renewal and maintenance

The degradation scheme of these mechanical constituents is a regular linear wear, accelerated by “impacts” (blocked wheel when braking, spinning, and crashed ballast on rail); these impacts are eliminated by maintenance (re-profiling and grinding); when approaching the material limit (e.g. 500 million tons for a modern rail) collapse of the constituent can be sudden and without notice.

Unfortunately, the degradation scheme is also sensitive to “initial” conditions (e.g. for rails and alignments to the quality of the first lying or grinding) and to “site” conditions (it is a well known fact that for linear infrastructure the average section for “homogenous” degradations is dozens of meters. This is true for rail lines, roads and highways, energy supply networks and pipelines).

Ruptures of rails or catenaries are unacceptable for safety or quality reasons. Therefore, efficiency requirements dictate a need to optimise between costs for maintenance and renewals and unacceptable situations. A safety margin that has a cost because it implies replacing constituents before they break down, shall be accepted in order to avoid facing these unacceptable situations on sections of line and network levels (the collapse of the entire Swiss rail power supply in 2005 demonstrates that it is not only a potential risk).

Of course the conditions of use of the components have an impact on the level of acceptable risk: a broken rail in a station where all trains stop but which is very rarely crossed by another train, does not present the same risk as inside a tunnel on a busy commuter line. Nevertheless, the examples in Chapter 2 show that it is always possible to make short-term savings on maintenance and total renewal costs by accepting larger renewals later. However, keeping the mentioned safety margin is crucial for keeping the services running and safeguarding the required safety level.

3. Planning

Transport by rail as by air is fully based on a programme built in advance, even if there are daily adaptations. This means that any work requires either to be planned in advance or to be done in the periods without traffic.
In practice all European networks use a specific planning scheme:

- Long-term planning (typically 5 years) for major works leading to major disruptions on the network (meaning a full day work or several days) and then disturbances to the services.
- Yearly planning (the time-tabling process) securing long-term planning.
- Weekly planning for small adaptations.
- Emergency planning when needed to cater for unplanned circumstances.

These plans interact heavily with other processes: degradation of constituents, available funds, purchases from external providers and staff planning, acceptance of night or week-end works (and in particular their related noise). It is then obvious that there is no real possible optimisation (life cycle cost as low as possible) without a certain guarantee of stability in funding.

In terms of planning, there is a fine balance between renewals, corrective, preventive and opportunity driven maintenance. The “art” for an infrastructure manager is to find the right balance between all these contradictory factors in the long term. It requires strong competencies at the decision-making level to provide the right information and appreciate the risks in order to develop sound processes.

4. General conclusions to Chapter 3

a. Unlike other modes of transport, the railway is subject to intense wear at the interfaces between track and mobile units (rail and wheels), and this constitutes a large part of the maintenance/renewals costs

b. It is necessary to find the optimal balance between reducing maintenance/renewal costs and to avoid breakdowns which may harm performance and safety: a safety margin shall be accepted

c. The need to plan maintenance works in advance is complicated by factors difficult to predict: degradation, funding, staff availability

d. Striking the right balance between these contradictory factors requires efficient, competent and transparent asset management and decision-making

Chapter 4 – Efficient processes

1. Improved technologies

The issue of availability versus cost is as big as railways are old. For more than two centuries engineers have developed methods for tackling this issue. Technological improvements have led to evolutions in the practices: new equipment has been introduced (catenaries, electronic signalling, telecommunications, but also long welded rails, elastic fastenings etc.), the works mechanised, the teams, their remits and competencies adapted and the engineering methods changed.
Application of technology can either increase components resilience (e.g. modern rails have nothing in common with the rails bought by railways 30 years ago) or allow a more predictive maintenance (only what is needed and just in time).

The following examples show that traditions are changed by modern technologies:
As noticed before, in maintaining an economically efficient railway infrastructure, there is a fine balance between renewals, corrective, preventive and opportunity driven maintenance. For instance, preventive interventions based on a more precise knowledge of actual condition allow for very efficient planning of use of resources and track access. The measures of the real state of the components (geometry of the track, catenaries, rail etc.) are now mostly automatic and computerised and feed large databases.

The higher frequency and quality of these measures give to the engineer a clear view on the evolution of his assets. Thus, the former preventive maintenance schemes with systematic replacement of parts are changing to a more predictive maintenance (only what is needed and just in time) system. For instance, the UK West Coast Route Modernisation (WCRM) programme within Network Rail is implementing reliability-based maintenance regimes for key signalling and electrification assets on the route. These regimes are supported by information provided by asset condition-monitoring systems being introduced to the route in parallel.

Charging can act as an incentive to avoid heavy wear and tear without decreasing the level of traffic. In Austria for instance, a track user charge differing for different riding qualities of locomotives was implemented in January 2005.

Complexity can be characterised by the density of switches or the variety of traffic on a line. A mixed line, in particular with heavy passenger traffic is more expensive than a freight only, or high-speed line (RAILSERVE and INFRACOST studies). Using dedicated lines can be more cost-efficient.

- New technologies (mainly computerised systems, telephone, safety, signalling etc.) now include remote control transmission.
- The “information revolution” assists the partnership with the train operators: for example British train operators determine their wheel maintenance programmes directly from Network Rail’s dynamic wheel measurement data.
- In the railway sector, *Dynamic Traffic Management* (DTM) is becoming an accepted solution for increasing capacity on dense networks. A DTM system uses simulation models combined with real-time traffic and origin-destination information to predict the effects of various management strategies, thus allowing more effective management and providing better traffic information than is currently possible. Pilot projects for instance in the Netherlands have proved that DTM can provide more

accurate traveller information, thereby optimising road user route choice, and reduce congestion and delays by applying the most effective management strategies.

- ”Enhanced signalling increases productivity by increasing traffic density (more train-Km/line-Km). Conventional methods of enhanced signalling are closer signal spacing, multiple-aspects (allowable speeds), centralized traffic control, and others. More recent innovations include versions of positive train control (PTC or ERTMS) and even “moving block” signalling in which train speed and spacing are determined by the schedule and by the characteristics of each train”. These new systems have significant economic benefits, and will even further improve the safety levels of today.

2. More efficient management

- The decision making process involves many stakeholders both at the level of the infrastructure manager and also externally (commuter operators, long distance passenger operators, freight operators, local authorities and ministries), with varying expectations. The decision-making process is therefore more efficient if all these expectations are taken into account in an open and transparent way. This requires a clear strategy for the infrastructure and the public services: the Public Authorities shall define the types of services allowed on each line, and, for lines outside which are not part of the Trans-European Network, the horizon of their use for public services and the horizon for their cost optimisation (LCC or shorter period).
- Management models differ as a result of history, culture and political preference. They can have a significant effect on productivity, both in determining how technology is employed to improve productivity and how the required investment in infrastructure capacity will be financed. This will be particularly the case if three parts of the management model are consistent with each other. *“That is, the competition objectives and the competitive realities in the economy must be clear and accepted. Then, the structure and ownership of the railway (and the rest of the transport sector) must yield the desired type and degree of intra-modal (rail versus rail) and inter-modal competition: a monolithic railway is rarely a competitive railway. Next, the approach to regulation must take the right balance between the competition that the market develops and whatever degree of market power the railway might maintain: only that which really needs regulation should be regulated (a principle that former planners find hard to accept). If the right balances are struck, then the railway will probably do an effective job of finding the right technology and generating the financial resources needed to provide the right capacity”*[1].
- Costs can be decreased furthermore by evaluating the competencies of the infrastructure manager staff. Among the key points are: business leadership from a management perspective (of which quality management is most important), and for the technical management reliability skills and logistics capacities are the most vital. If not available in-house, specific competences can be out-sourced (see next section). Experience has shown (cf. the UK) that under given circumstances reversing the process (i.e. bringing maintenance back in-house) may reduce costs and improve reliability.

[1] Assessing the Long-Term Outlook for Current Business Models in the Construction and Provision of Rail Freight Infrastructure and Services, OECD Futures Project on Global Infrastructure Needs: Prospects and Implications for Public and Private Actors, OECD, 15 August 2006, p. 29.

3. More efficient cooperation/organisation of the market

There is an evident need to increase the focus on economic and efficient maintenance of the infrastructure to European standards. An integrated view shared by all on the status of the individual elements within the infrastructure and their relation is a necessity. Among the solutions could be the following elements:

Global strategies:
Continuous progress is driven by a clear and stable strategy, following quality management principles. It implies some key activities such as:

- Appropriate scoping of work
- Planning
- Efficient utilisation of assets
- Centralised procurement of materials
- Mechanisation of tasks
- Professional logistics plan etc

European specifications:
The European Rail Agency has the responsibility to propose European mandatory technical specifications (TSIs: Technical Specifications for Interoperability) to the Article 21 Committee[2]. There is great potential for improvements in quality and availability if these TSIs remain at functional level and let infrastructure managers cooperate with the suppliers in the standardization bodies (CEN, CENELEC and ETSI) in order to find the most efficient solutions.

Opening of a competitive market:
This can be achieved by various means:

- Harmonisation of the qualification of suppliers;
- Harmonisation of the administrative and technical conditions for suppliers;
- Harmonisation in procurement. Formerly, the national rail companies used to buy components and assume the global life cycle cost. New supply contracts should introduce clear obligations of performances during the life cycle and include external cost such as training employees and staff and guarantees of reliability. EIM and the European Federation of Railway Trackwork Contractors (EFRTC) have started to work together on these harmonisation issues.

New forms of contracts and way of working with the contractors:
This implies the intent of driving a culture change in delivery through risk sharing to encourage joint resolution of issues. Incentives via pain/gain share mechanisms are critical in implementing desired behaviours. Contractors are assessed of course on pricing and delivery, but also on quality, safety and efficiency. The most efficient supplier in these different fields will be rewarded by increasing its volumes. A continuous demonstration of performance is then really valued.

Benchmark analysis:
This has been long used in the railway industry. Nevertheless, new methodologies, concentrating on global results (state and consistence of the network, life cycle cost (LCC), network availability and revenue, maintenance and renewal process and optimisation) could foster new progress. The UIC (International Union of Railways) INFRACOST Study has shown that there is a substantial potential for cost reduction by implementing best practices.

[2] The Article 21 Committee is established on the basis of the Article 21 of the Directive of the Interoperability of the Trans-European Conventional Rail Network.

Out-sourcing:
Most European railroads have managed during the last decades, to varying degrees, their technical resources through internal 'profit centres' and have not subcontracted much work in this area to really independent suppliers.
The recent opening of the European market, sharpened by the benchmarking of infrastructure managers, offers new opportunities for doing business with these "units" and suppliers have the opportunity to become more globally efficient and provide better reliability for the European rail network.

To seize these opportunities, these units or suppliers have to develop their human and technical assets independently from their national dimension. This strategic point of view leads European infrastructure managers to outsource their old structures.
The issue is heavily debated and especially the different ways to progress. Contractors as well as infrastructure managers argue that they need more European coordination and partnership to achieve this evolution.

Outsourcing has been one of the main points of the debate during the 2005 EIM/EFRTC conference on cost-efficiency. Some of the key conclusions of this debate are:

- The infrastructure manager must keep the control of its assets as it keeps the end-responsibility for the overall results. It has to retain sufficient skills and sufficient knowledge of assets that are scattered along thousand kilometres of track.

- Outsourcing should not be applied globally to all departments within the railway, due to the varying life cycle of each business: (design, building, renewal, heavy maintenance works, measuring).

- Outsourcing is not a solution for financial or management problems.

- Contracting maintenance requires a jointly operated and constructive approach to planning between infrastructure mangers and suppliers.

- Consequently it is absolutely vital to get contractual structures and the culture that surrounds them right, to ensure that objectives remain clear between the infrastructure managers and their suppliers.

- There are great difficulties in describing the results to be achieved in the short term (quality for the operator) and in the longer term (substance, strategy of traffic development).

- After ten years of trials, Network Rail, the British infrastructure manager found real advantages (cost and reliability) of taking control of their own maintenance again, when cautiously, Banverket (Swedish IM) has just begun to outsource the maintenance of its short-lines.

  Despite the improvements in efficiency described above, the general problems remain the same: the European railways have been public bodies for ages and major changes in the production processes face strong social resistance. It is only in recent times that some railways have really increased their productivity, due to external pressure.

3. Conclusions to Chapter 4

   a. Modern communication technology and computerised measurement of the state of components allow more efficient planning and use of resources.

   b. The right management model combines several factors effectively, and thus creates better prospects for using the efficient technologies. It weighs the realities in terms of competition against structure and ownership issues, and it regulates only what really needs to be regulated.

   c. E.U.-wide cooperation to reach truly harmonized standards can be achieved through application of global management principles, common technical specifications, and benchmarking of the technical network state, maintenance and renewal processes.

   d. Outsourcing may be another means to reduce costs; however, it is essential that the infrastructure manager keeps control of the state of his assets (required information). It is also necessary that the infrastructure manager retains necessary competencies within the company and that the process is not applied indiscriminately. The planning process should be operated jointly by the infrastructure manager and contractors.

Chapter 5 – Transparency and efficiency in planning

1. A strategic vision for the network

Cost optimisation cannot be reached if there is no clear strategy for the use of the network and the required level of performance: the types of services allowed on each line, the horizon of their use for public services and the horizon for their cost optimisation on the lines that are not part of the Trans-European Network. These topics are clearly the duty of public authorities in the current European framework. This strategic vision is not clearly established in all countries.

In the United Kingdom *Regional Planning Assessments* (RPAs) are a key factor in the development of a long-term strategy. RPAs are designed to develop an understanding of the challenges and assess the options for the development of the railways in each region over the next 15-20 years set in the wider spatial planning context. This means that full account is taken of regional and sub-regional strategies and plans, including forecasts of future population and employment changes. Stakeholders are involved as each RPA is drafted so that regional and sub-regional authorities can use the assessments in determining how heavy rail can play an effective role in addressing future local transport issues. The RPAs' forecasts for future demand feeds into the long-term strategy for the national network.

The UK *Railways Act 2005* allows the Secretary of State to specify other areas where he is looking for an improvement in rail performance. This guidance will be given in a longer term Rail Strategy that will accompany publication of the *High level output specifications* (HLOS, see 2) and will explain what improvement is sought and why.

In Sweden, following a long period of political debate on the future of transport, and plan-making related to the railway sector by Banverket (BV), a political agreement was reached in 2004. The new agreement spans the time period of 2005-2015, and allocates a total of € 11.7 billion for new investments in the railway network. These funds will be attributed by Government year-by-year, in line with specific projects that BV has planned for in its “Future Plan for the Railways”.

2. Multi-year infrastructure planning forecasts

For the reasons outlined in the previous chapters, and in particular for the planning issue, if the member state wants the infrastructure manager to be efficient in performing its tasks, it shall build a stable and reliable planning environment.

The Dutch Ministry of Transport publishes a yearly multi-annual infrastructure and transport plan (“MIT”), including detailed descriptions of future renewal projects and their budgets with a time-horizon of 5 years. The Dutch IM proposes new projects on the basis of detailed impact studies. The MIT thus forms an important part of the medium-term planning of the IM, and has enormous consequences for its future expenses.

The *Route Utilisation Strategies* in the UK are short to medium term industry plans *developed by the IM* for routes which look at making better use of existing capacity and, where appropriate, some network improvements. RUS are produced in accordance with the requirements of Network Rail's network license and guidelines set by the ORR. The process involves consultation with regional and local authorities.

3. Multi-year contractual development plan between Member State and IM

The financing of the infrastructure is at least partly ensured by the Member States (gap between the expenditures and the fees paid by the operators using the network).

Infrastructure managers are not in competition, and therefore it is difficult for the Member State to know how efficient its infrastructure manager is, compared to others. This is why it seems a good practice for Member States at least to establish key performance indicators and to monitor how these indicators evolve year on year. Both the railway companies, EIM and the European Commission are in favour of *Multi-Annual Contractual Development Plans* (MACs) between state and IM, and European legislation provides ample room for concluding such agreements. The MAC is a medium-term (3 years or more) contract including performance and productivity objectives, monitoring provisions and sanctions in the event set indicators are not reached.

There are several practical examples of MACs concluded between Member States and the IM. In Belgium for instance, the "Contrat de Gestion" covers all renewal and investment costs, and part of the maintenance costs. The IM has a minimum requirement to maintain the capacity of all its lines at the same level as in the beginning of its management contract. The period of the contract however is 2 years, which could leave scope for unstable and unpredictable funding.

In the Netherlands, the IM is also contractually bound to deliver outputs in terms of maintenance and renewal, and indicators for reliability and availability of the infrastructure are used. The delivery of contractual performances is enforced by penalties clauses in the contract. For instance, if a part of the network is not available as a result of unforeseen maintenance work, the IM has to pay a fine to the Dutch authorities.

In the UK, performance indicators are included in the *High Level Output Specifications*. The HLO is a strategic document by the Secretary of State which sets the *outputs* to be produced by the railways for a set number of years. The issues covered in it are reliability, safety and capacity. It will however specify only the improvement that the Secretary of State wishes to secure, not the investments that need to be undertaken to secure such an improvement. These will be formulated in the *Route Utilisation Strategies*.

A comparison of indicators between countries would be a further improvement. EIM recognises this and has started working on this.

Some studies have been carried out on these issues, in particular by UIC, but they constitute more snapshots than real performances monitoring.

4. Conclusions to Chapter 5

a. A predictable planning environment for all stakeholders and especially the IM is eminent to achieve efficiency in long-term spending on the network. A strategy for the use of the network has to be in place, pointing out for instance the types of services allowed on each line and the horizon of their use for public services.
b. Multi-year infrastructure planning forecasts issued by the State can provide the IM with detailed information on the planned works to be carried out for the near future, impacting on its spending horizon and making efficient planning feasible.
c. Multi-annual contractual development plans between the Member State and the IM include performance and productivity objectives, monitoring provisions and sanctions in the event set indicators are not reached. They should provide an incentive to IMs to "produce" efficiently, and in conformance with set norms with regard to safety, reliability, etc.

Conclusion

The EIM Report; Cost efficiency in Building & Maintaining the European Rail transport network illustrates that:

1. A reduction of investment in the quality of track in order to save money reduces the life-expectancy of track and increases maintenance cost.

2. A reduction of maintenance quality in order to save money reduces the life-time of track whilst increasing life-cycle-cost of track.

Both approaches are highly uneconomic because in track management, *quality pays back*. Indeed, the precondition for low cost railway track is high quality in investment (initial quality) and maintenance. Conditions for higher cost efficiency range from the use of new technology, to better management, or procurement and outsourcing decisions.

Railway Undertakings have realised that they must restructure to survive and similarly Infrastructure Managers have to improve their cost efficiency approaches, urgently, be it via key performance indicators, or via clear and binding contracts in order to justify the level of Access Charges.

EIM is working with its members and other trade bodies to develop innovative ways of delivering better maintenance and lower life cycle costs. A key input into this work is the development of joint research project with suppliers and others under the EU funding programmes (the Framework programmes).

A good example of such a project is the Innotrack project, carried out under the 6th Framework Programme, involving six infrastructure managers and a variety of suppliers which aims to reduce the life cycle cost of railway infrastructure products. EIM members will continue to look for ways of reducing the costs of the network whilst maintaining levels of safety and performance as their contribution to the future of the railways.