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## The European Network Economy: Opportunities and Impediments

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# THE EUROPEAN NETWORK ECONOMY:

# OPPORTUNITIES AND IMPEDIMENTS

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## 1. Outsiders's View on Europe: Preface

Economic integration, political diversity and socio-cultural identity are the current confusing features of Europe. Uniformity and heterogeneity seem to run parallel in Europe's pace towards a new profile in the international arena.

In order to offer some reflections on the future of Europe after its integration and on the emerging European network economy, it may be interesting to start with a few citations from four well-known American economists who had a panel discussion at the 67th Annual Conference of the Western Economic Association International (July 10, 1992, San Francisco). They were published as a special contribution in **Contemporary Policy Issues** (vol. 11, no. 2, April 1993, pp. 1-22).

> I think what we really are interested in here today is that the world in some ways is emerging and that its direction is uncertain in terms of international political structure. One potential direction is a movement away from the uniform community of nations—with at least legally and juridically the same rank—toward bigger entities, of which the European Community is the most conspicuous. Of course, we have moves in the opposite direction, such as in the case of the Soviet Union. But the circumstances there are somewhat special, so the general direction is not at all mixed.
>
> (K.J. Arrow, p. 2)

> The result of these transcendent influences—transcendent in the sense of transcending the nation-state—is to move toward globalization of business, professional, and social groups. As a general tendency, I think multinational regionalization—be it EC or NAFTA or OPEC—is a politically managed, if not manipulated, interim stage in the context of a sort of general move toward transcendence of the nation-state. In sum, there are strong technological forces tending to transcend the nation-state.
>
> (C. Wolf Jr., p.7)

After some 40 years of economic integration, particularly in Europe, this process may change as a result of changes in the world situation. Many have come to regard economic integration as inevitable, as a continuing dynamic process. But in recent years, a new dynamic process has emerged, that of *dis*integration. Thus, competing dynamic processes whose resolution could lead to a shift in the prevailing regime have emerged. The emergence of these new dynamic processes stems from the structural break that occurred in the international system over the period since 1989, involving the revolutions in central and eastern Europe, the end of the Cold War and of the Warsaw Pact, the unification of Germany, and the dissolution of the Soviet Union, all of which have had profound effects worldwide.

(M.D. Intriligator, p.8)

If we look at economic integration, I suppose nobody in this room opposes free trade. The problem with economic integration if it goes beyond free trade is that it develops into what we have in Europe. Regarding Schumann, by the way, I think that the United States' pressure came earlier. I think the United States wanted Europe united almost simply because we were united. The American statesmen could not imagine why Europe was not one country. So, I think we got in earlier. But basically, the Schumann plan was a cartel for coal, steel, and iron. Brussels has been busily engaged in organizing cartels ever since.

Needless to say, the agricultural program is the worst, but they all are very bad. What we would like is free trade without economic integration beyond that level, except for a few harmless things.

(G. Tullock, p. 15)

The above views point - despite their diversity - at various common European developments as observed by non-Europeans. The most intriguing ones are:

- integration benefits are only to be expected in case of free trade among regions and nation-states; this may be at odds with structural protectionism (including structural subsidies to privileged sectors).

- the era of the nation-state will likely go through a dramatic change in the near future, as it will increasingly be at odds with European thinking on the one hand and the drive towards regional autonomy on the other hand.

- economic connections between groups of actors will less be based on traditional intra-nation linkages, but much more on trans-border network configurations driven by economic forces in which regions play a dominant role.

- the concept of 'fortress Europe' which sees Europe as a strong economic and political power block is far from reality in light of the internal fights of nation-states to acquire a maximum share of the European 'pie'.

Nevertheless, it has to be recognized that the recent history of Europe - despite criticisms on the Maastricht Treaty - mirrors an unprecedented dynamics in which not only the EC12 countries, but also the EFTA countries and increasingly the East-European countries are involved (see Nijkamp 1993). Europe evolves into a network society with a myriad of nodal centres and regions connected by infrastructure connections of a different quality (Hall 1993). But especially the links to the Nordic countries, the East-European countries and the Mediterranean countries leave much to be desired, as in many cases we do not only observe missing links but also missing networks (see Nijkamp et al. 1994). In the meantime it has also become clear that a network society generates a window of opportunities for new operators who are able to reap the fruits of a multimodal infrastructure configuration with emphasis on complementary and competing networks. This means that the integration benefits of a new network economy are not only shaped through infrastructure policies of public decision-makers ut also by creative decisions of network operators who are able to combine the strong ad weak points of the emerging European network society.

## 2. The Emerging European Network Society

As mentioned in the preceding section, Europe is gradually but steadily moving towards a **network society**, characterized by economic integration, political coordination, regional autonomy and mobility of people. Networks connect people and places and are able to generate socio-economic added value through synergy and interaction. Such networks may be physical, immaterial,

organisational or club-oriented in nature, exhibiting a wide spectrum of multi-layer configurations e.g. roads, railways, telecommunications, e-mail etc.

Networks have traditionally mainly evolved on a local and national scale with standards varying according to local policies and requirements. Recently, lack of compatibility and capacity of systems have become key constraints to future development, and this issue is even a problem where there is no physical infrastructure (e.g. airlines). Control systems are needed to maximise capacity (e.g., Air Traffic Control, rail signalling and road traffic control). Even the infrastructure itself requires nowadays heavy new investment, as much of the original road and rail systems were constructed over 50 and 100 years ago, respectively, and they need badly a substantial upgrading or replacement. In addition, new networks are required in peripheral regions to assist development objectives, physical barriers have to be overcome (e.g., the Alps and the Channel), and the implementation of new infrastructure in East Europe requires large investment sums (see Figure 1). New technology has promoted satellite and fibre optic networks for communications, the reductions in costs of computing and networking have allowed "real time" decisions to be made, and huge data bases are available to assist in the decisions of many businesses. The move to the post-industrial society has revolutionised the ways in which existing networks are used and created opportunities for new forms of communications through city networking, data exchange and research networking (Knowles 1993).

The main feature of networks is **actor dependency** through physical and non-physical interaction (Kamann and Nijkamp 1991). Networks need of course an intelligent technological architecture, but its potential is largely determined by clever human decisions (see Capello 1993), so that social sciences have a clear role in network analysis. **Social science issues** in a network society concern in particular the following items:

- genesis and design of networks in the economy, in space and in social organizations and communities
- control and decision-making mechanisms in a democratic network society
- critical success factors for well functioning networks in relation to economic, financial, environmental or organizational impediments
- social, economic and technological niche formation in networks, through which interest groups are building up a competitive advantage
- barriers in open networks including their externalities, for instance, safety considerations in congested road networks

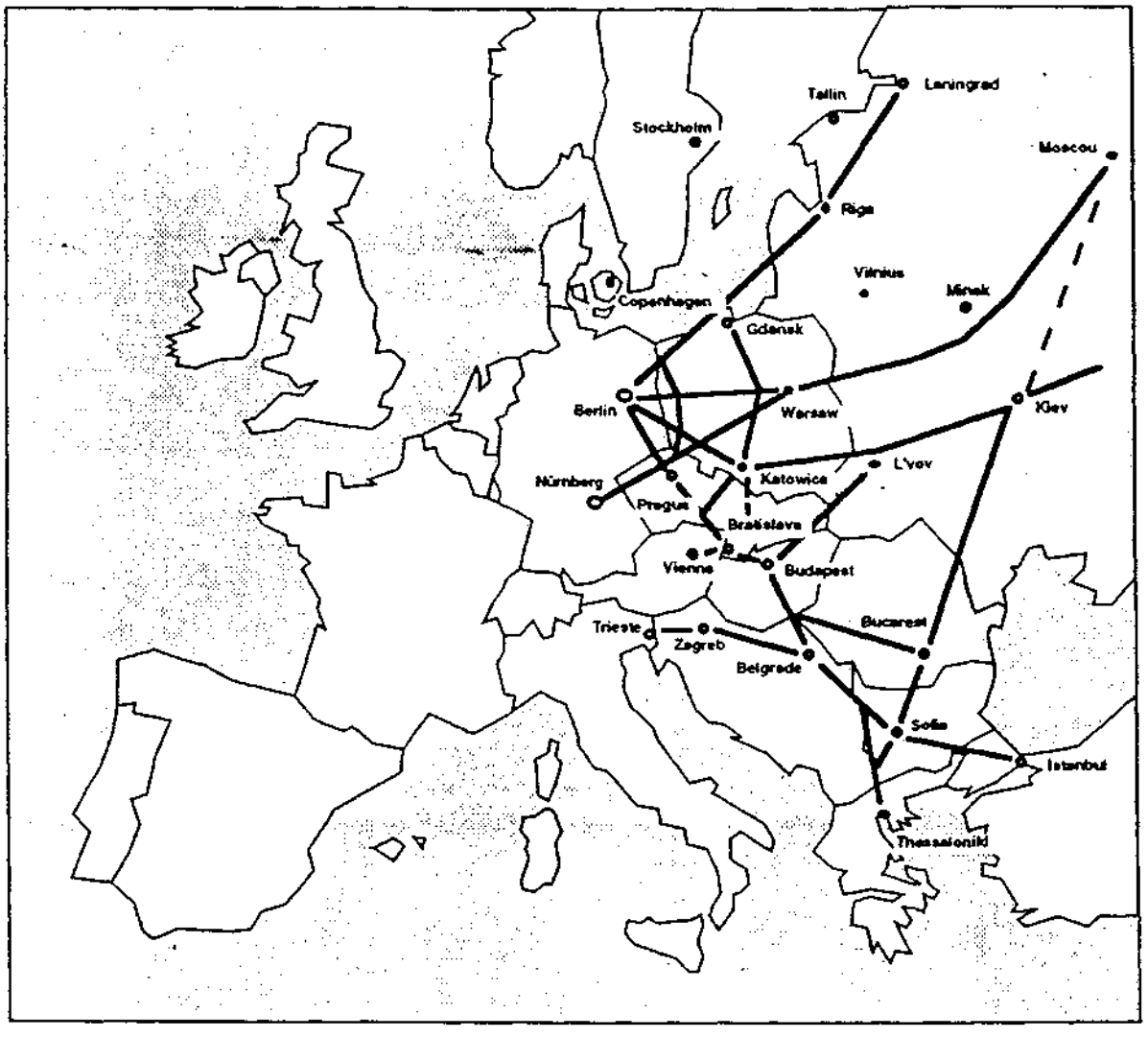


Figure 1. Potential and strategic corridors in East and Central Europe
Source: EC (1992, p.60)

It is thus noteworthy that attempts at improving the physical network infrastructure (such as rail-, motor-, air-, and waterway or telecommunication networks) are not sufficient to overcome the - sometimes much more dividing - non-physical barriers between countries and regions such as language or cultural barriers based on tradition or historical heritage. In particular, the unification of Germany and the recent opening of the borders to eastern Europe have demonstrated that bridging these non-physical gaps may take much longer than the re-integration of transport and communication networks, even though this alone may require decades. Thus there is apparently a tension field between potentiality and bottlenecks in the European restructuring process.

The emerging European network is not a uniform, smooth or equally accessible network, but is characterized by a **dialectic between integration and disintegration**, which might erode the integration benefits. Examples are:

- political conditions, notably economic openness vs. closure caused by civil wars;
- socio-psychological motives, in particular a sense of locality vs. European citizenship;
- institutional considerations, characterized by the decline of the nation-state vs. the strive for regional independence;
- industrial interests, asking simultaneously for free competition vs. European protectionism.

These observations call for due attention to be given to network behaviour. As a research theme, networks are no unknown territory. There exist approaches in mathematical topology, electrical engineering, hydrology, transport and information science and operations research which treat networks as directed graphs with fixed capacity carrying flows of different speed, intensity and direction. However, these concepts of networks are too limited to capture the complexity of interaction between network flows and the behaviour of the human actors operating and communicating over these networks. Only recently there have been attempts in sociology and political science to address these richer but much less tangible issues of social or political networks. The merging of the above two directions of thought (which may be provisionally termed 'hard' network theories and 'soft network theories) seems to be a timely - and for decision-making in Europe extremely relevant - research agenda.

Emerging research questions on European networks are inter alia:

- predictability of European 'surprises'; do networks act as platforms creating conditions for more stability in a socio-economic and political sense?
- global (economic, political, social, environmental) impacts of European (dis)integration; will the concept of 'fortress Europe' be re-inforced or revitalized through a network configuration?
- external costs of a European network development; are the social costs of a mobile European economy compatible with the social benefits gained?
- transaction costs of European dynamics; do the sudden jumps (e.g., the German re-unification) not lead to excessive costs which may erode the public support for the new European spirit?

The European network society is not only exhibiting unexpected dynamics, but also a high degree of **spatial mobility** (see Nijkamp 1993). This holds for both residential moves, industrial relocation and international migration. Questions which urgently need clarification are inter alia:

- explanatory backgrounds of a mobile society, at both a micro and meso/macro level
- implications of a 'declining European space' and of the loss of the 'home of man', as reflected in the rapid rise of regional autonomy ideas.
- multidisciplinary analysis and prediction of international migration in the European space, not only in relation to guest workers but also in relation to political refugees (Europe as an immigration continent).
- interrelationship between a mobile network society and (global and local) environmental externalities, especially from the viewpoint of global environmental change.
- the role of new technologies (e.g., telematics) on the behaviour of people in a dynamic European network space and the design of new maps of Europe that might emerge (see e.g. Masser et al., 1992).

It goes without saying that the construction of network society does not materialize automatically, but requires dedicated efforts from both the public and the private sector. Substantial capital investment is required to construct a high quality network and difficult decisions have to be made if the European dimension is considered as important as the national concerns. Traditionally, most transport infrastructure investment has been carried out by national governments in the public sector, and it is only in the communications sector that the possibility of private capital has been explored. New European agencies (e.g. EBRD and EIB) have been set up to adjudicate on new investments, and possibilities are also being considered of joint venture projects between the private and the public sectors. In the operations of transport and communications markets, many European countries have had different traditions, some based on strong central intervention and others allowing much greater market freedom. Under these different political regimes, networks evolve in different ways. For example, with respect to bus and air transport in a deregulated market the structure moves from a comprehensive network of services with many links to one based on a hub and spoke configuration with longer distances to be travelled, but with more frequent services. There are significant savings to the operator and entry to the market may be difficult.

In the context of regulatory policy on networks the role of governments is of utmost importance. Most decisions on European networks are taken by national governments through well established procedures. As transnational European networks evolve, many decisions will have to be taken by international agencies.

This requires that new institutional, organisational and legal frameworks be established. The roles of the different political, legal, financial and planning agencies will have to be resolved, together with an understanding of how decisions are taken. The implications of decisions taken at one level in the process will have to be accommodated at other levels if integration, equity and efficiency are to be maintained. The current debate on subsidiarity within the EC and the appropriate form of Environmental Impact Assessment in transport investment decisions is a good example of the problems raised. In addition to the EC political dimension, there are important issues of harmonisation and standardisation in networks, access to information, the organisational culture of networks and institutional and organisational barriers in networks.

## 3. The Role of Transport in the European Network

Networks generate synergy through (physical and non-physical) spatial interaction. Transportation fulfils a key role in modern societies, not only for road users, but also for many other actors: public authorities, network operators, industry and society at large. In the same vein, transport is assuming a central role in the new European force field. The context and nature of European trade and transport is entering a new era. As mentioned before, in recent years, Europe offers a scene with dramatic changes: integration of the EC market, desintegration of various nation states, and more openness between all countries and regions in Europe. From a global perspective, traditional patterns of competition - within national borders - are increasingly being replaced by vigorous competition on a multi-national and even worldwide scale. "Intra-country" competition is being replaced by "inter-trade-block" competition, since traditional boundaries disappear; this takes already clearly place in Europe and will take place in other parts of the world as well. Countries within such trade-blocks are becoming part of an open economic network with often European or even global dimensions. To maximize the competitiveness of such a network, and thereby maximize its socio-economic potential and performance, the quality of its transport infrastructure is of critical importance, as transport has become an important component of modern production processes, among others because of intensified division of tasks between firms (in different countries) and the logistic integration of business processes. At the same time, large metropolitan areas appear to become poles of competition in an international context, so that also the quality of a metropolitan network plays a pivotal role.

As a result of globalization and the rapid rise in international interaction and communication, transportation in Europe (both passengers and freight) has grown enormously, especially in recent years. As the supply of infrastructure - for various reasons - followed this trend only in part, existing infrastructure bottlenecks have been accentuated. This is a very serious problem, since economic development and infrastructural development have always been strongly interlinked, as is shown by hundreds of years of European history. The full benefits of the foreseen Internal European Market will only be reaped in case of

effective (physical and non-physical) infrastructural adjustments in Europe. What is needed in this context, is European - and **not** national - thinking and action in infrastructural policy, based on knowledge of past successes and failures in infrastructural planning and of the future needs of the economy, the people living in Europe and their (increasingly threatened) (natural) environment. Not only in the field of passenger transport, but notably in the field of freight transport, networks in Europe are not performing at a competitive scale. This holds for all six basic networks: rail, combined transport, road, inland waterways, airports and seaports.

Furthermore, the structure of production, distribution and transport goes through a rapid transition phase. Integrated logistics inside firms is increasingly linked to external distributional and market logistics, a tendency which leads inter alia to **logistic platforms** in an international network in order to fulfil the needs of just in time (JIT) delivery and material requirements planning (MRP). Multimodal transport will play a critical role in this new development, as is also witnessed in recent policy documents of the Commission, e.g. in the framework of the EURET programme.

The trend towards globalisation (or at least internationalisation) and the need for more competition at all levels in the new European setting have provoked a profound interest in the functioning of networks in Europe. Traditionally, the interest in networks was instigated by supply side motives, but it is increasingly recognized that new competitive behaviour of firms in Europe requires us to focus much more directly on those actors who coordinate, manage and operate flows in this network. Consequently, much more attention is needed for **demand driven** activities in the transport sector.

Unfortunately, a profound interest in a **European** orientation of users and organizers of transport in cross-border networks has until recently not been very significant, as transport policy and planning were seldom performed at this scale. National frontiers have always provided a clear physical and institutional barrier between countries, even though creative behaviour of network actors has induced growing transport demand in Europe. Intra-European transport infrastructure networks have not followed this rising trend in international mobility and show nowadays various bottlenecks in terms of **missing links** and **missing networks**. The emerging Internal Market between the twelve members of the European Community has put the focus of European politicians and industry (in a more pronounced way) on issues of socio-economic harmonization in order to remove distortions to free competition between industries in its member states, and as a result increasing consideration is now given to transportation. The Maastricht Treaty reinforces the critical function of transportation (infrastructure) for economic cohesion in Europe. But the way towards real value added networks based on **interoperability**, **interconnectivity** and **integrated chains** is still very long and full of obstacles, as it also requires a focus on competitive actors in the transport market.

Consequently, a new element to be considered in the current European transport policy scene is the changing role of actors in this field, in both the public domain (e.g., infrastructure owners or transport authorities) and the

private domain (e.g., freight forwarders or logistics suppliers). A major issue is whether and how transport regulatory policy can be used to create conditions for fair competition, based on a creative division of tasks between public authorities and private actors with the aim to generate added value on using intermodal networks in Europe.

Clearly, economic development and infrastructure development generally, reinforce one another. Therefore, the European economy will remain critically dependent on **well functioning core networks as catalysts for future development**, so that networks become a vehicle for indigenous development. There is nowadays however a growing awareness that the current European infrastructure network is becoming outdated, without being sufficiently upgraded or replaced by modern facilities which would position the European economies at a competitive edge. **Missing networks** emerge because transportation systems are developed in a segmented way, each country seeking for its own solution for each transport mode without keeping an eye on the synergetic effects of a coordinated design and use of advanced infrastructures by various actors. Another reason for missing networks is the focus on hard ware and the neglect of soft ware and organizational aspects as well as financial and ecological implications. Cabotage, protection of national carriers, segmented European railway companies, and lack of multi-modal transport strategies are but a few examples of the existence of low performing European networks. A European orientation towards the needs and behaviour of key actors for the integration of transport modes is necessary to cope with the current problems of missing and competing networks. It is therefore of great importance that the idea of Trans-European Networks is nowadays strongly advocated by the European Commission. But it is equally important that the strategic position of public and private actors (suppliers and users) is better understood and taken care of in network policy. Creative use of multimodal networks may turn competition into complementarity and better ensure sustainable transport. In conclusion, future of a unified Europe will be critically dependent on the functioning of strategic infrastructure networks which are **interconnected** in terms of (1) **integration** between different layers of a network (e.g., coordination of high speed/long distance networks such as TGV or airplane and lower speed local networks such as light rail or roads), and (2) **intermodality** between different competing or complementary network modalities. In this respect also the quality of **nodal centres** (terminals, stations, urban centres) plays an important role, as well as the frequencies of different types of transport (or carriers) in Europe.

The notion of **interoperability** of networks, as advocated in the Maastricht Treaty, generates a series of important issues which deserve thorough attention from the side of policy-makers and the research community:

- the operation of transnational networks, seen from the viewpoint of European cohesion and East-European (re)integration
- the close connection between the development of transport networks and (tele)communication networks (including new logistical systems) and their potential implications for the European space (e.g., polarisation tendencies towards larger metropolitan areas)

- the new roles of public and private decision-makers, where a creative division of tasks has to be found between public authorities (urban/regional, national, European) and private actors (transport operators and logistics suppliers) in order to generate value added networks
- the interconnectivity of high speed long distance networks and new regional-local infrastructures in central nodes of the European network
- the role of physical barriers (and organizational impediments) which reduce the benefits of economic integration in Europe (including the connections with Eastern Europe)
- the emerging conflict between environmental sustainability, infrastructure expansion and competing networks (notably competing transport modes)
- the impact of new transportation, logistic and (tele)communication technologies on infrastructure life cycles in the European space
- the lack of standardisation of transport systems technologies in Europe, which hamper the full benefits of an interoperable European network
- the completely different financing regimes for European transport modes, which prevent a fair competition
- the lack of strategic insight into the linkage between European networks and global networks developed in other regions outside Europe
- the behaviour of 'network actors' who aim to fulfil the needs of a global (or European) economy.

Consequently, the policy agenda for interoperable European networks is vast (Capineri 1993) and deserves much attention in the near future, with a particular view on integrating network operators.

## 4. The Role of Actors in a Network

International competitiveness is a necessary condition for enhancing the level of European economic performance after the completion of the internal market. Segmented and nationalistic infrastructure policy may at best serve the short-run interests of infrastructure owners, but is in the long run to the detriment of all network owners (and users) and affects Europe's economic position. Thus transportation and communication policy requires a balanced implementation of actions which ensure a consideration of both private and social costs, and a global orientation which exceeds country-based or segmented policy strategies. The current plans regarding the European high speed railway system are a clear case of creative action-oriented policy analysis, even though the technology policy underlying this system serves mainly the interest of individual countries.

Networks are at the same time vehicles through which nations (or regions) can control part of the international (or interregional) competition. Monopolistic and oligopolistic structures in space are the result. The socio-economic benefits of coordination and harmonisation are often neglected in favour of emphasis on

narrow nationalistic interest. This opens much new research in the economic importance of the existence of (deliberate and coincidental) barriers in international networks (including the missing links and missing networks phenomena).

Although at both national and European levels the attention is in recent years increasingly focused on Trans European Networks, it turns out that for the time being the actual interest in Europe is mainly addressed towards separate, i.e. single mode, transport solutions. Only recently, the awareness is growing that interconnected networks (supported inter alia by modern telecommunications and information technology) may offer a high added value. Despite its potential, **interoperability** between different modes with a view on **cohesion** of European transport systems in order to use the transport capacity as efficient as possible appears to be very difficult to achieve in practice. Two factors of strategic importance have to be envisaged in this context:

- **complementarity** between different nodes in order to benefit - in terms of added value networks - from synergy (e.g., rails and waterways, roads and airports etc.)
- **competition** between different nodes in order to operate under the most cost-efficient conditions at a European scale (e.g. common carriage).

It is clear that the goal to maximize value added from the use and operation of a multimodal international network will generally speaking best be reached if the impediments to free access of networks are at a minimum. Only reasons of socio-economic distributive impacts may temporarily restrict free entry, but efficiency through competition is normally best served through actors with a free choice of different modes. This means that integration benefits will be higher as third parties are able to reap the advantages of an interconnected infrastructure network. This once more emphasizes the need to look into the behaviour of key actors as a foundation for international network policy. Thus due attention is needed for the integration functions of new actors/operators in the transport market.

Transportation planning is often associated with physical movement, with infrastructure configurations and with regulations. Far less attention is paid to the way the transport market is organized, and how this organization uses and shapes transport modalities. Especially the transaction theory of firms has shed new light on the interesting link between firm behaviour and network development (e.g., hub and spokes systems). Even though transport systems exhibit fragmented networks, various operators (e.g., forwarding agencies, logistics suppliers) - through multi-modal shipping, integral logistics and neo-fordist customized delivery - are able to exploit transport networks for generating added value, not only in a local-regional but also in an international context. Globalisation of markets, new forms of competition, more client orientation, integration of production and warehousing, and transport innovations are shaping new opportunities for creative actors in the transport market reflected in joint ventures, 'filières', vertical integration etc. (see Figure 2). These new operators may to a large extent be considered as integrating actors in a spatial transport system

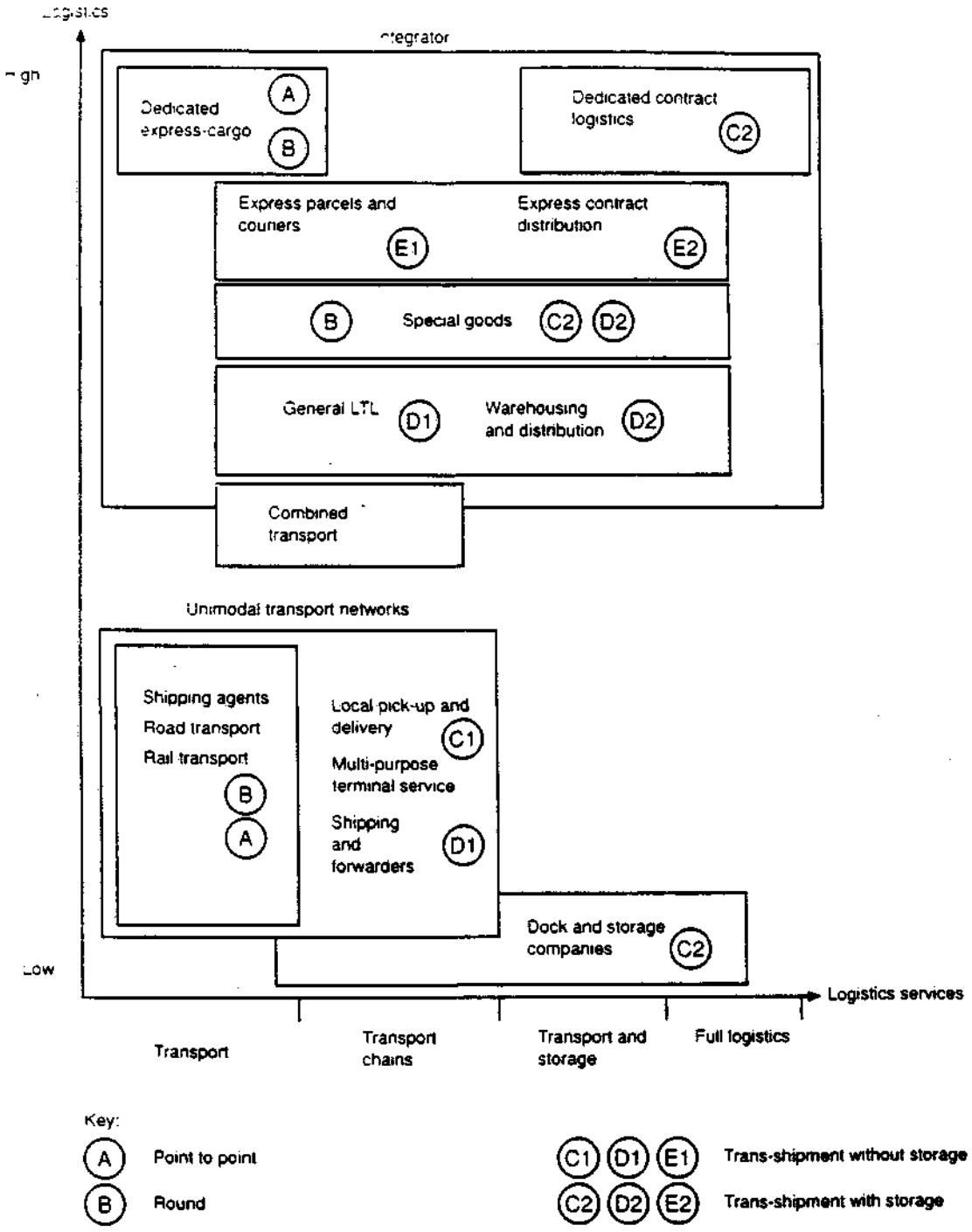


Figure 2. Types of logistics services providers
Source: OECD (1992, p. 89)

which can be typified according to:

- the structure of the transport market (free competition, regulated market etc.)
- the type of mode (road, rail, waterways, air etc.)
- the geographical coverage (from local to global)
- the quality of service (including scale and scope), and the tariff system
- the sophistication of transportation technology (e.g., logistic platforms, telematics, information systems)
- the structure of the network (e.g., hierarchy, hub and spokes etc.)
- the territorial and modal policy competence on networks
- the barriers to a full performance of networks (e.g., regulations, conflict of competence etc.)
- the integration with telecommunication (EDI, e.g.).

The role (change) of key actors in the global transport network - connecting localities with a global market - is represented by way of illustration in the "inter-transport" matrix[1] in Table 1. This matrix allows to clarify the integrating potential of networks as carried out by the actors/operators.

In this matrix **interoperability** refers mainly to operational and technical uniformity which allows actors and operators to use and link various layers or components of a transport network. **Interconnectivity** is in particular concerned with horizontal coordination of and access to networks of a different geographical coverage. Finally, **intermodality** addresses the issue of a sequential use of different transport modes in the chain of transport. The Inter-Transport Matrix depicts essentially the integrating capabilities of various actors in the context of various ways of generating an added value in combined/coordinated network infrastructures.

The Inter-Transport matrix is a useful vehicle for creating an operational typology of actors, their roles and their limitations in the emerging European network economy. Such a classification would concern both passengers and goods, while also information - as a complement or substitute for physical transport - may be included. For example, for passengers a distinction may be made into high speed business trips, short-range regional and local commuting and social trips, and long-range tourist trips. Similarly, for freight transport we might distinguish between express delivery service, containers, swop bodies, bulk goods (short-range) and bulk goods (long-range). Thus a range of actors may be distinguished whose task it is to combine network segments and modes into an efficient chain of operations.

The current popularity of network concepts is undeniably connected with the declining domain of public policy: networks tend to become the vehicles through

[1] The author wishes to thank Michel Frybourg for his inspiring creativity in developing this idea.

| "Integr-actors" | "Inter-actors" Interoperability | Interconnectivity | Intermodality |
|---|---|---|---|
| Territorial authorities/ policy makers | • safety norms<br>• environmental standards | • local/regional<br>• national/ European | • nodal design<br>• tariff system |
| Private or (semi-public) operators or organisations | • pre-competitive research | | • logistic suppliers<br>• value added networks<br>• regulators |
| Industrialists or technical research community | • (pre-)standardisation<br>• infrastructure technology<br>• vehicle dimensions | • information technology<br>• electronic customs | |

Table 1. The Inter-Transport Matrix

which competition is flourishing. Both external megatrends and internal system's forces necessitate a market orientation parallelled by risk minimization strategies. Networks seems to offer more certainty in terms of expected consequences of strategic decisions and hence may be regarded as a major critical success factor in (inter)national competition.

The set of network policy actions that can be envisaged is vast and ranges from direct public supply or intervention to user charge principles or complete laissez-faire. A major challenge of network owners and operators will be to formulate strategic plans that convincingly incorporate non-zero-sum game strategies with gains for all parties involved. This may be illustrated by means of some examples.

The 'user charge' principle in transport policy has in particular become a success in those countries where suppliers and users of transport infrastructure were all enjoying benefits (e.g., suppliers by receiving more revenues from road charges, users by increasing their travel speed etc.). Likewise the question of intermodal substitution (e.g., from the car or lorry to the train) will critically depend on the willingness to implement such incentives.

A subsequent issue - and probably the most difficult one - is the design of an **assessment/evaluation methodology** for transport network policy-making. This would have to be based on **performance indicators** for both private and public actors:

- productivity gains or added value
- network synergy based on public service delivery to private and public actors
- competitive improvement for firms

- spatial-territorial integration
- technological harmonization
- removal of bottlenecks or spatial externalities (e.g., congestion, environmental stress, road fatalities)
- user possibilities by various specific groups (e.g., small and medium size enterprises)
- financial costs/revenues for public, (semi-) public or private bodies in charge of operating the infrastructure
- contribution to European cohesion
- access and benefits for less favoured regions
- intermodal complementarity
- degree of interoperability
- use of telecommunication technologies (e.g. informatics, telematics)

The previous building blocks for an evaluation methodology can be included in a comprehensive policy evaluation scheme for integrated networks characterized by a multiplicity of operators (see Table 2). Clearly, the implementation of this scheme would require quite some field work, in which measurable indicators would have to be gathered.

It should be added that such indicators would have to be collected over a time span which would allow for change. Thus some sort of an observatory based on a systematic monitoring of information might be needed. The overall evaluation framework might be based on four different assessment angles:

- technological harmonization of multimodal networks
- efficiency growth for private and public actors using these networks
- distributional equity for all groups and regions involved
- sustainable development in terms of environment, resources and safety.

| | roles of actors | | barriers | | synergy | | |
|---|---|---|---|---|---|---|---|
| indigenous features | demand | supply | demand | supply | inter-operability | inter-connectivity | inter-modality |
| types of modes | | | | | | | |
| product orientation | | | | | | | |
| technologies | | | | | | | |
| organization | | | | | | | |
| regulatory regimes | | | | | | | |
| financing schemes | | | | | | | |
| pricing schemes | | | | | | | |
| product orientation | | | | | | | |

Table 2. A policy evaluation scheme for network operators

The new challenge is then to identify how private and public actors (and chains of actors) will use the new opportunities in the emerging European network economy, including creative ways of coping with bottlenecks.

## 5. Borders, Barriers and Maps in the European Network

In an open network economy borders should only play a modest role. In the past years many old borders have vanished and new political-economic maps have emerged. Especially Europe has exhibited a fast dynamics in this respect, but alto other continents (e.g., NAFTA in North-America) are gradually following the same trend. This means that the ongoing process of economic integration and economic competition in an open network economy is creating new roles and new possibilities for national states, cities and regions. Barriers related to former borders may disappear, but national self-interest may create new barriers. Thus renewal and establishment are coping with one another (see Nijkamp 1994).

Policy-makers find themselves in a difficult position as the deregulation paradigm may prevent them from a direct intervention. Controllability via public agencies becomes thus more and more problematic. Cities and regions tend to form their own strategic alliances without too much consideration for the former borders of nation states. At the same time it has to be recognized that transborder cooperation may generate unexpected benefits, as the economies of scale of new strategic alliances across the borders are significant (see Ratti and Reichman 1993). Consequently, borders in a permeable network are not necessarily barriers to development, but also windows of opportunities. This does not only hold for commercial activities, but also for exchange of information and knowledge. In general however, borders and barriers lead to a lower performance of a network, a border because of geopolitical reasons and a barrier because of institutional, physical or human-made impediments. They form an obstacle in a free transfer of people, goods or information. Clearly, some of these impediments are given by nature (e.g., mountains, lakes), but most of them are man-made and created for the sake of convenience or protection or are unintended effects or spinoffs of other barriers. Examples of man-made barriers are: congestion, fiscal constraints, institutional rules, technical conditions, market regulations, cultural inertia, language barriers or information shortage. All such barriers hamper competition in an open network economy.

In Europe, the traditional patterns of competition - within national borders - are increasingly being replaced by vigourous competition on a multi-national scale, since traditional frontiers disappear. Regions of different countries are becoming part of a **transnational economic network**. These developments may lead to a tendency in which established economic centres are losing part of their innovative potential in favour of regions with **medium-sized cities**. The network economies in the French regions Provence-Alpes-Cote-d' Azur en Languedoc-

Rousillon based on innovative small and medium-sized companies maintaining linkages among themselves and with large enterprises may serve as example for this tendency. Here various forms of expertise in **collaborative networks** transcend the older types of industrial strategy based on **internal concentration.** Besides these French regions the "Third Italy" is an example of a territorial network of small business maintaining more or less formal relations.

The geo-political changes at the regional level do not only concern the position of European centres (e.g., the shift fro Bonn to Berlin, or the emergence of new capital cities in the former Yugo-Slavia and USSR), but also the former border areas. The internal border areas in the EC are likely to receive a sudden improvement in their competitive position in view of their shift from geographical 'dead ends' of a country to new gateways, but the external border areas do not have such perspectives, so that their peripheral position may even be aggravated as a result of more integration and cohesion inside the EC, unless new transnational networks to the East are being built. Furthermore also rural areas and coastal areas and islands will be facing many new challenges with a clear perspective on a structural better position in the 'Europe of regions' (see EC 1991, Amsterdams Historisch Genootschap 1992).

Economic history shows that Schumpeterian waves of economic restructuring appear to discriminate among various regions or cities. In the past decade especially the **information and communication sector** is often regarded as the key sector in the so-called fifth Kondratieff wave. This sector comprises inter alia computers, electronic capital goods, telecommunications equipment, optical fibres, robotics, ceramics, data banks, information services, micro-electronics and biotechnology. The knowledge and information component appear to be extremely important in this new technology sector, and this has some authors led to the conviction, that so-called 3C-plus regions (regions with creativity, competence and connectivity) are the most promising areas for spatial-economic dynamics. On the other hand, the losers in this game will be the 3C-minus regions which are characterized by congestion, criminality and closure.

The creation of a **'new technology'** niche in a region is often regarded as a guarantee for regional revitalisation. However, the regional innovation potential is a multi-faceted phenomenon which shows much variation, as is also witnessed by Silicon Valley, the Greater Boston area, the London-Bristol corridor, the Dutch Randstad, or the greater Barcelona area.

The expected changes in the European scene have generated a broad interest in the future economic maps of Europe, based on 'plausible rational speculation'. Examples of such new maps are the 'blue banana', the 'blue star', the 'green grape', the 'Euregg-model' and many others (an overview of various European maps is contained in Nijkamp et al. 1993). Such maps are not meant to be blueprints or predictions, but thought experiments based on plausible scenarios (economic, social, political, technological etc.). Various interesting sketches of European spatial developments can be found in Brunet (1991). In Figures 3-5 three illustrations of such scenario thinking are given:

- a 'business as usual' scenario where existing force fields based on economic efficiency are reinforced ('la poursuite des tendences naturelles')
- a 'despair scenario' where the Mediterranean edge is economically cut off from the rest of Europe and the force field is oriented to the North-West ('le scénario du désespoir')
- a continental integration scenario stretching from North-Africa and the Mediterranean to the Baltic area ('modéle strategique des liaisons européennes').

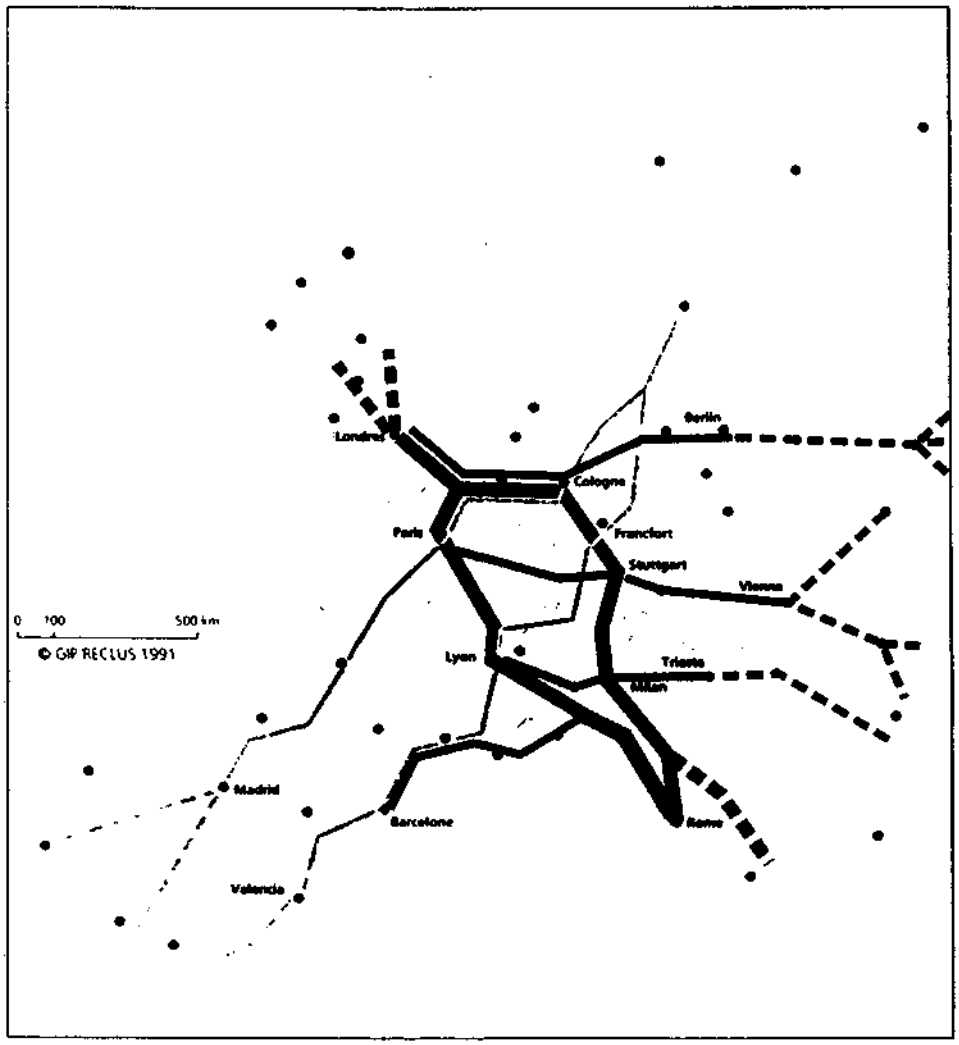


Figure 3. A European 'business as usual' scenario

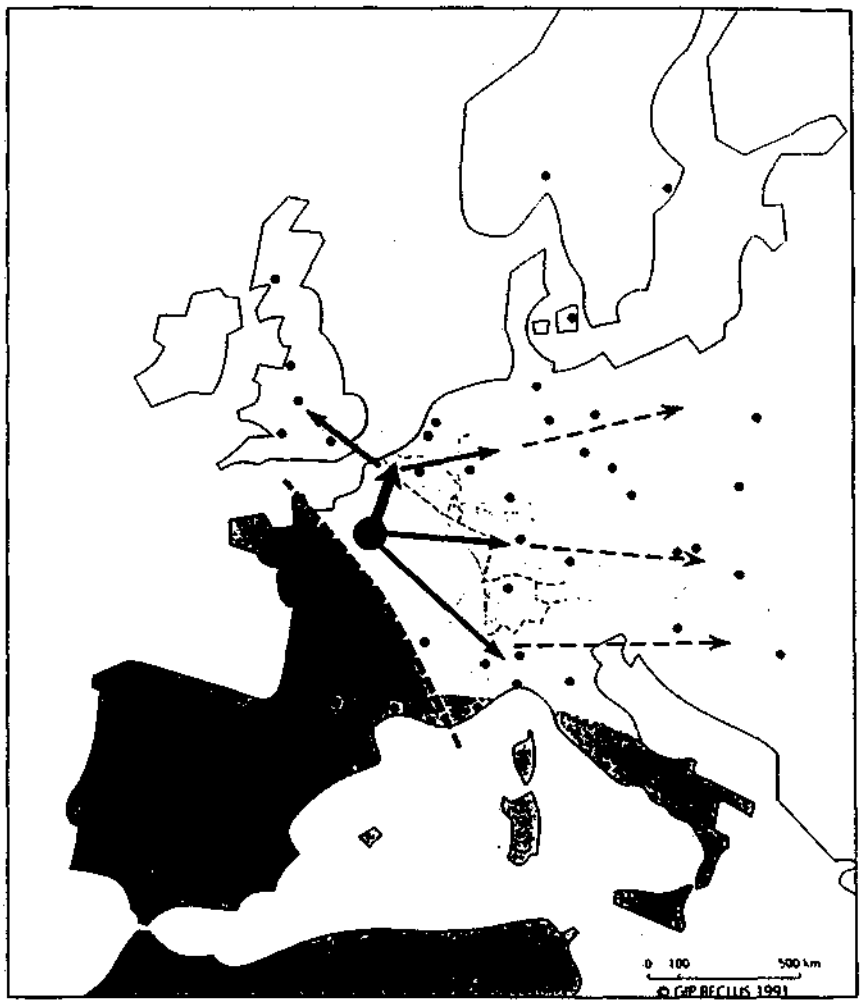


Figure 4. A European despair scenario

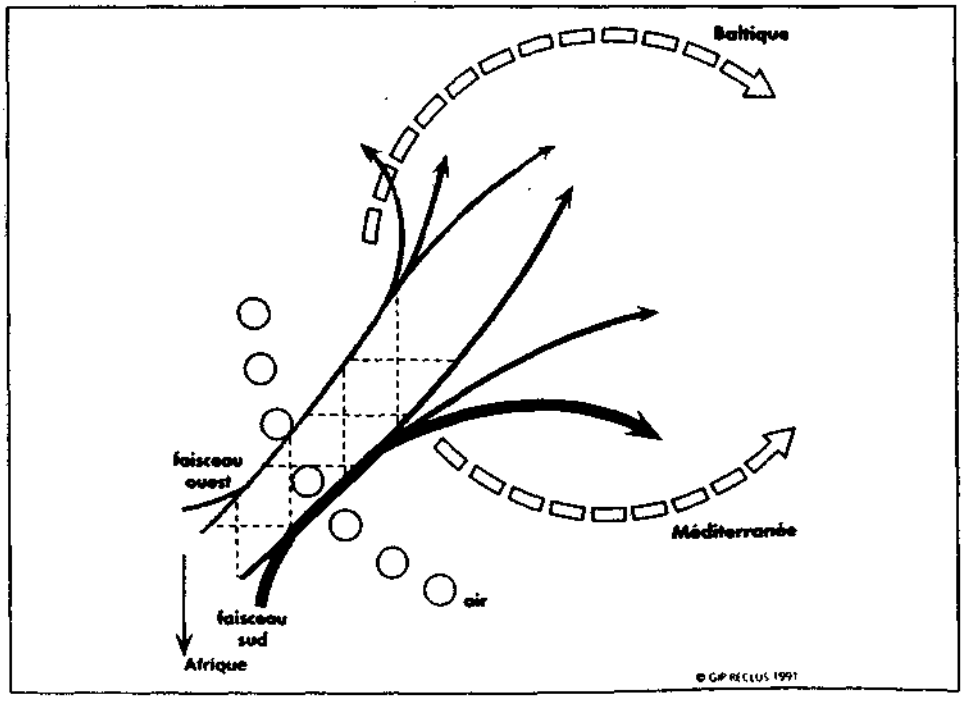


Figure 5. A European continental scenario

The main intention of such scenario maps is to identify which policy actions (spatial, economic, technological) - and at which levels - are necessary in order to cope with the negative aspects of such scenarios once they would take place. A common set of policy strategies which would in all cases be necessary is difficult to identify, but it seems plausible that the following guidelines for European network policy seem plausible:

- incorporation of European dimensions in local and regional policy-making

- free access to multi-modal European networks in order to stimulate international competition rather than to protect local or regional home markets

- technological standardisation within and between all infrastructure networks in all European countries, in order to reap the fruits of real international integration in Europe

- removal of all bottlenecks (institutional, technical) which hamper a real interoperability of intermodal network configurations in Europe

- due consideration to all negative externalities of a mobile Europe, for instance, by favouring a more efficient use of existing transport networks (e.g., via telematics) to the detriment of an expansion of physical capacity

- a balanced development between small and medium localities and large internationally-oriented metropolitan areas, as only a European network based on 'glocalisation' will be able to generate benefits which stem from the specific socio-political and economic geography of Europe.

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