NATIONAL TECHNOLOGICAL INFRASTRUCTURE AS THE INDISPENSABLE BASIS OF THE RESPECTIVE ITS ARCHITECTURE

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SUMMARY

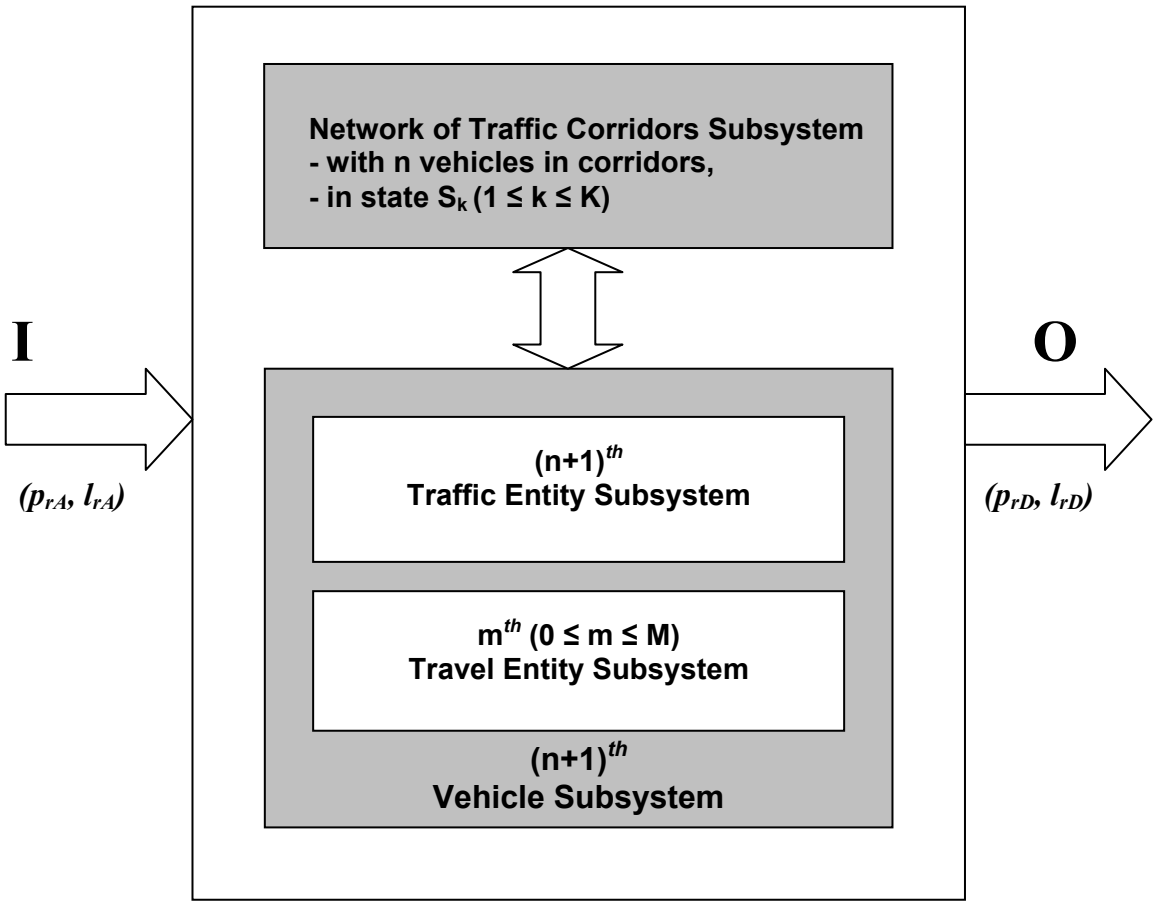
The National ITS consists of parts of a number of other national infrastructure systems, which support the national technological development. In transitional countries the underdeveloped technological infrastructure brings about the application of the short-term feasibility criteria for evaluation of the ITS projects, which cannot be satisfied. The European strategy should promote the development of National Technological Infrastructures as indispensable basis for ITS development.

INTRODUCTION

The National Intelligent Transport Systems in developed European countries are complex components of their National Technological Infrastructures. The systems consist of parts of a number of other national infrastructure systems, which support the national technological development. In countries with underdeveloped National Technological Infrastructure, like in Transitional Countries, the attempts to develop the National ITS Architectures result in self-supporting solutions, avoiding even the support of existing, but expensive infrastructure systems. The evaluation of the ITS projects follow the short-term feasibility criteria generally not realisable for national technological infrastructure systems. This is the reason why the European strategy should promote the development of National Technological Infrastructures as indispensable basis for implementation of compatible National ITS Architectures in all European countries.

INTELLIGENT TRANSPORT SYSTEMS AND THEIR ENVIRONMENTS

The Travel-and-Traffic Theory (1) and its application to the development of the National Intelligent Transport System (ITS) Architecture (2) in transitional conditions revealed some features of the system which, if well understood, may facilitate the development by substantial improvements of the operational, technological and economic feasibility of the respective projects.



p_{rA} - input space position coordinates of the travel entity r, where A denotes attachment,
l_{rA} - input age of the travel entity,
p_{rD} - output space position coordinates of the travel entity r, where D denotes detachment,
l_{rD} - output age of the travel entity.

Figure 1. Transport part of the Travel-and-Traffic system in transport.

Some fundamental concepts of the theory have been reported at several ITS World Congresses (3). In Fig. 1 and Fig. 2 the concepts are summarised through the application of the theory to the National Intelligent Transport System. The most important benefit of the theory is the possibility to discuss the National ITS Architecture in terms of General System Theories like one single complex system. This opens more profound insight into features of all ITS subsystems and their mutual couplings, and into ITS environment and couplings between ITS (or its subsystems) and the environment.

The attempts to develop the national ITS architecture by application of Travel-and-Traffic Theory resulted in facing the problem of underdeveloped or mismanaged set of national infrastructure technological systems, especially in countries in transition (from planned into free-market economy). The problem may be summarised as follows.

The public support to the development of national infrastructure systems in technology (like education, information, data, transport, telecommunications, post and other respective systems) is under critical level, leading to the mismanagement of the systems (generally underdeveloped). Having no support in national development policies, the infrastructure systems lose their infrastructure role.

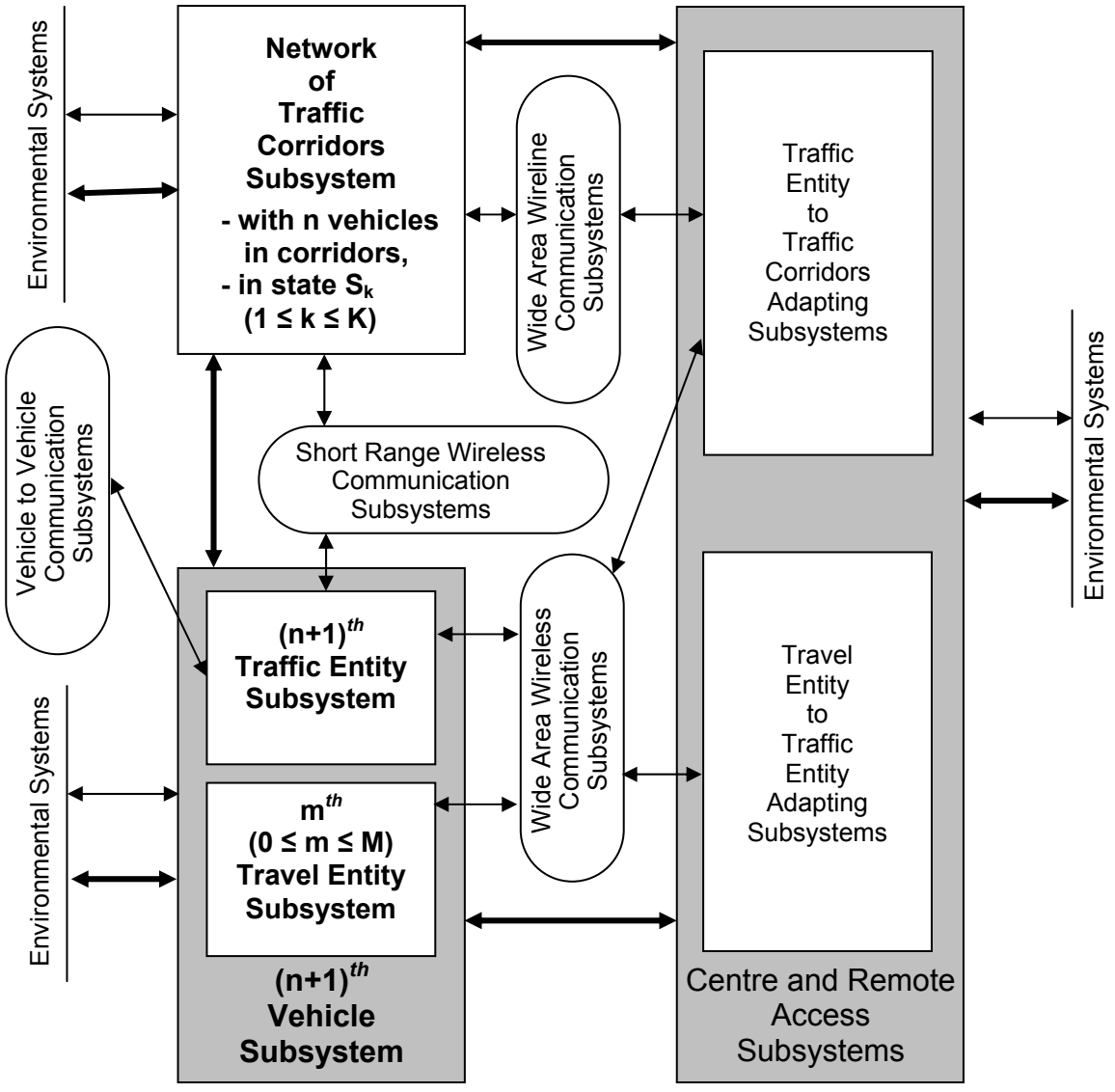


Figure 2. Intelligent Transport System

Instead of facilitating primarily the technological and economic development of the country, they become short-term economic undertakings, based on concepts of self-supporting solutions, and avoiding (as much as possible) any dependence on other national infrastructure systems.

Complex infrastructure systems, which consist of subsystems developed in other infrastructure systems, and which depend on all other (well developed) infrastructure systems in the country (like the Intelligent Transport System does) cannot be successfully developed under such conditions. Neither the criteria of economic feasibility of respective projects can be satisfied, nor the short-term efficiency and effectiveness of the systems may be achieved.

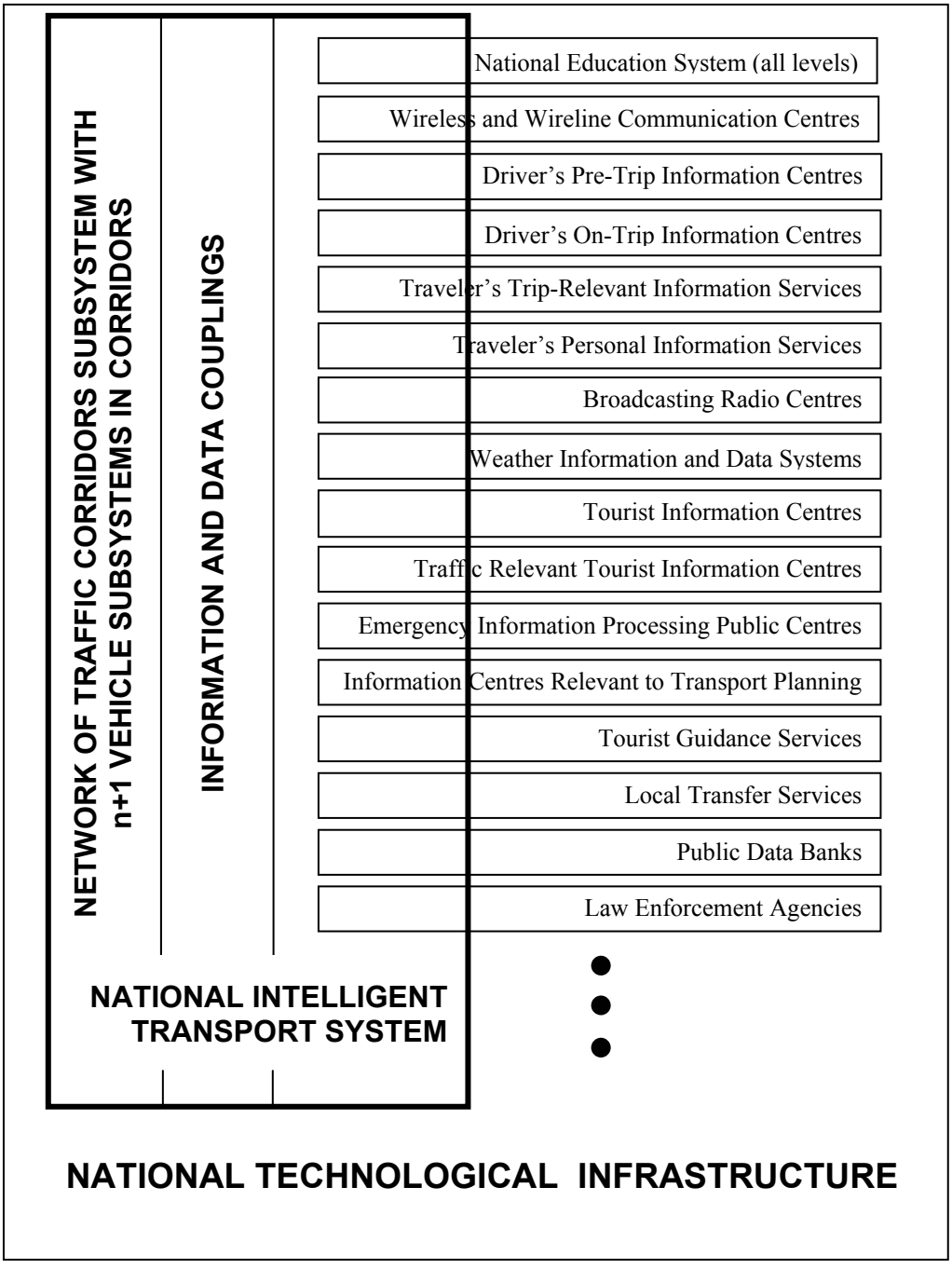


Figure 3. Part of the National Intelligent Transport System built of components of the National Technological Infrastructure, based on information and data couplings.

The comprehensive analyses of some models of National ITS Architectures (4), based on Travel-and-Traffic Theory (reported on previous Congresses by the same authors) gave us

better insight into the above mentioned problems. The most important result was: the analyses revealed strong interactions between transport subsystems (a variety of transport and transmission Networks of Traffic Corridors and all kinds of Vehicles with Travel Entities) and other systems in their environments (a variety of Service Centres, many Information Centres, ever rising number of Data Banks, etc.).

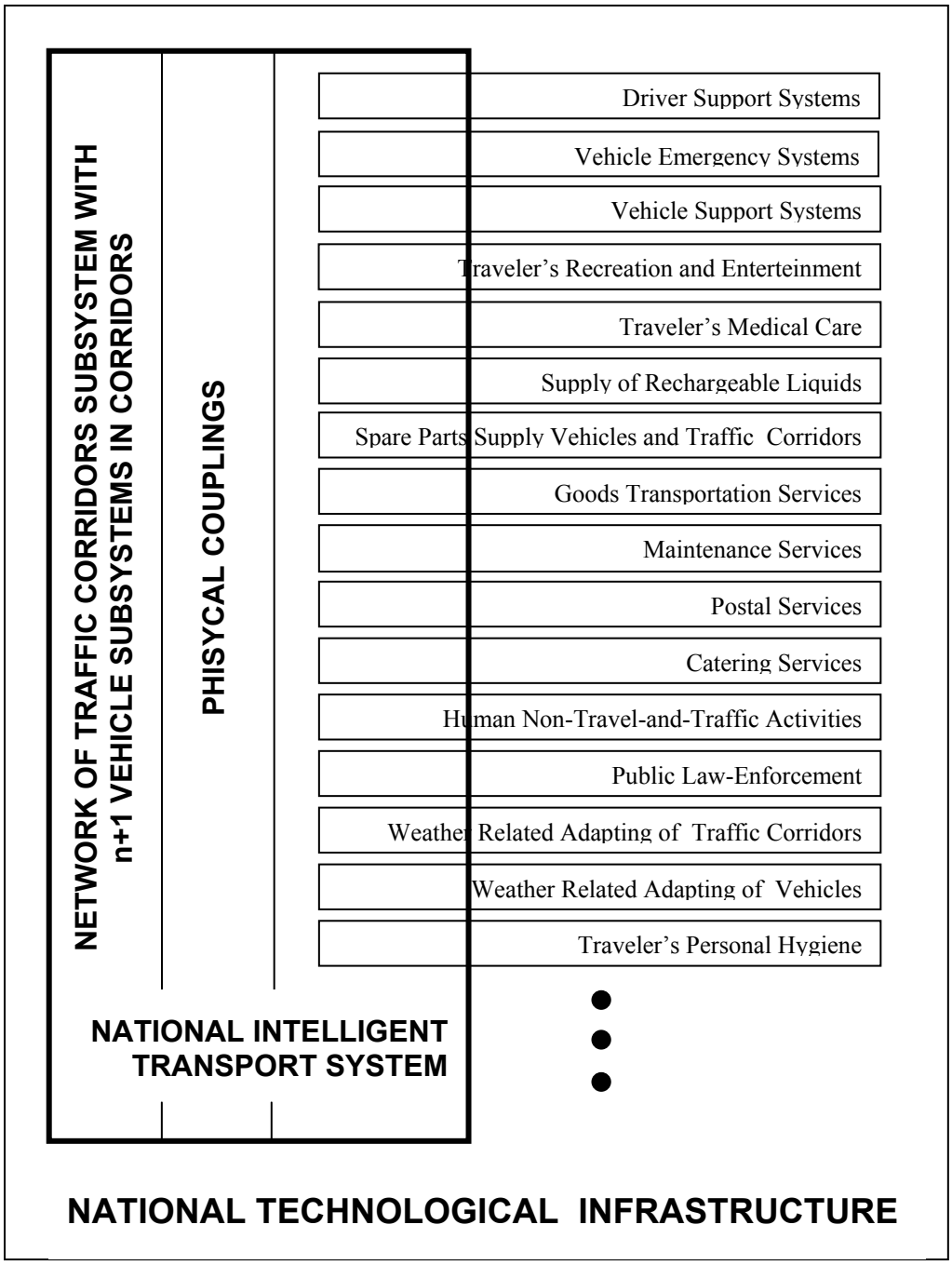


Figure 4. Part of the National Intelligent Transport System built of components of the National Technological Infrastructure, based on physical couplings.

NATIONAL ITS AND OTHER COMPONENTS OF THE RESPECTIVE TECHNOLOGICAL INFRASTRUCTURE

Generalised results of the analyses are described in terms of the National Intelligent Transport System and the National Technological Infrastructure.

The part of the National Intelligent Transport System built of components of the National Technological Infrastructure, based on information and data couplings, is shown in Fig. 3. The part of the National Intelligent Transport System built of components of the National Technological Infrastructure, based on physical couplings, is shown in Fig. 4.

All results suggested the introduction of the concept of National Technological Infrastructure as the basis for development of appropriate National ITS Architecture or National Intelligent Transport System, and of their implementation.

The results of the analyses are summarised in following statements:

- The National Intelligent Transport Systems in developed European countries are complex components of their National Technological Infrastructures.
- The National Intelligent Transport System consists of parts of a number of other National Technological Infrastructure systems, which support the national technological development.
- In countries with underdeveloped National Technological Infrastructure, like in transitional countries, the attempts to develop the National ITS Architectures result in self-supporting solutions, avoiding even the support of existing, but expensive infrastructure systems.
- In transitional countries the evaluation of the ITS projects follow the short-term economic feasibility criteria generally not realisable for National Technological Infrastructure systems.

CONCLUSION

All statements lead to the conclusion that the European strategy should promote the development of National Technological Infrastructures as indispensable basis for implementation of effective and efficient (mutually compatible) National ITS Architectures, or (in terms of the Travel-and-Traffic Theory) National Intelligent Transport Systems in European countries.

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