TRANSPORT PLANNING FOR EQUITY AND SUSTAINABILITY

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INTRODUCTION

Taken as a group, the transport planning community today has a doubtful reputation. The times have long passed when railway engineers and tunnellers were the heroes of industrial progress and technological efficiency. Today the profession is much more associated - rightly or wrongly - with the planning disasters of the recent past. After all transport engineers were responsible for the atrocious elevated motorway superstructures encroaching on many cities, the *tabula rasa* planning for the sake of undisturbed traffic flows, the enormous waste of urban and rural land for highways and airports, traffic congestion, noise and pollution and all the rest of the evils connected with modern transport. So the image of the profession is still one of stubborn technocrats who in their narrow-minded rationality always place technical efficiency over less tangible concerns such as environmental or social considerations.

However, a review of current political debates about transport and communications in the countries of Europe shows that technological efficiency as a goal for transport planning is increasingly being challenged by other more comprehensive goals. Today basically three fundamentally different, and sometimes opposing, opinions about the desirable evolution of transport and communications prevail. Two of them can be associated with the familiar dichotomy between the goals of *efficiency* and *equity* in economics, where the former is concerned with the maximisation of output from a given set of inputs whereas the second is concerned about the distributional effects of the economic process. Under the influence of ecological crises and diminishing resources, more recently a third goal has challenged the dominance of the former two, ecological *sustainability*, or preservation of long-term ecological balance, which can also be interpreted as a kind of equity between generations.

Societal innovations today are more likely to originate from grassroots movements than from bureaucratic or technical elites, but innovations are not likely to be successful without the consent and active support of the experts because they are the advisers of policy makers and play a key role in policy formulation and review. Therefore new concepts and ideas, once they are taken up by the experts, are likely to have an impact on actual policy making in the future. Therefore the attitudes and perceptions of experts are of interest.

It is the aim of this paper to discuss the attitudes and perceptions of experts involved in transport and communications planning and research based on material of a scenario writing project conducted by the authors as part of the Network for European Communications and Transport Activities Research (NECTAR). NECTAR was set up in 1986 under the auspices of the European Science Foundation. In this network, more than seventy scholars from nineteen European countries are participating in a series of research projects designed to promote international collaboration and the exchange of experience in the field of transport and communications.

One important contribution of NECTAR has been the collection and dissemination of information about research in the field of transport and communication going on in the ESF member countries and about the major trends and tendencies in transport and communications themselves as well as in their socioeconomic, technological and political contexts.

In a first phase of NECTAR, the collective knowledge of its members was tapped through a comprehensive survey of past and current trends in the socioeconomic and technological contexts of transport, communications and mobility, in transport, communications and mobility behaviour, and in the political and institutional framework of transport and communications in the nineteen ESF member countries. The results of this survey were presented in a recent monograph (Nijkamp et al., 1990). In a second phase, one of the core research area groups of NECTAR was set up to explore the *future* evolution of transport and communications in Europe on the basis of the information collected in the first survey in order to identify relevant fields for future transnational research projects from a European perspective and to discuss alternatives for an integrated European transport and communications policy.

The study reported in this paper is one of the products of this group. It set out to develop *long-term scenarios of transport and communications in Europe* and assess the desirability of basic options for transport and communications policy. However, it soon turned out that in order to do that its was necessary to extend the analysis to all human activities which have an impact on transport and communications. So the study changed from a narrow technical projection to a comprehensive assessment of likely and desirable (or undesirable) future scenarios and options for the spatial organisation of society. The results of the study are fully reported in Masser et al. (1992).

In this paper the scenarios themselves will not be described in detail; the interested reader is referred to the above publication. Rather, in order to discuss the attitudes and perceptions of experts involved in transport and communications planning and research, it will be asked how they see the future of transport and communications in Europe in the context of other fields related to the spatial organisation of society, and into which direction they want policy making in these fields to develop. In particular it will be asked whether the paradigm shift referred to above can is reflected by the views of the experts.

1. METHODOLOGY

Scenarios are descriptions of future developments based on explicit assumptions. As a method for exploring the future, scenarios are superior to more rigorous forecasting methods such as statistical extrapolation or mathematical models if the number of factors to be considered and the degree of uncertainty about the future are high. Scenarios have, in relative terms, only moderate data requirements, permit the incorporation of qualitative expert judgment, and, in conjunction with appropriate techniques such as Delphi, facilitate the process of converging initially different expert views towards one or possibly a few dominant opinions. Scenario writing as a group exercise has the potential of generating awareness of factors and impacts which may have not been identified through more formal forecasting methods.

Complexity and uncertainty are clearly high in the case of transport and communications. Transport and communications are closely interrelated with almost all aspects of human life, are linked with social and economic developments, are influenced by technological developments and are subject to numerous political and institutional constraints. Under these conditions, scenarios are perhaps the only method to identify 'corridors' of relevant and feasible futures within a universe of possible ones.

For these reasons, in the study the scenario method was adopted. The scenarios were to be at the same time multinational and multidisciplinary. They were to represent both highly industrialised countries in the European core and less industrialised peripheral countries and to consider aspects from both the engineering and social sciences including economy, sociology, psychology, and political science. Therefore the survey was conducted among all members of NECTAR encompassing transport engineers, planners, economists, geographers, sociologists, psychologists and political scientists from the nineteen ESF member countries. In addition in a second phase junior planners and researchers were accessed in order to highlight inter-generational variations in opinion.

The year 2020 was chosen as the forecasting horizon. This may seem a rather long forecasting period if one considers the speed of change in the socioeconomic and technological context of transport and communications. However, on the other hand, transport and communications infrastructure, because of the heavy investment involved, changes only very slowly, and the introduction of a fundamentally new transport or communications technologies such as high-speed trains or ISDN may even require decades to complete. Conversely, if one looks at the impacts of new transport or communications systems on, say, land use, location of households and firms, etc., these changes become effective only with considerable time lags, and even more time is involved before the changes in travel behaviour induced by these land use changes are felt in the transport system. Political changes are sometimes even slower, as the history of the adaptation of standards between national railway systems in Europe or the slow diffusion of pollution control for cars in some European countries demonstrates. For all these reasons, it was thought to be necessary to study the future of transport and communications in Europe within a 30-year framework.

In order to stimulate thinking in terms of fundamental options for the organisation of postindustrial society in time and space, *seed scenarios* covering all aspects of transport and communications and of their social, economic, technological and political context were compiled. Before these scenarios could be formulated, it was necessary to ask which kind of Europe should be envisaged throughout all scenarios. After the rapid changes in Eastern Europe during the last years, no question could be more difficult to answer. However, it was necessary to fix ideas. Therefore, without being too specific, a few general assumptions about the Europe of the year 2020 were made:

· *In 2020 Europe will be larger than the current EC.* Most likely some or all of the East European countries and the countries now forming EFTA will have in some form joined the European federation. Altogether the European federation will encompass between 400 and 500 million people, more than twice as much as the USA and the Pacific countries.

· *In 2020 there will be a European government.* Most likely, Europe will be a federation of more or less autonomous countries, each with its own legislation, jurisdiction and government. Nevertheless there will be a European president, a European cabinet, and a European parliament with significant powers over member states where European matters are concerned. International Trade and Industry, Research and Technology, Environment and Transport and Communications will be the most prominent European ministries because in these fields the need for integrated European policy-making is most obvious.

· *In 2020 there will be peace in Europe.* Of course this is more a hope than a scientific hypothesis, but a necessary one to make any predictions about the future. In short, it is assumed that between now and the year 2020, there will be no major political or economic crises, climatic or nuclear catastrophes, civil wars or military aggressions that may substantially disrupt the peaceful process of European integration.

Beyond these assumptions, everything else was left open. No assumptions were made about the forces that will shape policy-making in local, regional or European governments. However a set of possible *political directions* or *paradigms* was identified.

The three goals efficiency, equity and sustainability were chosen as the major directions of three *global scenarios* to serve as a point of departure for the study. In the study, they were associated with the keywords *Growth, Equity* and *Environment*:

- **The Growth Scenario (A).** The first scenario shows the most likely development of transport and communications in Europe if all policies emphasised economic growth as the primary objective. This would most probably also be a high-tech and market-economy scenario, with as little state intervention as possible. This scenario might be associated with the political ideals of many current conservative governments in Europe.
- **The Equity Scenario (B).** The second scenario shows the impacts of policies that primarily try to reduce inequalities in society both in terms of social and spatial disparities. Where these policies are in conflict with economic growth, considerations of equal access and equity are given priority. This scenario might be associated with the typical policy-making of social-democrat governments.
- **The Environment Scenario (C).** The third scenario emphasises quality of life and environmental aspects. There will be a restrained use of technology and some control of economic activity; in particular where economic activities are in conflict with environmental objectives, a lesser rate of economic growth will be accepted. This scenario might be associated with the views of the Green parties throughout Europe.

The relationship between the three paradigms or political directions can be illustrated by the triangle shown in Figure 1. Each of its corners represents one of the paradigms A, B and C: growth, equity or environment. The present situation is indicated at the centre of the triangle, the triangle area represents the domain of possible changes from the present condition. The line starting from the centre is the trajectory from our present state to the distant future of Europe 2020: it may bend in response to technical breakthroughs, new organisational patterns or political decisions.
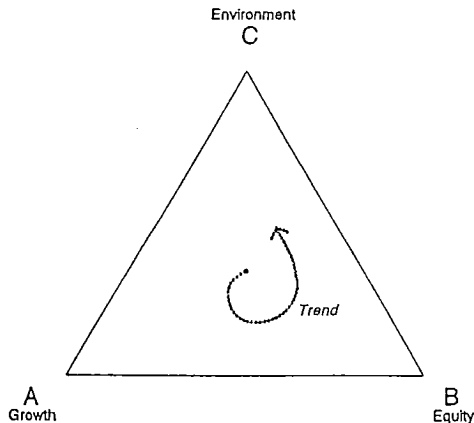

Figure 1. The three paradigms.

In order to make it easier to understand and compare the global scenarios, they were next decomposed into less comprehensive 'component scenarios' each covering *one* particular problem area or 'field'. The following nine fields were used:

1 Population,
2 Lifestyles,
3 Economy,
4 Environment,
5 Regional Development,
6 Urban and Rural Form,
7 Goods Transport,
8 Passenger Transport,
9 Communications.

Each component scenario is a description of the likely development in its field under the assumptions of one of the three global scenarios, i.e. each component scenario is associated with one global scenario, and there are three component scenarios for each field. The component scenarios of each field differ depending on the assumptions about the speed or direction of change, on developments in other fields (other component scenarios), or on the global scenario (seed scenario) they are associated with. However, there are no separate component scenarios for different countries; all component scenarios are written from a *European* perspective, i.e. describe the development in Europe as a whole taking account of different developments in different types of countries where necessary. Thus different speeds of development in different types of countries can be addressed.

The component scenarios can be arranged in a nine-by-three matrix in which each row represents one of the fields defined above, while each column represents one of the scenarios. Each cell of the matrix represents one component scenario.

Table 1. Global scenarios and component scenarios.

Component scenarios	Global scenarios		
	A Growth	B Equity	C Environment
1 Population	A1	B1	C1
2 Lifestyles	A2	B2	C2
3 Economy	A3	B3	C3
4 Environment	A4	B4	C4
5 Regional Development	A5	B5	C5
6 Urban and Rural Form	A6	B6	C6
7 Goods Transport	A7	B7	C7
8 Passenger Transport	A8	B8	C8
9 Communications	A9	B9	C9

Of course the real world is not so well-ordered as the matrix suggests. First of all, the actual development is not likely to follow one of the three global scenarios in their pure form. The Europe of the year 2020 will be a federation in which different political directions are likely to coexist in different countries, and even within countries there may be different flavours of policy-making dominant in different regions or at different times. Second, the nine 'fields' are not nearly so mutually exclusive as the neat rows of the matrix imply. In the real world they overlap and are linked by an intricate cobweb of mutual interdependencies: population and economy interact on the labour market, consume environmental resources, determine regional development and urban and rural form and generate flows of goods, passengers and information which in turn codetermine the process of spatial development, affect the environment and give rise to new mobility patterns and lifestyles. All these interdependencies have to be kept in mind when dealing with the component and global scenarios.

The twenty-seven component scenarios of Table 1 were presented in textual form to the respondents together with a questionnaire for their evaluation and with space for additional comments. To facilitate the assessment of the contents and likelihood of the component scenarios, common *background information* for each field including information on past trends, present condition, most likely future trends, opportunities and constraints and policies was also provided. The most likely future trends represent in fact a 'trend scenario', i.e. an extrapolation of current social, economic, technological and political tendencies. It shows the most likely development of transport and communications in Europe *if no major disruptions or breaks in the socioeconomic, technological and political context occur*. This implies that policies already 'in the pipeline' such as the completion of the Single European Market are taken into account. The component scenarios used this background information as their common point of departure.

Altogether sixty responses were received. Despite their relatively small number, the respondents represent a cross-section of the transport planning community in Europe, with a slight bias towards the northern countries, the engineering and economic experts and the younger age groups. With only nine respondents women were underrepresented, and all of these were in the youngest two age groups.

2. SUMMARY OF RESPONSES

The full set of component scenarios and the views of the respondents are documented in Masser et al. (1992). The presentation here focuses on how the experts perceive the future of transport and communications and its context fields in Europe and in which direction they want policy making in these fields to develop.

The survey provided an opportunity to examine whether this familiar prejudice about the transport planning community is justified. This was made possible by two standardised questions in an otherwise unstandardised questionnaire, which allowed the aggregation and grouping of the respondents in quantitative terms. The two standardised questions asked which of the seed scenarios were considered to be (a) most likely and (b) most desirable from the perspective of the respondent's country. In other words, the first question revealed how the respondents *viewed* reality and the second how they *wished* reality should be. The difference between the two can be used as a *measure of satisfaction* with the way things are: if the scenario seen as most likely is also the one seen as most desirable, satisfaction is perfect, conversely if the most likely scenario is also the least desirable, satisfaction is nil. For comparison reasons, perfect satisfaction is given the value of 100 and nil satisfaction one of zero, and the resulting index is called the *index of satisfaction*[1].

If indeed transport planners are narrow-minded technocrats as current prejudices claim, they should be quite happy with the world they have helped to create, i.e. have a high index of satisfaction. If anything they should regret that transport improvement is too slow and wish that transport policy be more growth-oriented. Is this hypothesis borne out by the results?

Figure 2 (top left) gives the answer. Here the responses are aggregated by discipline in a triangular coordinate space the corners of which are associated with the three overall goals, growth (A), equity (B) and environment (C). Each response, or group of responses, can be located in this coordinate space as a pair of points indicating the 'most likely' and 'most preferred' scenarios, respectively[2]. In this case the 'most likely' scenario is indicated by a hollow circle and the 'most preferred' scenario by a solid circle. Indeed the average satisfaction index of transport planners with an engineering background is higher than those one of the other disciplines. In particular urban and regional planners are much less in agreement with how things develop in their field. However the figure contains a surprise: All disciplines agree that the trend in transport and communication points in the direction of growth rather than equity or environment, but in contrast to the prejudice quoted above they feel that a shift away from a growth-oriented transport policy would be desirable. The desired shift clearly points towards the environment, not towards equity. Even the engineers among the respondents would prefer a more environment-conscious transport and communications policy!

Is this an artefact of the composition of the sample group? Figure 2 (top right) groups the respondents by age. A different picture emerges but the basic pattern is the same: All age groups think that transport planning should be less growth-oriented. The differences between the age groups are in line with common wisdom about age group behaviour: The younger experts are more radical than their elder colleagues; they are less satisfied with current trends and generally more concerned about environmental questions. The middle-aged and senior experts are less critical about the trends, and this is no surprise as their generation was actively involved in establishing them. However, even they think that things have to change towards a better environment.

If in these cases the respondents voted for less growth and more environmental policy in transport planning, the situation should become more diversified if individual countries are examined. After all, the countries in Europe are very different with respect to their transport and communications infrastructure: Some countries, in particular the industrialised countries of central, north-western and northern Europe, have highly developed transport and communications networks, while there are still serious deficiencies in infrastructure in countries like Portugal, Spain, southern Italy, Greece and Turkey. Accordingly, though there may exist a certain saturation effect in the northern countries, at least in the Mediterranean countries should be expected to push for *more* rather than less growth.

However, as Figure 2 (bottom left) shows, this is not the case. This figure shows likely and preferred scenarios for six regions or groups of countries[3]. It is true that respondents from northern countries were the least satisfied and the most environmentally concerned, with Benelux and Central Europe having the lowest satisfaction index. However, their colleagues from Mediterranean countries, though some of them are likely to favour the expansion of the transport and communication infrastructure in their countries, unanimously think that protecting the environment is even more important. Interestingly, their preferred scenario is closer to equity than to environment because they know about the disadvantage of being poorly connected. The respondents from the British Isles hold a middle position. It may seem surprising that the respondents from Mediterranean countries have the highest satisfaction index though clearly their infrastructure is less developed. The high index in this case merely indicates that they are less in opposition to the prevailing growth-oriented policy in their countries and wish only to make minor adjustments.
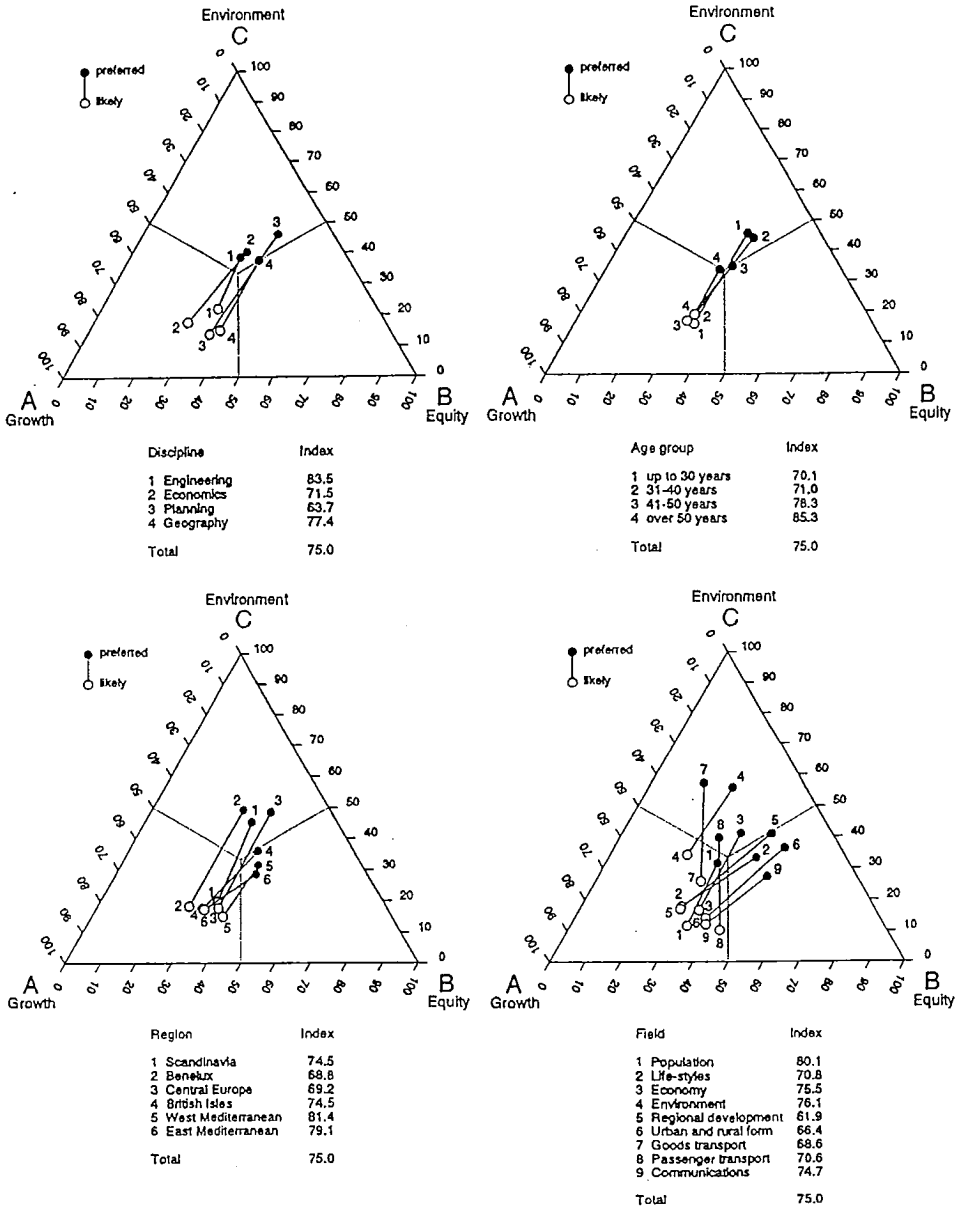
Figure 2. Evaluation of scenarios by discipline, age group, region and field.

So whatever grouping of the respondents one chooses, the result is unequivocal. There is an overwhelming consensus among the experts that the current growth-orientation in transport planning is harmful and should be replaced by a more environment-conscious or more equity-oriented kind of policy.

This result is encouraging. It says no less than that the familiar prejudice that transport planners are narrow-minded advocates of growth does not hold true - if the sample of experts chosen for this exercise is representative of transport planners in the countries included in the study. If this is the case - and there is no serious reason to doubt it - this result indicates a *major shift of paradigm* in the transport planning community. The importance of this shift cannot be overestimated. If indeed the experts concerned with the design and implementation of transport infrastructure develop a more comprehensive set of values with respect to the purpose and objectives of transport planning, this cannot fail to have its impacts on the public discussion on transport matters even in countries where the public opinion is still less advanced.

One note of caution seems appropriate. It may well be that the shift in paradigm is not so fundamental as it appears and should be more seen as an *adjustment* to a changing professional environment. Several comments of the respondents reveal that there is a widely held view, especially among respondents with engineering or economics backgrounds, that without growth neither equity nor a clean environment can be achieved, but that growth, if appropriately managed, can reduce disparities and also support ecological improvement. The belief that the conflicts between efficiency and equity and between economy and ecology can be resolved should certainly not be lightly dismissed, but it may prove to be harmful if it is misused to merely defend the continuation of business-as-usual growth-oriented policy making.

One disadvantage of the present aggregate analysis is that the concepts of 'environment' or 'equity' remain rather loosely defined. What is meant by an 'environment-conscious' or an 'equity-oriented' policy, and do the numerical responses say anything about possible policies? Figure 2 (bottom right), in which the responses are grouped by component scenario, may give some hints. Obviously, component fields in which the discrepancy between the likely and preferred trend is large, may be candidates for policy action; conversely where this discrepancy is small, the need (or possibility) for policy action may be less. Four component fields stand out by having a low satisfaction index:

5	*Regional Development*	61.9
6	*Urban and Rural Form*	66.4
7	*Goods Transport*	68.6
8	*Passenger Transport*	70.6

These are the fields in which the respondents see the greatest need and potential for change. In all four fields environmental considerations are felt to deserve more attention. This is particularly true for *Goods Transport* and *Passenger Transport* where the largest improvements for the environment can be achieved. The other two fields have a strong social dimension which means that a compromise solution between equity and environment needs to be found.

2. WHICH SCENARIO?

Growth, equity and environment are three partially conflicting paradigms that will influence the future geography of Europe. Which of them will be the most powerful? The overwhelming evidence of the experiment is that the growth scenario is by far the most likely. The majority of the respondents believed that if present trends continued the market economies of Western Europe would continue on their growth path.

The left-hand side of Table 2 shows the essential characteristics of the 'most likely' global scenario as assembled from the component scenarios. As indicated, the full explanation of the component scenarios is contained in Masser et al. (1992), however already the brief outline given in the table suggests that the world appearing behind these trends is one of polarisation between social groups and places and increasing levels of congestion and pollution.

However, there was also disagreement. Is this not a too naive extrapolation of existing trends? The consequences of the unconstrained growth scenario are too frightening that it is hard to believe that there would be no controlling action by national and European governments. So a great number of modifications of the growth scenario were suggested, some of which were taken from the other two scenarios.

It was argued, for instance, that the polarising effects of the Single European Market are not altogether clear, and any inequalities it creates would certainly be compensated by the Community. A surprisingly large number of respondents seemed to put much faith in the will and ability of the Community (or the European government) to counteract the growing spatial polarisation in Europe. Also the outlook on the environment in the growth scenario appeared to many as too grim. They pointed out that the advances in environmental protection already made would continue due to strong environmentalist movements and that through measures such as taxes on car ownership and petrol the environmental situation could be kept constant or even improved. Many also saw a brighter future for the European city pointing to the observable signs of a back-to-the-city movements and of inner-city restoration. The views on freight transport showed a large degree of uncertainty. To entirely rely on road transport as in the growth scenario seemed to be too disastrous to many, but given the present state of rail freight services no clear alternative trend emerged. Similarly, many felt that for passenger transport a society totally built on the private car would be infeasible and thought that a mixed policy of promoting both the car and the train would be more likely. With respect to telecommunications, many felt that telecommunications would also contribute to more equity.

In summary, the modifications and suggestions tended to endorse the growth scenario but added some more moderate, less radical notes to it. Nevertheless the outlook remains rather gloomy. If the experts - which represent after all the overwhelming majority of all European countries - are only partly right, the most likely scenario of transport and communications in Europe is a veritable horror scenario. It presents a continent with an unprecedented level of material wealth and technological perfection yet with unparalleled spatial disparities between its regions and cities, congested roads and a collapsed public transport system, a disappearing countryside and a devastated environment. Are there no alternatives?

The majority of respondents, however, felt that a fundamental change in values and policy making was required. Both the equity paradigm and the environment paradigm found their followers, but clearly the environment paradigm turned out to be the winner. The 'most preferred' scenario hence is a combination of the equity and environment scenarios, with the emphasis depending on the circumstances. The right-hand side of Table 2 shows the main characteristics of this combined target scenario. It can be seen from the table that the Europe 2020 emerging behind it is different from the one behind the 'most likely' scenario. It describes a more resource-conserving and sustainable, but also a more equitable and gentle world. The question is whether it can be achieved without severe losses of affluence and convenience. Some of the respondents did not believe that and therefore stayed with the growth scenario, hoping that, with the help of advanced technology, there is a corridor of benign growth. The others had no more confidence in technology.

Table 2.Summary of likely and preferred scenarios.

Field	Most likely scenario	Most preferred scenario
Population	Low birth rates, ageing society; growth-financed social security; non-EC foreign labour without citizenship.	Crisis of social security system overcome by immigration from developing countries; government support of young families.
Lifestyles	Singles and 'dinks' model for lifestyle: efficiency, mobility, telecommunication, consumption; declassification of less able.	Change of values: solidarity instead of competition; renaissance of the family; participation in community affairs emphasised.
Economy	'Fortress Europe' economic empire; income disparities between European core and periphery and within European countries.	Europe government promotes sustainable development; taxes on luxury goods, rigorous emission standards; alternative technologies.
Environment	Serious congestion and transport-generated pollution; massive land consumption for new motorways, high-speed rail lines and airports.	Europe leader in environment-conscious policy making; use of fossil fuels constant; heavy taxes on car ownership and petrol; public transport growing.
Regional Development	Further concentration of economic activities in the European core; agglomeration diseconomies; economic decline in peripheral regions.	Decentralisation programmes and strict land use control in urban areas; incentives for location in peripheral areas; decentralisation of transport infrastructure.
Urban and Rural Form	Spatial segregation of social groups in cities; suburbanisation of manufacturing; disappearing countryside.	Disincentives for location in large cities; financial aid for small cities; land speculation curbed; car restraint policies.
Goods Transport	Dramatic increase in road freight transport, toll motorways and bridges; rail freight service disappeared.	Restriction and taxation of road freight transport; air freight regulated; promotion of ecological vehicles for distribution.
Passenger Transport	Highly mobile society; dominance of individual automobility; local public transport declining; competition between car, high-speed rail and air.	Car use constrained; renaissance of public transport; clean cars provide harmless mobility for dispersed society.
Communications	Massive use of fibre-optics and satellite communications; 'information society' changes lifestyles; dominance of large cities reinforced.	Use of telecommunications for equalising information in central and peripheral locations; flat telecommunication fares.

3. CONCLUSIONS: CHOICES FOR EUROPE

Are there conclusions to be drawn from this analysis that might be useful for decision makers in Europe? The authors feel strongly that this is the case. The results suggest that today even the technical experts agree that European policy makers are at a crossroads where two fundamentally opposed directions of political action can be chosen:

The one direction is the one presently followed by national governments and the European Commission. Its basic paradigm is that because of the global competition with the United States and Japan, Europe must do everything possible to modernise its infrastructure and manufacturing equipment and hence promote continuous growth. Underlying this philosophy is that only a growing European economy can pay for the large amounts of investment necessary for this global race. However, planning for growth in one of the already richest regions of the world means widening the gap between the industrialised and developing countries with unpredictable consequences for the future. In a competitive economy it also means to condone spatial polarisation, because modernisation is most efficient in the already most advanced and most affluent metropolitan regions in the European core. Condoning spatial polarisation, however, means accepting growing income disparities between the core regions and the regions at the European periphery, which undoubtedly will benefit from the growth of the centres, but inevitably will grow less than these. In addition, further spatial polarisation also means more agglomeration diseconomies in terms of congestion, land speculation and environmental damage.

The other direction would be to promote an ecologically sustainable and socially equitable future at the expense of economic growth. Such a strategy would not only work towards a more peaceful solution of the imminent conflict between the developing and the industrialised countries, but would also avoid many of the rather negative prospects of spatial polarisation and environmental degradation inevitably associated with continued economic growth. It would be a great challenge for Europe to demonstrate that there is a future for Europe that is both equitable and in balance with nature without excessive and destructive material growth.

Notes

1. The 60 respondents participating in the exercise rank-ordered the three seed scenarios for each of the nine fields. The resulting 540 votes established the data base for the following analysis. The satisfaction index S is calculated as follows:

$$S = 100 - \{abs[w(r_a)-w(q_a)]+abs[w(r_b)-w(q_b)]+abs[w(r_c)-w(q_c)]\}$$

where r and q are the ranks of the scenarios with respect to likelihood and desirability, respectively, and subscripts a, b, c refer to component scenarios A (growth), B (equity) and C (environment), respectively. The weights w indicate the importance of the rank order for the satisfaction. In the following analysis the first rank was given a weight of 67 percent, the second rank of 33 percent, and the third rank was disregarded.

2. Using the terminology of the previous note, the coordinates of the most likely scenario are $w(r_a)$, $w(r_b)$ and $w(r_c)$, while the coordinates of the most preferred scenario are $w(q_a)$, $w(q_b)$ and $w(q_c)$.

3. The six regions are: Scandinavia (Denmark, Norway, Sweden), Benelux (Belgium, Netherlands), Central Europe (Germany, Switzerland, Austria), British Isles (United Kingdom, Ireland), West-Mediterranean (France, Portugal, Spain) and East-Mediterranean (Italy, Greece, Yugoslavia, Turkey).

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