II

(Acts whose publication is not obligatory)

COUNCIL

COUNCIL DECISION

of 29 June 1988

on a Community programme in the field of road transport informatics and telecommunications (Drive)

(88/416/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community and in particular Article 130Q (2) thereof,

Having regard to the proposal from the Commission (1),

In cooperation with the European Parliament (2),

Having regard to the opinion of the Economic and Social Committee (3),

Whereas the Community has as its task, by establishing a common market and progressively approximating the economic policies of Member States, *inter alia* to promote throughout the Community a harmonious development of economic activity and closer relations between the Member States belonging to it;

Whereas the Heads of State and Government emphasized the importance of road transport efficiency, safety and environmental compatibility as a major factor for economic growth and social development within the framework laid down in Article 75 of the Treaty;

Whereas the European Parliament, in its assessment of the situation and development of road transport, stressed the latter's role for the future political, social and economic development of the Community and made particular reference to the need to develop electronic road safety aids and by its adoption of the report of its Committee on Economic and Monetary Affairs and Industrial Policy on the European Community automobile industry demonstrated the European dimension of this industry;

Whereas the Council in its resolution of 19 December 1984 on road safety (4) invited the Commission to submit proposals;

Whereas the Single European Act provides a new political and legal base for the development of a scientific and technological strategy with particular importance being given to the goal of promoting industrial competitiveness;

Whereas, by Decision 87/516/Euratom/EEC (5), the Council adopted a framework programme for Community activities in the field of research and technological development (1987 to 1991) providing for research to be undertaken in the field of the application of information technology, telecommunications and broadcasting to meet common social needs and in particular road transport;

(1) OJ No C 355, 31. 12. 1987, p. 1 and OJ No C 146, 3. 6. 1988, p. 18.
(2) OJ No C 94, 11. 4. 1988, p. 194 and OJ No C 187, 18. 7. 1988.
(3) OJ No C 347, 22. 12. 1987, p. 26.
(4) OJ No C 341, 21. 12. 1984.
(5) OJ No L 302, 24. 10. 1987, p. 1.

Whereas Article 130K of the Treaty provides for the implementation of the framework programme to be carried out by means of specific programmes developed within each activity;

Whereas the Council has recognized in its Decision 87/85/EEC [1] the importance of standardization in the field of information technology and telecommunications and whereas cooperation in prenormative and precompetitive R&D towards the development of standards can make a major contribution, notably by facilitating the evolution towards future more efficient and safer road transport at regional and local levels;

Whereas the Economic and Social Committee has made particular reference to electronic traffic aids on major roads and to the implementation of a Community programme on road safety;

Whereas the Commission in its proposal for a medium-term transport infrastructure programme has made specific reference to the importance of stimulating technological developments for improving transport performance; whereas this is likely to be of value to exports and to the enlargement of the internal market, thus enabling new technologies for European industry to offer the security of future increases in productivity and competitiveness;

Whereas Decision 87/516/Euratom, EEC provides that a particular aim of Community research shall be to strengthen the scientific and technological basis of European industry, especially in strategic areas of high technology, and to encourage it to become more competitive at international level; whereas the same Decision further provides that Community action is justified where research contributes *inter alia* to the strengthening of the economic and social cohesion of the Community and the promotion of its overall harmonious development, while being consistent with the pursuit of scientific and technical quality; whereas it is intended that the programme for dedicated road infrastructure for vehicle safety in Europe, hereafter called the Drive programme, should contribute to the achievement of these objectives;

Whereas with the emergence of mobile communication services and the progressive introduction of computing in automobiles, the conditions for major improvements for traffic management, reduction of environmental impact of road transport and road safety are emerging;

Whereas developments in road transport efficiency and safety will benefit the international competitiveness of the European economies in general and of industries in particular;

Whereas advances in road transport efficiency and safety will contribute to resolving the problem of intolerable social and other consequences of road accidents;

Whereas concerted efforts in this field will contribute to the creation of the internal market and prevent the formation of new internal frontiers to road safety;

Whereas the development of common functional specifications for equipment and services will strengthen cohesion and permit the less developed regions to benefit fully from the efforts of Member States, thereby leading to improvements of the transport and traffic management infrastructure developments in the Community;

Whereas the development of the road transport infrastructure technology and services offers a wide range of opportunities for small and medium-sized companies in the manufacture of equipment and in the provision of specialized services within the Community;

Whereas, when precompetitive research leading to the strengthening of European technology is involved, it is appropriate for projects carried out in the context of Eureka and Drive to complement and support each other;

Whereas the Commission has declared at the second Eureka ministerial meeting in London (June 1986) its wish to support projects relating to road safety and navigation;

Whereas the constitution or consolidation of a specifically European industrial potential in the technologies concerned is an urgent necessity; whereas its beneficiaries must be industry, network/broadcasting operators, research establishments, undertakings, including small and medium-sized enterprises, and other bodies established in the Community which are best suited to attain these objectives;

Whereas exploratory investigations at Community level have confirmed the requests of participants of Eureka to take advantage of Community cooperation in this field;

Whereas the definition phase of the Prometheus (Eureka) project has confirmed the feasibility of the objectives and identified specific work to be undertaken by the Community to attain them;

Whereas it is essential that any precompetitive work in a project carried out in coordination with a Community technology project shall adhere to the principles for Community shared cost projects, especially with regard to

[1] OJ No L 36, 7. 2. 1987, p. 31.

cross-frontier cooperation and the inclusion of small and medium-sized enterprises;

Whereas it is in the Community's interest to consolidate the scientific and financial basis of European research by means of a greater extent of involvement of participants from European third countries in certain Community programmes and particularly in programmes involving cooperation in research and development of road transport technology;

Whereas the Drive programme will benefit from the results of Esprit and RACE as well as the on-going efforts in standardization;

Whereas the Commission intends also to propose Community programmes in the area of the application of information technologies and telecommunications to other transport sectors such as rail, sea and air transport;

Whereas the implementation of concerted actions in the COST framework is an essential element to complement industrially-oriented R&D projects;

Whereas the Scientific and Technical Research Committee (Crest) has expressed its opinion,

HAS ADOPTED THIS DECISION:

Article 1

1. A Community programme in the field of road transport informatics and telecommunications, Drive, shall be adopted for an initial period of 36 months beginning on 1 June 1988.

2. The programme is designed, in concertation with public and private actions in the field of road transport informatics undertaken at national and international level, to promote the competitiveness of the Community's industries, operators and service providers in order to make available to the final users, at minimum cost and with minimum delay, the improvements in road transport efficiency and safety as well as minimizing the environmental impact of road transport, thereby contributing to social as well as economic objectives.

3. The programme includes Community activity relevant to Eureka actions and in particular Prometheus, Europolis and Carminet in this field with respect to standardization and common functional specifications relating to the development of advanced infrastructure systems.

Article 2

The programme shall consist of the development of a common conceptual framework for cooperation, prenormative work and technology exploration and the investigation of the non-technological factors as required for the objective of concerting European efforts in improving road transport efficiency, road safety and reduction of environmental impact. The work includes the following elements:

I. Road transport informatics (RTI) technologies;

II. Evaluation of strategic options;

III. Specifications, protocols and standardization proposals.

The programme summary and objectives are set out in more detail in Annex II.

Article 3

1. Projects relating to the programme shall be executed by means of shared cost contracts. Contractors shall be expected to bear a substantial proportion of the costs, which should normally be at least 50 % of the total expenditure.

Alternatively, in respect of universities and research institutes carrying out projects, the Community may bear up to 100 % of the additional expenditure involved.

2. The proposals for projects shall, as a rule, be submitted in reply to on open invitation to tender and involve the participation of at least two independent partners not all established in the same Member State. At least one of the partners shall be an industrial undertaking. The invitation to tender shall be published in the *Official Journal of the European Communities*.

3. In exceptional cases concerning projects indispensable for implementing key requirements of the work plan

— where a proposal would involve:

  (i) unreasonable burden on the participants, particularly small and medium-sized enterprises and research establishments,

  (ii) only one independent partner,

  (iii) only independent partners established in the same Member State, or

— where an open tendering procedure would be unjustified on grounds of cost or efficiency, or

— where the amount of the Community's contribution to the cost does not exceed one million ECU,

it may be decided, in accordance with the procedures laid down in Article 8, to depart from the general provisions set out in paragraphs 1 and 2 of this Article.

4. The contracts for all parts of the programme shall be concluded with network operators, research establishements, universities, undertakings, including small and medium-sized enterprises, and other bodies established in the Community.

Article 4

Where Framework Agreements for scientific and technical cooperation between non-Community European countries and the Community have been concluded, organizations and enterprises established in these countries may, in accordance with the procedures laid down in Articles 3 and 8 and on the basis of the criterion of mutual advantage, become partners to a project undertaken within this programme.

Article 5

1. The funds estimated as necessary for the Community contribution to the execution of the programme amount to 60 million ECU over 36 months, including expenditure on staff whose costs shall not exceed 4,5 % of the Community's contribution.

2. The indicative allocation of these funds is set out in Annex I.

Article 6

1. The Commission shall ensure that the programme is properly performed and establish the appropriate implementation measures.

2. The Commission shall ensure that procedures are set up to allow for appropriate cooperation with COST activities related to the areas of research covered by the programme, by ensuring regular exchanges of information between the Committee referred to in Article 7 and the relevant COST management committees.

3. The Commission shall establish for each year and update as required a draft work plan defining the detailed objectives, the type of projects and actions to be undertaken and the corresponding financial plans. The Commission shall keep the European Parliament informed of the progress of the annual work plans.

4. The procedure laid down in Article 8 shall apply to:

— the establishment and updating of the annual work plan referred to in paragraph 3 of this Article,

— any departure from the general conditions laid down in Article 3 (1) and (2),

— the measures to be undertaken to evaluate each part of the programme by appropriate organizations, groups and other bodies,

— the assessment of the proposed projects and the estimated amount of the Community's financial contribution to them where this contribution is in excess of 2,5 million ECU,

— the participation in any project by European organizations and enterprises as provided for in Article 4.

5. The Commission may consult the committee referred to in Article 7 on any matter falling within the scope of this Decision.

Article 7

The Commission shall be assisted in the performance of its tasks by a committee, hereinafter referred to as 'the committee'. The committee, consisting of two representatives of each Member State, shall be set up by the Commission on the basis of nominations by the Member States.

Members of the committee may be assisted by experts or advisers depending on the nature of the issues under consideration.

The committee shall be chaired by a Commission representative.

The proceedings of the committee shall be confidential. The committee shall adopt its own rules of procedure. The secretarial services shall be provided by the Commission.

Article 8

1. Where the procedure laid down in this Article is to be followed, the chairman shall refer the matter to the committee, either on his own initiative or at the request of one of its members.

2. Under this procedure, the representative of the Commission, who acts as chairman, refers the draft of the measures to be adopted to the committee. The committee delivers an opinion within a time limit which shall normally be one month and shall in no case exceed two months. The opinion is delivered by the majority specified in Article 148 (2) of the Treaty for decisions which the Council is required to adopt on a proposal from the Commission, the votes of the representatives of the Member States being weighted as indicated in that Article. The chairman does not vote.

3. The Commission shall adopt the measures envisaged if they are in accordance with the opinion of the committee.

If the measures envisaged are not in accordance with the opinion of the committee, or if no opinion is delivered, the Commission shall, without delay, submit to the Council a proposal relating to the measures to be taken. The Council shall act by a qualified majority.

If, on the expiry of a period which may in no case exceed two months from the date of referral to the Council, the Council has not acted, the proposed measures shall be adopted by the Commission for matters falling within Article 6 (4).

Article 9

1. The result of the programme shall be reviewed by the Commission after 18 months. The Commission shall report to the Council and the European Parliament on the results of this review.

2. After the completion of the programme, the Commission shall send to the Council and the European Parliament a report on the performance and results of the programme.

3. The abovementioned reports will be carried out in relation to the precise objectives set out in Annex II to this Decision and in accordance with Article 2 (2) of the Framework Programme.

Article 10

1. With regards to the concertation activities provided for in Article 1 (2), the Member States and the Commission shall exchange all appropriate information to which they have access and which they are free to disclose concerning activities in the areas covered by this Decision, whether or not planned or carried out under their authority.

2. Information shall be exchanged according to a procedure to be defined by the Commission after consulting the committee and shall be treated as confidential at the suppliers' request.

Article 11

This Decision shall apply from 1 June 1988.

Article 12

This Decision is addressed to the Member States.

Done at Luxembourg, 29 June 1988.

For the Council

The President

H. RIESENHUBER

ANNEX I

INDICATIVE INTERNAL ALLOCATION OF FUNDS

	Estimated Community contribution (millions ECU)
PART I: RTI TECHNOLOGIES	32,9
A. Enabling and supporting RTI technologies	
(a) Specific components	
(b) Communications options	
(c) The inter-vehicle interactive component	
B. RTI software technologies	
(a) Software systems	
(b) Tools for development	
C. The human factor and man-machine interface	
D. Fault tolerance	
PART II: EVALUATION OF STRATEGIC OPTIONS	12,0
A. Refinement of objectives	
B. Evaluation tools	
C. Outline of implementing scenarios	
PART III: SPECIFICATIONS, PROTOCOLS AND STANDARDIZATION PROPOSALS	9,9
A. Definition of requirements and specific objectives	
B. The use of the evaluation tools	
C. The development of functional specifications and standardization proposals	
D. The drafting of guidelines for drawing up regulations	
PERSONAL COSTS	3,5 (1)
ADMINISTRATIVE COSTS	1,7
TOTAL	60,0

(1) This sum (3,5 million ECU) consists of 0,8 million ECU in respect of manpower required during the launching period and 2,7 million ECU (4,5 %) in respect of Commission staff.

ANNEX II

PROGRAMME SUMMARY AND OBJECTIVES

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PROGRAMME SUMMARY AND OBJECTIVES [1]

1. GLOBAL OBJECTIVES

New technologies in road transport informatics (RTI) will allow a breakthrough in road safety, a major improvement in road transport efficiency and a significant reduction in pollution.

Drive will set a framework for possible government support to speed implementation of potentially beneficial developments in Europe.

Drive will be a contribution to the creation of an integrated road transport environment (IRTE). *Inter alia,* this means that it will be concerned with all forms of road transport: not only with private cars but also with public road transport, with freight and other road vehicles as well as other users of the roads such as cyclists and pedestrians.

This Community programme will initially focus on common infrastructure technology requirements and technological and operational issues concerning public authorities. It will concentrate on complementing the cooperative efforts in which industry and research institutions are already engaged, taking into account the requirements of public administrations, and on harmonizing industrial and infrastructure priorities to advance the pre-normative work needed for the introduction of an integrated road transport environment throughout Europe.

Industry needs, and has asked for, the cooperation of public authorities because the new systems which could be introduced require:

— common standards at least at the European level,

— development, implementation and management of the infrastructural part of the systems,

— public agreement for those systems which modify vehicles' behaviour in matters related to safety,

— regulatory provisions.

In short, for the effective and timely implementation of RTI technologies there exist necessary, appropriate and respective tasks both for Drive and for Eureka and other projects in the domain of road transport informatics.

Given this agreed division of tasks, the end products of the Drive programme will be:

— the identification of the best choice of systems and the best strategy for implementation,

— guidelines to which industrial products and European regional infrastructures should conform,

— performance specifications and standards in order to enable industry to develop the necessary components,

— if necessary, the implementation of pilot schemes including the necessary supply of equipment.

In order to achieve these aims it will be necessary at an intermediate stage to identify the public needs, costs and benefits as well as the choice of options and to develop the appropriate evaluation tools. It will also be necessary to identify the gaps in present industrial initiatives.

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[1] This programme summary and objectives forms part of the proposal for the Drive programme. It is an overview of all the key elements involved. However, it does not extend to a detailed description of either the structure or the tasks of the programme. For the latter, please refer to the draft Drive work plan. This work plan is a detailed technical document which evolves with technological progress and perception of the demand characteristics. Each year it is to be submitted for approval by the management committee.

2. APPROACH

The following is a focusing structure for the tasks to be initiated, mainly in the first three years of the Drive programme.

There is a need for a systematic and considered approach. The urgency of the need is not in question, but we need to identify the most favourable solution in terms of cost-performance analysis.

To this end, the first objective is the establishment of the framework with which to:

1. ensure the representation of all actors concerned;
2. identify the needs of those actors and the constraints bounding them;
3. adopt a systems approach to the integration of the identified needs. This means a 'top down' approach to system building, i.e. by functional specifications;
4. evaluate the various potential systems in terms of techno-economic viability and in the light of functional specifications;
5. perform the scenario building in order to establish an implementation strategy in time. This operation will probably require several iterations. It should also ensure the openness of the system for inclusion of future sub-systems;
6. prepare a work plan with recommendations for further research.

In the interests of efficiency, effectiveness and economic optimization it is essential that the top down, or systems, approach be maintained. Consultations and definition of functions will adopt this approach. The examination and evaluation of the available systems and technologies will ensure optimization through the development and use of reference or benchmark criteria. In this way inductively-derived or 'bottom-up', research results can be evaluated in relation to higher-level functional specifications.

3. KEY ISSUES

Fragmentation is a characteristic feature of the prevailing supply and demand structures. Through concertation and iteration Drive will alert these diverse interests to the opportunities inherent in a coordinated Europe-wide implementation of RTI. Implicitly, the downside of non-cooperation will become apparent: another IT market sector opportunity will be lost to foreign competitors.

The Community should establish the framework wherein large-scale investment in road transport informatics (RTI) can be made.

Furthermore, a complete re-thinking of the functional requirements is necessary, as demonstrated by the inadequacy of present strategies.

Existing projects in the domain of road transport informatics (such as Prometheus and Europolis), which are supported by national administrations or by private industry, require as a prerequisite a framework to give the administrations a possibility to create guidelines, to evaluate new proposals and new systems and to develop strategies, on how to apply new systems. The work in Drive will relate predominantly to specifications, protocols and standards required for Europe-wide infrastructures and information systems. This must take place in an European context in order to avoid fragmentation and duplication and to minimize the risk of failure.

Furthermore, road transport systems are highly dynamic; network improvements prompt traffic flow and density adjustments, and the 'feed-back' loop thus established must be monitored and evaluated.

Strategy

An intercept strategy will ensure maximum synergy with other programmes, Community, national or private.

The first year can be expected to yield the best compromise in terms of functional requirements from all sector actors, taking into account the prevailing constraints and opportunities (of technologies, regulations and other issues).

Drive's approach is to find an optimal path for the introduction of pre-selected RTI technologies and systems and then to focus its support on implementation in those domains where public needs and benefits have been identified. To this end, Drive's work is both pre-competitive and pre-normative in character.

However, the potential impacts of the programme on a number of industrial sectors in Europe should not be underestimated. Early agreement by sector actors on open standards and requirements supporting RTI implementation will simultaneously provide:

— a larger potential market,

— potential economies of scale to producers,

— a minimization of investment risks (user acceptance will have been researched; Member State governments will have drawn-up purchasing programmes based on Drive recommendations).

Thus, indirectly, Drive's approach includes industrial development goals at the European level. Optimization of Drive's tasks will include explicitly procedures and tools for identifying and exploiting chances of sharing costs with other, parallel, projects within Eureka, within the Community's own framework research programme and elsewhere.

Drive will assist national governments in addressing the social and economic challenge in road transport efficiency and safety and in evaluating their partnership with industry in this domain. To this end, information about planned developments and investments will be needed. Coordination at the European level is the key to successful introduction of the technologies since major capital investments can be expected only once governments have determined their own priorities. Raising the productivity of capital invested both by governments and by enterprises engaged in RTI is an objective of Drive.

Systems research

At an early stage it will be necessary to identify the aspects and characteristics of the IRTE that will play a major role.

The decisions about system design elements will include:

1. categorization of the road transport environment (e.g. urban, suburban, inter-urban, rural); specification of the characteristics of each and their respective and combined effects on the system requirements; recommended choices and priorities amongst these;

2. identification of the requirements of road transport modes;

3. types of trip generation by purpose (journey to work, deliveries, shopping, leisure, holidays); the evolution of demand (including impacts of varying working and shopping hours and peak holiday periods); temporal elasticity of trip types;

4. the requirements of special services: emergency services, the police, taxis, tourist travel;

5. the requirements of special road users: handicapped persons, the elderly, pedestrians, cyclists, children;

6. clarifying policy choices at an early stage and preparing the ground for concensus and cooperation in decision-making — a key role for the successful development of the programme. Amongst the issues for agreement will be:

   — the relative priorities for private versus public transport in the different levels (urban, inter-urban, etc.) of the IRTE,

   — the transfer of certain loads (especially freight) to rail, and the role of combined transport facilities,

   — the relative location of RTI intelligence: vehicle infrastructure;

7. precision of the constraints and opportunities present in the IRTE and their likely impacts on the pace and diffusion of the Drive actions across Europe. This includes identification of the

principal differences in infrastructure conditions (transport and telecommunications) and its influence (e.g. timing of implementations, need for an open system allowing future evolution) on system design; the general availability of resources;

8. the organizational problems of the sector. This issue is critical because of the fragmentary and uncoordinated nature of prevailing initiatives. Included here are the Eureka projects and how they can interface with Drive; the existing competences and/or responsibilities of the various authorities managing the IRTE (which are currently sub-optimal and would become increasingly so with RTI implementation) and what should be done to modify these;

9. identify the issues/problems which need mandatory implementation and hence legal/regulatory changes at Community and/or national level.

Drive's scope

This concerns ensuring that the interests of the public domain are fully and optimally catered for. The deliverables expected from the programme should engender the changes needed to achieve the stated goals in the spheres of road traffic safety, traffic congestion and environmental pollution.

General deliverables:

— definition of realistic objectives and tasks over time with sufficient precision to enable the different actors to make their necessary contribution within the framework of their mandate,

— reduction to a minimum of the financial costs of cooperation. Taking into account existing and planned developments in related fields is expected to be a major task for Drive. The aim here is to ensure that the incremental addition of Drive requirements to these developments will create major benefits,

— governments will have to work internationally within Drive to ensure a timely development and application of evaluation models. These models should allow feasibility studies of various combinations of new developments,

— definition of the specific technologies, the public needs, the public costs and benefits and the choice of options,

— definition and use of the appropriate evaluation tools to evaluate the various potential systems (cost/performance ratios, acceptability and introduction problems),

— estimation of the resource requirements needed to reach the stated objectives and produce the deliverables),

— definition of the functional specifications, including the identification and definition of the basic characteristics upon which policy choices will need to be made,

— identification of the constraints and opportunities present in the IRTE and their likely impacts on the pace and diffusion of the Drive actions across Europe,

— iterative building of scenarios and recommendation of a final and complete set of implementation strategies,

— recommendations for further research,

— preparation and annual revision of a work plan, adapted to take account of progress made,

— indication and part-financing of the necessary pre-normative research such that suitable standards can be put in place,

— definition of the standards for the various interfaces (mandatory or recommended),

— establishment of protocols for signal propagation and information exchange,

— drafting of guidelines for the drawing-up of regulations,

— providing the framework wherein large-scale investments can be planned and profitably executed.

It should be clearly understood that the above list is not written as 'tablets of stone'. Rather it is an indication of the currently-perceived needs for Drive programme deliverables. At a later stage, as new research results become available and scenario-building more certain, the list may be added to and emphases drawn out.

4. WORK PLAN DESIGN

4.1. Role of the Drive management committee and team

The functional specifications of the system are expected to be defined following consultations with the sector actors. However, certain basic elements have to be introduced by the system designers. Amongst other things these functional specifications will include identifying and defining the basic characteristics upon which policy choices will need to be made. The system designers will take into account all the aspects related to the system as presented in Section 3 'Systems research'.

In short, the system designers will be responsible for studying, clarifying and refining these issues as well as recommending chosen paths for optimizing the overall functional specifications. These recommendations, guided by concertation from sector actors, will ultimately be subject to approval by the Drive management committee. The scenario-building exercise will pass through various iterations before a final and complete set of implementation strategies is recommended.

4.2. Work plan development

The basic steps that precede any action in the transport system are (see figure 1):

— information collection,

— information processing,

— information diffusion.

A similar approach for scenario building is considered appropriate.

This process will start with the data requirements as specified from the optimized functional specifications. The various RTI technologies will then be examined and the specifications, protocols and standards requirements will be identified. Finally, with the use of evaluation tools, scenario assessments will be conducted. A specific action plan and associated implementation strategies will be arrived at after a number of iterations of the evaluation process.

The work plan is prepared on the basis of an iterative process including the following steps:

— a check with the actors involved,

— adjustment of the scenario for new developments,

— adjustment of evaluation programme.

Such iteration and work plan refining will be continuous during the whole Drive lifetime. However, the first draft is expected to cover 80 % of all intended work, although only specified in general terms. Subsequent iterations will give mainly more detail rather than new topics.

The draft work plan, giving a scenario of work to be done, is being prepared on the basis of the available information from Eureka projects, national projects and the Drive planning studies and workshops. In the latter, a variety of actors have been able to assist.

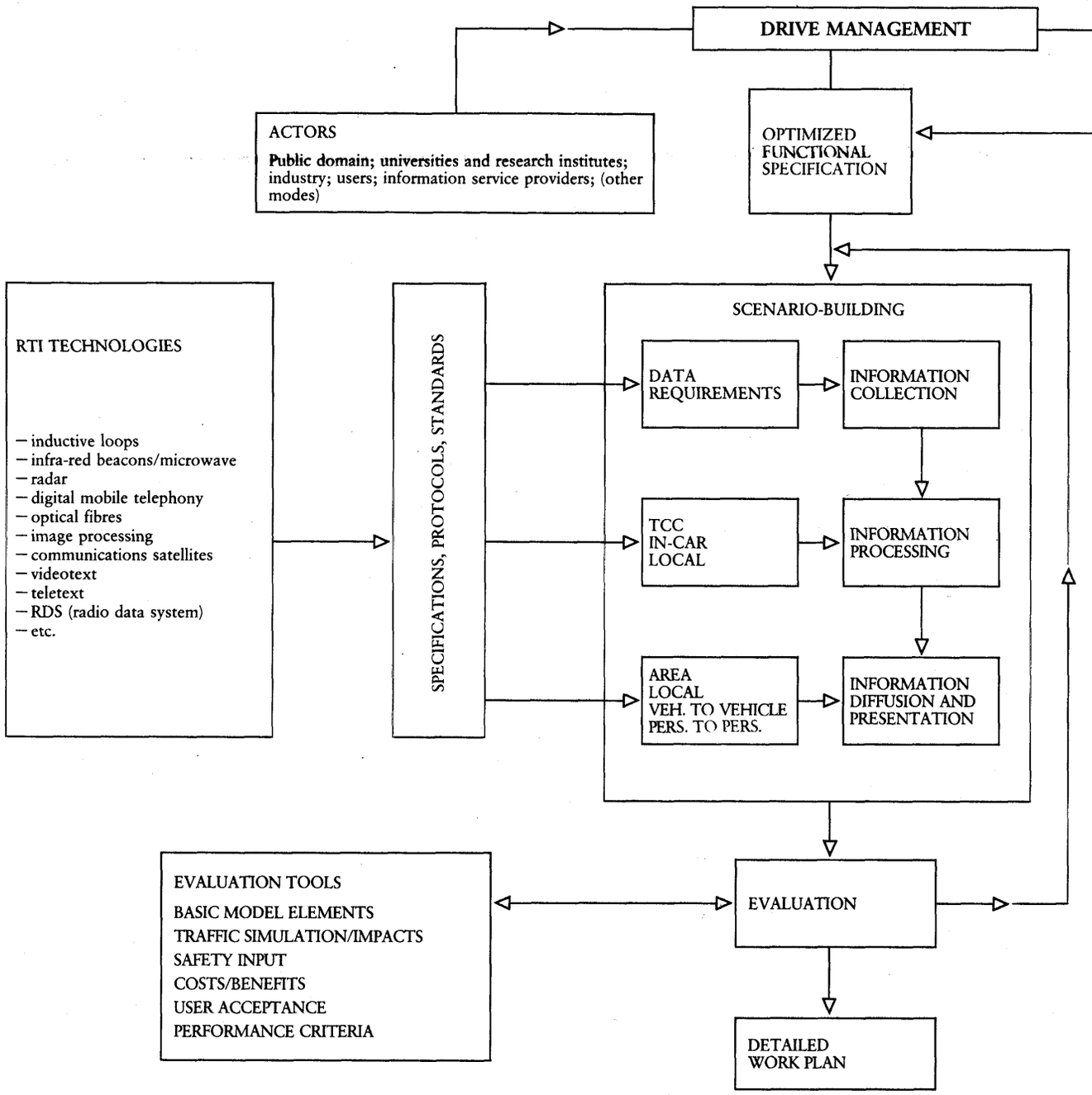


Figure 1:

Drive: Programme and system features

4.3. **Milestones**

This encompasses the generation of concrete and realistic objectives at specific points in the future. For example the tentative objectives identified could be:

1991: Specifications for a real-time plurilingual road information and navigation system in Europe; and

Specifications for advanced road safety systems and devices

1995: Operational real-time plurilingual road information and navigation system in Europe;

Operational fail-safe anti-collision system for impact speeds exceeding 30 kilometres per hour.

It may be appropriate to generate amended objectives relating to different criteria or to different years. This is likely to be an iterative process in which objectives may be refined in the light of what is desirable and/or achievable using the results of the overall assessment process.

In the light of the above comments, indicative examples of lower-level 1991 objectives include implementation:

— of European-wide standards for alpha-numeric and symbolic traffic messages (traditional and advanced),

— of a partial (geographical) and minimal (requirements) interactive real-time plurilingual road information and navigation system,

— of partial (geographical) but fully-integrated two-way communications between key traffic control centres,

— of a pilot scheme for testing advanced road safety devices (e.g. black box, alcohol testing),

— of extended schemes of RTI-controlled traffic managment and road safety (e.g. based on LISB/Autoguide-type systems; speed and distance-keeping; road pricing),

— R&D and testing of anti-collision and other road safety systems,

— information exchange system to improve the capacity utilization performance of freight transport.

5. TECHNOLOGIES TO BE ADDRESSED

Objective

To:

— explore the key technologies which might be employed so as to maximize the cost/performance ratio,

— select technologies which are sufficiently mature for implementation in the time frame envisaged, and

— allow for later extensions to wider functions.

This work will be system driven and specifically related to the functional specifications. Evaluation will be performed using appropriate tools specially developed within Drive.

Scope

This will include the research, test and experimentation needed to explore the techno-economic characteristics of the relevant technologies. The content covers Drive specific hardware and software topics including:

5.1. Enabling and supporting RTI technologies

5.1.1. *Specific components*

These are required for low cost implementation of both vehicle-borne and infrastructure elements. The interfaces to roadside beacons, loops or other sensors have also to be considered in the same

vein and be developed so that they do not introduce too many system constraints as technologies change. The scale of production of these elements will certainly support specific customized integrated circuits using silicon or gallium arsenide technology (and biochip technologies if driver fitness sensors are incorporated).

5.1.2. *Communications options*

These are radio or line systems. For radio, usage will range from:

— sub-audio (perhaps multiplexed with entertainment),

— kilo-cycle frequencies (for road loop detection and transmission) to HF (for local broadcasts), to

— VHF and UHF for vehicle to fixed station communications and cellular radio systems, to

— microwaves for satellite communications and

— millimetric waves, oxygen band or infra-red for short distance communications to roadside beacons etc.

The possible modulation systems include digital multi-level frequency hopping and noise communications or spread spectrum techniques.

For the line communications the options are:

— PSTN,

— message switching infrastructure,

— ISDN (when implementation is far enough advanced),

— IBC,

— synchronous or asynchronous communication,

— bulk transfer of some information at night, etc.

Advanced error correction techniques as well as message minimization and compression techniques will be incorporated.

5.1.3. *The inter-vehicle interactive component*

The techniques of radar, sonar, infra-red and stimulated radio repeating need to be explored. The technologies for the emitters and receivers must be identified so as to be cheap, rugged and vibration proof.

5.2. **RTI software technologies**

5.2.1. *Software systems*

The Drive network will require software to handle the complex process of infrastructure planning and the fast response operation of day-to-day management. Requirements can be expected in four areas:

— for infrastructure planning, decision support systems in all forms including expert systems, tabular analysis and simulation techniques,

— for traffic management, telecommunications systems backed by operational versions of the decision support systems,

— for on-board vehicle systems, embedded software in conformance with standard specifications,

— special applications software (e.g. for freight transport).

This will involve specialized applications of emerging telecommunications technologies.

5.5.2. *Tools for development*

Significant increases in programming productivity, together with greater efficiency between systems will be achieved by the use of a unified software infrastructure which covers specification, implementation, the on-line environment, testing and reusability.

An essential component for the first year will be a relevant tool for requirements capture and subsequent mapping onto a systems architecture. These requirements cover the functions, system behaviour interfaces and performance of the systems. Considerable effort is needed in a short space of time to choose among the options and establish a suitable framework for the requirements of the programme. The framework adopted will allow for checking of consistency and completeness. A software toolset will be of considerable value here.

5.3. The human factor and man-machine interface

The human factor is very important since the minimum of interference must be caused to the driver whose primary task is controlling the vehicle. In order to obtain a plurilingual embodiment, the techniques of speech synthesis and pictographic displays need to be thoroughly explored.

Controls should be ergonomically efficient, familiar, and easy to use. Human factor engineering research will be needed.

The man-machine interface should hide the system complexity and provide a simple user-friendly interface oriented towards user needs, including special groups such as naive and disabled users.

5.4. Fault tolerance

Since lives depend on the integrity of systems, it is essential that fault tolerance techniques be incorporated. These should include:

— indication of a module failure,

— automatic switch-over to a back-up module in the event of a failure,

— graceful degradation ('limp home' strategy) of service, etc.

6. EVALUATION OF STRATEGIC OPTIONS

Objective

To assess the technological options and implementation strategies identified in Part 5 against objectives and against the functional requirements of the sector actors, using the criteria already mentioned (i.e. cost/performance ratio, market penetration, regulatory constraints, synergy, etc.), and to use the results to generate viable scenarios for an implementation strategy.

Scope

This comprises three main tasks:

— the refinement of objectives,

— specially developed evaluation tools to assess the suitability of various technological options, and

— the generation of viable scenarios which incorporate the appropriate technological options for meeting the defined objectives.

6.1. Refinement of objectives

Objective

To refine the specific objectives, as mentioned in paragraph 4.3 above, against which the performance of various technological options are assessed.

6.2. Evaluation tools

The work will embrace methods for evaluating the costs and benefits of potential systems at various stages of their implementation, including

— their acceptability to drivers and vehicle owners,

— effects on accident rates and severity,

— financial and operational implications for operating authorities,

— effects on traffic flows and network efficiency,

— costs and benefits to the environment.

Existing models will be used or built upon wherever this is appropriate.

A base model will provide the means for deriving forecasts of road traffic demand and network supply, which will form part of the base information for input to the impact assessment methods. Its component sub-models will provide the basic tools for the impact assessments.

An infrastructure model will provide the framework within which the implications of various infrastructure-based systems can be assessed, including the timescale, cost and organizational factors which will need to be taken into account.

An interface model will provide the means for assessing the user acceptability of vehicle-based sub-systems and of possible technological options. This sub-model will include tools for market research and techniques for the assessment of human factors.

The traffic impact sub-model will take as input particular scenarios postulating discrete sets of technological options, taken from the infrastructure reference model, together with the base traffic forecasts from the base model and the effects of market penetration estimated from the interface model, and will produce estimates of the effects on traffic.

Output from the traffic impact sub-model, together with information from the scenarios themselves, will provide the input to the assessment sub-model which will be designed to evaluate the effects of options with regard to particular criteria. The criteria will include:

— financial,

— operational,

— safety,

— efficiency, and

— environmental parameters.

The results of running the assessment sub-model will provide the information for the impact comparison in which the effects of the various options will be compared.

Even if the final objective of building-up evaluation tools is the assessment of techno-economic options in the context of the programme's development, the establishment of a set of evaluation tools in the RTI area and at a European level should allow further utilization in the context of national development policies and standardization by constituting a reference for evaluation procedures.

Tools to be developed could then be heterogeneous with respect to embodied methodologies, but definition of possible interfaces will allow their use in integrated procedures.

Formally defined models will thus be developed to get both aggregated and detailed traffic forecasts on the European road network to produce estimates of the effects on traffic of various possible technological options and implementation strategies and to provide the information on the financial, operational, safety, efficiency and environmental effects for global assessment.

Various techniques, ranging from simple data analysis and educated guess to market research, economic and organizational analysis, will be used instead to get system level traffic forecasts (i.e. car ownership, transport demand, modal shares) and reference schemes for infrastructure and in-vehicle sub-systems, information and decision flows.

6.3. Outline of implementation scenarios

Objective

To generate the viable scenarios for the follow-up, based upon the results of the assessments of technical options and the extent to which they meet the objectives defined.

This represents the final stage of the evaluation.

7. SPECIFICATIONS, PROTOCOLS AND STANDARDIZATION PROPOSALS

Objective

— To establish protocols for signal propagation and information interchange,

— to define signal properties which are required to permit the system to operate in a satisfactory manner with no interference to or from external systems,

— to define specifications for data collection and promulgation.

Scope

To:

— draw up standards for the various interfaces,

— assess the requirements of each interface,

— produce specifications, standards and protocols incorporating the requirements arising from the established combinations of technological options,

— draft guidelines for the drawing up of regulations.

7.1. Definition of requirements and specific objectives

Objective

To generate specific standards for signals, protocols and the features of highways, against which the completeness and efficacy can be judged.

Scope

This encompasses the generation of specific and realistic standards for the various interfaces which are identified during the development of the model for system functional integration.

It is envisaged that this will be an iterative process by which the objectives and requirements are updated and refined as interfaces are progressively included.

7.2. The use of the evaluation tools

Objective

To run the various component sub-models of the evaluation model (both individually and in concert) to ensure that optimum standards and protocols are drawn up for the efficient operation of the whole.

Scope

To identify the definitive interfaces from a study of the evaluation tools with all sub-systems incorporated. This will establish the required minimum operating parameters over all interfaces. Some boundaries may have to be shared. Suitable strategies will need to be adopted in order to obtain an overall optimum at an acceptable cost.

7.3. **The development of functional specifications and standardization proposals**

Objective

To draw up suitable standards and protocols which will define the interfaces used throughout the Drive system.

Scope

To consider each and every interface in the total system in order to establish standards which may be achieved by the technologies and which permit the efficient operation of the whole.

Where appropriate these standards and protocols should be similar to or comply with those already established by other institutions concerned with the interchange of data such as CCITT and CEPT for example.

It may be necessary to revise some standards if new technologies are incorporated for which there are none, or for which the standards are insufficient.

7.4. **The drafting of guidelines for drawing up regulations**

Objective

To draw up guidelines which will inform legislators of the contents required of regulations to be in force.

Scope

To cover the range of regulations which may be required to be introduced or modified within Member States to enable the road infrastructure to be installed and operated. An additional aspect of this work is to include any regulations governing the obligations of drivers who wish to take advantage of the system and those who do not. It is foreseen that this work will differ from Member State to Member State in order to bring about a final agreed uniformity.