



CHARM '89

COMPUTER-HELPED AREA-WIDE REGIONAL MOBILITY

PRELIMINARY PROPOSAL & DISCUSSION DOCUMENT

Prepared by Eric Britton of the EcoPlan Access Program for the:
DRIVE Program, European Commission, Brussels
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Association EcoPlan International
4, rue de Chevreuse 75006 Paris, France
Tel. 326-1323 Fax 326-1747
Association régie sous la Loi de 1^{er} Juillet 1901 (Siret 304555295 00019)

BASIC PROJECT PRINCIPLES

Project Summary:

EcoPlan proposes to lead and contribute over the remainder of 1989 to a collaborative program and brainstorming effort within the Commission's DRIVE program, which is to involve research agencies and industrial groups in a first instance in France and Sweden.

The basic idea behind the project is to establish a flexible framework for concept development and investigation in the selected problem area, which can then be tested, refined, and, if appropriate, put to work in actual demonstrations by a number of independent centers of thought and expertise.

The objective is to try to develop potentially viable new concepts capable of making much more intensive use of the vehicles and road infrastructures that are already in existence, making imaginative use of available services, technologies, and organizations.

By its nature, the project is to concentrate heavily on issues of

- Information systems, and
- Incentive systems.

Unlike the EC's "CASSIOPE" project that looks at new proposals for information and related computer management systems for public transport, this collaborative EcoPlan project under the Access program proposes to look at the scope of with reference to privately owned and operated vehicles.

This proposal builds on an earlier brainstorming presentation for a technology demonstration project along these lines made by EcoPlan to the OECD Environment Directorate in 1978, and later that year in a public presentation to the Swedish Road Transport Institute (VTI): CHARM - Computer-Helped Area-Wide Regional Mobility System (see Annex A below for details).

I. Brainstorm Introduction

1. How are we going to provide fair and efficient transport to people living in outlying rural areas, many of whom today are not well served by our present transportation engagements.
2. Given the numbers involved – i.e., of people who need to be served and available public moneys to do better-- it has to be seen that there is no choice.... i.e., to make any real impacts, we are going to have to work with what is out there: "the vehicles already on the road.
3. The "problem" i.e., that huge number of all too often close to empty vehicles that are out there spinning around 'chaotically' and at great cost to the community as a whole (environmental and other), contains within it nearly all of the needed elements of the answer.
4. Sad Reality #1: All proposed "alternative systems" of the last years (i.e., public transport, mass transit, high-tech innovational systems, etc.) have one or both of two fatal flaws:
 - Wrong quantities (off by orders of magnitude, given the number of people who need to be moved through the system)P
 - Entirely inadequate flexibility (i.e., few if any come anywhere close to the O/D and flexibility that most people expect from their preferred transport means (e.g., cars))
 - (For the record, the problem is "not technical feasibility, safety, reliability, or even cost! The problem lies elsewhere.)
4. Sad Reality #2: There is "nothing on the horizon new modes... technologies, organizational arrangements, management improvements, economics that is going to make a significant macro difference, in terms of the global dimensions of the problem, between now and the early years of the next century. Nothing! We have to accept that, if we are ever to come to grips with the real challenge.

5. This does not mean however that specific places/sites will not be able to achieve some interesting things in these issues of transport and the environment. Rather it is just an accurate reflection of the scarcity of resources, imagination, money, courage et al that are needed to make such alternatives work. Even at best, we are confronted with a huge problem of scale.
6. Which brings us right back to our Point 1 i.e. we have to here to work with the system and resources that we already have in place. We can't box with the problem. We have to use jujitsu, that is we have to figure out how to be smart enough to use the force and weight that is out there..
7. For the record, we can recall, briefly, that the main lines of today's in-place system consist of:
 - Very large numbers of vehicles of all kinds out there spinning around on a hugely expensive and extensive supporting physical infrastructure.
 - Virtually all of these vehicles have considerable 'spare capacity' (i.e., for private cars somewhere between 1.2 and .3 occupants on average, and for almost all other vehicles substantial unused capacities, including dead-heading).
 - Major "overloads" on the system in terms of specific nodes, links, times (a.k.a. traffic congestion)
 - More than proportional increase of 'system static' (e.g., accidents, aggressive behavior ...) as the system overloads.
 - Mounting bill for time unnecessarily wasted in transit.
 - Increasingly unacceptable and possibly "cascading" environmental impacts (not only air emissions, smog, acid rain, Greenhouse effects et al ... but also fast growing problems in other areas as well (liquid effluents, toxic metals, sludge, solid waste, etc.)).
8. All of the above concatenate, to yield a system which is hugely 'resource promiscuous'
9. Two other characteristics of the existing car+road system is that it is marked by:

- An extremely primitive 'information system' -- at least if the goal is wide spread, convenient and cost effective vehicle sharing; and
 - Something on the order of zero incentive (where it counts) to do any better.
10. Without wishing to get into the fine grain of this part of the discussion quite yet, let us nonetheless point out that the last two of the above points (i.e., heavy limitations in (a) the use of information within the system, and (b) of "incentive to do better") together begin to suggest one possible (and, perhaps, the only) way out of the box.
- 11. "Detour No. 1: What's wrong with taxis?"**
1. Seen from the vantage of the user, certainly the fastest and most convenient way to get there is to have someone pick him up at his door step and deliver him to his destination ... "when" he wants to go.
 2. A 'well working' taxi system in principal can do this quite well, with the reservations that:
 - a. There aren't nearly enough taxis around to make a serious dent in the problem.
 - b. Most taxi services are just as inefficient as cars (i.e., basically same occupancy rate).
 - c. High cost ... three quarters of which is related to the paid driver.
 - d. High cost/lost time in getting taxi to pick up point.
12. The fact is that technology and management improvements are concatenating to permit big percentage improvements in taxi services and economics (see our 1985 report on 'TaxiCom' et al that is available at no cost from the Technology Transfer Office of the Secretary of the US. Department of Transportation).
13. But even in these best case situations, we are still "orders of magnitudes" away from the requisite solution set. (That said, the 'TaxiCom' approach has a number of interesting analogies that those concerned with the present conceptual thrust will wish to consider.)
- 14. "Detour No. 2: Car pooling limitations:**

- This approach is (a) fine as far as it goes and (b) can, in fact, go a great deal further.
- However, pooling too suffers from a number of severe limitations as a global solution. Among these:
 - i. Limited flexibility
 - ii. Useful for only very specific type of trips (mainly work commuting)
 - and
 - iii. By particular cultural and personality types.
- For the record, we might also note the following limitations to most existing systems of this type:
 - i. Relatively 'information poor'
 - ii. Real incentive limitations, and hence,
 - iii. Very fragile and hard to keep together

Outline Of Suggested Pilot Program

1. The above decidedly casual and incomplete introduction, whatever its limitations, helps us to get the main cards out on the table. Specifically, it gives us enough background to be able to make a first cut statement of the intention of this project, which:
 - **To initiate a search for ideas and concepts which could, in a relatively short period of time (months not years), lead to a number of well thought out, relatively low cost pilot projects and demonstrations of the "key concept**
2. **Key Concept:**

What we need is to find a number of different ways to combine:

 - Technology
 - Organization
 - Incentive schemes,that will combine to...
 - **Lead to sharp increases in the utilization rate of vehicles --- already in the system ---**
3. **Hypothesis:**

There are only three broad sets of barriers or inadequacies that keep this from occurring all by itself:

 - Lack of right concepts
 - Current technology information systems inadequacies
 - Insufficient incentives (where they count)
4. Against this background, the goal of this program therefore is to encourage a certain number of "centers of excellence" around Europe:
 - To submit proposals for concepts and pilot projects which address these issues; and
 - To use these proposals to seek out support for further concept development and proving, as needed to plan and

implement demonstrations and pilot projects that have a chance of succeeding.

5. A great "variety" of approaches and operating environments will be important.

6. Short background notes on two possible approaches are attached ("CHARM" and "SMART DRIVE"). These are included at this time not so much because of any exceptional interest or great merit on their part, but rather just to show two somewhat different kinds of approaches.

CHARM ¹

Computer-Helped Area-Wide Regional Mobility System

Concept Introduction

The objective of this proposal, as originally set out in 1978, was to suggest how was going to be possible to harness the then emerging microcomputer technologies and telephone system innovations to provide a more "free form" Dial A Ride Type service that could eventually provide appropriately dense and flexible vehicle sharing in outlying, lower density rural areas.

The initial point of departure for this concept was the realization that by dint of their low population densities rural areas are poorly suited to any of the traditional forms of public transportation. Furthermore, as the rural population in many areas of Europe was aging, relatively poorer and yet further thinning out in terms of density as younger and more

Yet another key piece of the problem is being posed by the continuing disappearance of stores and services in many rural communities, which is greatly increasing the distances that people need to travel in order to meet their daily needs.

An aging rural population, relatively poor, much less likely to own or be able to drive a car, living in areas where local supplies and services are rapidly declining, where conventional public transport can never hope to operate within acceptable economics ... all combine to provide the nexus for the CHARM proposal.

¹ This concept was first proposed in May 1978 by Eric Britton EcoPlan to meetings of the OECD Environment Directorate in Paris, and later that year in a public presentation to the Swedish Road Transport Institute (VTI) in Linköping, Sweden.

Translated in today's technology, the core of the proposal is dynamic, multi-level ride sharing combining both participating private vehicles and group taxi services. Intended to work best for trips that can be planned at least 24 hours in advance - which incidentally account for more than 90% of all trip types which need such service - the core of the system is a "Minitel-like" bulletin board service that can be consulted and used by "club" members roughly as follows:

- User consults via their Minitel the CHARM "bulletin board", plugging in his desired travel time (zone) and O/D requirement;
- Minitel terminal immediately displays for user closest "fit", in terms of the time and O/D pattern, of registered service providers (see below for details);
- The traveler registers his detailed travel objective: exact trip desired and precise O/D requirement. (Initial Service Order);

In response to the user request, active providers can make a precise "bid", which the user later scans and accepts as appropriate. This acceptance constitutes the service "contract" (with additional wrinkles, etc. as required);

Participating service suppliers use their Minitels to screen and organize trips. Initially, the provider will file time and O/D coordinates of trip (1). Further interaction with the systems will be handled according to provider preference, but one possible interactive technique by an active provider might be (i) several days prior to trip; (ii) 24 hours prior; (iii) 4 hours prior.

At one extreme, drivers who make regular trips will aim to develop a "club" of equally regular users; closer to a traditional car pool in its organization (but more flexible) than, say, a group taxi. At the other extreme, there may be the providers of taxi-like or "sweeper" services (who are in it for the money) who will be correspondingly more active in their use of the dispatching system.

Because of the nature of the travel requirements of most rural residents who don't have ready access to cars, it can be anticipated that the greater part of all "social minimum" travel requirement can be handled on a quite regular or "pool" basis. The missing link to this, at present, is the lack of the requisite central "pooling and dispatching" system.

Existing travel voucher, coupon and other similar schemes and revenue supplements can easily be adapted to this new use environment.

Existing rural taxi operators can make use of the dispatching information to develop their own "group ride" services, offering correspondingly lower fares as a result of multi-party service. In addition to offering service at the "official" kilometer rate, they can offer premier or "sweeper" services at higher rates, especially where grouping is not for some reason possible.

Service providers need not be limited to private car owners and taxis. The bulletin board can also serve as a useful information/marketing device for existing rural bus services, which in point of fact often tend to be overlooked as a possible option by anyone other than confirmed users. (In one possible variant, the rural bus operator can develop more O/D flexibility to increase load factors and improve service levels).

Other types of vehicles which could be similarly integrated: school buses, works buses, postal vehicles, delivery vehicles, etc.

Obviously, there could be a role for smart cards in such services as well, though we would suggest that such additional unconventional challenges will best be met only once the full CHARM scheme is up and working to satisfaction.

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The above is only a preliminary sketch of this concept. It is provided at this point not so much as a firm proposal (which it is obviously far from being) but as a first rough example of how one such concept might be approached and made to work.

The objective of the proposed program is to encourage and promote initial development of a number of such concepts, in the expectation that the best of these will go far beyond the two crude examples sketched out above.

SMART-DRIVE

-- Concept Introduction ² --

1. Like CHARM, this concept is also based on vehicle sharing through telecommunications and appropriate incentive schemes.
3. Its success is contingent on its ability to provide "car like" levels of transport service, both in space and time, to a significant number of people.
4. The concept aims for as close to total flexibility as any ride sharing package can conceivably achieve. At the upper limit this might eventually go as far as "real time" levels of service, of the sort associated with the most ambitious Dial-a-Ride projects of the past. In the near term, however, this can be thought of as "multi-level ride sharing" with a wide spectrum of possible sharing mechanisms.
5. Sharing is open to club members only.
5. All club members have a special smart card.
6. All vehicle owners have an on-board "cardreader/meter", which in one possible variant works as follows: club member climbs into vehicle, puts his card into meter which identifies:
 - (a) rider,
 - (b) time,
 - (c) odometer setting.
7. At end of trip, club member reclaims card.
8. In one variant, the smart card is charged directly, with given kilometer (and possibly time of day) charge subtracted from total card value. At same time a corresponding credit is made to the car owner (minus system overheads). In each system

² From a first cut Drive proposal of 9 may 1989

drivers run a "master card" through their meter at monthly or weekly intervals which they then mail to SMART DRIVE Center, who arrange corresponding back credit, etc.

9. In a second possible variant, users carry bank credit cards which identify them and permit system operator to bill them monthly for charges.
10. On-board readers/meters also generate paper receipts with summary of all trip information.
11. Compensation levels for drivers should be high, to encourage maximum vehicle participation.
12. User charges should be as reasonable as possible, to encourage system use.
13. Because of the social services rendered, such vehicles should be able to qualify for such things as privileged access, preferential parking charges, ability to use HVO lanes and other facilities, special tax treatment, etc., etc., to be worked out in each case.
14. To avoid problems of use by unauthorized persons in less safe areas, a smart card may also be needed to open the door of each vehicle.
15. Among the other techniques of "pooling":
 - Pre-arranged rides
 - Pick-up at authorized stops (perhaps using a "line taxi" or jitney approach)
 - Vehicles might indicate route or destination.
16. Nothing keeps a Smart-Drive system from being crossed with a Minitel or CHARM project (see below), to allow much more flexible and broader use.
17. A clear "code of conduct" for users and drivers will be imperative.
18. The local taxi company will sue - unless some type of accommodation can be made. Best of all, the SMART DRIVE sponsors should try to pre-empt such resistance, i.e., by building the taxi company in as a provider of "sweeper" services, work out special deals of E&H transport, etc.

19. This last point symbolizes in many ways the broad approach that needs to be taken - i.e., the ability of each project team (a) to identify in advance the full range of likely barriers and problems, and (b) to define the entire project, as possible, as an "increasing sum game", so that those involved identify themselves as "positively impacted" by the project, rather than threatened in any sense.

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The above sketch formulation does not, as it stands, make any real headway with either of the two technology/operations areas which are targeted for attention: the information system deficiencies, or the incentive problem. Nonetheless, it provides a first view of one possible Transport Variant X which, with further work and refinement, might permit some inroads to be made on this tough and largely unaddressed socio-technical problem area. At last!