INNOVATION IN AUTOMOTIVE TELEMATICS SERVICES: CHARACTERISTICS OF THE FIELD AND MANAGEMENT PRINCIPLES

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The growing role of innovation in the strategy of car manufacturers leads them to relentlessly look for new sources of differentiation. In this way Telematics, a suite of technologies centered on communications systems within cars, is expected to bolster the car industry by offering a new stream of revenues. This articles focuses on the impact of this technology on design organization. In the first part, we demonstrate that Telematics is a radical innovation for automotive industry. Therefore traditional design models, such as heavyweight project management, are unsuitable. Next, the paper studies the organization adopted by a european car manufacturer in the light of recent research on the management of innovation.

Biographical notes

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INTRODUCTION

The New Information and Communication Technologies (NICTs) have for several years constituted a very fertile field for innovation with the proliferation of initiatives relating to telematics services for automobiles, or the "communicating car". These terms refer to the motorist's ability to access, from the vehicle itself, a certain number of services, which are customarily grouped in four areas:

1. Emergency breakdown service: a localized call for breakdown service in the event of a problem, the automatic triggering of SOS assistance in case of an accident, and remote maintenance;
2. Navigational aids: navigation, plus guidance to amenities and points of interest (i.e. parking facilities, tourist attractions, hotels);
3. Communication services: telephone, sending/receiving of e-mail, videoconferencing and the like;
4. Entertainment or so-call "infotainment": i.e. hotel reservations, online shopping, games for passengers, creation of a personal jukebox and so on.

Design and exploitation of such services involve various actors in complex cooperation processes. Service providers generate the information needed for the service (for example traffic information) and operate the service platform (for example the emergency call center) ; telecom operators develop and maintain the communication systems that connect the car to the service operators ; car equipment suppliers develop the onboard systems needed for the service (for example integrated radio, GPS and GSM equipment) ; car manufacturers specify, integrate and market the new services and onboard equipments.

The first commercially available application, Onstar, was launched by GM in 1996, and other manufacturers quickly followed suit: BMW with Passo (1997) and then Assist (2000), Renault with Odysline (1999), Ford with Wingcast (2000), Fiat with Connect (2000), and Mercedes with Tele Aid (2001). The outlook today appears uncertain and ambivalent. On the one hand, massive projections are still being put forward despite the collapse of the Internet sector. The Frost & Sullivan firm has evaluated the market for automotive telematics services at 8.5 billion euros in 2007 and predicts a 15% growth rate beginning in 2003, while the Forrester Institute estimates that 30 million vehicles will be equipped in the United States between now and 2005 [1]. On the other hand, GM – with its claim of 2000 subscribers [2] – is the only manufacturer that has achieved a certain degree of success as far as concrete results are concerned; at the other end of the scale, European manufacturers are experiencing great difficulties. Even the frontrunners count only several hundred subscribers (Fiat), while several projects were discontinued in 2001 (Renault's Odysline) or profoundly restructured (PSA Peugeot Citroen). And looking beyond the distribution of these innovations, the strategic and financial benefits of injecting massive investment into this field of innovation remain very uncertain for manufacturers.

The thesis that we will defend in this paper is that telematics services constitute a field of innovation representing a definitive turning point for the automotive industry – a turning point that was, for a moment, obscured by the euphoria generated by the Internet. Consequently, an aggressive strategy in this area

implies the adoption of management tools specifically adapted to the collective learning process required in this field of innovation.

The first section will deal with the specific parameters of the field of innovation constituted by automotive telematics services. We will define five problematical areas, as related to the traditional processes of innovation in the automotive industry: the strategic duality that underlies telematics innovations; the importance for the car makers to organize learning process of customers and distribution networks; the opening up of the product and the automotive industry to other business sectors; the synchronization of service innovations with traditional product cycles; and the problems raised by the uncoupling of knowledge acquisition from product development.

In the second part, we will analyze the innovation-based management models capable of supporting an effective development strategy in this field. We will rely, first of all, on the theoretical references proposed by recent research in intensive innovation management ([3], [4]) and, more specifically, on the concept of " innovative-supply project" management ([5], [6]). Secondly, we will draw on a research project currently being conducted with a European automobile manufacturer, here referred to as TelCar, which conducted Telematics project since 1998 . This research, based on the principles of interactive research ([7], [8]), gives us the opportunity to conduct an in-depth *ex-post* analysis of the Telematic Platform (TP), an organizational tool created by Telcar in 1998 to manage the development of these new services.

THE SPECIFIC CHARACTERISTICS OF TELEMATICS SERVICES AS RELATED TO TRADITIONAL FIELDS OF AUTOMOTIVE INNOVATION

Our objective in this section is to characterize the field of telematics services from the point of view of innovation management theory. We will show that, when compared with the traditional areas of innovation in the automotive industry, this field is characterized by profoundly original characteristics, which can be summarized in five points: the strategic intent, the role of the customer and of the distribution network, the timescale applicable to the field of innovation, the opening up of the automotive industry to other (very different) business sectors, and, finally, the necessity of undertaking the acquisition of expertise simultaneously with product development.

The strategic and semantic duality of telematics service innovations

The term "service" is polysemous, meaning that it can be used in at least two different ways:

- Meaning no. 1: the term "Services" refers to an economic category designating non-material products (communication and transportation services, the hotel industry, etc.);
- Meaning no. 2: the term "Service" designates the entire body of services furnished to a customer before, during and after the purchase of a product (which may be material or non-material in nature) to facilitate or improve the use of the product by the customer (financing, advice, warranty, technical assistance, after-sales service etc.).

The two meanings are obviously not exclusive. To provide a service (meaning no. 2) generally involves non-material activities that could be classified as “services”, (meaning no. 1). Vice versa, “services” (meaning no. 1) include a significant amount of “service” (meaning no. 2): for example, the hotline of a software company (logically, this could be seen as a “service of a service business”). But on the other hand, these two meanings do not totally overlap: who has not experienced, at one time or another, a service (meaning no. 1) accompanied by a lack of service (meaning no. 2) ?

The field of “telematics services” goes right to the heart of this duality of meanings. Onboard telematics open a door to the automobile becoming a medium for service activities as defined in meaning no. 1: mobile communications, online shopping and so on. Onboard telematics can also be a medium for service (as understood in meaning no. 2) in the use of the automotive product (breakdown assistance, maintenance support for the car, navigation aids etc.). And this service (meaning no. 2) can rely on and/or generate service activities as understood in meaning no. 1 (e.g. traffic information service providers).

This characteristic presents, on the one hand, a significant opportunity for innovation, inasmuch as this field can be a meeting place for the strategies of various participants: business sectors interested in the exploration of new fields of technical innovation, product experts seeking to improve their customer relationships, equipment manufacturers, and telecom professionals (technical consultants, operators, content providers etc.).

On the other hand, this characteristic can be problematical, since it can be a source of confusion and misunderstanding over the objectives pursued by the various participants cooperating in the venture. Two different strategic outlooks underlie current initiatives in the area of telematics services:

- The first continues the innovation strategies that have been known to drive the automobile market for a decade ([9],[10]): the aim is to provide a distinguishing “value-added feature”. Service innovations, with their attendant technical equipment, are only an additional developmental stage, in the tradition of the airbag, ABS, the keyless car etc.
- In the second strategic vision, the key element for manufacturers is not targeted on the product's competitiveness, but rather on the effectiveness of the commercial relationship between the company and its customer (which can be measured by customer loyalty rates, marketing costs and so on), an area that up until now has been relatively untouched by the waves of rationalization undergone by the automotive industry. In fact, it has been shown (see Table 1) that the automotive sector is one of the segments in which it is very difficult to set up a lasting customer relationship, due, first of all, to the infrequent nature of transactions (one buys a car only rarely) and, secondly, to the presence of an intermediary that acts as the interface between the customer and the manufacturer.

Types of customer interaction		Interaction with the customer	
		Direct	Indirect
Frequency of interaction	High	Banks, retail settings, telecoms	Airlines, packaged goods, drugs
	Low	Internet infrastructure	Furniture and auto manufacturers

Table 1 – source: [11]

Many books and articles (see [12], for instance) have emphasized the importance of customer relationship management (CRM) to a firm's competitiveness. In this context, the communicating car becomes a means of establishing a richer and more continuous relationship with customers by offering them services that set up a direct relationship with them beyond the act of purchasing the vehicle. It thus becomes possible to better understand the uses they makes of their cars, and therefore to continually adapt proposed products and services, with the services being easier to implement due to new vehicle design cycles. The setting up of this type of direct relationship between the manufacturer and its customers takes on added importance in light of the radical restructuring of automotive distribution ([13]), which is calling into question the principle of exclusive distribution rights.

In principle, and stated in a general way, these two strategic outlooks appear very similar and entirely compatible : the car manufacturer can launch an innovative equipment (radio/CD coupled with GSM and GPS, for instance) that simultaneously support new services used to improve his CRM strategy. But in fact, the two strategies implies different priorities for the project teams :

- Thus, the speed with which the conspicuous onboard equipment in a car can be put on the market is a key point for the first viewpoint (with the result that partnership choices are centred on the equipment rather than on service providers), while, in the second outlook, redefining the customer-brand relationship is emphasized, which presupposes the setting up of an entire infrastructure for the use of the information within a CRM context.
- Similarly, there are differing economic equations associated with the two strategies: the first strategy is based on a traditional economic argument, given the context of selling innovative equipment; in the second viewpoint, the economic repercussions are more indirect, but also more lasting (i.e. increased return on selling costs or improved customer loyalty).

The user learning process and the exploration of technical solutions must occur simultaneously

One of the most reiterated characteristics of service businesses is the importance of the particular role played by the customer. More precisely, we would emphasize, with [14] and [15], that:

- The service is co-produced by the provider and the buyer ;
- This service co-production is consumed instantaneously, while products are put into inventory;

- The quality of the service cannot be evaluated apart from the context of its production/consumption – we sometimes speak of “experiential products” (the perceived quality of a hotel's check-in service cannot be disassociated from the moods and particular habits of the customer or the time available to him on that particular day to carry out the transaction etc.).

This has a major effect on the importance of customer involvement in the design process for innovative services, on the one hand, and of the personnel with whom they interact in the service relationship, on the other (i.e. distribution networks, call centre representatives etc.). To be sure, understanding and anticipation (since we're talking about innovation) of the customer dilemma is a common concern of all innovation processes, whether they are product-oriented or service-oriented. But the idea of involving a business's customers in the design process is much more radical and original[1] [16],[[17],[18].

The aim of these new approaches is to structure the learning curve required for the use of future services by customers at the same time as the manufacturer's technical solutions, and the organizational processes capable of supporting them, are developed.

However, in the automotive sector it is customary, on the contrary, to “push” innovations onto the market, with the assumption that the learning curve for innovative products is not a problem and can be resolved by traditional means of communication (i.e. advertising, informational campaigns). This type of approach is indeed appropriate when innovation results in a simplification of the use of the automobile, for example, or when the product takes over more and more functions that previously required the driver to possess a degree of practical knowledge, causing the driver, in turn, to become increasingly passive (i.e. various types of assisted devices or processes, passive protection systems etc.).

Such an approach also works when the innovation consists of incorporating applications that were developed elsewhere – particularly those destined for domestic use – for further use in the automobile [19]. The development of onboard audio systems is a good example of such a situation: the transfer process allowed customers to take advantage of the learning curve already achieved elsewhere. Moreover, this approach significantly reduces the risks associated with the customer's view of the value to be attributed to a new feature, as well as significantly easing the penetration of these innovations in the automotive sector (since the building of public awareness and learning stages can be eliminated).

However, it is a completely different story for the types of new feature found in advanced telematics systems (i.e. navigation aids, tourist information, links with manufacturer after-sales networks, fleet management etc.). The importance of the learning curve for customers and sales personnel is today one of the major difficulties encountered in the deployment practices currently in use for innovative products or services because traditional new-product marketing methods, which are implicitly based on public awareness and a customer competence level that have not yet been achieved, are called into question [20].

[1] There is no question of returning to the traditional “market pull” approach, the limitations of which have been amply demonstrated with regard to the generation of significant innovation.

The problems currently being encountered can be summed up by two major difficulties:

- Defining the innovative service – The list of possible services is potentially quite large, ranging from traditional roadside assistance to hotel reservations, traffic information and e-mail services. The concrete implementation of these services offers the opportunity for a variety of solutions, between which it is difficult to choose in principle (What type of control interfaces are needed? Should priority be given to voice interfaces? How does one reconcile onboard intelligence services with the services provided by GSM? Etc.);
- Assigning a value to the innovative service – This is primarily a problem that stems from the fact that customers "do not know what they are buying" and, with the exception of a few technology buffs, they are not willing to pay extra for it. But the problem also stems from the fact that the economic models for these services are new for the automobile industry: subscriptions, pay-per use, the involvement of third-party financing and so on. There is a great deal of uncertainty surrounding the costs associated with these services since they involve lasting commitments to processes that depend on a high level of customer initiative, which cannot be easily controlled. This can result in situations that might appear paradoxical, where certain services are launched for their image value alone with the hope that they *don't* "take off", because a deficit would result from their full deployment.

The need to open up the automotive industry to the world of communications and services

The car differs significantly from public transportation, which gives priority to collective prerogatives over individual travel. The notions of autonomy and independence are firmly rooted in the history of automotive products and within the industry itself. Improved reliability and increased product life are making drivers increasingly independent of the after-sales network. Manufacturers are used to exerting their control and integrating, as far as possible, all of the components required for their development. This explains the influence of manufacturers on upstream suppliers as well as on the development of financing subsidiaries, for example. To date, the economic weight of the manufacturer has greatly facilitated this strategy, with the corollary that innovations likely to call this paradigm into question tend to be eliminated.

The field of telematics services constitutes a major exception to the underlying logic of autonomy and isolation of the western automotive world.

- The very idea of the communicating car puts the accent on the link (and thus on the interdependence) between the individual automobile environment and back offices or various other service-providing communities.
- The question of the boundaries of the automobile as an object and its interfacing with other technical systems is one of the key problems of automotive telematics. Should the industry attempt to absorb and completely incorporate emerging technical systems in order to convert them to "onboard" systems? Or, on the contrary, should it rely on mobile technologies (i.e. mobile phones, portable computers) and open up the automotive system by creating the most effective interfaces possible?

- With the implementation of these systems, automobile manufacturers are confronted with the necessity of cooperating with other major economic players operating in other sectors, which they cannot hope to dominate. Such is the case with computer technology, electronics and telecom operators: it is widely acknowledged that, as far as electronic components are concerned, the automobile market is a minor player, when compared with the mobile phone market, for example. For this reason, manufacturers are experiencing great difficulty in influencing standards to accommodate the specific needs of the automotive product (in terms of reliability and security of supply, for example).
- On the other hand, telematics services require the manufacturer to cooperate with the somewhat “non-capitalistic”, heterogeneous and unregulated world of content service providers (e.g. traffic information, tourist guides etc.).

To continue with their traditional stance of isolation and self-containment is to relinquish the opportunity to become an aggressive player in the field of innovative telematics services. But by adopting this new strategy, they are opening a Pandora's box in the area of image and brand liability by implementing a system that is no longer entirely under their control. The customer is likely to blame the manufacturer for the poor reception of the onboard telephone system, or for the unreliability of the traffic info provided by the active navigation system, or for billing errors in online purchasing. From a legal standpoint, will some companies prohibit, for example, any form of communication while driving ? Will lawmakers intervene in this debate? What is the manufacturer's liability in the event of service failure? And so on.

The synchronization of service innovations with traditional product cycles

Automotive innovation processes are locked into product lifecycles, and changes tend to coincide with new model dates. In the 1990s, the heavyweight model [21] exerted a strong influence, with the result that product-development timing constraints became the single most important factor driving the diverse energies of the company and its suppliers [9]. A sense of project urgency was instilled in companies and constituted a powerful tool for the mobilization of manpower [22].

The development of service innovations introduces a different temporal outlook:
- Telematics services do in fact rely on onboard equipment, which is included in the traditional automotive product development process. But modification cycles in the areas of computer and electronic technology change much more quickly than in the automotive sector. The synchronization of these cycles can give rise to some paradoxical situations: the customer may end up buying onboard equipment, at a higher price, that offers a lower level of service than a mobile device.
- Onboard equipment alone, when it is necessary, is not the only factor to be considered, since the provision of services also depends on external support structures (regardless of whether we are talking about hardware, software or content). Situations can thus arise where the onboard equipment is “in advance” of the available services, due to regulatory measures, for example, or to the lack of a commitment from telecom operators on the subject.

- One of the strategic challenges in the realm of automotive service innovation is, as we have seen, the establishment of a positive and more continuous sales relationship with the customer. It is only a slight exaggeration to say that, after the initial purchase, the new car customer hopes never to see the dealer again, because when it is necessary it is more often than not to remedy some sort of damage or failure (a breakdown, an accident or the like) and it is usually costly. The introduction of new services provides the opportunity to reintroduce a positive element into the relationship with the manufacturer outside of the context of a new purchase. This obviously presents a parallel with the computer world, where successive software versions do not entail the purchase of new hardware, but contribute to it in accordance with a product inflation process, which the customer has a hard time avoiding. If the automotive industry is to commit itself to such an approach, with its attendant commercial advantages, it must appropriate a new point of view, one that the computer industry is already quite well acquainted with: the ability to set a value on the service that is independent of the physical hardware that makes it possible; the ability to manage the upgrading of existing equipment and to master compatibility problems between different generations of equipment; the ability to mobilize the company around the promotion of the less physical and more central sphere of accessible services; and so on.

The problem raised by the uncoupling of expertise acquisition from product development

Project management for products has been structured in such a way as to uncouple the elimination of major uncertainties (i.e. the role of advanced engineering) from the development of projects relying on a solid knowledge base that has been developed in strategic areas of expertise. Our prior comments make it clear that this uncoupling is particularly problematical in the development of telematics services, where it would seem, on the contrary, that product development and the establishment of an upstream knowledge base cannot be separated:

- In traditional projects, a strategy statement precedes and provides a framework for the implementation of the project. As we have seen, this type of pre-established exploratory framework is difficult to implement for innovative strategies, quite simply because there is no common vocabulary or understanding of the phenomena and causalities, and such would be necessary for a consistent and stable strategic statement. Strategic dialogue on the communicating car has played an important motivational role for companies in a field that is quite foreign to the dominant corporate culture of the automotive industry. However, their limited ability to establish these frameworks became quickly apparent, giving an impression of ambivalence involving many U-turns.
- When dealing with innovative applications, the marketing of new products or services is a prerequisite to the creation of expertise, which must be based on the way these services are received and accepted by customers.
- With the uncontrollable proliferation of technology providers, experimentation is unavoidable, even at the risk of a high probability of failure. It then becomes necessary to make the best of such failures by capitalizing effectively on the lessons they provide.

Here again, the development of telematics services offers a good example of the need for a close association between the acquisition of new knowledge and the development of new products and services.

THE TELCAR TELEMATICS PLATFORM, A PROTOTYPE EXAMPLE OF PROJECT MANAGEMENT FOR INNOVATION-BASED STRATEGIES

What kind of organization would be capable of driving the exploration of such an innovative field ? Project management for product development has been deeply changed in the late 80's and 90's ([21]). But those evolutions would appear to be ineffective, since it is no longer possible to specify in advance either the objectives to be attained or the course the project should take. Some recent researches suggests guidelines for more appropriate tools.

- The "lineages" concept [3] & [4] emphasize the dynamic structuring of repeated product innovation strategies and of learning curves regarding technical and functional concepts and fields of knowledge, but leave wide open the question of how these should be transformed into organizational and interfirm cooperation tools.
- "Innovative-supply project management" was defined and tested in our previous research [5] & [6] to fill this gap. We formalized generic principles to manage this highly risky projects [6], and the on-going work with TelCar, gives us the opportunity to test the relevance of these generic principles. We used it to analyze the organizational tool set up by Telcar to manage an ambitious innovation-based strategy in the field of telematics. In this part, we shall detail the preliminary results of this analysis, which focuses on one specific example, the telematics platform (TP).
- The "Co-learning" concept [19] formalizes these new inter-firm cooperation situations. In co-development processes the partners are focussed on the achievement of an explicit ex-ante target. In "co-learning" situations, the scope of the cooperation is to explore a large and fuzzy space of potentially valuable features as technology roadmaps. Co-learning situations implies then different contractual arrangements as management practices for ruling the cooperation.

The Telematic Platform

In December 1998, TelCar decided to set up a dedicated structure to organize the development and marketing of telematics services. The TP has brought together, in the same location, approximately twenty people representing different department of the firm (marketing, IT, electronics, purchasing, product line management, services etc.). The TP has its own budget and operates under a single manager. This platform has a multi-faceted mission:

- it is charged with maintaining a technology watch over Telematics,
- it is responsible for defining specifications for future telematics hardware and services, anticipating problems concerning the building of equipment into vehicles, and even identifying suppliers that are likely to participate in this field.
- Finally, it must coordinate initial implementation of the first services.

In the following sections, we describe and we analyze the running of the TP in the light of our theoretical framework.

Principle 1: The sphere of action and evaluation reference parameters must be defined.

The first problem with this type of project is in defining its sphere of action and the reference parameters that will be used to evaluate it. One major risk is that such projects may be seen as just a plethora of studies, each emanating from a different part of the organization, with the whole never being considered as a coherent entity on which much may depend. Declaring something to be an “innovative-supply project” leads, on the contrary, to a collection of studies into techniques and their applications being regarded as a single entity in order to build a progressive overall grasp of the field in question (utilization, technical solution, partners, legal problems etc.). The difficulty then is to manage this portfolio, in which each study is carried out not only for its own sake but also for its contribution to the whole.

The setting up of the TP conforms to this vision. The existence of this situation within TelCar provided the conditions for an innovative exploration in a field that essentially cuts across all boundaries – those of projects, skills, products, time constraints, and more. It takes into account the interdependence of the various dimensions of the learning curves, as well as the fact that the learning curve of telematics services cannot be treated as a juxtaposition of independent development projects (which would justify a whole series of standard project organization applications). However, at the same time as it plays out its commando role in an emerging field, this type of set-up must work with existing entities, which will subsequently use and build upon what has been learned. The TP was in a position to cooperate with other parts of the company, which leads us to look at the various existing means of cooperation with other parts of the organization (technical departments, commercial structures, and so on). In the TP's case, there was an "outer circle" made up of representatives of technical departments and product lines. Members of this group were heavily involved in the subject while still remaining attached to their original departments: they were often at the platform and participates to the “Telematic plenary”, the weekly meeting organized by the TP manager to check-up the course of the project. Also included were management structures set up by the manufacturer to handle all questions connected with telematics. These structures usually draw in participants from a more senior level in the hierarchy, although for the most part on a strictly part-time basis. The members of the "outer circle" have a dual role, which is essential since they constitute a key link in the "attachment" of the platform to the company. On the one hand, they are the representatives of the product lines and the technical departments within the platform. Wearing this hat, they complement the skills brought together in the inner circle by supplying the expertise of their own departments. Their contribution also includes clarifying the policies and constraints that must be built into the platform for its actions to be acceptable to the rest of the company. On the other hand, they are the representatives and channels of communication from the platform to the technical departments and product lines, and thus participate in disseminating the TP's activities within their own spheres.

While it clearly illustrates the first principle of a unifying organizational identity focused on a single concept, our analysis of the TP also reveals how difficult it is to preserve a balance between focusing on the emerging concept and maintaining

cooperation among the various elements present. Our research in fact showed that:

- As far as bringing together the various initiatives was concerned, the TP could hardly be said to have drawn in certain strands initiated prior to its creation;
- As far as the involvement of key skills was concerned, the fields of services and distribution were underrepresented compared with technical skills.

Principle 2: The performance of investigations has a dual nature: the products developed and the knowledge accumulated both have value.

Each element of the portfolio thus combines the process of knowledge production with the process of creating revenue. A management tool must therefore take these two aspects of performance into account (see rows and columns of Fig. 2). A study can therefore progress to the marketing stage without providing any new knowledge apart from the fact that there is an immediate market for the component in question. Conversely, another study might not go on to produce any revenue but may nonetheless generate crucial knowledge for understanding the technique or for defining its potential field of application. As a function of the knowledge acquired, technical uncertainties are reduced and tests to be carried out become clearer, as do the potential applications – and, bit-by-bit, the investigations converge, or stop if the technique proves to be less useful than was previously thought.

From here on in, if this principle is taken into account, the traditional view of performance is modified. What counts is not simply the revenue hoped for from each study, nor even the sum total of the short-term projected cash flows, but rather the growth in the return from each iteration of the investigation. When the management system succeeds in organizing this capitalization and these transfers, the average return of the portfolio increases, with each project contributing not only through its own results but also through the experience from which subsequent projects will benefit (the objective of "increasing average return" of the project portfolio [5] & [6]).

This kind of management is essential in the front line of emerging technology, where the risk of failure is great because of the one-off nature of the strategy. The way the TP is defined accords perfectly with this philosophy of integrating a diversity of experiments in the strategy of investigating the field comprehensively. This strategy will enable progressive specification of the goals to be attained in terms of matched technical solution/practical value pairs (see rows and columns of the following diagram).

Studies	**Customer's sector**	**Service definition**	**Technical options**	**Etc.**	**Outcome**
Study 1					**Results of studies**
Study 2					
…					
Study n					
Outcome	**Knowledge drawn from studies that can be used elsewhere**				

Figure 2: The dual nature of the performance of studies in the portfolio of an innovative-supply project

Principle 3: Testing plays a central role in management.

Unlike development projects, which make use of the company's knowledge base, innovative-supply project typically suffer from much greater uncertainty. Neither the potential of the technique nor its future applications are known, which makes *ab initio* predictions on the course of the project quite illusory. Sketching out a plan of action must therefore be seen as a temporary grid over the field to be explored, allowing the learning process to begin.

In this context, the design of the tests that will prove or disprove the initial hypotheses occupies a crucial place in the management of the project. This is a key coordination element, inasmuch as no other timescale is applicable, unlike with development projects. In addition, it is a way of creating knowledge (and surprises!) that could radically change the direction of the investigation, whereas in development projects the main purpose of testing is to confirm the validity of the proposed solutions. The intensity of the learning experience will depend on the ability of the team to generate, carry out, and learn from a continuous flow of tests over a period of time. Here we come back to the theories of innovations ([23], [24] & [25]), which underline the need for action where there is no clear preference; said action will enable the discovery of both problems and solutions. And, indeed, the history of the TP is littered with such experiments, which, while using relatively modest means, enable testing of the projected services (prototypes on test rigs, experimentation using simplified versions of the services to be provided based on temporary agreements with various partners etc.).

Principle 4: An investigation should be focused in time.

Innovation-based strategies take place in an extremely dynamic competitive environment. Practical values, strategies and technologies keep changing during the investigation process. Answers that are satisfactory at a given moment are no longer adequate a short time later, since questions evolve as they are being studied! Handling the various investigations sequentially therefore increases the risk that a partial answer, which is adequate at one moment, will no longer be so when the other facets of the problem have been resolved; consequently, the project is constantly drifting. This being the case, whether the project comes to fruition or not depends on the speed of the investigation and on the synchronization of a solution in the area of marketing and technology. In accordance with this principle, an investigation strategy where all the studies are scheduled to run in parallel would be of much greater value than an investigation where they are scheduled consecutively. This is the same notion as concurrent engineering ([9],[21]) but the aim is not so much a shorter time-to-market (a key argument in low-uncertainty developments) as an increased probability of success (breaking the synchronization between the "technical" and "marketing" aspects increases the risk of their never converging).

Telematics services are typical of this situation. That is why the platform's mission covers everything from exploring the field to marketing new services. It is in fact now well established that the validation of the first ideas to be developed plays an essential role in the design of innovative solutions [3] & [5]. In any case, the role of the platform will evolve from phase to phase :

- The platform assumes the leadership role in the initial stages, which consist of:

- *Exploring* the field of innovation "defined" by the driving concept of a "telematics service" (What services are possible? What technical lines of attack can be envisaged?);
- *Sorting out* which of these strands fit in best with the company's overall strategy. Here, the role of the tool is to prepare and organize the decision-making paradigm of the sorting process, which should be confirmed by company management representatives (technical, production and marketing departments etc.);
- *Preparing the solution* (once the concepts have been defined), by designing “halfway solutions” [10] that correspond to potential applications and have been through a validation process proving them suitable to be put forward as a credible proposal to the project teams.

- The leadership role then passes to the technical groups and project teams for the final development stage, although the platform continues to monitor the implementation in order to prepare future services. This is in fact the time when problems with implementing the concept are discovered, factors that will enable subsequent versions to be improved.

The major difficulty here is to strike a balance between these two roles. Two kinds of drift are in fact possible:

- *The first is a drift towards pure "research"*. In this case, the platform comes to be seen as a technology-watch tool, relatively isolated from the development stage. However, we have seen that contact with the practical side is crucial for the improvement of successive generations of applications. The platform's own experience has shown how difficult it is to draw in the technical people if the solutions that have been developed are not sufficiently "mature" or "tried and tested".
- *Conversely, the project can veer towards the development side* by taking over the whole process of perfecting both services and equipment instead of leaving this to the traditional development projects. This problem was clearly observed on the TP, which, having noticed how technical uncertainties had plagued the vehicle project teams, took over the development of onboard hardware intended to handle future telematics services. The extent and difficulty of this development task rapidly shifted the centre of gravity of the TP's activities from a “federating pre-project phase” position in the field of telematics services to the position of developing an individual product.

Principle 5: Problems should be constantly reformulated.

"Traditional" project management directs all efforts toward a predefined goal. This fifth principle predicates a different conception heuristic. To start with, investigations are guided by a set of requirements that may be the evaluation of a specific technology or, on the other hand, the fulfilment of a customer's need. The process of seeking an answer will generate knowledge that may well call into question the relevance of the original question or requirements. An investigation is not a simple tracing of the route from a single question to a single answer; it is the exploration of a matched question-and-answer pair, which may change as time goes on.

A perfect illustration of this situation is provided by the history of telematics within TelCar. The strategy of the company in this area became progressively

clearer between the two underlying visions that we identified in the first part. The slump in the value of dot-com companies also had a profound effect on the hypotheses and the conditions that had enabled the first operational steps to be taken. One of the aspects of a work in progress is to analyze how the organizational tools simultaneously enabled prior anticipation of the possibility of such splits and extraction of the maximum possible benefit from the work already done after redefinition of the strategy.

CONCLUSION

Telematics services constitute one of the major areas of innovation for the future of the automotive industry. However, our analysis shows that organizations that have performed well in the efficient development of innovative vehicles and components are ill equipped to grasp the opportunities in this field. Various research projects now make it possible to give a better definition of management models appropriate to a context of intensive innovation: dual-function teams at Tefal studied by [26] a model of technical integration [25]; technical networks at Renault [10]; and reorganization of research into a platform structure [27] or into "lineages" [4].

The Telematics Platform tried out at TelCar constitutes an organizational prototype, which broadly confirms the theoretical model of the project management of "innovative-supply project" that we have described in another context [5]. It illustrates the need to set-up a dedicated structure to manage the exploration of a "field of innovation" ([4]) that cut across traditional firm boundaries (department, project, time constraints…). But, at the same time, our research reveals some weaknesses. Firstly we explain the difficulty to involve the different departments concerned by the innovation (especially the distribution networks) or to take in projects initiated before the creation of the TP. Secondly, we show that the TP drift toward pure development, partly because of problems with a supplier and partly because of the reluctance of project teams to support highly uncertain developments. This explains that the TP sometimes missed the schedule. Since the first telematic services will soon be released, the TP is at a turning point in his history. The follow-up research, which will consist of tracking the project through the coming year, will enable this intermediate result to be confirmed and refined.

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