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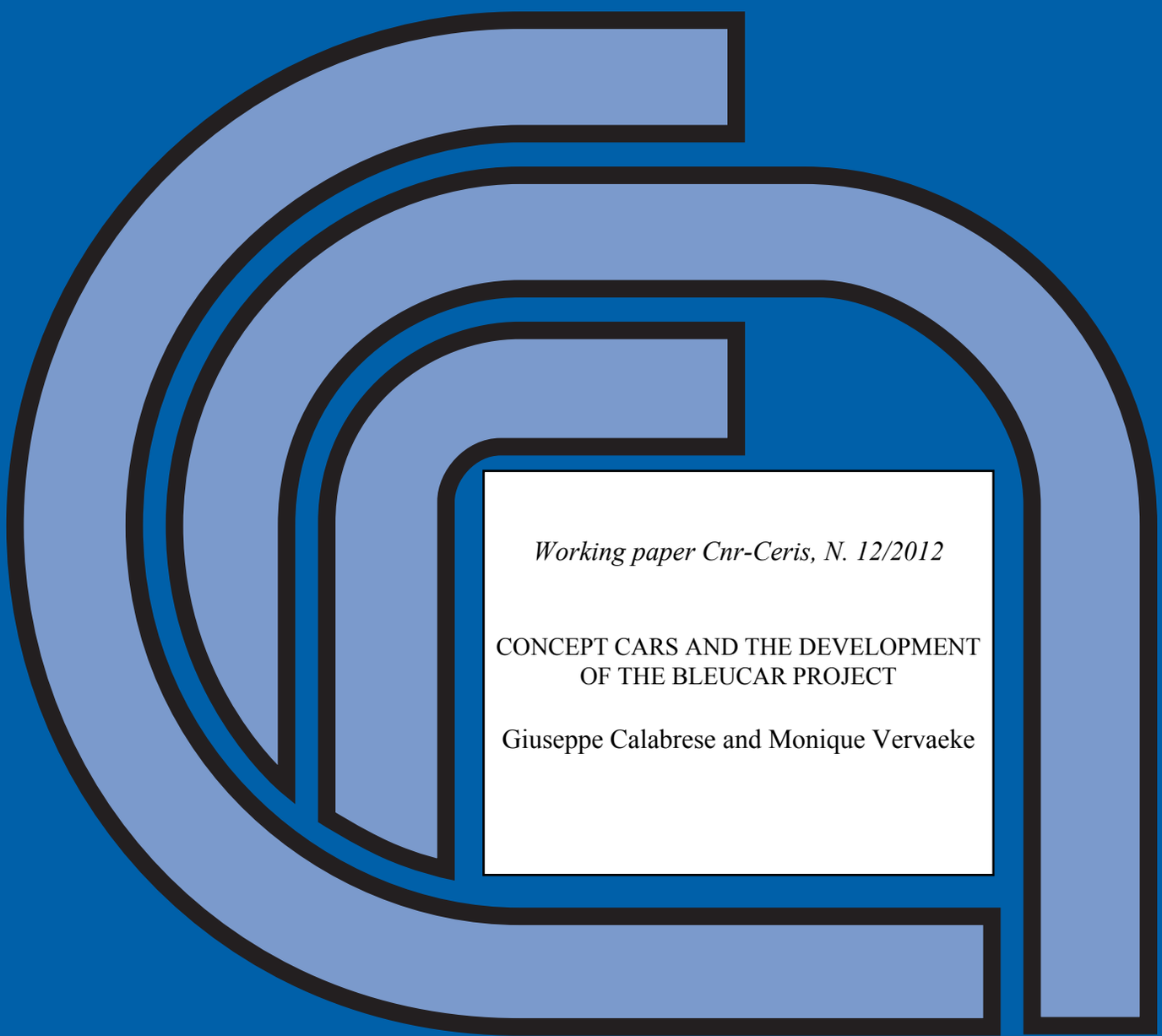

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CONCEPT CARS AND THE DEVELOPMENT OF THE BLEUCAR PROJECT

Giuseppe Calabrese and Monique Vervaeke

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DIREZIONE E REDAZIONE
Cnr-Ceris
Via Real Collegio, 30
10024 Moncalieri (Torino), Italy
Tel. +39 011 6824.911
Fax +39 011 6824.966
segreteria@ceris.cnr.it
www.ceris.cnr.it

SEDE DI ROMA
Via dei Taurini, 19
00185 Roma, Italy
Tel. +39 06 49937810
Fax +39 06 49937884

SEDE DI MILANO
Via Bassini, 15
20121 Milano, Italy
tel. +39 02 23699501
Fax +39 02 23699530

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Concept cars and the development of the bleucar project

Giuseppe Calabrese

National Research Council of Italy, CNR-Ceris,
Via Real Collegio 30, 10024 Moncalieri (To), Italy
E-mail: g.calabrese@ceris.cnr.it

Monique Vervaeke

Centre Maurice Halbwachs-CNRS,
48 Bd Jourdan Paris 75009, Paris, France
E-mail: monique.vervaeke@ens.fr

ABSTRACT: Many scholars are discussing signs and company strategies that seems to confirm that the transition to cleaner vehicles is starting. Freyssenet (2011) announced a new automobile revolution and Rifkin (2011) a third industrial revolution. How could industrial design be a field of study and discussion about ideas related to an automobile revolution? What are the links between an automobile revolution and a third industrial revolution? The prospective design approach would be used to analyse the new orientation taken in the automotive industry. Concept cars and new experiments are giving signs about the evolution of the automotive sector towards new forms of mobility. The Bleucar and Autolib in Paris, an innovative electric car sharing system is the outgrowth of an historical process. The paper examines how design of concept cars introduced new representations and changing social uses of the cars in the 1990's. It will be described the first step of the Bleucar's project, the design research, the actors and the companies involved in the project since 2005. Finally, the paper analyses actors and institutional interactions between public and private partners for setting up the Autolib mobility system in Paris. The conclusions present some reflections about the issue of new mobility systems for the automotive industry.

Keywords: Industrial design, design theories, concept car, new mobility, electric vehicle

JEL Codes: L60, M10

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SUMMARY

1. INTRODUCTION

Industrial designers have a "creative activity" that shapes products or services conceived according to industrial organization and means (Dorfles, 1963). Industrial design, as a discipline, is different from engineering design, combining technical disciplines (e.g. mechanics and electronics), which do not treat the visual aspect of a product.

Designers' creative approaches are exhibited as concept cars during motor shows (Detroit, Geneva, Paris, and Frankfurt). Concept cars and experimental projects indicate carmakers' orientations about their new product lines and they give previsions of companies' strategies. An examination of prospective design can be used to analyse the automotive industry's orientations towards new forms of mobility.

Industrial designers are exploring ideas anticipating changing ways of mobility as well as the social representations of mobility. They are engaged in a debate criticizing industrialization that fails to take environmental impact into account (Papanek, 1972; Manzini, 1986; Manzini and Vezzoli, 1998).

Designing new means of motorization in sustainable development terms is not new, but the 1990's appear to have marked a turning point in the way carmakers oriented their product strategies towards sustainable targets. Besides, the transition to safer and more eco-friendly automotives often evokes a new vision of mobility. Policy response to sustainable development should aim at the implementation of measures capable of (Ceschin and Vezzoli, 2010):

encouraging companies to shift their business models by adopting use-oriented (e.g. leasing, sharing, pooling) and result-oriented (e.g. pay per service unit schemes, integrated mobility schemes) services;

- changing agents' behaviours (e.g. public procurements, consumer awareness);
- supporting demonstrative pilot projects (e.g. promising business models without direct market pressure);
- involving universities and research centres in supporting knowledge transfer and disseminating information.

In this context, a number of noteworthy public policies are being put forward by local authorities (Calabrese, 2012). More and more city councils are promoting electric urban mobility systems, renewing their fleets with electric vehicles, and installing charging stations. Just to name a few: E-mobility in Berlin, Zen.car in Brussels, E-vai in Milan, Car2go in Ulm and in Austin, Connected car in Galicia.

The most promising initiative seems to be the "Autolib" electric car sharing system in greater Paris, that is marking a step in the diffusion of a new mobility system by the quantity of electric vehicles made available to urban users (3,000) and the number of municipalities (46) associated with the project. The innovative trajectory of Autolib with the electric vehicle Bleucar is the outgrowth of a lengthy historical process, much longer than the two years announced on the 2012 Autolib web site. The latter only takes into account the public decision-making process involving Autolib. In fact, the trajectory that led to this electric car sharing system was the result of twenty years research and development and several company alliances.

2. THE EVOLUTION OF SOCIAL REPRESENTATIONS OF MOBILITY

In Jacques Tati's film 'Mon Oncle' the house, the electric garage with the new Chevrolet bel

Air 1956 symbolized the aspiration of Mr. and Mrs. Arpel to affirm the modernity in their style of life and their social position. The film shot in 1956-1957, came out in 1958. Indeed, the current success of up-market German cars shows that cars continue to be a symbol of social status. But in the art world, the mythology of the car is being questioned and is even under attack. And Twenty years after the Chevrolet bel Air J. Tati in his movie Trafic (1971) did a satire about urban traffic jams.

Over the last fifteen years, cars have increasingly become associated with pollution, noise and traffic jams in urban city centres. Owning a car, as an outward sign of social status, loses its power of attraction in urban traffic jams. With internet and smartphones new technologies are changing the relationship to time and place and in influencing young way of life and sociability. The values previously associated with the car, such as independence and freedom, are called into question.

Car speed is no longer associated with rebellion or used as a symbol against the social order. In 2008, the well known Rock group Radiohead proclaimed that they are trying to play at places with some form of transport infrastructure other than cars. They also encouraged car sharing, if public transport is not available.

Changes in the social representations of the car encourage thinking about future forms of mobility. It creates new issues and stimulates thinking on new perspectives among industrial designers. They reinterpret consumers' expectations in accordance with changing life style.

Industrial designers work on visual perceptions of the car and its effects on the feeling of comfort and safety. Robert A. Lutz, former General Motors vice chairman between 2001 and 2009, explains in his book, 'Car Guys vs. Bean Counters' how he promoted design and "design thinking" at G.M. "Perceived quality" and innovative cars like the electric Chevrolet Volt were competitive advantages in the battle of GM against Toyota for reconquering market share (Lutz, 2011).

The models displayed at auto shows communicate principles and creative orientations of carmakers' design departments. Concept cars are creativity exercises that highlight designers' prospective work, test new proposals and prepare buyers for future developments in interior and bodywork design. Prior to 1990 few concept cars had opened up alternative ways of envisaging mobility.

3. THE EVOLUTION OF DESIGN IN THE AUTOMOTIVE INDUSTRY

Economic and managerial literature has only recently taken into account innovation paths based on design. Approximately until the late 1980s, technological innovation and aesthetical innovation were kept separate both in theory and in practice (Calabrese, 2011).

The reason behind the marginal role assigned to design within theoretical speculation lies in its distinctive features and, in particular, in the impossibility to categorise it within an industrial world made of scientific knowledge, mass markets, standardisation, and economies of scale (Micelli and Finotto, 2005). In fact, the typical model used in economic literature to describe the dynamics of innovation mainly focuses on the process of creation, management, and enhancement of scientific and technological knowledge, in which innovation processes generally flow from basic research to product launch, going through applied and pre-competitive research (Malerba, 2000).

In spite of this traditional approach, the core of the recent Design-driven innovation theory (Zurlo et al. 2002), also called Design Inspired (Utterback, 2006), is that radical innovations arise through both technological innovations and design, thanks to the creation or transformation of product meanings in terms of worth, personality, identity, and status associated with the product itself (Verganti, 2003). Design too is capable of lending products a substantial competitive value, similar to that generated by technological innovation.

A design thinking process is based on exploratory studies formulating future socio-cultural scenarios to determine the new meanings that will be associated with a product or service (Brown and Katz, 2000). With this human-centred approach to innovation, instead of targeting a clientele according to existing market organisation, mobility practices are observed and examine to find out new ideas in urban mobility compatible with sustainable development objectives.

Four possible ways of resorting to design as innovative lever can be identified (Micelli and Finotto, 2005):

- Design as exclusiveness and aesthetics. These companies can be defined as design-based, since they have turned design into their primary asset and base all their strategic decisions on this competitive lever.
- Design as ergonomics and aesthetics. These companies have distinguished themselves for their attention to product functionality and have invested considerable sums in ergonomics as a source of innovation.
- Design as creative integration of technology. These companies tend to incorporate state-of-the-art technologies into design products used in everyday life, which are destined to become some sort of commodity.
- Design as aesthetic recontextualisation of traditional products. These companies tend to join the world of shapes to that of meanings and experiences.

The contrast between technological innovation and Design-driven innovation takes on distinctive traits within the automotive sector.

The industrial conception of style originated in the United States before the Second World War with Alfred Sloan, who introduced the concept of planned obsolescence to General Motors, foreseeing that style would soon become one of the most important and aggressive elements in sales promotion. The first automotive industry style centres were set up with the purpose of planning the aesthetic makeover of products (Vervaeke, 2012).

Every one or two years each model underwent a facelift and restyling and every five years, regardless of the amount of sales, each model was replaced. If on one hand this system enabled General Motors to become one of the biggest and most profitable industrial enterprises, on the other hand so many frequent modifications led to the commercial launch of quite a few conceptual degenerations.

Conversely, European manufacturers focused on a model's long lifespan as a success factor, thanks to innovative technical and aesthetic content. Some examples are particularly significant: the first Mini Minor was launched in 1959 and its production continued until 2000; the first Fiat Panda was produced for over 20 years; the Porsche 911, which was manufactured from 1963 to 1998, achieved higher sales than any other later model and reached its peak of success in 1997.

In the 1970s the oil crises forced also the United States to rethink cars in a more rational and functional way. Sterile styling gave way to design, *i.e.* to approaching the styling of a car's

shape with much more awareness. Those years saw the spreading of concepts such as accessibility, aerodynamics, and ergonomics (Pininfarina, 2003).

The changes currently affecting the automotive sector are not only fast but they also require a strong innovative contribution, in which technology and design go hand in hand (Calabrese, 2010). Building a new model entails substantial investments, which have a marked influence on the selling price. Carrying out comparative design studies to provide a wider range of choices costs relatively little when compared to the general investment costs. This is one of the reasons why, when major carmakers design new models, they also involve independent design firms, in order to have a large selection of options to choose from.

With the purpose of reducing costs, carmakers have rationalised internal projects so that they can use one chassis for different models, thus pursuing economies of scale more effectively. In some cases, a maximum of eight vehicle models have been produced using the same platform. The aspect that mostly differentiates one model from the next is design and style has probably become the most distinctive element of brand image.

Within this context, the contribution of stylists has proved to be very important since it has managed, though partially, to transform cars by bringing out some unexpressed functionalities and by actually creating new market segments, whose importance, however, is still limited.

Given the complexity of cars as products, they display all the previously mentioned innovative levers of the Design-driven theory.

Suffice it to think of multi purpose vehicles (MPVs), which were crossed with station wagons, giving rise (design as ergonomics and aesthetics) to either multi utility vehicles, when the main purpose is carrying passengers, or to multi-purpose vehicles, when the main purpose is carrying things, or to leisure activity vehicles, if the required size and quality are lower. MPVs were also crossed with all-terrain vehicles, spawning the so-called sport utility vehicles and the cheaper crossovers (design as creative integration of technology).

Around the same time, microcars and citycars appeared on the market; some of them were innovative, others essentially consisted in revamping previous successful models (design as aesthetic recontextualisation of traditional products), and they met with wide popular acclaim. Tuning activities should also be mentioned: they have evolved from individual handmade modifications to industrialised large-scale customisation and have led to the production of premium and luxury cars (design as exclusiveness and aesthetics), on which most of the research concerning highly innovative stylistic forms is actually concentrated.

The new frontier of car design is represented by new types of propulsion, in particular electric, full or hybrid, which require a different layout and new vehicle architecture and simultaneously involve all the innovative levers of design (design as creative integration of technology).

4. NEW PERSPECTIVES FOR ELECTRIC MOBILITY SINCE THE 1990S

The selective historical overview below presents some iconic models selected as characteristic of the evolution towards new mobility systems. Three phases can be detected: the precursory time, the perspective concept period and the experimental concept phase. The box shows for each period some iconic models of the evolution toward the new mobility system.

4.1 The precursors time

At the time of automotive pioneers there coexisted steam powered, electric and petrol vehicles. The first electric car had more power than petrol cars but it could not sustain long travel before it lost of battery power. The Columbia Phantom Mark III 1897-1907 was the first American electric car produced in small series. Columbia automobile, the company which produced this model tested it as a taxicab for the city of New York. At the end of the XIX century petrol engine cars were slower than short-range electric cars. Jeantaud cars won the record of kilometer/Hour in 1898 and 1899. With an electric car named the 'Jamais contente' (Never Satisfied), in 1899, Janatzy broke the speed record of the Jeantaud car in 1899 by reaching a top speed of over 105.98 Km/h. The body maker, Rothschild (Rheims Auscher's successors), used sheet aluminium. The bodywork, with its aerodynamic shape, small wheels and lower position of the deck, presented innovative visual codes embodied by the 'hippomobiles'.

4.2 The prospective concept period

In 1908 Ford in introducing new technique of production had a great influence on the evolution of the automotive industry with his Model T. Even though the petrol vehicle established itself in a mass market and that alternative choices were no longer offered, few companies tested new concepts. During the German Occupation of Paris, the shortage of petrol encouraged inventors to develop small urban vehicles such as Paul Arzen's electric car named the 'l'oeuf électrique (electric egg)' for example. This model with a 'bubble' design introduced a new formal vocabulary, completely different from the angular forms and right-angled window cut-outs that were to dominate from 1960-1980 vehicles.

During the 1970's some concept cars explored a new way of driving with a joystick and new plastic bodywork materials (Jarret vehicle, 1970; Mazda EX 005). In 1978, Fiat set up a partnership with Pininfarina for studying an environmentally-friendly electric city car called Fiat Ecos. After the petrol crisis of 1972 several experiments attempted to create little urban cars. Main automakers studied electric models resulting from combustion engine conversions.

4.3 The experimental concept period

The number of concept cars announcing new ways of thinking mobility increased from the 1990s. The electric 'Impact' developed by GM and the Prius Hybrid concept car, were examples of this trend. New relationships between drivers and mobility were tested. GM rented the 'Impact'. Hayek with the EV Swatch project and PSA with the Tulip project decided to set up an electric car rental system of urban mobility. In this period several carmakers embarked on prospective research on new mobility systems based on electric, solar or hydrogen propulsion presented as concept cars in motor shows.

While Pininfarina and Matra were coachbuilders producing limited series they participated as pioneers one research on electric vehicle with original models (Fiat Ecos, Metrocubo and Nido EV for Pininfarina; Zoom: fold it away, Bleucar 1 for Matra).

The concept cars developed in the 1990s contributed to changing the image of vehicles. They contributed to rendering small urban cars with lower fuel consumption attractive. Shapes were organised around smoother surfaces with fewer convoluted sculptural effects and less air resistance. The sharp-angled windscreens and rear windows filmed by J. Tati in 'Trafic' were replaced by curved lines that produced a smooth continuous contour from bonnet to boot.

Prospective research on vehicles with new propulsion systems influenced all models.

Some iconic models of the evolution toward new mobility system

The precursors period

- The electric traction omnibus by Walter C. Bersey and Fred Kimball 1888;
- The Columbia Phantom Mark III 1897-1907;
- The Jeantaud electric car 1899;
- La Jamais Contente (The Never Satisfied) C. Janatzy, Rothschild body-maker 1899.

The prospective concept period

- Peugeot 401 (1935) convertible electric by Georges Paulin;
- CGE Tudor (1941) and Oeuf electrique (Electric Egg by Paul Arzens, 1942), Paris under German occupation with petrol rationing;
- Nissan experimental electric car (1947);
- Jarret (1969) Paris Motor show, an electric concept car without steering wheel or pedals, steered with a joystick and an electronic system, design Technes;
- Mazda EX 005 (1970), Tokyo motor show, an hybrid concept car, vehicle moulded in plastic;
- Volvo Electric car (1977) a two-seater electric car;
- Fiat Ecos (1978) with Pininfarina a study for an environmentally-friendly electric city car;
- GM Sunraycer (1987) solar model that served as a base for the GM Impact (1990).

The experimental concept period

- The GM Impact (1990) Los Angeles motor show, precursor to the electric rental EV1 (1996), production limited to 4 per day stopped in 2001. Under the threat of legal proceedings, subscribers were to return their vehicles in 2003 (Who Killed the Electric Car? 2006, documentary by Chris Paine;
- Citroën Citela (1991-1992 Geneva motor show) an electric vehicle;
- Matra Renault Zoom (1992) an electric vehicle;
- PSA Tulip (1995) an electric product/service mobility system for a car rental system;
- EV Swatch (1990-1998) an electric product/service mobility system for a car rental system;
- Honda EV plus (1996), an electric vehicle;
- Prius hybrid concept car (1995) presented by Toyota at the Tokyo Motor show, mass production will begin in 1997 and sales on the American market in 2000;
- Jeep Commander, Daimler (1998) powered by fuel cells;
- Pininfarina Metrocubo (1999) an hybrid concept car;
- Think Ford (2000), an electric vehicle;
- La Bulle Coqueline Courrège (2002) an electric vehicle based on an earlier model driven in a Courrège fashion show in 1998;
- Ford MA (2002) use of recyclable materials (bamboo) and electric motors;
- Pininfarina Nido EV (2004) an electric vehicle;
- Matra Bleucar 1 (2005) an electric vehicle Geneva Motorshow
- Venturi Eclectic concept (2006);
- Aptera (2006) an electric vehicle.

These vehicles permitted experiments with new materials (aluminium, fiberglass…), transforming vehicle architecture and changing interior layout by introducing new means of communication and altering seating positions for the driver and the passengers. The visual and aesthetic codes of concept cars anticipate future changes (Vervaeke, 2010). By presenting the Prius Hybrid concept car in 1995, and introducing an industrial version on the American market in 2000, Toyota gained a competitive advantage by anticipating a new market.

This carmaker differentiated itself by proposing the first mass market Hybrid vehicle. This strategy of differentiation to eclipse competitors allowed this carmaker to become "the undisputed darling of the media", in the words of Lutz. It justified the launch of the GM Chevrolet Volt, plug-in hybrid electric vehicle at the Detroit Motor Show in 2007 as part of GM strategy to re-establish its media image of innovative carmaker, an image tarnished by Toyota's lead on the American market with the Prius (Lutz, 2011). At this motor show Toyota launched a fuel-guzzling full size Tundra pickup that shows that for Toyota its carmaker's strategy of range differentiation and its positioning on different market segments are more important than its environmental concerns. Toyota used the societal issues raised by sustainable development in order to position itself on a new market segment. While continuing to develop a wide range of petrol driven vehicles, the hybrid is one means of capitalising on brand identity.

Nevertheless, the evolution of the automotive sector towards new forms of mobility is a slow process. Designer activities are constrained by carmaker strategy. As a matter of fact, the automotive sector is a mature industry, technologically dominated by all-steel bodies and internal combustion engine. These technical aspects have resulted in an industry with high fixed costs, necessitating mass production to achieve low per-unit prices in the market (Wells, 2010). Thus innovation is, for the most part, incremental, conservative and process-oriented (MacNeill and Bailey, 2010).

5. THE ACTORS, THE BLEUCAR TRAJECTORIES AND THE AUTOLIB ELECTRIC CAR SHARING SYSTEM

The idea of an electric car sharing system appeared in the 1990's. Hayek who completely transformed watch design with the launch of the Swatch, created a team to design a small two-seater electric car for rental. In 1994, he entered into partnership with Mercedes, but abandoned the collaboration in 1998 on the launch of the petrol engine Smart, as he considered it to be a deviation from his original project (Vervaeke, 2012).

PSA Peugeot Citroën had already studied the possibility of an electric car-sharing project in 1995. The Individual and Public Urban Transport Programme 'TULIP' (Transport Urbain Libre Individuel et Public) imagined a car rental subscription service with electric recharging points and stations. The two-seater concept car consisted of five main elements assembled by heat fusion, but it was only a conceptual project with no outcome. Peugeot and Citroen models were transformed into electric cars in the 1990s. They will be used for the first French experiments in electric car rental systems in La Rochelle.

The City of Paris entrusted the organisation of an electric car sharing system to a mixed transport syndicate 'Autolib', created in 2009. In 2010 several joint company ventures had put forward their proposals. At the end of consultations three vehicle projects remained in competition: Bolloré Group with the Bluecar; the Avis, RATP, SNCF and Vinci Park consortium

with the electric Smart; VTLIB' (Véolia urban transport) with the Peugeot Ion (based on the Mitsubishi iMIEV). The criteria taken into consideration by the mixed transport syndicate 'Autolib' included vehicles, service, economic model and risk-sharing conditions.

The Bolloré Group was chosen on the basis of the cheapest proposal. Several factors could explain the lower operational costs. The rental cost of the Bolloré Group's lithium-metal-polymer batteries are cheaper than traditional lithium-ion batteries but the design process no doubt also contributed to reducing costs.

Compared with the others two competing vehicles (Smart, Peugeot Ion), the Bluecar was from the beginning the only purpose-designed electric car rather than being a conversions from a traditional vehicle. In the current phase of research on electric vehicles, an integrated design appears more favourable to the reduction of costs than modular design. The 2011 Bluecar model was the result of Matra and Pininfarina' cumulative research on electric car architecture, equilibrium, volumes and specific components initiated since the 1990's.

The joint venture between Pininfarina and Bolloré Group was set up in 2008 with the purpose of designing, developing, manufacturing and distributing an electric car with revolutionary technical features and formal qualities. This project originates in the takeover by Pininfarina of the French company Matra in 2003, which had established a lasting collaboration with the Bolloré Group. The Autolib service should create around 1,500 jobs and employ 250 advisors available to motorists 24/24h through a communication system embedded in the vehicle. With 3,000 cars circulating in Paris, Autolib will have made a significant step in the spread of electric vehicles and its acceptation by car users.

5.1 The Bolloré trajectory in electric batteries and its partnership with Matra

The Bolloré Group, through its Batscap division that developed a lithium-metal-polymer based automotive battery, initially collaborated with Matra Automobile on an electric car project. Matra Automobile was the product of the Lagardere Group's diversification from military equipment to the automobile sector. The automobile subsidiary directed by Guédon developed a series of models that renewed the way mobility was perceived (Chabbi, 2003). The main innovations concerned materials with the introduction of plastic panels, and vehicle architecture (Baghera 1972-1973, 3 front seats, Espace designed in 1978, produced with Renault in 1981). The Espace II had plastic bodywork panels fabricated using the Sheet moulding Compound (SMC) process from chopped glass fibre waste.

Guédon, CEO of Matra Automobile and his team, worked on the initial bodywork projects for the Bluecar. The first concept car was presented at the 2005 Geneva motor show. Matra Automobile was purchased by Pininfarina group in 2003 when the Lagardere Group decided to pull out of the automobile sector. Following Matra's merger with the Italian Pininfarina, Bolloré Group engaged in a joint venture with Pininfarina to continue the development of the Bluecar. Throughout the project's progress the cooperating companies evolved continuously. Despite the Lagardere Group's financial strategy to drop the automobile sector and Pininfarina's financial difficulties, the Bolloré Group had the financial means to develop new partnerships, to mobilise collaborators and a succession of firms with a great deal of automotive expertise and thus permitting the project to reach its industrial phase.

Autolib' will demonstrate the Bolloré Group's ability to provide a complete solution in the field of electric cars and its success will be a commercial showcase for its two subsidiaries: Batscap for battery manufacturing and the IER Group selling solutions worldwide for people and goods flow management, self-service and access security in the air transportation, public transportation, logistics platforms, transport, retail, postal and public sectors. This Bolloré Group strategy organises a car design and manufacturing process based on intercompany partnerships that differ from the intercompany relationships around which the automotive sector is traditionally organised.

5.2 The Pininfarina trajectory in electric vehicles

Nowadays Pininfarina is still an Italian design house and flexible partner for OEMs, but no more a coachbuilder. In fact, in 2009 Pininfarina approved a revised industrial plan to end to its contract car making operations. The main reason of the difficulties is to ascribe to the increasing flexibility of automakers' assembly plants that induced more car companies in reducing drastically contract manufacturing. Moreover, in the case of Pininfarina can be mentioned two other explanations: hindrances occurred in the engineering and production process and the change of the contractual conditions with carmakers.

The revised plan came just before creditor banks approved a financial rescue for the company that saved it from the equivalent of a U.S. Chapter 11 bankruptcy filing. At the time of writing the ownership perspective is not defined yet, banks are looking for a buyer, but the recovery of the Pininfarina family is still possible.

The former Pininfarina plan in electric vehicles could be seen under a twofold perspective:

- the complete development of green vehicles from styling to prototyping for automaker, utility companies or local authorities;
- the development, production and direct selling of electric cars to indistinct customers.

The unveiling of the second Nido version falls in the first case. Nido is a running prototype for a new family of EV with a limit production to less than 10,000 units a year so that it does not become a major competitor to electric vehicles that major car companies plan to launch. According to Pininfarina, this car project could help automakers to introduce an EV into their range very quickly. It could also find a market with utility companies and city governments that are looking for an electric vehicle that can be tailored to their needs. The Nido could be developed for production in 20 months at a cost of 120 million to 130 million euros (Automotive News Europe, 27 May 2010). The Nido is the result of a long tradition of Pininfarina in developing EV, the first proposal was is 1978 with the three doors Ecos model.

The second strategic line was ceased in the last plan and also the joint venture with Bolloré Group was cancelled. This partnership foresaw that the first experimental prototypes (named B0) would have to be available in autumn 2010 and production was to reach 10,000 units a year by 2012 with sales throughout Europe. The production of the Bluecar model would have taken place in a Pininfarina plant. In order to facilitate the matching of supply and demand, it would had been possible to rent the electric vehicle for a minimum period of three months at 330 Euro per month and 24/7 technical assistance would have been provided by a dedicated service centre.

During 2009 the planned engineering activities for the project suffered a delay and, in relation to the evolution of the ownership structure of Pininfarina described above, the project suffered in the early months of 2011 a significant transformation with the definition of a new plan and the addition of new partners.

5.3 The Bluecar trajectory

The selective historical overview of iconic models in the evolution toward new mobility systems, described in section 2, shows some exploratory research conducted by Matra and Pininfarina on the electric car. Matra Automobile has undertaken research on urban electric cars from 1984 (P50 project). This research led to the development of the concept car "Zoom: fold it away", a three wheeled electric vehicle in 1992. Pininfarina developed the Metrocubo (1999) and the first Nido version (2004) concept cars. Matra and Pininfarina got experience that enabled them to develop their expertise and capitalise on their errors to develop the Bluecar.

The different concept cars of the Bleucar show the evolution of the design research. The mass produced vehicle has a visual identity as a result of contributions from Matra, D3, Pininfarina and Cecomp a few design research actors. Between the four stages of the project, the overall shape changed and also the companies involved.

Phase I *- VBE1 or Bluecar 1: Geneva Motor Show*

The 2005 Matra concept car is a two-door, three-front seat vehicle, 2 small foldaway rear seats with a half sphere on the side and a cubical rear form aimed at creating a feeling of security. D3 (a mock up and prototype company) made the mock-up.

Phase II *- Bluecar 2: 2007*

This running model, 3 front seats, 2 small foldaway rear seats was the result of a cooperation between Matra Automobile Engineering (a new Pininfarina subsidiary), D3 (a new Pininfarina subsidiary) and Bolloré Group.

Bluecar phase 1 and 2 readapted the following elements of the Espace (a succesfull Matra car produced by Renault): composite materials, large window areas, modular seating positions.

Phase III *- Bluecar Pininfarina B0, Paris Motor Show 2008*

The Pininfarina-Bolloré Bluecar is a 4 door, 4 seat car. The Pininfarina design gave a shape with a soft continuity of lines from the bonnet to the roof, from front wheel to the back light. The shape is extremely fluid. Solar cells are embedded in the roof. Lines are refined. The Pininfarina Bluecar dropped the very square rear design and adopted more fluid dynamic lines. The glazed surface area was reorganised, and notably the roof that became totally transparent. In profile, the upward elliptical lines soften the heavy rear aspect of the first two versions created during the Matra era.

Phase IV *- Bluecar Autolib December 2011*

The Bluecar designed for the 'Autolib project' is a small four-seat, 2 door vehicle, weighing 1100 kg. This smaller model keeps the stylistic elements of the larger version with its curved lines, the result of research on parts assembly. The driver's higher seating position however created a more balanced global architecture more characteristic of the Monospace (space cruiser): an ample interior in a shell body.

After the Pininfarina financial difficulties of 2009, a new agreement between Bolloré Group and Pininfarina provided the production of 4,000 electric vehicles derived from the Bluecar with the brand of Pininfarina and the rent of the Pininfarina plant for three years to the Italian coachbuilder Cecomp that is based in the outskirts of Turin and specialized in automotive prototypes and pre-industrialization. It was founded in 1978 and currently employs 130 employees with a turnover of approximately 20 million euros.

In addition to assembling, Cecomp has developed the mechanical and car body parts. The total value of the rent is 14 million euros and 57 employees of Pininfarina were relocated to Cecomp.

In order to complete the industrial development phase of the Bluecar project, a new multi-company partnership has been created between Espace Développement (a consulting company in design concept) and D3, both previous participants in the beginning of the project, new partnerships with the Segula Group, acquired Matra Automobile Engineering research division, and with Cecomp. Segula Technologie with its 7,000 employees is a French diversified group involved in aerospace and defence, automobile and industrial vehicles that has developed expertise in the electric vehicle domain.

Some of the Matra Automobile personnel found themselves participating in different phases of the Bluecar project, notably Guédon who, first directed Matra Automobile, next he worked on the project during the Pininfarina era (Matra Automobile Engineering), set up Espace Développement. Between 2005 and the launch of the Bluecar in 2011, the Espace Développement and D3 teams changed ownership three successive times as different capital-based companies. It shows that research and development in new mobility field is quiet uncertain.

Between phase III and IV, the project team was reorganized. The new cooperation system of actors had the target to set up a running prototype and to finish the development. After the Pininfarina show car which established the conceptual design step of the project, Cecomp, Espace Development and D3 worked on the study mock ups, the running last prototype and the pilot production prototype.

They tested mock–ups, interior design, modified some aspects of the exterior (lights, for example) and developed the components for industrialisation.

Bolloré Group gave the constraint to respect three priorities:

- the control of the price,
- design, choose and assembly components that produce a lighter vehicle at a controlled price,
- respect the timing negotiated with the "Autolib syndicat mixte". The project team had to work out the development problems.

The Bluecar is not blue. The car body is made from aluminium alloys to keep the basic grey colour of the metal. Car bodies are normally made from steel alloys. Steel is easier to press, to work, to cut. Aluminium is lighter than steel but more expensive. An aluminium body left unpainted has the advantage of reducing costs, and avoids using paints with solvents and varnishes that are harmful to the environment. Furthermore, for a car-sharing system, this option minimises maintenance in the event of vandalism or fender benders as bumps and scratches are less visible which save on touching-up paintwork. Moreover, grey unpainted aluminium is not out of place among the circulating cars. Car buyers often choose a shade of grey among carmakers' broad range of colours due to delivery waiting time or simple conformism.

6. CONCLUSIONS

A new mobility system put on the market is no longer just a product, the car, but it is a product-service (self-service rental terminals, charging points, stations, a web site). The Autolib project shows that in addition to the teams of industrial and engineering designers, designers were also involved in creating the self-service rental terminals, charging points, stations with subscription and information terminals. Graphic designers worked on the Internet site.

Actors involved in doing innovative experiments in favour of new mobility systems have difficulty imposing themselves as new comers in the automobile sector. The Bolloré Group, as a new comer, succeeded through its alliances with companies that had already proved their skill and competence in the automobile sector.

The major carmakers have the financial means to anticipate and control new trends in mobility by absorbing failing competitors or creating alliances. In a dominant position, they orchestrate social forms and the rhythm of the transition towards innovative models as well as influencing legislation. The development of running prototypes involves costly trials. The major carmakers have the financial means to anticipate and control new trends in mobility by absorbing failing competitors or creating alliances. In a dominant position, they orchestrate social forms and the rhythm of change towards innovative models as well influencing legislation (cf. American carmakers opposition to the California zero-emission vehicle rule adopted in 1990 by California Air Resources Board. The ZEV mandate required in 1998 2% zero emission vehicles of the sales in the state of California and 10% in 2003. Those constraints were finally revoked (Linde, 2010)). The competencies and expertise necessary to develop industrially produced vehicles coupled with the financial investments incurred constitute a double barrier for new market entrants. In addition, observations regarding the background and decision making process of innovative projects also shows that major carmakers can exert some control over new entrants through partnership agreements (e.g. Tesla and Toyota, Tesla and Daimler Mercedes, Segway and General Motors).

Rifkin believes that a new energy regime based on locally sustainable renewable energy grids and energy sharing will radically transform the way we consume, travel, produce electricity and organise exchanges. With the third industrial revolution, a distributed and collaborative economy would change all our economic, political and social institutions (Rifkin, 2011). However, in today's market-driven economy, international competition and stock market mechanisms encourage industrial concentration. According to a study conducted by the French Corporate Governance Institute (Gomez and Guedri, 2012) in 1992, only 37 French companies outside the financial sector had an annual turnover of over 7.5 billion Euros whereas in 2010 it had increased to 58.

According to *Insee première*, in 2007, 242 major companies produced 34% of the Gross Domestic Product and employed 27% of French salaried workers. In the automotive industry, six major companies employ 74% of workers in the sector (Hecquet, 2010). The strong restructuring process observed in the automotive sector over the last ten years, marked by concentrations and mergers by absorption of companies in difficulty (Freyssenet, 2009) and the stoppage of short production runs for Italian designer car bodies (Calabrese, 2011), are not convergent with the model proposed by Rifkin. Despite its intellectual coherence, this model is likely to remain utopian for a few more decades.

With regard to the three scenarios for future developments in the automotive sector elaborated by Freyssenet, the scenario of diversity, the scenario of progressiveness and the scenario of rupture, changes in product strategy seem to indicate the predominance of diversity (Freyssenet, 2011).

Customers' behaviours, their acceptance of battery rental services and in ensuring the success of innovative experiments in new mobility systems will determine the speed (or slowness) of change. As well as consumers, public authorities and associations, new environmental norms and the financing of experiments will also play an influential role in setting up the social conditions for the transition to new mobility systems.

REFERENCES

Beaume, R. and Midler, C. (2009) 'From technology competition to reinventing individual ecomobility: new design strategies for electric vehicles', *International Journal of Automotive Technology and Management*, Vol. 9, No. 2, pp. 174-190.

Brown, T. and Katz, B. (2009) *Change by design: how design thinking can transform organizations and inspire innovation*, HarperCollinsBusiness, New York.

Calabrese, G. (2010) "Innovation design and sustainable development in the automobile industry" *International Journal of Automotive Technoloy and Management,* Vol. 10, No. 1, pp. 1-12.

Calabrese, G. (2011) "Structure and transformation of the Italian car styling supply chain", in *International Journal of vehicle Design*, Vol. 57, N. 2-3, pp. 212-229.

Calabrese G. (2012) (ed.) *The greening of automotive industry*, Palgrave Macmillan, Londres.

Ceschin, F. and Vezzoli, C. (2010) 'The role of public policy in stimulating radical environmental impact reduction in the automotive sector: the need to focus on product-service system innovation', *International Journal of Automotive Technology and Management,* Vol. 10, No. 2-3, pp. 321-341.

Chabbi, M. (2003) *Passion automobile. Philippe Guédon, l'homme de l'Espace*, Etai, Boulogne Billancourt.

Dorfles G., (1963) *Introduzione al disegno industriale,* Cappelli, Bologne.

Freyssenet, M. (2009) 'The second automobile revolution : promises and uncer-tainties', in Freyssenet, M. (ed) *The second automobile revolution. Trajectories of the world carmakers in the 21st century*, Palgrave Macmillan, Basingstoke and New York, pp. 443-454.

Freyssenet, M. (2011) 'Three possible scenarios for cleaner automobiles', in *International Journal of vehicle Design*, Vol. 11, No. 4, pp. 300-311.

Gomez P-Y, Guedri Z. (2012) *Le grand décrochage*, www.ifge-online.org, Cahier n°1, Institut français de gouvernement d'entreprises.

Hecquet V. (2010) ' Quatre nouvelles catégories d'entreprise. Une meilleure vision du tissu productif', *Insee, Première,* n 1321, novembre, pp. 1-4.

Linde A. (2010) *Electric Cars- The future is Now*, Veloce Publishing, Dorchester.

Lutz, R. (2011) *Car Guys vs. Bean Counters*, Penguin Group, Portfolio, New York.

MacNeill, S. and Bailey, D. (2010) 'Changing Policies for the Automotive Industry in an Old' Industrial Region: An Open Innovation Model for the UK West Midlands?', in *International Journal of Automotive Technology and Management*, Vol. 10, No. 2–3, pp. 128-144.

Malerba, F. (2000) *Economia dell'innovazione*, Carocci Editore, Roma.

Manzini, E. (1986) *La materia dell'invenzione*, Arcadia, Milan.

Manzini C. and Vezzoli E. (1998) *Lo sviluppo di prodotti sostenibili. I requisiti ambientali del prodotti industriali*, Maggioli, Rimini.

Micelli, S. and Finotto V. (2005) 'Il ruolo strategico del design nella competitività d'impresa' in Bettiol, M. and Micelli S. (Eds.) *Design e creatività nel Made in Italy,* Bruno Mondadori, Milano.

Papanek, V. (1972) *Design for the real world,* Thames & Hudson, London.

Pininfarina, S. (2003) 'Il design industriale tra arte funzionalità e mercato' *Impresa & Stato,* www.mi.camcom.it, No. 62.

Rifkin, J. (2011) *The Third Industrial Revolution: How Lateral Power Is Transforming Energy, the Economy, and the World*, Palgrave Macmillan, New York.

Utterback, J. (2006) 'What makes products great', in Utterback, J. Vedi, B-A. Alvarez, E. Ekman, S. Sanderson, S.W. Tether, B. and Verganti, R. (Eds.) *Design-Inspired Innovation,* World Scientific, New York.

Verganti, R. (2003) 'Design as brokering of languages: innovation strategies in Italian firms', *Design management Journal,* Vol. 13, No. 3, pp. 34-42.

Vervaeke, M. (2012) 'Industrial Designers and Challenges of Sustainable Development' in G. Calabrese (ed.) *The Greening of Automotive Industry*, Palgrave Macmillan, Londres, pp. 49-68.

Vervaeke, M. (2010) 'From watching the markets to making trends: the role of industrial designers in competitive strategies', in Midler, C., Minguet, G. and Vervaeke, M. (Eds.) *Working on innovation*. Routledge, New York, pp. 42-71.

Wells, P. (2010) 'Sustainability and Diversity in the Global Automotive Industry', in *International Journal of Automotive Technology and Management*, Vol. 10, No. 2–3, pp. 305-320.

Zurlo, F. Cagliano, R. Simonelli, G. and Verganti, R. (2002) *Innovare con il design. Il caso del settore dell'illuminazione in Italia,* Milano: Il Sole24Ore.

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