THE TECHNICAL OBJECT AS A RESOURCE FOR IMAGINARIES STIMULATION: THE CASE OF TWIZY IN THE AUTOMOTIVE INDUSTRY

Laura Le Du, Sophie Hooge, Pascal Le Masson

Innovation Product Development Management (IPDM)

The 22nd Annual Conference 14-16th June 2015 - Copenhagen Denmark.

THE TECHNICAL OBJECT AS A RESOURCE FOR IMAGINARIES STIMULATION: THE CASE OF TWIZY IN THE AUTOMOTIVE INDUSTRY.

Laura LE DU
Center for Management Science
Mines ParisTech
laura.le_du@mines-paristech.fr

Sophie HOOGE
Center for Management Science
Mines ParisTech
sophie.hooge@mines-paristech.fr

Pascal LE MASSON
Center for Management Science
Mines ParisTech
pascal.le_masson@mines-paristech.fr

Traditionally perceived as a support of existing or latent imaginaries (Borup *et al.*, 2006) technical objects can also support new imaginaries pre-determined by designers (Verganti, 2013) (Hatchuel, 2013) (Le Masson *et al.*, 2011). This article suggests another approach: to consider technical objects as generative products (Brown *et al.*, 2010) of new imaginaries non previously determined. How to evaluate the creation of new imaginaries? What are the potential advantages for an industrial firm in its innovation strategic management?

I. INTRODUCTION

Imaginaries are perceived as stable and evolve very slowly (Wunenburger, 2011) while technical objects are considered as the result of these imaginaries (Balandier, 2001). We suggest in this paper to extend the design theory hypothesis that technical objects can be generative by stimulating socio-technical imaginaries. Our empirical setting is particularly suitable for the purpose because after being highly evolving for decades, the automotive sector is currently perceived as fixed and locked. In this context we studied: Twizy, a disruptive object for the domain since it does not answer the traditional performance criteria but generates a lot of emulation between actors in the market.

Indeed, Twizy is an electric quadricycle only for two passengers who are sitting one behind the other. We have used a longitudinal collaborative research with the French car manufacturer Renault since 2007 in order to well understand the design of the object. Thanks to interactions with clinic clients, the analysis of secondary data and semi-structured interviews of the main characters concerned by the development of the object in 2014, it has enabled us to understand the impact of the object. The findings show an example of an imaginary stimulating object and highlight the potential resource that it could be for the strategic design. Whereas the expected reaction from the professional actors and the market would be a rejection of the object, our article demonstrates why the design of imaginary generative object has a potential value and the conditions to catch it. The paper contributes to the management innovation theory by going further in the generative product notion with the proposition that a product is able to generate new imaginaries. In this way, the paper also contributes to improve that imaginaries are not totally fixed but able to evolve (in less than decades). The paper also contributes in the practice to integrate a new resource, which enables firms to integrate a design product & design management pro-active strategy.

II. OBJECTIVE AND RESEARCH QUESTION : characterising an object, which generate a potential of imaginaries.

This article aims to deepen the theoretical and management knowledge about an imaginaries stimulating object. How characterize the value of a disruptive object, which does not answer the traditional performance criteria? How can we estimate the stimulation of new imaginaries?

We focus our literature review on two theoretical frameworks: the first one about the imaginaries often mobilized in philosophy and sociology and the second one in management strategic innovation in management sciences.

Bachelard (1970), one of the famous reference authors about imaginaries shows the interest in stimulation of imaginary process. Indeed, without activation the mechanism it would be sterile. In this context, technical object is often considered as an output of the imaginary mechanism(Balandier, 2001). In the contemporary debate, we think that imaginaries are evolving and that an impact on them is possible (Jasanoff *et al.*, 2006). By considering technical object as the embodiment of socio-technical imaginaries, the literature does not show how it could be an input of the imaginary process or a part of this mechanism. Simultaneously, management sciences use imaginaries as a design constraint but the literature does not expose how they could be also a resource for the management.

Following works on the generative product uses, we will try to fill this gap by showing that imaginaries could be stimulated thanks to a technical objects. And that it represent a potential value for the design but also for the strategic innovation management.

III. LITERATURE REVIEW

Employed in transdisciplinary academic fields, as in mathematics, sociology, philosophy, psychoanalysis, anthropology as in poetic, artistic, cinematic, religious, gastronomic or policy, the imaginary term is mainly discussed in the literature of philosophical, sociological or anthropological. Reference authors as Jung (1946), Bachelard (1970), Durand (1969), Wunenburger (2011) brought a precious lighting about the nature and the working of imaginary by trying to define it and to understand its mechanic and its logic. While other authors as Jasanoff *et al.* (2006) highlight its power by describing the capacity of sociotechnical imaginaries to support scientific and technological national projects.

(Wunenburger, 2011) describes imaginaries as "sets of productions, mental or materialized in works, based on visual images and language, which forming coherent and dynamic sets". Firstly, as confirm Musso *et al.* (2014), the semantic part is important "language made of stories, images and world of dynamic forms with coherence and grammar structures that can be formalized"

Secondly, imaginary involve a collective dimension that Giust-Desprairies (2003) defines as "a set of elements, which in a group is organized in a meaningful unity". So there would be as many imaginaries as cohesive units. Chamoiseau (2008) describes the imaginary diversity by having a "mosaic character composed of several traces, imaginary perfumes where the relationship is not harmonious, but rather paradoxical and confrontational".

Thirdly, mental representations are connected with reality and adopt a certain form of materiality. In this way, reality is transformed in representations and representations in a social or individual reality (Musso, 2009). Users-designers have theirs own way to evolve in industrial built universe, so they modify the object by a "transforming", "hacking" or "creeping function", depending on the possibilities offered by the product (De Certeau, 1980).

Now, we propose to detail what are the relations between imaginary and technical object. Through the Balandier (2001) definition, "the technical object is a cultural and social construction as an imaginaries genealogy". In this way, management sciences usually consider technical object as imaginaries embodiment:

- by the existing or latent imaginaries embodiment in the expectation approach (Borup *et al.*, 2006, Godet, 2000, Gordon *et al.*, 2005). Here, the activity analyses current or latent expectations (van Lente, 2012) in order to propose a product, which meet them (Abernathy and Utterback, 1978). Usually, the new product adoption is facilitated by the marketing diffusion strategy used to pre-interpret the innovation (Rogers, 2010). Moreover, to anticipate this phase, firms integrate users earlier and earlier in the design process (Piller, 2007, Von Hippel, 1986) or modify their design process toward an open innovation strategy (Chesbrough, 2003).

- by the new imaginaries embodiment. It is the designing of a new valuable proposition(Verganti, 2013), *derived* from the product and imaginaries but

different from existing imaginaries and, possibly, different from the product itself (Forty, 1986): the product itself does *not* embody an existing imaginary, it contributes to the design of a new social-technical imaginary. This model is claimed by famous design schools such as Bauhaus, where teachers and students aim at creating new styles that would help create new society and values (Hatchuel, 2013) (Le Masson *et al.*, 2011).

Imaginary can be also viewed as a mechanic system. Indeed, Jung (1946) qualifies it as "A system, an organizer dynamic images, which give them a depth notion by linking them" (Jung, 1946), while Bachelard (1970) see it as "a transformer and deformer system of images which produce sens beyond the scientific understanding". Durand (1969) links these two aspects by characterizing it as well as "a museum of all images: past, possible, produced and to be produce" and as "the procedure of them production, transmission and reception".

Supported by the interest of stimulation of an imaginary mechanism highlighted by Bachelard (1970), could the technical object be a stimulator of this mechanism? As Brown *et al.* (2010) speak about generative products uses, here the technical object could be an imaginary stimulator.

Note that these two models have very different practical implications: in Model 1, designers should embody existing or new imaginaries in the product; in model 2, the success depends on *how the product stimulates the design of new uses* and values. The Model 1 is quite well known, thus in this paper, we aim to improve model 2 with empirical data in order to understand the role of the new product in the process of designing new uses.

Relation between technical object and imaginaries		**Perception of imaginary's evolution**	**Designer's imaginary on the object**	**Management sciences**	**Reference authors**
Output	Object embodies existing and/or latent imaginaries	Stables, any possible influence	Determined	Expectations,	(Borup *et al.*, 2006)
Input	Object embodies new imaginaries	Progressives, possible influence	Determined	Design-driven innovation, Bauhaus	(Verganti, 2013), (Hatchuel, 2013), (Le Masson *et al.*, 2011)
Mechanic	Object as a stimulator of imaginary potential	Progressives, possible influence	No pre-determined	Current article	Current article

Table 1: Synthesis of literature about the relation between imaginaries and management sciences

IV. METHODS AND MATERIALS

To address this problematic of generative imaginaries we conducted a longitudinal collaborative research (Shani and Coghlan, 2008) with the French car manufacturer Renault since 2007.
The paper is based on the analysis of the industrial case (Yin, 2009) of Twizy, an electric disruptive quadricycle only for two passengers who are sitting one behind the other.

The research follows the main principles of intervention research (Hatchuel and David, 2007) (Radaelli *et al.*, 2014), that aims to produce actionable knowledge for practitioners through the strategic management application and to enrich the scientific knowledge about imaginaries (Argyris, 1993).
Our close partnership enabled us to collect a rich empirical data through the analysis of secondary data, semi-interviews of Program strategy manager and different stakeholders intern in the firm but also through the participation of lead users focus groups.

Please, refer to the following table for the sum up of data collection and treatment.

To be able to offer a comparison of the technical object model that we describe in the article, we choose comparable products, which come from the same domain and share the same initial function in the same historical period but which impact the imaginaries in a different way. For these reason we have choosen: Twizy and Clio 4.

What	Date of data collection	Nature of data	Methods of data collection
Twizy Prospects (France)	26/06/2012	Document	People who made a reservation, People registered to ZE newsletter, Curious who were not involved havebeen screened out. Online deliberative methodology (debate®): qualitative methodology.
TWIZY – Launching customer feedback survey (France & Germany)	26/06/2012	Document	2 interview periods : same customer interviewed twice and fresh additional customers to be included in the second period.Same questionnaire for France & Germany by phone. Target respondents: Private & fleet customers
Meeting with lead users	05/03/2014	Audio recording + notes + retranscription	
Twizy Trade press feedback at the launching product	28/02/2014	Document	Press feedback synthesis 8 countries

Clio 4 Trade press feedback at the launching product	10/04/2014	Document	Press feedback synthesis 2 countries
Twizy Product manager	06/02/2014	Document	
Electric vehicle competitive analysis manager	07/02/2014	Document	
Twizy Program manager	21/01/14 & 15/04/2014	Two semi-structured interviews + notes	
Twizy's designer	20/11/2014	Semi-structured interview + notes	

Table 2: Synthesis of methods and data collection

V. CASE STUDY

A. THE EFFECT OF TWO AUTOMOTIVE PRODUCTS ON USERS, NON USERS, PROFESSIONAL AND NON-PROFESSIONAL ACTORS

Thanks to the empirical materials and related to imaginaries characteristics presented earlier, we propose to expose the variety of: lexical fields, profiles touched by the product and the class of actions between two different automotive objects: Clio 4 and Twizy.

1. The heterogeneity of semantic mobilized by early adopters and the trade press

We will start to observe the semantic used firstly by the early adopters about Twizy and secondly by the automotive trade press about Twizy and Clio 4.

- **Lexical fields used by early adopters about Twizy**

We propose in this part, to look into the vocabulary employed by French and German customers in a feedback survey and the vocabulary employed by French early adopters comes from the Twizy Internet social network community during a meeting.

We identified some recurrent words that we organised in several categories, which draw four lexical fields: "**future**", "**human**", "**game**" and "**animals**".

So we observe a large variety of terms to speak about the friendly aspect of the object and the last verbatims leads us directly to discuss about the "**future**" field. Here as well it exists a lot of different words to express the science fiction feeling generated by the object. As said a 32 years old men from Reims "It looks a bit like a lunar car, as vehicles they send into space" and there is no limit to qualify the space openness: Twizy is as

"Buggy of the 3th millennium", "lunar vehicle", "Soldier of Star Wars", "It is a glimpse of Dark Vador's garage", "Cyclops", "a human oddity", "space capsule". To sum up this object "It has a really futurist (men, 55 years old, Frankfurt).

The "**Human**" semantic field is very rich with numerous terms as "friendly", "chic", "sexy", "seduction power", "cute", "cute mug", "teasing", "humoristic", "and endearing" to speak about the object. They explain the human aspect by these terms: "sympathy capital". "The Twizy is small, cute, and looks happy" (woman, 35 years old, Wolfsburg). "We have a more sympathetic side" (men, 37 years old, Valencienne), "it is a sympathy capital with customers" (men, with the Twizy car sharing system). By its original exterior aspect, it is easier to be recognized "that's it! I am known", when another said, "I'm not better known than before, but people no more forget me".

The "**game**" lexical field is also divers with "kart", "fun", "playful" "enjoyable" "humorous" Example they say "my funny small car", "it is like a toy", (men, 36 years old, Villeneuve-Loubet) "it is like a lego car" (men, 37 years old, Valencienne).

Furthermore, users employ an additional lexical field about: **animals**. They qualify the object as "carapace" ("shell"), "mosquito", "strange bird", "dragonfly", "bug", "creature", "cockroach", "cockchafer", and "rabbit ears". "The form looks like a bug. The wheels and the king of shell above it gives the feeling, as a big cockroach, something like a cockchafer" (men, 50 years old, Gaillac).

- **A semantic comparison in the trade press between Twizy and Clio 4**

The previous part took into account the oral vocabulary used by users, now we are going to look into terms written in the automotive press by professionals.

The following table summarizes the number of articles analysed in this study.

	Twizy	**Clio 4**
France	58	40
UK	4	1
Suisse	1	0
Espagne	12	0
Allemagne	9	0
Italie	5	0
Belgique	3	0
USA	1	0
Total	**93**	**41**

Table 3 : Number of trade press articles

For Twizy, the database contains the press reactions from eight countries (with 62 % French articles and 99% European articles) in April 2012, a month after the "Twizy' launching" and for Clio 4, the database contains the press reactions from two countries (with 98% French articles and 100% European articles) in September 2012 at the beginning of school year after the Clio 4 launching two months earlier.

After a first reading we identified recurrent words relative to the traditional **automobile** vocabulary. These terms about the technical aspect of the product match the traditional criteria used to evaluate the performance of an automotive product by professional actors. It is for example: “powerful”, “comfort”, “speed”, “dimension”, “weight”, “engine”, “suspension”, “facility”, “simplicity”, “security”, “pleasur”. We observe these terms both in Clio 4 and Twizy articles, but with a density up to three times more for Clio 4 documents. It is important to notice that only these terms are used to describe both positive and negative aspects of the object.

Of course we check if early adopters qualifying words were also present in trade press articles. It appears that only “modern” in the future semantic field and “friendly”, “chic”, “sexy” in the human field are used both for Twizy and Clio 4.

So while the future and human field exist also for Clio 4 but it is poor, game and animal semantics do not exist for Clio 4 and are only assigned to the Twizy object.

The diversity to qualify Twizy is clear compared to a traditional car. And the reality of the field variety is confirmed by the density of the terms that we find in the trade press. Above all for futuristic terms that are used up to around three times more and for game terms up to fifteen times more with these words: “fun”, “kart” and “playful”.

	Automotive	**Future**	**Human**	**Game**	**Animals**
Density	Clio 4	Twizy			
Variety		Twizy	Twizy		
New				Twizy	Twizy

Table 4: Synthesis of terms characteristics for Twizy and Clio 4

To sum up the comparison of data press reactions between Twizy and Clio 4, we observe a richer variety of lexical terms to speak about Twizy than Clio 4. And, we can see in the trade press that the qualifying for Clio 4 is almost only focused on the automotive field. Moreover, we observe **a richer diversity and intensity of words with the early adopters** than with the special media~~s~~.

2. The heterogeneity of profiles touched by the Twizy

Whereas the Clio 4 meets with the classic customer target of B segment, Twizy touches multiple profiles in France and around the world, despite its low sales. Indeed, while around 15 000 Twizy have been sold since its launching, Clio 4 counts around 100 000 sales per year.

The heterogeneity of Twizy customers is very important: urban drivers, urban trendy people, young businessmen, enthusiasts of beautiful and powerful cars, provincial drivers, drivers without driving licence for a while, younger buyers than for a standard car, handymen, private individuals, professional fleets, institutional fleets, anti-Renault customers, non traditional Renault’s sales countries. As said the Program strategy

manager « Twizy clients are not at all traditional: it is for example wealthy clients in the Gulf countries, but also cities for development of car sharing and attract new residents". The territorial dimension is interesting indeed, Twizy is able to touch European people as well as Gulf countries (first for the local Policy in Dubaï) and the American continent (for trendy people in Florida or rich American citizens who lived in secure quarters), whereas the culture is different.

And it is also interesting to notice the Twizy variety perception of institutions. Twizy is viewed as a "relational connector" by this rich American businessman who wants to connect people in the part of Las Vegas city that he bought. In this way he bought some Twizy precisely because it is not a vehicle. More modestly, European cities perceive the object more like a mobility answer to their town planning (eg. environmentally aspect for Switzerland).

3. The heterogeneity of uses by the Twizy users

Then we will observe the (non exhaustive) variety of uses generated by the Twizy all around the world thanks to the Product Planning benchmarking and early adopters testimonies. Are uses as diverse and rich as the lexical fields? What kinds of uses appear with the object? That is the point that we propose to highlight in the following part.

Initially designed for an urban utility for short moving transport, we are going to see that it generates an unusual important variety of uses. In order to present uses in a structured way, we propose to organise practices in three parts: at the stationed position, at the moving position and around the hacking aspect of the object.

Designed to move from a point to another, can we predict that people find a particular utility of the object at the stop position? Not really, however that is the first surprise that we observe. Indeed, Twizy became an artistic support for Pierre Hermé, a well-known pastry chef in the world, who made a "Twizy macaroon" at the 18th Chocolate exhibition in 2012 in Paris. We could see the object totally covered by an artist macaroon creation. It was also an artistic support for a photograph who made a serie of pictures of animals in an urban context. But the park position can also have a functional utility, for instance, with this agile mobile coffee shop application launched by Van Dyck Rösterei a german from Frankfurt. His concept, with a coffee maker at the extern back of the Twizy has been named "Espressizy".

On the moving application a lot of diversity of uses also appeared, that we can classified in different purposes as: quick intervention, communication application or material transport function. These three categories are not exclusive of each other. The most famous moving application is the quick intervention by the appropriation of different domains as, for instance, the medical profession with the firefighter in Deutschland and in Paris and the Red Cross in Spain. But a quick intervention interests also the police in France and the Château de Versailles for security supervision in the park. The communication application is easily guessable, it consists in considering the Twizy as an ad support for a sticker covering. A lot of firms, public organisations, carsharing system, use the Twizy as an advertising object for example: Marionnaud, Domino's pizza, Twizy

way carsharing system, Police de Paris…etc. Because the categories are not exclusives Domino's pizza can also be integrated in our third category: material transport function. Addition to an advertising support, the firm use the object to quick deliver their customers. Finally, the Twizy is also used for symbolic event: the wedding in France. Paradoxically, it is used both as car married and as a broom wagon.

To allow these different applications or functions in the Twizy, it is a necessity to modify the object. The "hacking" of the vehicle started with the customers and then with Renault. The automotive industrial proposes two new versions with the transformation of the second part of the vehicle that is the passenger seat. The "Twizy cargo" version offers a larger boot to answer the material transport needs while the VELUD (the electric vehicle for an sustainable urban logistic) totally switches the second seat to transform it in a modularity platform where you can install, for example, a quite bigger storage box than proposed by the original version.

But most of the transformations of the Twizy are not made by the industrial maker but rather by the customers themselvesthe industrial maker but rather by the customers themselves does not make most of the transformations of the Twizy. Indeed, firefighters in Deutschland and the Spanish Red Cross developped a kind of open luggage rack specified for their activity where there are able to transport a first aid luggage. Furthermore a "normal" additional rack is also created to receive a small close box in the Twizy's back for a similar boot using.

In mountain, for the winter season, people also created specific applications. Example: to transport ski materials at the Twizy's back they designed in Alpes d'Huez in France a special rack and to drive on ice they designed in Turkey a kind of ice skate to add on the first two wheels.

Almost all these previous transformations are available to anyone who wants to modify its Twizy. And it also exists particular changes / evolutions designed by customers who then have a single version of their object. It is the case of this handyman in the south of France who changed different part of its Twizy to adapt it to his specific needs. For example, he cut out the glove compartment to transform it into an electric meter box. He also cut out a piece of plastic part inside the vehicle to install two electric plugs. Moreover he also transformed the seat function in a storage place with a generator installation. Thanks to all of these evolutions he is able to know how much electricity he charges in his friends house, he is able to charge any electric device inside his vehicle and he increases his energy independence.

We notice, as it is quite classic for some vehicle, the Renault automaker propose a Twizy sport version.

B. ANALYSIS: THE TWIZY OBJECT AS AN IMAGINARIES STIMULTION

To interpret this original and large variety of lexical fields and uses generate by Twizy compared to a traditional car as Clio 4, we propose a model with two status of the technical object: 1) the object suits current reference imaginaries and embodies them; 2) the object turns upside down the classic imaginaries reference and generate new one.

- **Model 1: the technical object embodies imaginaries**

In the first status, the interpretation and the adoption of the product is quite easy and very similar to the on that we use to see with the anterior object of the same domain.
In such case, for instance with the Clio 4, it is easy for users, professional press actors and industrial car manufacturers to judge the performance of the product. Indeed, by the traditional technic criteria, the object respects most of the classic codes, where we expect for: motor performance, powerful, dimensions, weight, security and comfort. As expected in September 2012, in the press release, the Clio 4 find its market and customers targeted in the B segment, the multipurpose city's vehicle segment. Moreover, the product does not reveal some particularly uses.

Because the product matches properly the expectations, we think we can say that the object does not modify the representations and the imaginaries of the domain because it totally matches the current imaginaries. In this case, there is no evolution of socio-technical imaginaries involved.

Whereas Clio 4 embodies the current or latent imaginaries, that is not the case for Twizy. Because if we apply on it the traditional evaluation criteria, the risk as we see in the Twizy prospect survey, is to see in this object all the disadvantages of a car and a motorcycle. The product answers neither to a precise customer target. The expected clients were not so clear for Twizy, in March 2012, in the press release. The car manufacturer Renault said: “there is no real type of customers target” […] “it is for people who look for a nonstandard vehicle and a lot of sensations which is economic and environmentally” even if the Twizy Program said “all initial Twizy customer targeted are wrong: young fashion Parisian and stressed housewife”. And as we see there is not a convergence to a defined use.

- **Model 2: the technical object stimulate imaginaries**

To be able to see the impact of the object on their imaginaries, a solution consists in showing the evolution between the initial references and the current situation in these three following dimensions: semantic fields, collective aspect and action classes.

Indeed, we propose to translate the rich diversity of the semantic fields as the number of potential representations, imaginaries that this object is able to generate. Because there is adoption, the object embodies at least a small part of current or latent imaginaries but above all it enable the projection of new imaginaries totally detach from the reference universe. Compared to its low sales, the object is curiously able to touch small but diverse populations on different territories. It is important to notice here, that the culture of these users are sometimes very different and the motivation to adopt the product it also heterogeneous. To summarize, in addition to generate a large variety of the initial function for which it is designed, Twizy is also able to question its original function and generate a variety of others and a diversity of applications of them.

The different new functions of the object can be analysed and structured as: a means of mobility, an applications platform and also at the end as a symbolic object.

The Twizy heterogeneity functions and applications		
CONCEPT OBJECT OF MOBILITY	**CONCEPT OF A PLATFORM OBJECT**	**CONCEPT OF A SYMBOLIC OBJECT**
A device to go from a physical point to another	An open system which allow people to development theirs applications	Social object, representation role
Urban classic mobility	**A support of communication**	**Luxury object**
Urban car sharing system	**A support of modularity transportations**	**Artistic object**
Quick intervention	**A support of storage applications**	**Symbolic object**
	A support of service applications	
	A support of energy applications	

Table 5: The heterogeneity of Twizy functions and applications

The object's properties allow the generative concepts which themselves promote the development of new concepts. And the reconfiguration of new functions allows people to think about what are their own vision and perception of the object.
In the same way, the heterogeneity perceptions that people have to others about this vehicle, (eg. that citizens have to users), modify and/or simulate the own perception of the object and increase the variety potential perception that people can have to others.

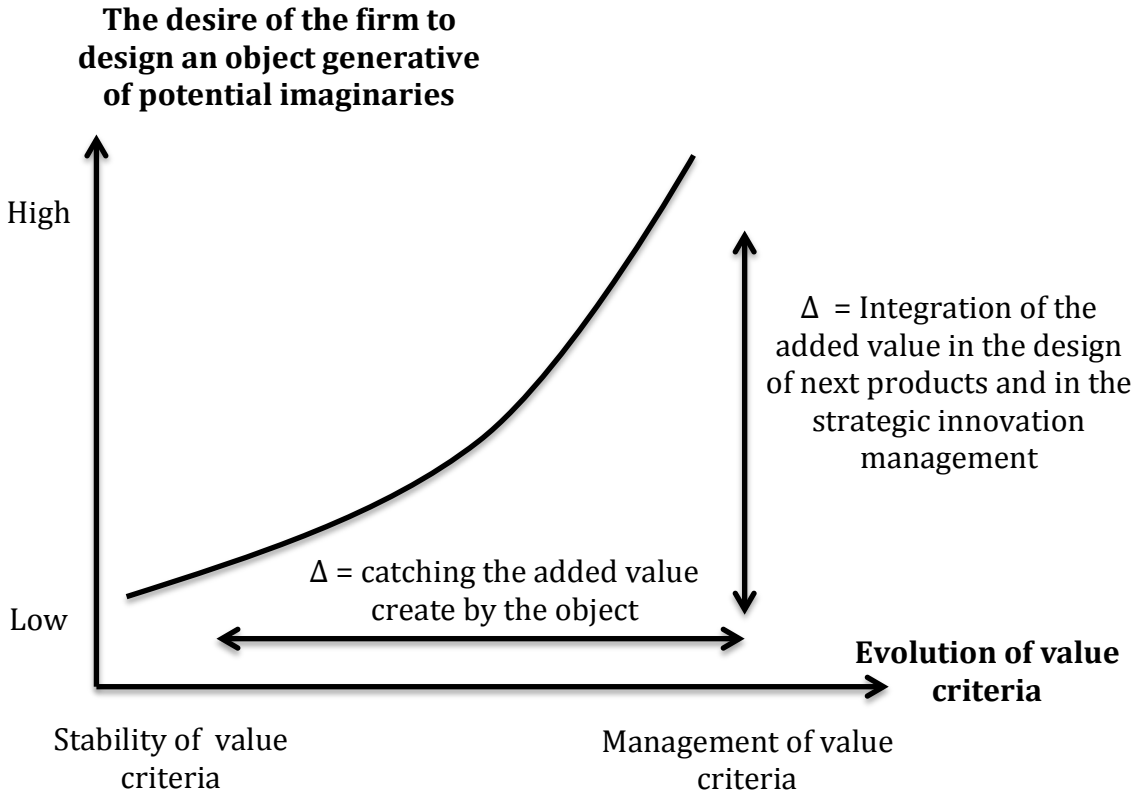
We think we can say that Twizy does not embody a new imaginary but generates a potential on new ones. The technical object would be a generative potential imaginaries.

	Model 1 : Clio 4 Imaginaries are :	**Model 2 : Twizy** Imaginaries are :
Semantic fields	invariant	Heterogeneous, non coherent, sometimes opposite
Collective aspect	Conform to the marketing target	Heterogeneous, non coherent, impossible to anticipate
Action classes	Conform to the initial function	Heterogeneous, variety of representations inside an action class + multiple action classes
Resume	Enclosed	Open + generative potential
Technical object	Imaginaries are embodied in the technical object	Imaginaries are stimulate by the technical object

Table 6: The resume of the relation between the imaginaries and the technical object through the models 1 and 2

C. MANAGERIAL APPLICATION

How a firm should receive the design of stimulator imaginaries object? Does it represent a bug of the design process? Or does it represent an opportunity for the design and the strategic innovation? Finally, how to catch the potential value of it if it is really an opportunity?



According the empirical case study, the first essential point for the strategic management is to take into account the value criteria. Secondly, to feel the potential of the added value of the generative imaginaries product and take the advantages of it, the firm have to be in a pro-active position by integrating them. So that is on these two axes that we propose to perceive the potential for the firm.

By an evolution of value criteria, it has become possible for the firm to catch and understand the value of new imaginaries that was impossible with the standard view. So this first step allows to perceive the potential value. The second step, consist in transforming it into a real value. In the medium term it consists in integrating the understanding of new imaginaries and embodies it in the next product. The activity refers to the Bauhaus and design-driven innovation. In the long term, it consists in perceiving the appearance of new imaginaries as an innovation field. In this way, it is the role of the strategic innovation to manage it.

To sum up, the stimulator of imaginary potentials can be considered as a design resource for the next products but also as a resource for the strategic innovation management.

VI. LIMITS AND PERSPECTIVES

Our case shows that technical object can play an active role and stimulate imaginaries. The article tries to show the potential value creation and how it can be a resource for the organisation.

Through this empirical case study, we hope to contribute to the imaginary academic field by showing that it is possible to move the current imaginary, even these that appear stable, locked and difficult to break. By taking the imaginary references promoted in the philosophy and sociology, which is the original literature on subject, we tried to demonstrate the nature of the impact of the different two different technical objects on the imaginaries.

Moreover, we would like to bring to the strategic innovation management a positive sign about the designing of disruptive object. The relative perception of loss of control could be a resource for the management by becoming a new exploration space. So the designing of generative object imaginaries can viewed as a middle term or long term strategy input.

In order to strengthen the case study and the hypothesis brought in this article, it would welcome to look into other empirical cases, which have the capacity to generate new imaginaries. So, we will be able identify the intrinsic characteristics that give a generative function. Like this, we could provide factual inputs to designers for the designing of future objects.

VII. CONCLUSION

The study in this article shows that it is possible to impact imaginaries thanks to a technical object. The empirical case showed that a technical object could generate a potential of imaginaries. It means that the imaginaries revealed are not previously determined, defined or decided by the designer. In this way, it avoids the risk to think that the generation of new imaginaries come under a manipulation action. We perceive it rather as resource of the exploration of new innovation space.

VIII. BIBLIOGRAPHY

Abernathy, W. J. & Utterback, J. M. (1978) 'Patterns of innovation in technology', *Technology review,* 80, 40-47.

Argyris, C. (1993) *Knowledge for action: A guide to overcoming barriers to organizational change*, ERIC.

Bachelard, G. (1970) *La formation de l'esprit scientifique*, Vrin Paris.
Balandier, G. (2001) *Le grand système*, Fayard.
Borup, M., Brown, N., Konrad, K. & Van Lente, H. (2006) 'The sociology of expectations in science and technology', *Technology analysis & strategic management,* 18, 285-98.
Brown, I., Le Masson, P. & Weil, B. (2010) 'Collaborative disruptive innovation success: The critical role of domain-challenging common meaning', *17th IPDM Conference Proceedings.*
Chamoiseau, P. (2008) 'L'imaginaire de la diversité', *Entrevue à (sic) Patrick*.
Chesbrough, H. W. (2003) *Open innovation: The new imperative for creating and profiting from technology*, Harvard Business Press.
De Certeau, M. (1980) 'L'invention du quotidien - Arts de faire', *Gallimard, Paris*.
Durand, G. (1969) 'Les structures anthropologiques de l'imaginaire', *Paris, Dunod*.
Forty, A. (1986) *Objects of Desire: Designs and Society 1750-1980*, Thames and Hudson.
Giust-Desprairies, F. (2003) 'L'imaginaire collectif ou la construction du monde dans les groupes institués'.
Godet, M. (2000) 'The art of scenarios and strategic planning: tools and pitfalls', *Technological forecasting and social change,* 65, 3-22.
Gordon, T. J., Glenn, J. C. & Jakil, A. (2005) 'Frontiers of futures research: what's next?', *Technological Forecasting and Social Change,* 72, 1064-69.
Hatchuel, A. (2013) 'Deconstructing meaning: Industrial design as Adornment and Wit', *Crafting the Future: Proceedings of the 10th European Academy of Design Conference.*
Hatchuel, A. & David, A. (2007) 'Collaborating for management research: from action research to intervention research in management', *Handbook of collaborative management research*, 143-62.
Jasanoff, S., Kim, S.-H. & Sperling, S. (2006) 'Sociotechnical Imaginaries and Science and Technology Policy: A Cross-National Comparison', *NSF project proposal, Kennedy School of Government, Harvard University*.
Jung, C. G. (1946) *L'homme à la découverte de son âme: structure et fonctionnement de l'inconscient*, Mont-Blanc.
Le Masson, P., Hatchuel, A. & Weil, B. (2011) 'The interplay between creativity issues and design theories: a new perspective for design management studies?', *Creativity and Innovation Management,* 20, 217-37.
Musso, P. (2009) 'L'évolution des cultures numériques - Usages et imaginaires des TIC : la friction de fiction dans l'ouvrage', 201-10.
Musso, P., Coiffier, S. & Lucas, J.-F. (2014) *Innover avec et par les imaginaires*, Manucius.
Piller, F. T. (2007) *Mass customization*, Springer.
Radaelli, G., Guerci, M., Cirella, S. & Shani, A. B. R. (2014) 'Intervention research as management research in practice: learning from a case in the fashion design industry', *British Journal of Management,* 25, 335-51.
Rogers, E. M. (2010) *Diffusion of innovations*, Simon and Schuster.
Shani, A. B. & Coghlan, D. (2008) *Handbook of collaborative management research*, Sage Publications Thousand Oaks, CA.
Van Lente, H. (2012) 'Navigating foresight in a sea of expectations: lessons from the sociology of expectations', *Technology Analysis & Strategic Management,* 24, 769-82.
Verganti, R. (2013) *Design driven innovation: changing the rules of competition by radically innovating what things mean*, Harvard Business Press.

Von Hippel, E. (1986) 'Lead users: a source of novel product concepts', *Management science,* 32, 791-805.
Wunenburger, J.-J. (2011) 'L'imagination mode d'emploi ?'.
Yin, R. K. (2009) *Case study research: Design and methods*, Sage.