

# Techno-marketing and innovative design: organising value exploration and competencies renewal

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## Abstract

This document aims at describing the intentions for the research project entitled “Techno-marketing and innovative design: organising value exploration and competencies renewal”. We describe here the context of the project, its objectives and how we will organise the research. This document is attached to the request package for the PhD CIFRE program made in collaboration with Zodiac Aerospace and l’Ecole Nationale Supérieure des Mines de Paris (Centre for Scientific Management / Centre de Gestion Scientifique). The project intends to study in depth the duality techno-marketing, the new shapes it takes when it comes to ally user-driven innovation and techno-push innovation, and the organisational and economic challenges these shapes imply for design/engineering in engineering offices. Based on recent breakthroughs in the field of design theories, which allow modelling the interactions between rule creation and rules’ structures, our scope of work will let us analyse the possible organisational forms, identify specific management needs et develop management tools suited for this user-drive/techno-push (in terms of performance, evaluation, process structuring etc.). This study will then permit reinforcing the economic and management dimensions of the C-K design theory, studying the double logics of market-pull and techno-push where they can be very contradictory in some cases and complementary at other times, investigating different ways of evaluating the economic performance of design capabilities and studying the emergence of organisation forms which at the frontier between systematic design and innovative design try to “rule” the design activity.

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## 1. Context

Zodiac Aerospace – aeronautical equipment supplier with worldwide reputation with leadership in different market linked to cabins, embedded systems and aircraft safety – came to MINES ParisTech to set up a PhD (CIFRE program) led by the corporate technical direction focused on Innovation which main goal is to drive an innovation strategy across the group.

The subject « Techno-marketing and innovative design: organising value exploration and competencies renewal» is in line with the ground-breaking strategy set in place by Zodiac Aerospace since 2012. The objective is more focused on the cabin interiors domain, to throw off the shackles of the regulatory framework in

order to integrate passengers’ feedback and offer global solutions for aircraft manufacturers and airlines. Setting up multi-disciplinary structures close to aircraft manufacturers was a first step. They allow elaborating innovative concepts that are going beyond Zodiac Aerospace’s current product lines.

This aeronautical industrial actor with its client-supplier or assembler-equipment manufacturer relationship is looking to renew its technical competencies in an environment where we have platforms close to our clients. It is about wanting to innovate for our customers first, for the *business unit* “cabin interiors furnishing” and then try to reach out to the rest of the group. We would like to co-innovate in order to regenerate design/engineering methods in the group. It is a

very original approach whereas an overview in literature shows that we have a priori two possible ways and that are almost contradictory to tackle Zodiac Aerospace's challenge: user-driven and techno-push.

### 1.1. First approach: *user-driven*

The first approach consists in organising the design activity with a strong orientation towards the market, and a careful listening to the client. Identifying and getting closer well-identified clients intersects the *lead-user* strategy proposed in (von Hippel, 1986) and (von Hippel, 1988). In a strong technological environment, the approach is expressed by the identification the principal ordering customers with distinct needs, who are used to foresee future needs for the rest of the market. As their demand is ahead of time, these lead-users can be the source of new concepts. Zodiac Aerospace is in that sense getting closer to specific customers: look for the innovation and future market needs by aircraft manufacturers. The underlying forces are those of co-innovation, which is beyond co-development (Midler, et al., 2007), and we also encompass the open innovation approach (Chesbrough, 2003) where the usual design canvas is opened to larger public with internal and external stakeholders.

Industrial actors and the automotive industry for instance have tried different methods to collaborate on subject such as engineering. Beyond the just in-time philosophy, with suppliers fully subjugated and a strong accent on operational constraints rather than design/engineering (Cusumano & Nobeoka, 1997), the industry tried to move the centre of gravity towards innovation for more differentiation on the markets. And we must underline the fact that it was the suppliers who actually brought innovations, rather than the car manufacturer who is mainly integrating and selling to the final customers. Despite a close contact with the customer, the manufacturer will

not necessarily see potential disruptive innovations for the final customer that are normally seen at the supplier level. Collaborative platforms were then set up between manufacturers and suppliers around the integration of equipment, and notions such as co-design and co-development emerged (see (Prahalad & Ramaswamy, 2004) and (Hout & Stalk, 1993)). This collaboration which surpasses the buy off the shelf behaviour implies a tight sharing between engineers particularly and a better knowledge of the usage of the design equipment. Engineers are then assigned at the customer's facility (or close to it) in order to develop the required products (see collaborations described in the PhD thesis (Laigle, 1994)). Depending on the industrial environment, and the life cycles, the team made of assigned engineers and integration engineers can turn quickly into a development office, hence overshadowing different exploration fields and potentially innovative since the demand is strongly centred on optimised and rapid solutions.

In this collaborative frame, we may wonder about the knowledge sharing for the client-supplier relationship, and notably if the sharing structure is efficient in this co-development context (Merminod & Le Dain, 2014). Moreover, it raised the issue of the paradox of embeddedness by (Uzzi, 1997) for the assigned engineers. The works from 1996 put forward the negative effects of a strong collaboration/integration in inter-company and market visibility perspective: a great homogeneity would then weaken stakeholders against the market. Thus, even though a good cohesion would be a priori an advantage for better client-supplier collaboration in terms of technical issues, design and innovation, the homogeneity would be also a break to creativity and cross business units' innovations diffusion. To a degree where the innovative design regime we are aiming at would be compromised. Albeit, this first approach does

answer the marketing side of the issue: tight collaboration with the clients.

## 1.2. Second approach: *techno-push*

The second approach to Zodiac Aerospace's challenge would be to focus on innovation via a techno-push. The emphasis is placed on an internal work at such a level where the client is almost forgotten. Literature seems to put forward a «grey box» organisation where the supplier works deeply on his products, his value and skills space to come up with technological platforms with a high generic power. (Meyer & Lehnerd, 1997). It involves performing a crucial study of the internal methods and design theories show that to reach an innovative design regime, it would be preferable to adopt a design structure based on *General Purpose Technologies* (GPTs) (Bresnahan, 1996). These technologies are characterised by their omnipresence, a continuous technical and economical enhancement and innovation facilitation. A generic technology allows as well to be transferred to different market segments and potentially create new ones. A genuine example can be the technology of internal combustion. In the cabin interior domain, Zodiac Aerospace could then restructure itself around GPTs in order to gain from a high genericity and the breaking of existing design rules, in order to explore value and renew skills.

In this frame of mind, an innovative risk management is needed specially when it comes to project portfolio (Cooper & Kleinschmidt, 2002) and as it was suggested in the PhD thesis (Kokshagina, 2014) when we face the situation of designing in double unknown situation (market and technology). On a similar topic, the article (Felk, et al., 2010) tackles the issue of strategic efficiency for GPTs in fast changing markets. The authors have already laid some foundations of technical projects management, and it allows reaching out considerations that more than technological ideas on how to organize around

GPTs and finally underline a project and management approach in a broad way.

This layout of engineering offices needs also a certain level of retreat which opens the perspective of design rules regeneration, techno-push, sustained innovation and probably differentiation on the markets. We must also highlight that the genericity could be then transposed to other business units.

By contrast with the first approach, we could guarantee the technical side of the challenge and the value exploration organisation in parallel with the skills renewal.

## 1.3. Subject's challenges

We see that the two approaches suggested by the literature, offers two ways to tackle the problematic presented by Zodiac Aerospace. Nevertheless, the group is looking for a model that could marry both trajectories which are uncommonly combined and almost contradictory.

Indeed, the combination is rather complicated on different aspects: the employee in a user-driven or customer-oriented innovation perspective will rather try to adapt as much as possible to the client whereas the techno-push logic will tend to escalate in genericity and to abstract itself from too specific customer needs; from the intellectual property viewpoint, the developer will tend to possess the technologies but on the other hand the co-development will seek sharing; from a strategic management standpoint, the techno-push logic consists in claiming an autonomous strategy (platform leader) whereas co-development tends to isolate dyads or even competing ecosystems; from the project management perspective, the double logic may lead the protagonists to have diverging objectives for a same project; finally in terms of professions, we are looking at having a coexistence in a same system: an innovative marketing, capable of

satisfying the present customer and considering the renewal of his requirements specifications, and on the other hand an innovative engineering office capable of using its current resources to develop suitable products for the direct clients and to be able to benefit from the platform interaction in order to deeply revise its rules basis.

For all these reasons, it seems rather complicated or even contradictory to combine both logics - and at the same time: knowing how to make it could be the key for a generative and innovative design, as well as robust and capable of adding value.

The subject of this PhD thesis is precisely about helping to surpass these apparent contradictions and to build up a new model combining user-driven and techno-push.

The subject is equally more promising that as we are about to see, recent breakthroughs in design theories and a better understanding of organisations focused on designing in an innovation regime allow to grasp the stakes and the adequacy of combining techno-push and user-driven, and to better analyse the relevant management needs and consider the development of adapted management tools.

## 2. Objectives

The theoretical developments in design sciences, with notably the C-K Theory (*Concept-Knowledge* explained in (Le Masson, et al., 2014)) allow us today to have solid understanding of generative logics at work in contemporary industrial design environment. In particular, they have put forward from formal and empirical point of view that contemporary innovative design requires not only the breaking of forms rules in systematic design but also the development of a new family of rules allowing them to gain from the generative potential of an adjusted systematic

design. Each process has its own requirements (cognitive, organisational, economic, etc.)

From the design theories perspectives, the user-driven processes appear to be as particularly promising in order to re-discuss design rules – because based on the uses it permits to break certain design rules, properly established sometimes for the markets and clients that have evolved. And the techno-push process or the development of GPTs is the occasion to unfold new rules applicable to larger scope of application.

Design theories grant the possibility to understand the stakes implied to articulate these two processes.

Furthermore, the C-K theory offers an analytical frame for design activities that can be very useful to breakdown novel organisational structures or to follow-up on experimentation and the efficiency of new implemented methods (see for the numerous publications on that matter)

This is why the C-K theory; with its concept-knowledge duality, will be a major advantage to map the techno-marketing platform and interactions with the client.

The tracking of this analytical frame with the support of thorough studies will allow raising the relevant management needs. This should ideally be followed with the set-up of adapted processes to the model of co-innovation that is looking at promoting genericity and a regime of innovative design across business units within Zodiac Aerospace.

The study whilst confronted to both strategies well-documented in literature, will try to open a third approach centred on innovation inter/intra-companies. Instead of pulling back to develop GPTs and breaking design rules, Zodiac Aerospace is getting closer to customers in a co-development approach in order to trigger a value exploration and the renewal of skills not only for

the confronted business unit, but also to spread across the group with the impulse from the corporate innovation direction.

The research can also engage in enhancing the model of concurrent engineering with adapted management tools. These will also have to set up an adequate management platform to palliate the issues of project management in a collaboration environment: the roles of each individual, the knowledge sharing, the project objectives, the projects' performance measurement, and the intellectual property management. There will be also a feedback for the supplier which will have to be smartly conducted in order to spread out the new design rules and developed technologies to other business units. The potential management tools suggest also to be able accept an alteration in the judgement and the running of engineering offices by the clients, but also by the strategic committee of the company.

For same level inter-company collaborations in a co-innovation effort or in a R&D partnership, literature already raise several issues related management and legal aspects: (Bidault, 1994), (Segrestin, 2005) and with the support from C-K theory (Gillier, 2010) and (Gillier, 2010). We will also have to make good use of these studies so that we can look into the client-supplier relationship different from two actors on the same market.

These are all elements that we need to be able to develop and formulate into an economic and managerial dimension for the concerned engineering offices.

It aims at filling a theoretical and practical gap which leads to sense an original model for innovative design regime in a collaborative client-supplier relationship.

As a result, we have several questions we will be dealing with:

- How do we distribute the work and define the perimeter of responsibilities for each individual within these techno-marketing platforms?
- How do we organise a techno-push and the diffusion of new design rules for a group-scale innovation with the support of techno-marketing platforms?
- How do have buy-in from operational teams when it comes to accepting new concepts stemming from new rules (social adherence issue)?
- How do we evaluate the concepts in order to stick with the most relevant? We should be able to weigh these with criteria that go beyond return on investment.
- How do we manage the projects and keep track of their efficiency from the concept phase up to development?
- How do we manage intellectual property rights in these hybrid configurations?
- How do we proceed with the personal in these platforms compared to their company origins (concept of belonging, informal trading inter-companies, etc.)?

### 3. Expected results

The research should help making progress on multiple fields:

- Coming back on the opposition between user-driven and techno-push, and if possible reveal new articulations between these two logics.
- From a design theories perspective: to see how we articulate the reconsideration of forms rules with the creation of new ones.
- From an organisation point of view: to observe how at the interface between systematic design and innovative design appear new organisational structures that are looking at ruling the design methods.

- From a (economic) evaluation standpoint of design capacities: to develop models, tools and analysis allowing the description of the variety of economic efficiency forms and to enrich classical criteria (Net Present Value, etc.), which have shown their limits for innovative design.

#### 4. Research organisation

As a first step, a full immersion in the company seems necessary in order to have a deep understanding of the company culture and its history related to engineering offices, marketing teams and client relationships. A map of relationships, and decision tree would be a substantial way to apprehend the organisational issues and the concurrent engineering challenges. Moreover, the analysis with the support of the C-K theory of some major applications in engineering offices would give a first evaluation of the exploration processes and the design methods in the targeted offices.

As a second step, after having a good grasp of the work environment, understanding the way the solutions, designed by our engineering offices, are integrated by the clients may highlight potential performance indicators of the current exploration and design processes.

These two first phases of data collection will have to be theoretically supported, and nourished by previous studies in the C-K theory framework and its relevant tools (KCP method, V2OR for instance), but also with the company history and its organisational evolution.

As a third step, and at this research level, we should have an extensive understanding of the existing organisation, and the gaps that have to be filled. We could then define a new organisation with adequate management tools and start an experimentation phase. The latter will have to be strongly supported and framed in order to react quickly and propose adjustments

to the redefined platforms. If these trials and their corrections are proven to be positive we will then consider deploying on a larger scale.

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