New Product Development (NPD) service suppliers in Open Innovation practices: processes and organization for knowledge exchange and integration

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Abstract

New Product Development (NPD) service providers have assumed a prominent role in enabling a more widespread use of Open Innovation strategies, thanks to their ability to acquire, recombine and sell specialized knowledge and technologies. This paper adopts the point of view of the NPD service provider to investigate the approaches it can employ in order to favor knowledge exchange with its clients, throughout the service delivery process. The research relies on a multiple case study, which focuses on three collaborative projects undertaken by a worldwide leading provider of NPD services with some of its most important clients. The analysis reveals some important findings. First, the NPD service provider uses standard approaches, both as regards process and organizational variables, to address two critical barriers toward a successful completion of the inter-organizational relationship: the tacit nature of the knowledge to be exchanged and the difficulties in predicting the content of collaboration activities. Second, in implementing these approaches, the NPD service provider takes into account the distinctive characteristics of each client and the peculiarities of the specific collaborative project. Besides providing several managerial insights that will be useful for managers working in NPD service providers, the paper contributes to the academic debate, e.g., investigating the importance of trust in successful inter-organizational knowledge exchange processes.

1. Introduction

Open Innovation has been one of the most debated topics in technology and innovation management research in the last decade (Chesbrough, 2003; Gassmann, 2006). It has been proposed as a new paradigm for industrial innovation management, according to which firms use "purposive inflows and outflows of knowledge to accelerate innovation, and to expand the markets for external use of innovation, respectively" (Chesbrough et al., 2006). The impact of Open Innovation on management practice has been significant as well. Not only firms in high-tech, high-velocity industries (Chesbrough, 2003), but also companies competing in more mature, asset-intensive markets (Chesbrough and Crowther, 2006), have increasingly applied the Open Innovation principles. Literature has unquestionably shown that effectively acquiring and integrating external knowledge is a critical challenge for innovative firms (Chesbrough, 2003; Chesbrough et al., 2006). However, surprisingly very limited attention has been devoted to understand how the exchange process can be managed by the "supplier" of the external knowledge, despite its fundamental role in the process. The paper attempts to address this gap by focusing on a particular category of external knowledge suppliers, i.e. New Product Development service providers. NPD service providers secure their clients with a wide array of knowledge-intensive services, able to support all the steps of the NPD process, such as technology and market scouting, concept generation, design, engineering, testing, rapid and virtual prototyping and 3D modelling services.

However, it is in the first phases of the NPD process that the relationship between the NPD service provider and its clients is particularly challenging, because of the tacitness of the knowledge to be exchanged and the considerable level of market and technical uncertainty characterizing scouting and concept generation activities (Borja de Mozota, 2003). Tacitness in the early phases of the NPD process stems from the need of the NPD service provider to delve itself deeply into the client's rich body of experience about industry's evolutionary trends, customers' requirements, products' meanings and languages, socio-cultural dynamics, as well as its vision and mission, organisational culture and values (Philips, 2004). These pieces of knowledge are very hard to codify in written specifications and require extensive face-to-face interactions, where trust plays a critical role (Bstieler, 2006), to be properly conveyed and assimilated. Furthermore, the first activities

in the NPD process are very complex, uncertain and involve a significant deal of creativity, which makes it particularly complex to predict their progress at the beginning of the provider-client relationship and to anticipate those exceptions that might affect their development.

Starting from these premises, the aim of the paper is to investigate how an NPD service provider organizes and manages the relationships with its clients in the early stages of the development process, so as to facilitate the transfer and integration of knowledge into the clients' innovation process. The focus is on two main dimensions of the knowledge exchange relationship: (i) the process followed to exchange knowledge and integrate it in the client's innovation process; (ii) the organization of this process. These issues are investigated using a rich empirical basis gathered in the scope of a multiple case study analysis. The case study focuses on three projects undertaken by a leading NPD service provider (which is labelled *ServiceSupplier* in the remainder of the paper for confidentiality reasons) with three of its most important clients. Besides contributing to the recent debate on Open Innovation, the findings of the paper hold important practical implications. They provide managers of NPD service providers with a number of suggestions about which approaches could be used to administer the relationship with clients, so as to ease the exchange and integration of knowledge and, ultimately, increase customer's satisfaction. The structure of the paper is as follows. The next section briefly reviews the bodies of literature which are relevant for the purpose of this paper. Afterwards, the methodology used in the empirical analysis will be presented. The fourth section illustrates and discusses the main results of the analysis and, finally, conclusions are drawn and some avenues for future research outlined.

2. Overview of the literature

The purpose of this section is to provide an overview of three streams of research which are relevant for the purpose of the paper, i.e. Open Innovation, NPD service providers and inter-organizational knowledge exchange.

<u>2.1 Open Innovation</u>

Open Innovation has been unquestionably one of the most debated topics in management research over the last decade (Chesbrough, 2003; Christensen *et al.*, 2005; Gassmann, 2006; Vanhaverbeke, 2006). It can be described as an emerging innovation management paradigm which suggests that firms should strategically commit themselves to make the most out of their knowledge abundant external environment, with the aim to improve innovation performance and, ultimately, create economic value. Open Innovation is therefore all about exchanging knowledge and technologies with a wide population of external organisations, such as Universities, clients, competitors, firms from other industries, individuals, NPD service providers, suppliers.

The 'early adopters' of Open Innovation were mainly large, multinational corporations, working in high-technology, high-velocity industries, e.g., Intel (Chesbrough, 2003), Air Chemicals (Tao and Magnotta, 2006), Nokia (Dittrich and Duysters, 2007), DSM (Kirschbaum, 2005), Procter & Gamble (Houston and Sakkab, 2006) and IBM (Dittrich et al., 2007). However, more recent empirical analyses have shown that also firms from mature, asset intensive industries (Chiaroni et al., 2010; Chesbrough and Crowther, 2006) and SMEs (van de Vrande et al., 2009) have started to conform to the emerging innovation management paradigm. Recent research has mainly adopted the point of view of the firm willing to take advantage from Open Innovation and has investigated the major issues that should be addressed in order to streamline the implementation and adoption of the new paradigm. Some scholars have studied the organisational implications of Open Innovation and, in particular, the changes to the firm's organisation that are needed to evolve from a 'Closed' to an 'Open' approach (Chiaroni et al., 2010; Gassmann, 2006). Others have investigated the use of ICT and knowledge management systems that can support the implementation of Open Innovation processes (Dodgson et al., 2006; Huston and Sakkab, 2006). A further stream of research has documented how innovative firms can use innovation networks to anticipate and manage radical technological changes (Dittrich and Duysters, 2007; Dittrich et al., 2007). More recently, scholars have examined how firms can take advantage from Open Innovation during periods of economic downturn (Chesbrough, 2009; Di Minin et al., 2010).

Despite theoretical and empirical research on Open Innovation has illustrated that exchanging knowledge with external organisations requires carefully designed managerial and organisational practices, in terms of both processes and organization, very limited research has been carried out so far to understand how the exchange process can be organised and managed by the "supplier" of the external knowledge. It is reasonable to assume that the effectiveness with which a firm interacts with an external organisation for knowledge exchange purposes does not merely depend on the managerial approaches adopted on the side of the knowledge recipient. It is also the proficiency with which the knowledge supplier organises and manages the exchange process that matters in this respect. The paper contributes to close this gap in Open Innovation literature by focusing on a particular type of "knowledge supplier", with which Open Innovation firms have been increasingly partnering for acquiring useful knowledge, i.e. New Product Development service providers.

2.2 NPD service providers

NPD service providers have been traditionally depicted as "knowledge brokers" (Sutton 2002; Hargadon 2003), i.e. "firms that span multiple markets and technology domains and innovate by brokering knowledge from where it is known to where it is not" (Hargadon, 1998 pp.210). NPD service providers play a critical role in knowledge transfer and exchange processes (Hargadon and Sutton, 1997; Hargadon, 1998), because of their particular characteristics (Muller and Zenker, 2001): (i) their knowledge-intensity; (ii) the function of consulting they perform, which favours an effective and efficient absorption of the transferred knowledge into the recipient organization; (iii) their interactive or client-related nature: the strong linkages they are used to create with clients stimulate the integration of the transferred knowledge into the recipient organization's innovation process.

The major issues regarding NPD services that have been investigated in the literature so far can be synthesised as follows: (i) the role of NPD service providers as partners in technological collaborations (Chatterji,1996; Chatterji and Manuel, 1993); (ii) the knowledge-brokering role played by NPD service

providers, which can also foster the birth and growth of technology-intensive industries (Hargadon and Sutton, 1997; Hargadon, 1998) (iii) the impact of NPD service providers on national or local economies (Mansfield and Lee, 1996; Windrum and Tomlinson, 1999); (iv) the effect of NPD service providers on companies' innovative performance (Katsoulacos and Tsounis, 2000; Kessler et al., 2000; MacPherson, 1997a,b,c). This brief synthesis of the literature indicates that NPD service providers have been studied mainly from an industrial economic perspective so far, and that management research has dealt with NPD services only when it had adopted the point of view of the firm which establishes a relationship with the service provider. Research into the organization and management of NPD service providers is very limited indeed (some exceptions are the works by Chiesa et al., 2004, 2007, 2008). Studying how a supplier of NPD services organizes and manages the relationships with its clients, so as to facilitate knowledge transfer and integration, is a topic that deserves future investigation. The paper adds therefore also to the body of research that has been briefly reviewed in this last section, by focusing on the process and organizational variables NPD service providers should rely on, in order to support an effective knowledge exchange process.

2.3 Inter-organizational knowledge exchange

There are two major variables that might affect the easiness with which knowledge and technologies can be exchanged between organisations: the characteristics of knowledge itself and the ability to anticipate the content and outcomes of the knowledge exchange process.

The first factor refers to the distinction between tacit and codified (or explicit) knowledge (Polanyi, 1962). Tacit knowledge "indwells in a comprehensive cognizance of the human mind and body" (Polanyi, 1962), is highly personal or firm-specific and hence hard to formalise into blueprints or written instructions (Nonaka and Takeuchi, 1995; Marwick, 2001). It is made of a specific expertise that a firm acquires during the years and therefore it is very hard to communicate and transfer between organisations without continuous personal, face-to-face communication (Marcotte and Niosi, 2000). Explicit knowledge, on the contrary, is codified (Nonaka and Takeuchi, 1995; Marcotte and Niosi, 2000), i.e. knowledge put into a symbolic form

(e.g., blueprints, written instructions, formal languages). When knowledge is codified, in fact, it is standardised, easily available to firms and the communicational and human factors are less problematic (Marwick, 2001).

The second factor refers to the uncertainty surrounding the content and outcomes of the knowledge exchange process. When the outcomes of the collaboration are uncertain, cannot be foreseen in advance, involve a significant deal of creativity and are highly variable, it is particularly complex to predict those exceptions that might affect development activities. As suggested by the information-processing contingency theory (Tushman and Nadler, 1978; Egelhoff, 1982), under these conditions the information needed to coordinate R&D and innovation activities is hard to be codified and exchanged without misunderstandings and high costs. This increases the challenges the supplier is confronted with when it comes to administer its relationship with clients.

These theoretical lenses represent the basis for a thorough analysis of the different process and organization solutions adopted by the NPD service provider to ease knowledge exchange and integration with its clients during the early phases of the collaborative development process.

3. Research design and methodology

As previously mentioned, the paper focuses on New Product Development (NPD) service providers and it investigates how they organise the collaborative relationship with clients during the upstream phases of the NPD process, i.e. technology and market scouting and concept generation. Despite NPD service providers collaborate with their clients along different phases of the NPD process, the earlier stages entail specific challenges: knowledge exchanged between the NPD service provider and its client is typically tacit (Chiesa et al., 2008) and the uncertainty about both project scope and product life-cycle is particularly soaring (Verganti, 1997, 1999). This makes them particularly relevant for our analysis for both theoretical and practical reasons. In particular the analysis focuses on two main levers on which NPD service providers can act to address the abovementioned challenges: the collaboration process and its organization.

Due to the complex system of variables that characterize the problem, we use a case study methodology approach that allows us to develop a holistic and contextualized analysis. We believe that this method is suited to the exploratory nature of this research as it allows us not only to explore the phenomenon in its complexity, but also to identify those variables which we deem critical (Eisenhardt and Graebner, 2007). Therefore, our case studies have an exploratory intent, are retrospective and multiple in nature (Yin, 1984). The case studies focus on three projects undertaken by a leading NPD service providers (named *ServiceSupplier*) with some of its most important clients.

ServiceSupplier is a design and innovation consultancy firm based in U.S., with other offices in Italy and Japan. The company's core disciplines include, for example, brand experience, design strategy, organizational innovation and product innovation. The company was founded in 1983 and it employs today approximately 180 people, with an annual turnover of about 2 million €. It has worked with clients in several industries: medical, consumer, computer, automotive, hospitality, and financial services. The company has won 14 IDSA/BusinessWeek International Design Excellence Awards since 2003 and developed more than 330 design and utility patents. For the purpose of our research, we have analyzed first the typical approaches that *ServiceSupplier* uses to manage and organize the relationship with its clients during the service delivery process. This analysis, whose major findings are presented in section 4.1, is based on three in-depth direct interviews carried out with designers and managers from *ServiceSupplier*. Afterward, we have adopted a second unit of analysis (i.e. a single collaborative innovation project) to investigate how *ServiceSupplier* adapts the standard approaches unearthed in the previous step of the research to the characteristics of each project it is involved in (the results of this analysis are presented in section 4.2). To this purpose, we have identified three projects aimed at the development of incremental innovations destined to the consumer market, that *ServiceSupplier* has recently carried out in collaboration with three clients, which are heterogeneous under several perspectives: industry belonging, business model and size (employees and annual turnover), as well as expected output of the project. Table 1 provides some preliminary information about the three clients. The decision to focus on incremental innovation projects in the consumer domain of course affects the generalizability of the findings. The development of radical innovations might indeed

require different organizational endeavors for the collaborative project, e.g., the establishment of a full time joint team, co-located in the same place. This might have in turn important impacts on the easiness with which tacit knowledge can be exchanged as well as the uncertainty regarding the development process. The reader should be aware of this generalizability concerns.

Two in-depth interviews have been carried out to gather empirical evidence for each innovation project, together with a brief questionnaire which was useful to collect background data such as client's turnover, employees, business model, expected output and timing of the collaboration with *ServiceSupplier*. Both the interviews were planned around a protocol able to track the decision making process in the collaboration with *ServiceSupplier*. The first interview was organized with senior managers and designers from *ServiceSupplier*, while the second with NPD project managers and team members from each client, who were identified in collaboration with *ServiceSupplier* during the first interview.

All interviews were carried out by at least two authors. Before starting the data analysis phase, we retrieved additional information through secondary resources for data triangulation purposes. The content analysis was developed by each author, coding the principal phases of the innovation process (Eisenhardt, 1989). In order to increase the robustness of the interpretations, few different interpretations by the three authors were corroborated by re-contacting the interviewees by phone and a synthetic report about each case study was shared with interviewees to obtain a final approval.

Name	Description	Industry	Business model	Size	Expected output of the project with *ServiceSupplier*
ClientA	It was in June 1973 that *ClientA* made its debut among sports footwear manufacturers. Tennis shoes signaled the beginning of production, followed by models for basketball, volleyball, athletics and football. Sports clothing took the stage afterwards. Their involvement in both the design and fine-tuning of the products together with their image led the company to become a leader in tennis and football. This same period saw *ClientA* expand into the export market. International growth continued rapidly and ten years later the brand was being distributed in more than 60 countries around the world. Today, the performance segment has now been strengthened, in line with the new corporate mission. Special focus is given to footwear and technical clothing for football and tennis, also supporting the brand's worldwide leadership with products that are right on the cutting edge in terms of innovation and design. In parallel, based on production, technical and stylistic know-how, an idea has been developed for men's and women's leisure clothing and footwear with a sport-inspired image and taste in terms of the selection of fabrics, colors and styles.	Footwear	B2C	500 employees 311 mln € turnover	COMPONENT *ClientA* wanted to develop an absorption system for its tennis shoes line
ClientB	*ClientB Group* is a world leader in the production of automatic snack and beverage vending machines and is a major international player in both the HoReCa (hotel, restaurant and café) and the Office Coffee Services sectors. *ClientB Group* was formed in 2000, following the integration of two long-established vending companies. The newly formed group flourished and in 2007, *ClientB Group* responded to market demands for an even wider range of products through several acquisitions. These companies brought specific capabilities *to ClientB Group* such as competences in the espresso coffee technology in relation to portioned dispensing machines and competences in the payment systems design and production. Such new capabilities enanched the *ClientB Group* offer and therefore ideally placed to consolidate *ClientB Group*'s presence in the burgeoning cashless technology marketplace.	Vending machine	B2B	1.800 employees 400 mln € turnover	SCENARIO *ClientB* decided to collaborate with *ServiceSupplier* in order to build some scenarios about what would be the vending machine of the future
ClientC	*ClientC* is one of the world's leading international appliance companies. Each year, some 40 million consumers in more than 150 countries choose *ClientC* products, such as cookers and cooktops, ovens, fridges and freezers, dishwashers, washing machines, tumble dryers, room air conditioners and vacuum cleaners. With a presence in more than 100 countries *ClientC* is a truly international company. *ClientC* products include refrigerators, dishwashers, washing machines, vacuum cleaners and cookers sold under well respected brands. The founding father of *ClientC* established the principles by which the company still thrives. His dream to improve quality of life has had fundamental impact on homes around the world. Today *ClientC*, 90 years later, is a global leader in household appliances and appliances for professional use. "Thinking of you" expresses the *ClientC* offering: to maintain continuous focus on the consumer, whether it's a question of product development, design, production, marketing, logistics or service.	Household appliances	B2C	55.000 employees 11.000 mln € turnover	PRODUCT *ClientC* started the collaboration with *ServiceSupplier* in order to make a synthesis of the results it has achieved after a year of internal concept generation activities. *ClientC* asked *ServiceSupplier* to develop an operating model, i.e. a prototype that looks like and works like a new product, for a new household appliance.

Table 1: Case studies overview

4. Results and Discussion

A detailed description of the three case studies is reported in Appendix 1. The analysis of this rich empirical evidence suggests that *ServiceSupplier* employs some standard approaches to administer knowledge exchange and integration throughout the relationship with its clients. However, these methods are put into practice according to specific criteria that account for the heterogeneity of the clients with which *ServiceSupplier* interacts and their collaborative NPD projects. The common approaches applied by *ServiceSupplier* regardless of the nature of its clients are presented in Section 4.1. The reasons why it differentiates the way in which these methods are put into practice are discussed in Section 4.2.

### 4.1. Standard approaches for knowledge exchange and integration

ServiceSupplier adopts specific solutions in terms of innovation process and collaborative organization to ease knowledge exchange and integration with its clients.

Innovation Process

ServiceSupplier sets out the collaboration with its clients according to a standard sequence of activities since the outset of the relationship (see Figure 1). Specifically, the collaboration starts with a kick-off meeting, in which the client exposes a rough brief of the project to *ServiceSupplier*. The kick-off ends with a preliminary schedule of the activities and the meetings established for the next one or two weeks, according to the length of the project. After the kick-off meeting, the collaboration process goes through a very critical activity, which is called *Alignment and Learning*. The aim of this phase is twofold. On the one hand, *ServiceSupplier* gathers and interprets, through several face-to-face, personal contacts with the client's managers, the client's needs and diagnoses its organizational culture (*Alignment*). This task is of paramount importance to refine the original brief of the project and agree on the collaboration both for the NPD service provider and its client. This activity lasts on average one week. After the scope of the project and the client's needs and culture are

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fully understood, *ServiceSupplier* often proposes changes in the first draft of the project schedule, the progression of the team meetings and the critical milestones of the project.

On the other hand, the characteristics of the market where the client sells its products are thoroughly investigated by *ServiceSupplier,* with the aim to identify useful insights for the development of the new product (*Learning*). This task is supported by a set of user need analysis tools such as interviews with key users or ethnography, e.g., in the case of *ClientA*. An analysis of competing products is part of the process. These preliminary activities end with the identification of the development directions for the concept, both in terms of client needs and market opportunities (*Analysis and Direction* milestone). After the *Alignment and Learning* phase, which lasts on average four weeks, *ServiceSupplier* starts the *Scenario development and Concept generation* phase. This stage can be either more focused toward a scenario analysis, as in the case of *ClientB*, or aimed at developing a new concept for products or components, as in the case of *ClientA*. Designers and engineers develop a number of product concepts to illustrate what types of products are both technically feasible and would best meet the requirements of the target specifications. This activity usually requires eight weeks to be completed and ends with the presentation of the preliminary concepts to the client (*Preliminary Concept* milestone). Afterwards, the *Concept development* phase starts, which has an average duration of eight weeks. *ServiceSupplier* defines here the product's specifications and then it creates all the CAD/CAM drawings and models needed to produce a small batch of prototypes (*Refined Concept* milestone). Starting from these, *ServiceSupplier* creates the prototypes and tests them. If the prototypes pass the tests, the *Testing and concept migration* phase ends with a "green light" to production process development and engineering activities (which last of average sixteen weeks). This is clear in the cases of *ClientA* and *ClientC*, whereas the collaboration with *ClientB* was stopped before the *Concept development* phase started.
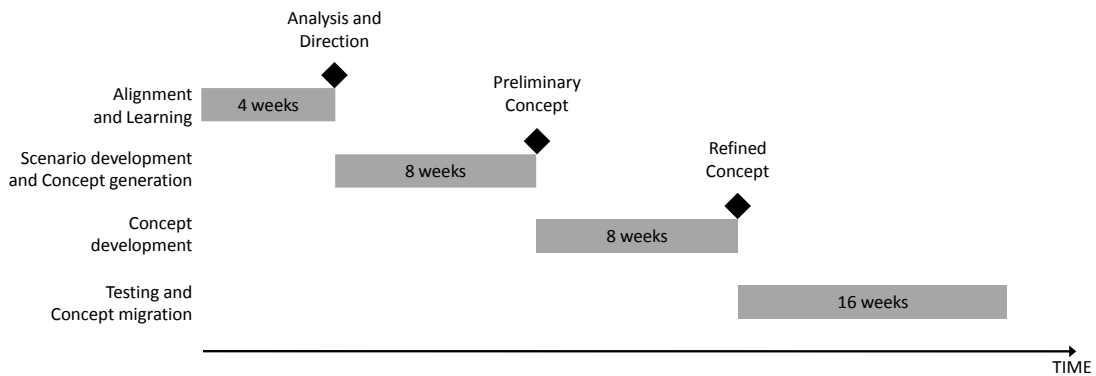
Figure 1: Innovation Process adopted by *ServiceSupplier*

Despite the innovation process depicted in Figure 1 resembles to some extent the traditional NPD process described in the well-established pertinent literature (Ulrich and Eppinger, 1995), there are some important aspects that is worth emphasizing.

In particular, our analysis indicates that *ServiceSupplier* handles with care and devotes significant time and resources to the first phases of the collaborative NPD process, i.e. *Alignment and Learning*. The presence and relevance of the *Alignment and Learning* activities is a major difference in comparison with traditional NPD processes (Ulrich and Eppinger, 1995). Although realignment of team and organization is a critical activity also in NPD projects undertaken within a single firm (Shilling and Hill, 1998), in case of collaboration with an NPD service provider the need for establishing a highly formalized alignment activity grows higher, because it involves people working for different firms (the NPD service provider and its client), who do not know each other and do not share the same culture and values. This makes *Alignment and Learning* activities more complex to be administered. In particular, developing a deep knowledge over the client's culture, needs and expectations about the collaboration is particularly challenging because this type of knowledge is highly tacit and confidential. Strong interactions and several face to face meetings become fundamental in order to acquire such knowledge and this suggests the need for a more formalized process.

The importance of the *Alignment and Learning* phase is due to two additional reasons. First, it is fundamental in creating trust between the *ServiceSupplier* and its clients. As already noted by management literature (Zaheer et. al, 1998; Adler, 2001), trust is the main coordination mechanism that should be used in order to administer collaborations that are uncertain in nature, cannot be preprogrammed, and require creative collaboration. Market and hierarchy are not effective coordination mechanisms in the management of these projects (Adler, 2001).

> *"The first phase of the collaboration is fundamental for establishing a good and trustworthy relationship with the client. How you are dressed, how you talk with the other team members, what you know about their products and experience … all these aspects impact on how you are accepted by the team of the client. […] The most critical thing during the Alignment and Learning phase is to win the trust of and enter in close, personal relationship with those people that do not believe in the project. It is obviously much more difficult in shorter projects"* – *Project and Design* Manager (about project collaboration with *ClientB*), *ServiceSupplier*

Some interesting aspects emerge as regards trust formation from comparing the three projects. *ClientC* had already collaborated with *ServiceSupplier* in the past, and in particular with the senior designer who participated to the development project. In this context of prior reciprocal knowledge, one single face to face meeting was sufficient to ensure a proper alignment and the creation of a trustful relationship. On the contrary, the projects with *ClientA* and *ClientB*, with which *ServiceSupplier* had never collaborated in the past, required at least three personal meetings between the project teams' members to raise an adequate level of trust. In the same vein, how *ServiceSupplier* builds up the project team is a fundamental lever to enable the creation of trust with the client organization, as it will be better explained in the next section.

Second, it emerges that, if *Alignment and Learning* phase is poorly undertaken, it can undermine the project chances of success.

"In order to make the project continue smoothly I really have to understand the client's needs. I can develop the best product of the world from a technical point of view. It cannot be enough if the client wants something different" − Product Manager (about project collaboration with *ClientC), ServiceSupplier*

The client's objectives and expectations are analysed, interpreted and interiorized during this phase of the process by the NPD service provider, together with the peculiarities of the industry. This often brings *ServiceSupplier* to reiterate the first draft of the design brief in a document where its own interpretation of the problem is illustrated. The brief[1] becomes therefore a critical tool through which *ServiceSupplier* and its clients share reciprocal knowledge and align themselves before project activities start.

The cases about *ClientA* and *ClientB* testify the challenges inherent in the *Alignement and Learning* phase. Focusing too much on the technical attributes of the products (*ClientA*) and misunderstanding the real needs of the client (*ClientB*), prevented *ServiceSupplier* from fully satisfying the two clients. Misunderstandings during the *Alignment and Learning* phase can be prevented by adopting consolidated project management tools. Several authors have stressed the importance of the so-called "scope management process" (Pinto and Slevin, 1988; Clark, 1999). Going through a formal scope management process, i.e. scope planning, scope definition, scope verification and scope change control, *ServiceSupplier* could improve the outcomes of *Alignment and Learning*, making the knowledge about the client's need more explicit and manageable during the whole project lifecycle.

Finally, our analysis points out an intriguing trade-off related to the *Alignment and Learning* phase. On the one hand, it is true that a good *Alignment and Leaning* with the client improves the chance of creating a trustworthy relationship and of satisfying the client. However, delving itself too deeply into the client's

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[1] According to Borja de Mozota (2003), the design brief activates the concept generation and consists of three main elements: the design project objective, information about the client company and information about the project.

culture and system of values might prevent *ServiceSupplier* from identifying very innovative solutions to the client needs (Tushman and O'Reilly, 2004; Weiß, 2004). Therefore, *ServiceSupplier* uses to balance these contrasting needs through collecting insights and suggestions about the project from other designers and engineers not directly involved in its execution. The cases of *ClientA* and *ClientB* are paradigmatic in this respect. *ServiceSupplier* dedicated a room in its offices to expose the prototypes and the products of its clients in order to encourage designers and engineers to use them, give their impressions and opinions and hence stimulating the organization's ability to think out-of-the-box.

Collaborative Organization

In the previous paragraph we pointed out the importance of trust as a coordination and transfer mechanism for tacit knowledge exchange during the *Alignment and Learning* phase. The ability of *ServiceSupplier* to build a trusted relationship with its clients during this critical stage mainly descends from the composition of the team which takes part in the NPD project.

The *ServiceSupplier* team has a standard configuration, which comprises a "core team", eventually supported by an extended one. Each member has specific competencies and is in charge of carrying out a given set of activities. The core team is made of three people. The *Key Account* is in charge of managing the relationship with the client and typically has a significant experience in new business development and marketing. He takes part in the milestone meetings with the clients and acts as the formal interface between *ServiceSupplier* and the client's top management (and especially the *Project Leader* of the client's team). Within *ServiceSupplier*, a Key Account is responsible at the same time for a maximum of 4 projects, depending on their strategic importance. The second key role in the core team is the *Project and Design Manager*, who is responsible for managing and developing the project. Typically this role is assigned to a senior designer with significant experience in strategic and product design. Besides actively participating in the project, he is in charge of scheduling and controlling its progress. Surprisingly, this administrative role is not given to a person with an engineering background. This is largely due to the history of *ServiceSupplier*, that was born as a pure

design company and, as a result, its culture has always encouraged designers to develop strong project management capabilities, which is very uncommon in other design firms. The third member of the core team is usually a *Concept Developer* with product design experience, who supports the team especially during the *Scenario development and Concept generation* phases. Technical knowledge is typically ensured, when necessary, by temporarily extending the team to comprise *Product Manager* and *Product Developer* roles[2]. An additional *Concept Developer* can be part of the extended team performing the more time-consuming or knowledge-specific activities, such as reading white papers and specialized literature or developing prototypes and defining the specifics and the materials of the product[3] (see Figure 2).
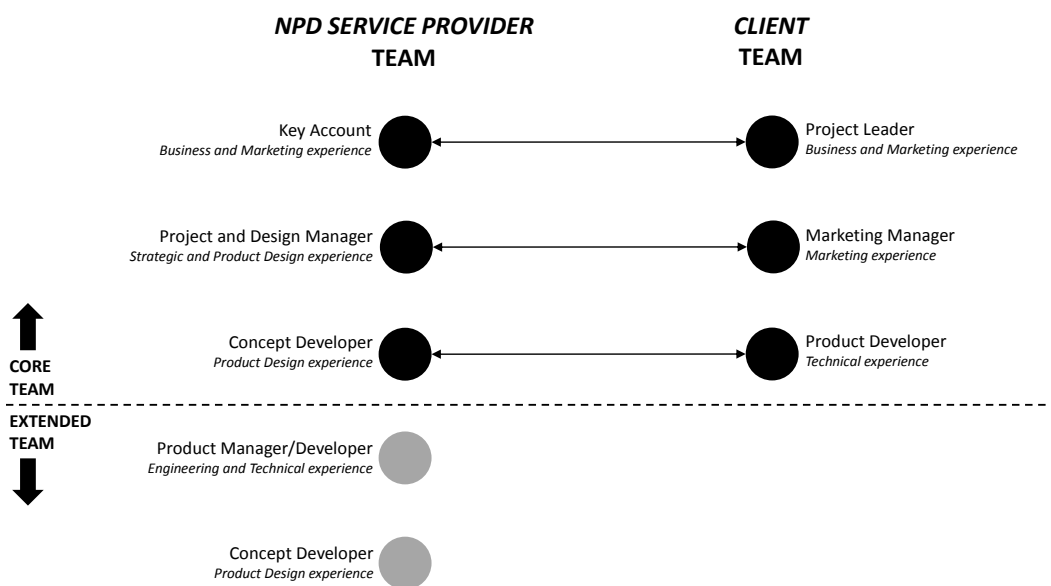
Figure 2: Collaborative Organization adopted by *ServiceSupplier*

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[2] The project developed in collaboration with *ClientC* is an exception in this respect: the complexity of the technical problems concerning the project objectives and the absence of a traditional *Key Account* in the core team forced *ServiceSupplier* to include a *Product Manager* in the core team.

[3] The *Concept Developer* in the core team has the same competences and is responsible for the same activities as the one in the extended team. The only difference between the two is their importance in the project. The *Concept Developer* in the core team has a key role in developing the project and in managing the interface with the *Product Developer* in the client team. On the contrary, the *Concept Developer* in the extended team serves as an additional resource who mainly works in back office to speed up project activities.

Although the structure of the *ServiceSupplier* team is rather traditional, some aspects deserve special attention. First, it appears that a critical point to which *ServiceSupplier* pays particular attention is to build up the team on the basis of the motivation of the prospective members. Obviously, the human resources included in one team are chosen on the basis of their skills, i.e. technical competencies, previous experiences in the industry and relational capabilities. However, a prerequisite in this selection process is the existence of a strong motivation to take part in the project:

"For our designers, money and work-time are not so important. A designer wants to work on something that really enjoys him" – *Product Developer* (about project collaboration with *ClientC*), *ServiceSupplier*

Our analysis indicates that the motivation of the team members is particularly critical right because it helps build trust with the client organization, where extensive personal contacts and face to face meetings require special commitment to be successfully managed. As noticed above, trust is the fundamental coordination mechanisms to manage projects characterized by high level of uncertainty. For the same reason, cultural affinity, spoken languages and personality traits are all critical aspects that *ServiceSupplier* takes into careful consideration in the creation of the team. For instance, in the case of *ClientA*, *ServiceSupplier* assigned the *Key Account* role considering as one of the main criteria the fact that the prospective *Key Account* spoke the same language of the client and was very close to it from a cultural and personality point of view. What should be remarked here is that trust is built through personal relationships between the member of the *ServiceSupplier* team and the client's one. The client's team has usually a simple structure (see Figure 2). A *Project Leader* is in charge of coordinating a group of people who come from both the technical and marketing departments. The analysis suggests that horizontal communication flows exist between the two teams and that they occur mainly at the same "hierarchical" level (e.g., the *Product Manager* and *Product Developer* of the *ServiceSupplier* team are in close relationship with the client's employees with a technical

background). Horizontal communications and interactions are fundamental in order to transfer tacit knowledge. This kind of knowledge is embedded in the people within the organization, i.e. it is sticky (von Hippel, 1994). Therefore, in order to figure out a complete picture of the client's needs and expectations, *Service Supplier* should gather information at different organizational levels. In this vein It is interesting to emphasize that, during the *Alignment and Learning* phase, *ServiceSupplier* pays particular attention to diagnosing and understanding the personal characteristics and cultural background of each member of the client's team. This often brings *ServiceSupplier* to slightly change the composition of its team to favor the establishment of a trustworthy relationship between the respective members.

Another aspect that deserves attention is that the *ServiceSupplier* team often plays a critical role of "championing" the innovation process within the client's team (Schon, 1963; Chakrabarti, 1974; Howell and Higgins, 1990). In other words, they are often asked to support the *Project Leader* in convincing and motivating the whole team about the adequateness of the decisions taken during the development process, as it is clear in the cases of *ClientA* and *ClientC.* This is useful to reduce the perceived uncertainty over the project by the client's team, by strengthening the motivation of its members:

> *"We have developed a scoring tool. It was nothing more than an excel sheet created in order to rate different product concepts. The project leader asked us such tool to convince and motivate his team of the quality of the concept chosen" – Project and Design Manager* (about project collaboration with *ClientA*)*, ServiceSupplier*

Differently put, leveraging the trust built with the client during the first stages of the collaborative process, the *ServiceSupplier* team uses its reputation and well-respected competencies to motivate the client's team to pursue ambitious goals and overcome the unavoidable barriers that surface in the development project.

4.2. Tailoring the approaches of knowledge exchange and integration to the peculiarities of each project

The analysis of the empirical evidence further suggests that *ServiceSupplier* adapts the standard approaches and strategies for knowledge exchange and integration described in the last paragraph to the peculiarities of each collaborative project. Several variables can be identified as influencing how *ServiceSupplier* puts the above mentioned standard approaches into practice. Table 2 synthesizes the impacts of the major contingent variables on the standard practices adopted by *ServiceSupplier*. A thorough discussion on the topic follows.

Client Collaboration Attitude

The amount of time and resources that *ServiceSupplier* devotes to the *Alignment and Learning* phase of the collaborative process is heavily affected by the previous experience of the client in collaborating with NPD service suppliers (*Client Collaboration Attitude*). This is clear in the case of *ClientC*, which suggests that firms which have already collaborated with external consultants in their innovation activities are more inclined and able to transfer critical information and tacit knowledge about their competencies, needs and competitive advantage. This substantially reduces the barriers the NPD service provider has to overcome to acquire and integrate this critical knowledge from the outset of the process.

> *"The kick-off meeting was held in a room with all the sketches of the concept hanged to the walls. What they had previously told us about their work was exposed on the wall. We exchanged our cell phone numbers, defined how to share information and arranged the next meetings. After another additional meeting we had clearly understood the scope of the project. We were ready to start." – Project and Design Manager* (about project collaboration with *ClientC*), *ServiceSupplier*

Furthermore, in cases where *ServiceSupplier* starts working with clients that it has already collaborated with, it often employs a simplified structure for the core team, where there is no *Key Account* and the *Project and Design Manager* is entitled with higher responsibility for managing the relationship with the client, as in the case of *ClientC*:

"I had more responsibilities than I usually have. I was in charge of both the practical issues of the project, such as planning and controlling, and the relational issues, such as taking care of the relation with the client" – Project and Design Manager (about project collaboration with *ClientC*), *ServiceSupplier*

Because reciprocal trust has already been built during previous relationships, the *Key Account* role is not so critical for the successful completion of the project, this explaining the above mentioned uncommon configuration of the team.

Client Collaboration Timing

Although the focus of our analysis is on the early stages of the NPD process, substantial differences can be observed, e.g., between the case of *ClientA*, where *ServiceSupplier* was involved in the very preliminary, unstructured concept generation activities, and the case of *ClientC*, where the client had already performed concept generation internally and collaborated with *ServiceSupplier* on testing and concept migration activities. Our analysis indicates that, the earlier the stage at which *ServiceSupplier* is involved in the client's NPD process (*Client Collaboration Timing*), the more critical the *Alignment and Learning* phase for the NPD service supplier, because it is much more difficult to codify the objectives of the collaboration and to understand the needs and requirements of the client, i.e. the knowledge to be exchanged is highly tacit and uncertainty over the outcomes of the project is high. Therefore, *ServiceSupplier* has to devote more time and

resources in order to be carefully aligned with the client. *ServiceSupplier* spent two weeks aligning with *ClientA*, and only one week in the projects with the other two clients. Nevertheless, as reported in Table 2 and discussed in the last paragraph, the effort *ServiceSupplier* is required to put in *Alignment and Learning* does not depend only on *Client Collaboration Timing*, but also on *Client Collaboration Attitude*. However, despite the similar impact of these two variables, they explain the empirical evidence in a different way. *Client Collaboration Timing* impacts on the amount of tacit knowledge that needs to be exchanged in order to be fully aligned. The sooner the collaboration starts, the higher is the amount of tacit knowledge to share between the counterparts. On the contrary, *Client Collaborative Attitude* influences the easiness with which tacit knowledge can be transferred. Taking as constant the amount of tacit knowledge to be exchanged, the higher the client's attitude to collaborate with NPD service providers and with *ServiceSupplier*, the shorter the time required to exchange and integrate this body of knowledge, and consequently the shorter the time required to align NPD service provider with its client.

A second aspect to emphasize is that, the earlier the stage of involvement of the NPD service supplier, the lower the degree of formalization and the rigidity of the collaborative process. Although milestones and schedules are set out and shared by *ServiceSupplier* and its client also at the beginning of these projects, they are much more flexible and are often adjusted as long as development activities unfold (e.g., in the case of *ClientB*). Furthermore, when the NPD service provider is involved later in the NPD process, temporal milestones become tighter, which requires a closer monitoring and control of the development process. This is clear in case of *ClientC*:

> *"We had very short lead time to finish the project. At the very beginning of the project we planned even the date and the hour of the final meeting. We had the need to fix the agenda of all the people involved with very short notice. We had not the possibility to make mistakes" – Project and Design Manager* (about project collaboration with *ClientC*)*, ServiceSupplier*

This evidence can be explained by considering that the last phases of the NPD process are characterized by a lower level of uncertainty, which makes the implementation and use of formalized project management techniques easier.

Finally, the later the stage in which *ServiceSupplier* is involved in the collaborative NPD process, the stronger the role played by the *Product Developer* within the team of the client, since technical competencies become more relevant as long as the NPD project moves downstream. It is possible to notice that, in the projects which ended involving also the latter stages of the NPD process, the technical functions of the client team increased their decision making power and their presence. The heterogeneous importance of people with a technical background in the client team has an impact on the organizational power of the *Product Manager / Developer* inside the *ServiceSupplier*'s team. In particular, the higher the importance of the technical department in the client team, the higher the relevance of the *Product Manager / Developer* within the *ServiceSupplier* team. Again, this is related to trust and to the easiness with which knowledge and information can be exchanged between the counterparts:

> *"In the project the engineer had a very important role. The technical department of the customers usually looks at us (designers) suspiciously. The engineer should be trusted by them"*
> *– Project and Design Manager* (about project collaboration with *ClientC*)*, ServiceSupplier*

In this respect, while the extended teams in both projects with *ClientA* and *ClientC* foresaw the presence of a *Product Manager* and a *Product Developer*, in the case of *ClientB* these roles were not involved, neither in the core nor in the extended team.

Provider Collaboration Role

The analysis of the cases indicates that the NPD service provider can play two distinct roles throughout the collaboration with its client (*Provider Collaboration Role*). It can represent a "source" of innovation (Fischer, 2001; Hipp, 2000), as in the case of *ClientA*, where *ServiceSupplier* was required to come out with new concepts for a critical component of a new product. Alternatively, it can play a "facilitator" role (Fischer, 2001; Hipp, 2000), as in the case of *ClientC*, where *ServiceSupplier* helped the client take a decision about which concepts should be given higher priority.

It seems that, if the NPD service provider acts as a "source" of innovation, it needs to devote much more time and resources to the *Alignment and Learning* phase of the collaborative process, because it is required to develop a substantial competence about the market, the users, and the competition of the client, so as to propose new components and product designs. This is clear if we compare the time required by the NPD service provider to fully understand the market of ClientA (three weeks), where *ServiceSupplier* played the role of "provider", and of *ClientC* (one week), where *ServiceSupplier* played instead the role of "facilitator", i.e. worked on contents already developed by the client firm. The existence of already developed concepts makes knowledge to be exchanged more explicit and reduces the overall uncertainty over the projects since some relevant decisions have already been taken.

	Client Collaboration Attitude			Client Collaboration Timing			Provider Collaboration Role		
	ClientA	ClientB	ClientC	ClientA	ClientB	ClientC	ClientA	ClientB	ClientC
Classification of the cases	*ClientA* was not used to collaborate with external NPD providers and it was the first time that *ServiceSupplier* worked with them. Furthermore, *ServiceSupplier* had no previous experiences in the footwear industry.	*ClientB* was not used to collaborate with external NPD providers and it was the first time that *ServiceSupplier* had collaborated with it.	*ClientC* had already collaborated with *ServiceSupplier* and it was accustomed to working with consultants in the innovation process, e.g., it had other internal groups collaborating with external NPD service providers.	*ServiceSupplier* was involved in the NPD project from the beginning, with the aim of designing a new shock absorption system.	*ServiceSupplier* was involved in the NPD process from the beginning, with the aim of elaborating some scenarios about what the vending machine in the future would be.	*ServiceSupplier* was involved in the NPD process in the concept development phase, with the aim of formalizing and synthesizing six concepts already developed by ClientC.	*ServiceSupplier* represented a "source" of innovation, since it had to come out with radically new concepts for one of the *ClientA*'s product.	*ServiceSupplier* represented a "source" of Innovation, since it had to come out with radically new scenarios for the vendor machines of the future.	*ServiceSupplier* represented a "facilitator" of Innovation, since it had to synthesize and formalize concepts already developed by *ClientC* internally.
Innovation Process — Alignment and Learning	*(Alignment)* *ServiceSupplier* needed to perform four face to face meetings in order to complete the alignment phase..	*(Alignment)* *ServiceSupplier* developed knowledge about the client in three face to face meetings.	*(Alignment)* *ServiceSupplier* fully understood the scope of the project in one meeting, hold in a room with the sketches of preliminary concepts attached on the walls.	*(Alignment)* The collaboration started with a thorough analysis of the needs and the capabilities of the client. It took two weeks and was focused on better defining the project brief taking into account the client's capabilities.	*(Alignment)* *ServiceSupplier* needed to understand the client's needs. The accomplishment of the task required several interactions between *ServiceSupplier*'s and the client's team .	*(Alignment)* The two teams defined how to exchange information, documents and PowerPoint presentations. After the first meeting, *ServiceSupplier* had clear in mind the scope of the project. This phase took one day to be completed.	*(Learning)* *ServiceSupplier* collected web searches and literature on similar products. Furthermore it surveyed the key users of the product, both professionals and amateurs. Finally *ServiceSupplier* developed a tool to test different absorption systems. This activity took three weeks	*(Learning)* *ServiceSupplier* dedicated three weeks in order to develop a map of the entire supply chain of the product. During such preliminary task *ServiceSupplier* identified a new important stakeholder as the distributors.	*(Learning)* There was not a detailed learning phase, since *ServiceSupplier* had to synthesize concepts already developed. Indeed the preformed interviews were used to test the client's reactions to the new features.
Collaborative Organization — NPD Service Provider team	The composition of the team followed the traditional structure: a *Key Account* supported by people with both a design and an engineering background.	Two senior designers were involved in the project. One of them was in charge mainly of managing the relationship with the client, i.e. he had the role of *Key Account*, while the other had the role of *Project and Design Manager*.	Differently from the other projects, there was no a *Key Account*. Thus *ServiceSupplier* increased the responsibility of the senior designer.	The team set up by *ServiceSupplier*, had a mix of design, technical and strategic competences with the *Product Manager* and *Product Developer* who increased their importance as the project entered its last phase.	The core and extended team set out by *ServiceSupplier* was made up only of people with design and strategic competences.	The core team set out by *ServiceSupplier*, was made up of a *Project and Design Manager*, a *Concept Developer* and a *Product Manager*. In the extended team a *Product Developer* was included.			
Collaborative Organization — Client team				The team comprised a *Project Leader*, a *Marketing Manager* and a *Product Developer*	The team comprised a *Project Leader*, coming from the marketing department, and other two *Marketing Managers*.	The team comprised a *Project Leader*, coming from the R&D department, a *Marketing Manager* and two *Product Developers*.			

Table 2: Impact of contingent variables on the management practice adopted by the *ServiceSupplier*

5. Conclusions

The research presented in this paper starts from the premise that, as a result of the increasing diffusion of Open Innovation practices, a soaring number of innovative companies find themselves entrenched into a strongly interconnected network of heterogeneous actors with which different types of inter-organisational relationships are established for knowledge exchange. Among these external actors, NPD service providers have expanded their role as brokers and providers of critical specialised knowledge and technologies.

This paper adopts the point of view of an NPD service provider and investigates the approaches that it can employ to favor knowledge exchange with its clients throughout the service delivery process. The research shows that the NPD service provider should act upon the configuration of the innovation process and the organization of the collaborative relationship to address two critical barriers toward a successful completion of the relationship with its clients, i.e. the tacit nature of the knowledge to be exchanged and the difficulties in predicting the content of collaboration activities.

Although the findings of the research are exploratory in intent, we believe that the paper has relevant practical implications. In particular, it can be of help to managers of NPD service providers, who are given several practical insights, gathered from the experience of one of the worldwide leading players in the industry, about how the collaborative relationship with client firms can be organized and managed so as to increase the capability to transfer tacit and complex knowledge and hence improve competitiveness. The major strategies unearthed by the paper that an NPD service provider can employ to this aim are summarized in Figure 3.

The paper further illustrates that putting these approaches into practice requires that the NPD service provider takes into account the distinctive characteristics of each client (e.g., in terms of previous experience in working with providers of Knowledge-Intensive Business Services) and the peculiarities of the specific collaborative project in which it is involved (e.g., in terms of phase of the NPD process where the contribution of the service supplier is required and the major role it is asked to perform, being it a "source" of new concepts and ideas for innovative products or simply a "facilitator" which helps the client prioritize and select

concepts and ideas already developed). We believe that the paper can benefit as well product and design managers working in those companies that, adhering to the principles of the Open Innovation paradigm, have been increasingly relying on suppliers of specialized knowledge and technologies, among which New Product Development service providers are growing in importance. They are given a picture of how these service suppliers organize the service delivery process, which will hopefully suggest them some insights to improve and facilitate the establishment of trustworthy relationships.
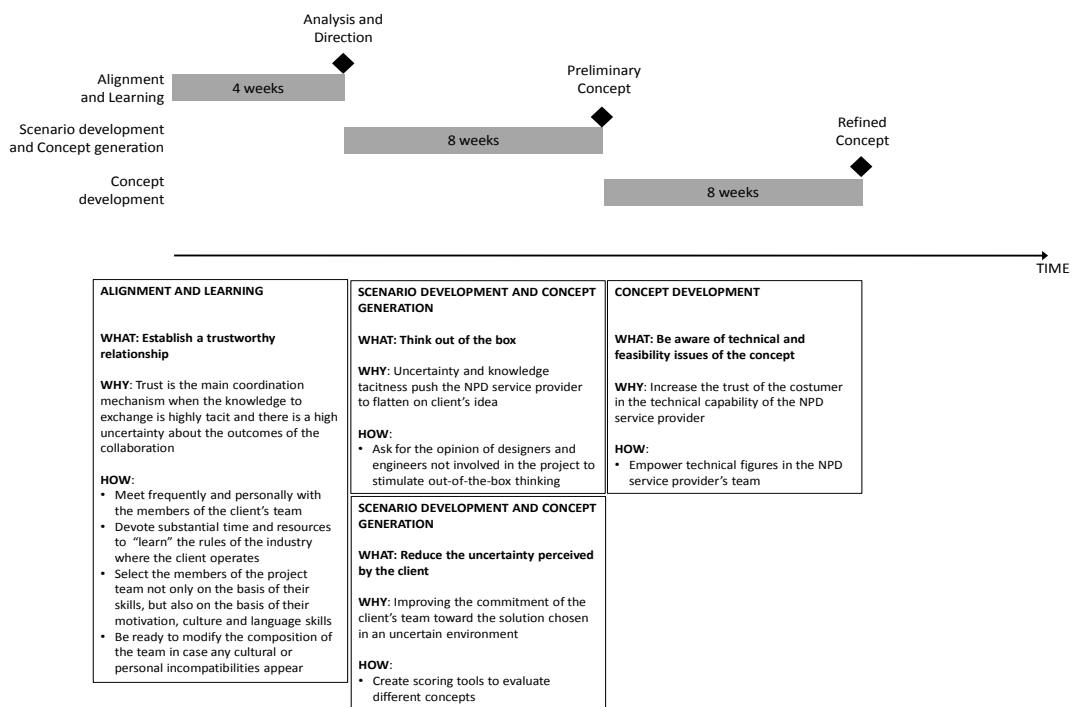
Figure 3: Strategies for an effective knowledge exchange and integration

As regards the implications for research, the paper is a first attempt, in the recent Open Innovation debate, to investigate inter-organizational relationships for knowledge exchange from the point of view of the provider of this knowledge. Furthermore, it contributes to the development of a deeper theoretical understanding of how NPD service provider firms organize themselves, a topic which has not received adequate attention as yet, in spite of the importance that these services have assumed in most of the industrialized economies over the last years. Consistently with research on collaborative NPD, the paper

points to the importance of trust in determining the successful completion of this kind of inter-organizational relationships. Furthermore, it encourages researchers to investigate the managerial and organizational determinants underlining trust formation, which have been only explored in this research. Moreover, an interesting opportunity for future research is about the investigation of attitudinal and personality traits of people involved in the collaborative NPD process with the aim to assess their impact on trust formation, client's satisfaction and, ultimately, on the successful completion of the project. This would contribute to the recent research (Rothaermel and Hess, 2007) which has explored the micro-foundations of a firm's capabilities in innovation management. Another interesting issue to explore relates to the generalizability of this study. We focused our analysis on incremental innovation projects destined to consumer markets. However it would be interesting to understand how and why the process and organizational solutions unearthed by our research are useful also for the development of radical new products, which usually challenge the client's competencies and established organizational routines.

APPENDIX 1: DESCRIPTION OF CASE STUDIES

ClientA

ClientA was a leader in the shoe industry but in the early 2000's its market position worsened due to the increased competition. In order to face this challenge, *ClientA* decided to reinforce its technical credibility trough the commercialization of an innovative shock absorption system for its tennis shoes line. The new system was aimed at satisfying the needs of both professional and non-professional players, and it had clearly to communicate its added value and the innovative elements of its design. The development of the new system for the tennis shoes was only the first step within a broader innovation strategy pursued by *ClientA*. Indeed *ClientA* started the collaboration project having in mind the opportunity to migration the technologies and design of the new system to other areas of interest, such as five-a-side football and classical football.

A. Innovation Process

The collaboration process started with a project kick-off (September 2004) and its overall duration was 12 months (see Figure 4). Since it was the first meeting, during the kick-off *ClientA* exposed a short brief of the project to *ServiceSupplier* and, afterward, two meetings were scheduled for the following week. Indeed the first activities performed by the NPD service provider were devoted to better understand the scope of the collaboration, i.e. to align *ServiceSupplier*'s team with the objectives of the client by taking into account its existing capability. Due to the tacit nature of the knowledge that the NPD supplier had to acquire at this stage, there was the need for continuous face to face contacts between *ServiceSupplier* team and its client. Furthermore, it was the first time that *ServiceSupplier* collaborated with *ClientA* and, more importantly, it was the first time it worked in the footwear industry. Furthermore, *ClientA* was not used to collaborate with NPD service providers during its NPD activities. Therefore a significant effort was required to align the *ServiceSupplier*'s team and *ClientA*'s. The collaboration went through a deep analysis of the needs and the capabilities of the client. Understanding *ClientA*'s development and production processes, reviewing its products and technologies and performing a benchmarking of the relevant competitors' products were essential to gather the critical information to successfully complete the project. These pieces of information were gathered in collaboration with *ClientA*'s team in four face to face meetings. First, *ServiceSupplier* performed an analysis of *ClientA*'s products, with the aim of understanding the technical functionality and advantages of this shoe, and it diagnosed as well *ClientA*'s competences. Second, *ServiceSupplier* asked *ClientA* to evaluate the different products of its competitors, in order to understand which were *ClientA*'s evaluation criteria. Only at this stage a detailed schedule of the project activities and milestones was agreed upon (*Alignment* activity lasted 2 weeks).

During these early activities *ServiceSupplier* collected data and information about the shoe market in order to learn about the client's competitive environment. In this phase *ServiceSupplier* collected also web researches on similar products and relevant literature to better understand the market context. Furthermore, *ClientA* helped *ServiceSupplier* with the identification of the main key users, both professionals and amateurs. Surveys and focus groups were employed in this phase. Moreover, customers were observed during the use of their tennis shoes. During this activity the project team of *ServiceSupplier* collaborated with the University of Cremona to develop a tool that could be used to test the mechanical response of the shoes to the different movements of the feet (*Learning* activity lasted 3 weeks). At the end of the *Alignment and Learning* phase *ServiceSupplier* presented the preliminary findings to *ClientA* in order to discuss the areas of opportunity identified and to select the more promising directions to explore and develop in the next phases of the program (*Analysis and Direction* milestone).

Starting from the results coming from the *Analysis and Direction* milestone, *ServiceSupplier* developed different concepts for the absorption system. At the end, five detailed concepts were proposed to *ClientA*, through the use of 2D sketches. In order to enhance the creativity of its project team, *ServiceSupplier* gave the possibility to the designers who were not involved in the project to contribute to identify interesting concept ideas. An entire room of the *ServiceSupplier*'s offices based in Milan was dedicated to expose *ClientA*'s and competitors' shoes. The designers had the opportunity to look at them, try them, bring them at home, leave a comment or propose an idea to improve them. The five initial concepts were reduced to

three and presented during the *Preliminary Concept* milestone (the *Scenario development and Concept generation* phase lasted 3 months).

In order to help *ClientA* in the selection of the most promising concepts, *ServiceSupplier* developed an ad hoc dashboard which used a traditional scoring evaluation method. This should be used to corroborate a critical decision taken by the *ClientA* team during the concept selection phase. It was *ClientA*'s project leader who asked *ServiceSupplier* to develop and use this tool, which was very much appreciated by the whole team. Starting from the selected concept, 3D CAD drawings were created and a small shoe batch was produced during the *Refined Concept* milestone (the *Concept development* phase lasted other 3 months).

The prototypes were used to test and refine the concepts with the aim to define the best production process. *ServiceSupplier* defined the specifics of the products and developed the bills of material, taking into account the skills and the competences already owned by *ClientA* (*Testing and Concept migration* phase lasted 5 months).
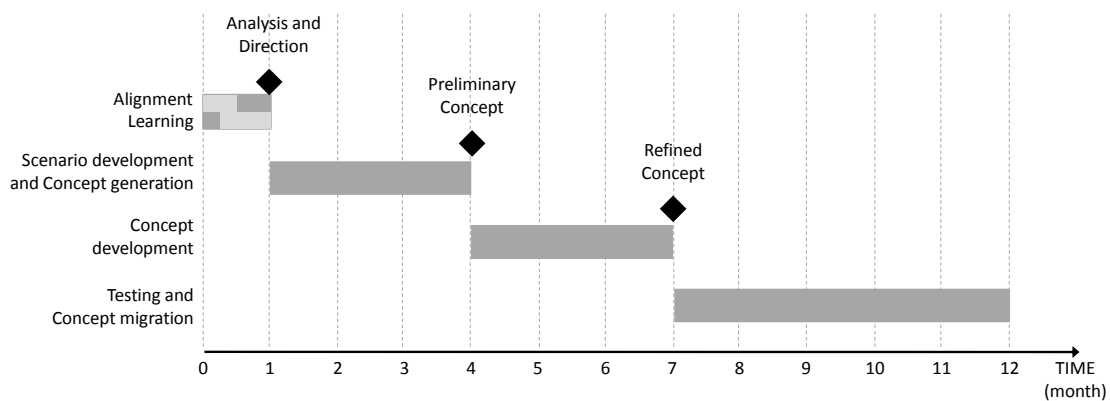
Figure 4: Innovation Process adopted by *ServiceSupplier* during the collaboration with *ClientA*

A. Collaborative Organization

The *ServiceSupplier* core team was made up of three people (see Figure 5): the *Key Account*, who was accountable for managing the relationship with the *Project Leader* and characterized by a significant experience in new business development and marketing; *Project and Design Manager*, selected from the *ServiceSupplier*'s senior designers with the responsibility to develop a product consistent with the strategic objectives defined by *ClientA*; a junior designer in charge of performing the analysis of the user's needs and the concept realization (*Concept Developer)*. Despite his limited technical experience, the *Concept Developer* was selected because of his strong motivation to take part in this project. In the same vein, the *Key Account* was chosen on the basis of its cultural and language skills since he came from the same country of origin of the *Project Leader*. The extended team benefited from the presence of two additional designers, who were heavily employed in the most time-consuming activities, such as desk and field researches in the learning phase and concepts development (*Concept Developer*). Furthermore, the extended team comprised a senior and a junior engineer. They were deeply involved in the last phases of the project, while in the first ones they were in charge of supervising the choices of the core team in order to guarantee the technical feasibility of the developed concepts (*Product Manager* and *Product Developer*).

The *ClientA*'s team comprised the *Project Leader*, who was mainly involved in strategic and commercial decisions, the *Marketing Manager*, who collaborated with the *Project and Design Manager* in the identification of project priorities and was responsible for the concept initially defined in collaboration with the *Project Leader*, and the *Product Developer*, who represented the real interface with *ServiceSupplier* in terms of product implementation (see Figure 5).
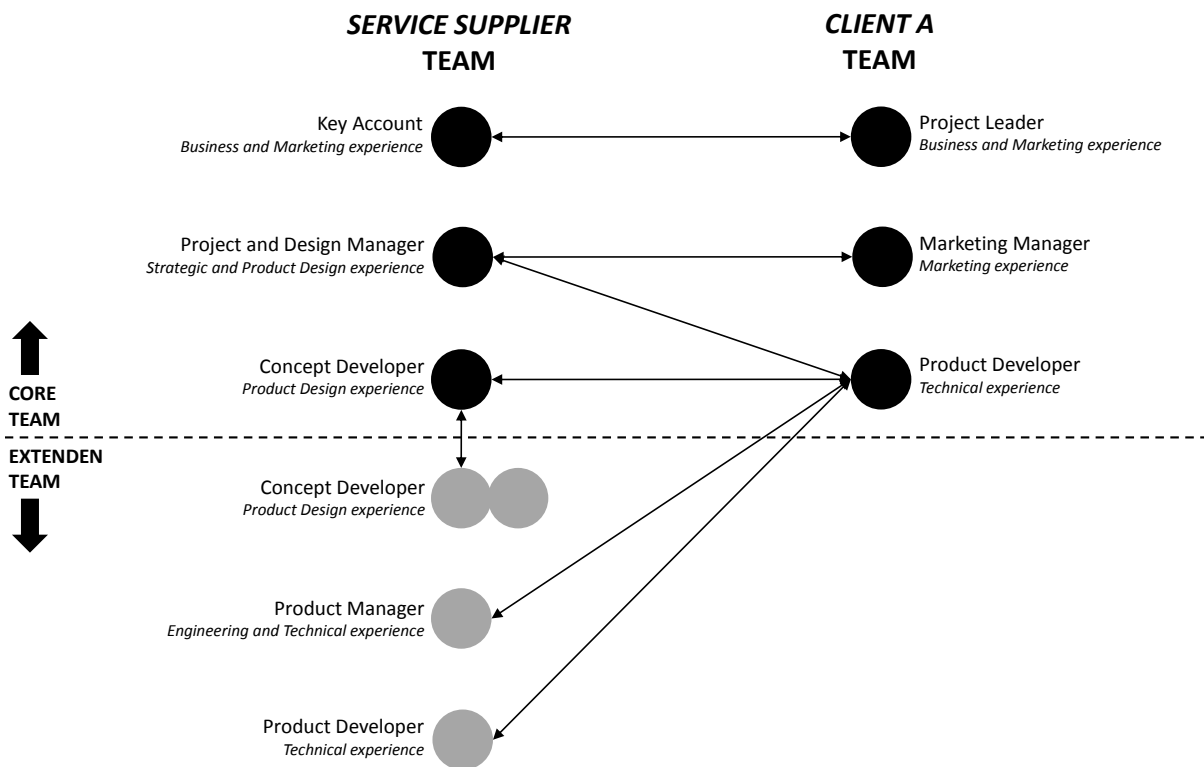
SERVICE SUPPLIER TEAM   **CLIENT A TEAM**

Key Account
Business and Marketing experience

Project Leader
Business and Marketing experience

Project and Design Manager
Strategic and Product Design experience

Marketing Manager
Marketing experience

Concept Developer
Product Design experience

Product Developer
Technical experience

CORE TEAM

EXTENDEN TEAM

Concept Developer
Product Design experience

Product Manager
Engineering and Technical experience

Product Developer
Technical experience

Figure 5: Collaborative Organization adopted in the collaboration between *ServiceSupplier* and *ClientA*

A. Project and collaboration results

The shock absorption system developed in the scope of the project was never launched on the market, even if some ideas coming from this project have been employed in other products. The main reason explaining this poor outcome of the collaborative project was an excessive focus on the product's technical aspects. Indeed the senior designer of the project was too focused on creating the best shoe from a technical perspective, without taking into account what the client really wanted.
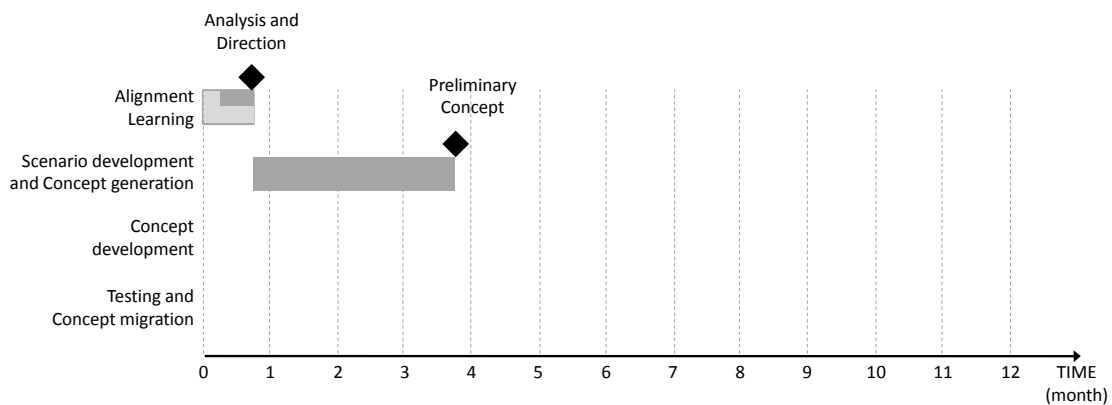
ClientB

ClientB is a worldwide market leader in the vendor machine industry and it is ahead of its competitors in terms of technical and innovation capabilities. However, in 2005 it decided to collaborate with *ServiceSupplier* in order to build some scenarios about what the vending machine of the future would be, in order to maintain its leading market position. The lead time for the entire project was around 4 months.

B. Innovation Process

After the presentation of a short project brief by *ClientB* during the kick-off (March 2006), *ServiceSupplier* looked very carefully at the characteristics of its client (see Figure 6). Had it already developed radically innovative products? What are the *ClientB*'s needs? How can *ServiceSupplier* answer to such needs? Finding an answer to these questions was necessary to focus *ServiceSupplier* on the project scope, i.e. to align *ServiceSupplier*'s team with the needs of its client. Since the focus was on the development of new scenarios about future vendor machine, in this preliminary phase *ServiceSupplier* did not focus so much on the capabilities of *ClientB*. *ServiceSupplier* needed to meet and talk with different key people within *ClientB* in order to focus the project scope and clearly identify project objectives. These tasks lasted around one week and required three face to face meetings, due to the difficulty in codifying the scope of the collaboration (*Alignment* activity lasted 1 week).

Furthermore, *ServiceSupplier* needed to better understand the vendor machines market, to learn about the client's competitive environment, in order to identify the variables that would affect the vending machine of tomorrow. To achieve this objective, *ServiceSupplier* spent two weeks developing a map of the entire supply chain of the product (the *Learning* activity lasted 3 weeks). While it was performing this preliminary task, *ServiceSupplier* identified a big weakness in *ClientB*: it had always developed products looking at the needs of the final users of the vending machines, without taking into account the needs and requirements of other important stakeholders, such as the distributors. Through an intense research, based on the analysis of white papers and scenario analysis, *ServiceSupplier* developed several interesting insights for the vendor machine of the future. These insights were presented and validated by the client during a formal meeting (*Analysis and Direction* milestone).

Figure 6: Innovation Process adopted by *ServiceSupplier* during the collaboration with *ClientB*

Starting from the issues unearthed during the *Analysis and Direction* milestone, *ServiceSupplier* developed three new scenarios about future vendor machines. In the *Scenario development and concept generation* phase designers who were not directly involved in the project participated to two brainstorming sessions in order to increase creative capabilities. They were invited to use and comment on some of the existing vendor machines developed by *ClientB*, located within the *ServiceSupplier*'s offices. During the *Preliminary concept* milestone meeting three new scenarios were proposed to *ClientB* (the *Scenario development and concept generation* phase lasted 3 months).

B. Collaborative Organization
ServiceSupplier carried out the project employing a core team made of two senior designers with significant experience in strategic and product design, while usually *ServiceSupplier* involved only one senior designer in each project. One of them was in charge of managing the relationship with the client (*Key Account*), while the other was assigned the role of *Project and Design Manager*. Both were staffed full time on the project. Furthermore, a junior designer was allocated to the project with the aim of helping the team in searching information about the future trends in the vendor machine industry (*Concept Developer)*. The team was also supported by an extended one, made up of other two junior designers (*Concept Developer*). These additional resources were involved in specific tasks mainly with the aim of supporting the core team in the labor-intensive research phase (see Figure 7).
The *ClientB*'s team comprised a *Project Leader*, with a significant experience in new business development and marketing, and other two *Marketing Managers*. Two employees coming from the R&D Department (*Product Developer*) took part in some meetings with *ServiceSupplier* mainly with the aim of ensuring the technical feasibility of the proposed scenarios (see Figure 7).
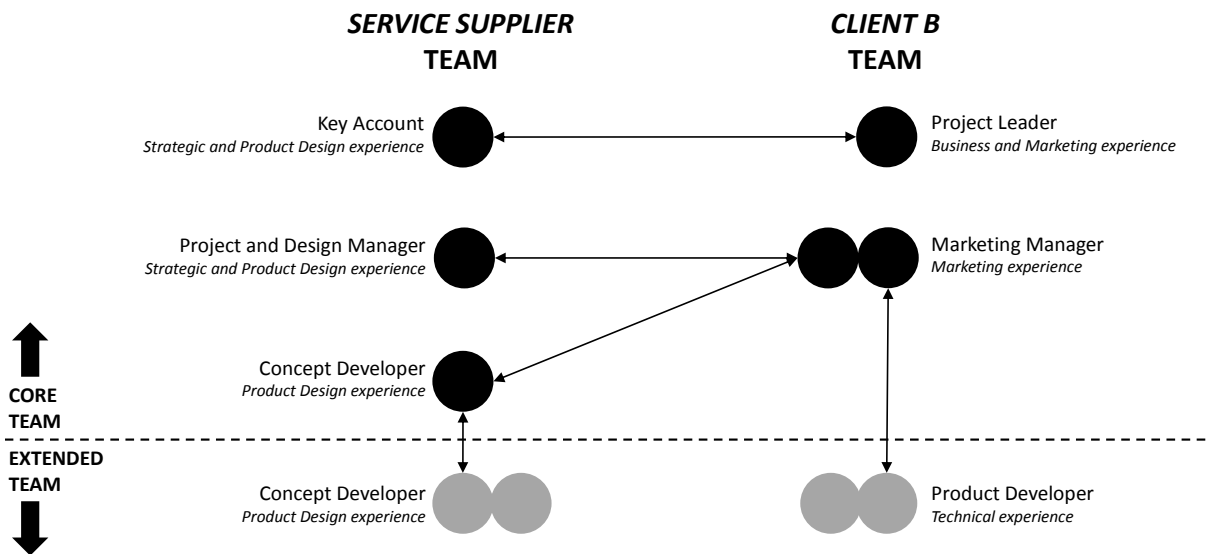
Figure 7: Collaborative Organization adopted in the collaboration between *ServiceSupplier* and *ClientB*

B. Project and collaboration results

ClientB was very satisfied with the output of the collaboration. It judged the concepts proposed as interesting further developments of their traditional vending machines. However, *ClientB* had the problem to transform these preliminary concepts into technical modifications of the existing product line. *ServiceSupplier* had not considered this aspect during the development of the project, since the scope was bounded to the identification of future scenarios. This brought to a partial misalignment between the output of the collaboration and the needs of *ClientB* and points to the importance of a careful alignment between the NPD service supplier and its client since the outset of the project.

ClientC

ClientC was aware of the importance of innovation in its turbulent competitive environment. As a result of a continuous idea generation process, it had internally developed a set of six new features for a household appliance through a brainstorming activity. Every two weeks people from R&D in Germany, the Marketing Manager from the France Division, the Chief Engineer from the Sweden Division, and a group of Designers from the Italy Division had met together to develop these new features. *ClientC* asked *ServiceSupplier* to formalize and synthesize their work creating an operative model for the household appliance, i.e. a model that looks like and works like a new product. The lead time for the project was very short, about 2 months. *ClientC* had already collaborated with *ServiceSupplier* and it was accustomed to performing similar collaborative tasks.
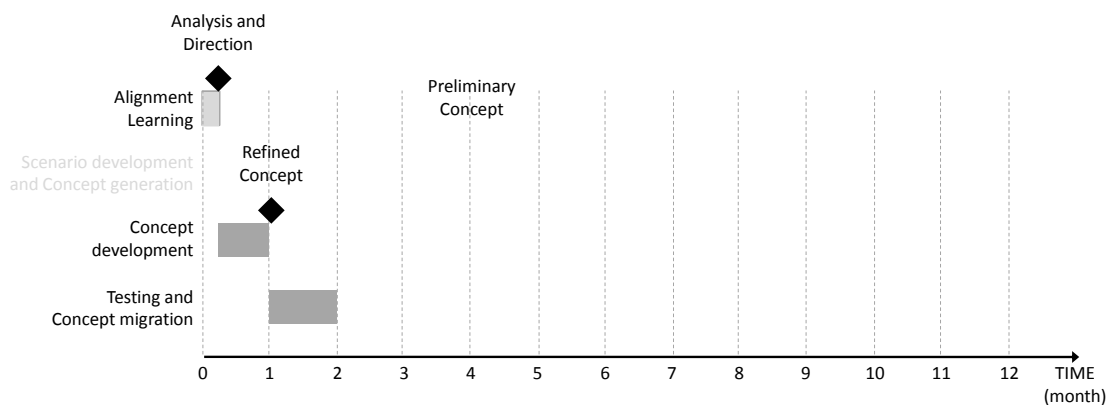
C. Innovation Process

The project started with a kick-off meeting (in June 2005) that was held in a room with the sketches of the new features, developed during the brainstorming, hanged on the four walls (see Figure 8). Because of the short time available to carry out the project (2 months), the meetings in the following week were immediately scheduled and the two teams defined how to exchange information, documents and PowerPoint presentations. After the first meeting, *ServiceSupplier* had clear in mind the scope of the project: realizing an operating model of the household appliance incorporating the most promising features already developed, i.e. a model that looks like and works like a new product. At the end of the first week *ServiceSupplier* performed an exact schedule of the entire project. The main milestones and the internal meetings were established early on (*Alignment* and *Learning* activities were developed in parallel and lasted 1 week).

After the *Analysis and Direction* milestone, the concept development phase started. Indeed, since *ClientC* had already developed six preliminary concepts, the concept generation phase was not performed collaboratively. *ServiceSupplier* tested the impact of the new features on *ClientC*'s customers carrying out 30 in-depth interviews. Each interview lasted about one hour. Half of them were conducted in France while the other fifteen in the UK. Interviews started with a short investigation of the current advantages and disadvantages related to the new features developed by *ClientC*. Furthermore, in order to stimulate the discussion and to replicate an "in-store situation", the interviewees could open and look at three products with different features. The "in-store simulation" concluded with the costumers' ranking the features developed by *ClientC* and of preferred combinations of the same features.

Starting from this information, *ServiceSupplier* refined and improved the six concepts developed by *ClientC*. At this time, *ServiceSupplier* developed scoring tools to evaluate different options. *ClientC* assessed preliminary concepts thanks to this tool and became aware and confident about the decisions they took. Among the six initial concepts, three reached the next phase and passed the *Refined Concept* milestone (the *Concept Development* phase lasted around 1 month).

After the *Refined Concept* milestone, the *ServiceSupplier* focused on the product architecture definition and the identification of appropriate material. *ServiceSupplier* checked the integration of the components in the whole product through CAD drawings. Physical prototypes were tested in life context with key customers through ethnographic methodologies. Both members of the *ServiceSupplier* team and of the client's team took part in this test. The project ended with the definition of the product requirements (the *Testing and Concept migration* phase lasted around 1 month).

Figure 8: Innovation Process adopted by *ServiceSupplier* during the collaboration with *ClientC*

C. Collaborative Organization

The *ServiceSupplier* core team was directed by a senior designer who directly interacted with the *ClientC Project Leader* coming from the R&D department. In this project, the senior designer covered both the role of *Key Account* taking care of commercial and relational aspects and *Project and Design Manager*, planning the project and co-elaborating its strategic objectives. *ServiceSupplier* was used to employ two distinct people in the role of *Key Account* and *Project and Design Manager*. However, all the people specialized in business development working for *ServiceSupplier* at that time were already involved in other projects. Moreover, *ClientC* was accustomed to collaborate with external NPD service providers and it had already collaborated with *ServiceSupplier* (specifically with the same senior designer). This made it much easier to establish trustworthy relationships with the client's team since the outset of the collaborative relationship. A junior designer (*Concept Developer)* directly interacted with the *Marketing Manager*, while the *Product Manager* with significant experience in engineering and technical development represented the interface with the *Product Developer* who came from the technical office. In this project the role of the *Product Manager* was particularly critical. Indeed the designers are usually looked at suspiciously by the engineering department

of the client firm. Therefore, it is critical that the *Product Manager* from the *ServiceSupplier* works to gain the trust of the client's engineering department. He has to demonstrate to be able to answer their questions and to show that he has understood how the project has to be developed. Since the collaboration was aimed at developing an operative model, the engineering department had an important role in the project. The *ServiceSupplier*'s team was supported by a *Product Developer* with a significant technical experience.

The *ClientC*'s team was made of a *Project Leader* coming from the R&D department, a *Marketing Manager* who interacted with the *Concept Developer* and two employees coming from the operations department *(Product Developer)*.
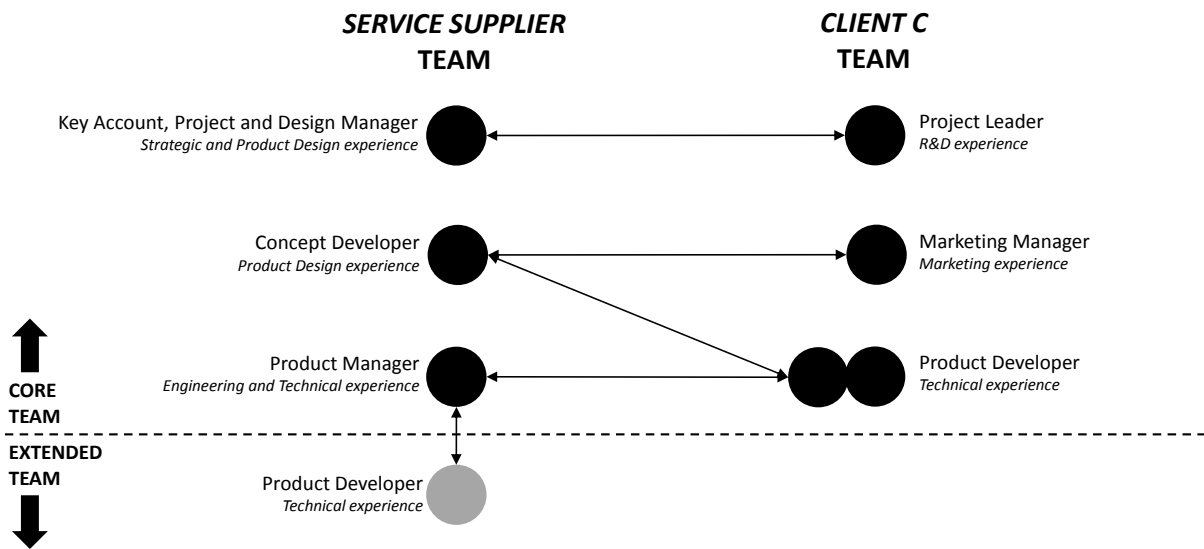

Figure 9: Collaborative Organization adopted in the collaboration between *ServiceSupplier* and *ClientC*

C. Project and collaboration results

The collaboration was very successful. The project was closed on time and the selected features are now produced and installed in several models of the household appliance. Furthermore, the client was very satisfied with the outcome of the collaboration. *ClientC* wrote one of the best reference letter ever received by *ServiceSupplier*. In particular, the ability of ServiceSupplier to meet the strict deadline and its capability to build a very multidisciplinary team in a short period were greatly appreciated by the client.

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