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IDENTIFICATION AND EXPLOITATION OF NEW DESIGN PATHS BY BREAKTHROUGH INNOVATION EXPERTS IN A GENERATIVE DESIGN PARTNERSHIP

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Abstract

For the past 5 years, more and more established technological firms have structured domain of expertise dedicated to breakthrough innovation management, in order to foster their innovative capabilities. Our paper studies how such expertise may be organised to identify and exploit more effectively new design paths. Our case study is based on the Renault's experts who demonstrate how the design theories could support the firm's innovation capabilities through an exploration partnership. The conclusion presents new co-exploration models and proposes organisations of the expert's activities.

Keywords: C-K design theory, co-design, design management, innovation

1. Introduction

For the past 5 years, several established technological firms have created a domain of expertise fully dedicated to breakthrough innovation management. This is the case at Renault, a French car maker, that created such a domain called Innovation Patterns at the end of 2018. The aim of such domain of expertise is to foster the innovation capabilities of the firm.

To do so, the experts at Renault have the objective to demonstrate how modelling innovation management through design theories can support the firm's innovation capabilities. In fact, the experts in partnership with our research team observe how design models create more value for the firm and improve its innovative capabilities. It is assumed that the experts have a deep understanding of the management of co-design partnership and of different design theories (systematic design, innovative design, co-design, etc). The experts at Renault decided to apply them on the on-going strategic partnership of their firm with Google.

In this way, our research team decided to observe the experts using design theories in the Renault-Google partnership. To be more precise, among all the players in the partnership, we observe only the experts. Since they are not the operational actors of the Renault-Google partnership, they had no contact or access to Google. It was also necessary to observe which results they obtained in terms of potential value creation for Renault, or Google, or Renault & Google, and in terms of improvement of innovative capabilities of the firm. Finally, their indirect contribution on the co-design partnership management (as they are not the operational actors of the partnership) could be purposely analysed to improve the field of design partnership research.

Thus, the research question of this paper addresses, is "Can radical innovation expertise be organized to identify and exploit more effectively new design paths for radical innovation?" and we propose to investigate this issue by analysing how they used models of innovation project partners based on C-K theory, the innovative design theory. This article aims to contribute to inter firms innovative design partnership management, more specifically to the processes that support the generativity in co-design theories. First, it aims to identify the main co-design partnership models within innovative design C-K theory, developed in scientific literature. Second, it shows how experts in breakthrough innovation contribute to the identification and exploitation of new design paths in an inter-firm partnership project. Furthermore, this article aims to evaluate if the previous applications in the field are coherent with literature. We conclude that a single actor can potentially manage and realise by themself all the steps of each method and can find innovative design path for both actors.
This article starts by a state of the art of design partnership models (section 2). In section 3, we present a field application in a French car maker, and we describe the method used to collect and analyse the data. Next, we present the results of the literature analysis and the field application (section 4). Section 5 discusses these results and presents the main conclusions.

2. State of the art: Model of generativity of design partnerships with technological industrial firms

Since the 90's, industrial technological firms have been facing an increasing pressure in competition, in which they have to present regular radical innovations at the lowest price. It became interesting to externalize some design-activities to suppliers in order to realise cost reductions and to benefit from the best innovation solutions (Maniak et al., 2007). Thus suppliers took the innovation design control of some entire subsystems of complex products, while industrial firms became responsible of the design and the coordination of all these subsystems, in a logic of platform (Gawer and Cusumano, 2014; Meyer and Lehnerd, 1997). The contribution of suppliers in the effort of R&D transforms their relationships with industrial firms. Gillier and Piat (2008) have modelized these relationships in three categories: subcontract, co-development and exploratory partnership. In subcontracting, suppliers strictly fulfil technical specifications; in co-development they find technical solutions to functional specifications, while in exploratory partnership the object to design is unknown, so supplier and customer have to design together functional and technical specifications.

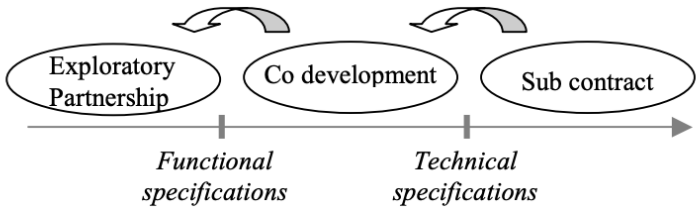

Figure 1. Exploratory partnerships in design process (Gillier and Piat, 2008, p2)

This last type partnership, Exploratory Partnership, needs methods to be managed and to produce the most generativity. Generativity is known as the ability to produce design proposals that are different from existing solutions and design standards (Hatchuel et al., 2011). The design theories model the generative reasoning and are often used by researchers working on radical innovation partnership. Recently, some have based their models on the C-K theory proposed by Hatchuel and Weil (2009). C-K theory makes visible the interaction between two spaces: the concept space (C) containing desirable propositions, which we cannot be determine as true or false; and the knowledge space (K) containing decidable propositions that are true or false. The concept and knowledge spaces expand during an innovative design process, following four possible interactions: C➔K (ie. conjunction); K➔C (ie. disjunction); C➔C (ie. partitions) and K➔K (i.e learning, deduction). C-K theory allows both researchers and practitioners to rigorously describe the generation of new objects and new knowledge in the design process (Hatchuel et al., 2015).
To better understand the co-exploration in partnership, C-K theory has been used by researchers in co-design theory to model the role of several design groups involved in a partnership. The following paragraph presents several instances of such research.

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2.1. Modelling collaborative steps for a generative co-exploration

The model of Matching Building (Gillier et al., 2012) underlines the effect of two agents on their mutual concepts and knowledge bases. These agents A and B create their own C-K frames following the principle of the C-K theory: C-KA and C-KB. Then they follow either a matching or a building model.

In the matching phase, the partners investigate together the individual C-K frames to identify intersections, which can be common interests (similar concepts), or missing knowledge they both want to acquire. If actors are sharing similar concepts or knowledge needs, they can engage in common explorations or knowledge transfers in order to provoke conceptual partitions and new disjunctions. Thus, they are able to merge their C-K frames in a common C-K (C-KAB), and to carry on the exploration.

The building phase is considered in the case where both actors do not find relevant intersections between their own C-K frame, and can't merge them. They need to "build" a common relevant concept. To achieve this objective, they first collect information about each other to reactivate the existing knowledge, then to reinforce their own knowledge base, and to finally generate new concepts. After that, they organise a new matching phase.

In a nutshell, the matching phase allows the intersections of the two C-K frames, while the building phase transforms the two C-K frames and force the intersections.

The result of this process appeared in three steps: first the partners identify a common relevant field of innovation, which become smaller with the appearance of generic concepts, to finally let place to one common "partner-concept".

2.2. Modelling the generativity in a co-exploration

Another way to model the interaction between partners is presented in the C-K co-generation model (Klasing Chen et al., 2017) which aims to also increase the generativity of the partnership. This model is born from the following analysis: Perkmann and Walsh (2007) have demonstrated that in a partnership, the simple knowledge transfer from one domain to another does not work most of the time. To reduce this risk and also to increase the generativity of a partnership, it becomes interesting to go beyond the simple knowledge transfer through knowledge co-construction. It suggests that both partners A and B work together from the beginning to the end of the collaboration, by creating together common knowledge, defining the goal and their role in this partnership.

Klasing Chen et al used a C-K- based co-generation model to build on these previous works and propose to organise these principles in three steps:

1. Creating a first partnership intention by building C-K mapping of its own activities: C-KA and C-KB.
2. Jointly building C-K mapping (C-KA B) from scratch that should guide the R&D partnership and the daily working agenda of the dedicated resources (which is not the case in the matching-building models, as C-KA B is from the C-KA and C-KB merging).
3. The two initial C-K mappings (C-KA and C-KB) evolve through the discussion on the joint research program and through confrontations.

These steps aim to harmonize the discrepancies of strategy, needs and competencies between partners. Indeed, despite potential huge differences between knowledge and concepts of the two partners, the formalization of strategic concepts helps to identify common knowledge and sub-concepts. They can also agree with the evaluation criteria. In others words, the creation of a common language is essential in cross-sector partnerships to allow a common understanding of the project. It is one of the force of C-K theory (Hatchuel and Weil, 2009).

2.3. Modelling a generative co-exploration with an unknown partner

If the model of Matching Building and C-K-co-generation consider the relation between different design communities, it is supposed that the actors know each other, or that they work in a shared environment.

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The E-C-K and T-C-K model (Jean et al., 2015) was created to overcome two kinds of fixation in a design partnership. The first fixation exists on the environment: in systematic design (Pahl et al., 2007) the customer and the need, which is the environment of the project, are defined in the specification. Thus, the environment is fixated, while the design effort is concentrated on the technological solution, to make it fit with the environment. This is situation of market pull. The second fixation is about the technology: in the D4 method (Gillier and Piat, 2008), the technology is divided in properties to determine its functions, and so its customers and its needs. In the same stream, (Glaser and Miecznik, 2009) use the Reverse Invent method to make technology-intensive firms generate new opportunities by identifying new market for their core technologies. This time, the technology is fixated to fit with an environment. This is a situation of "technological push". In both situation the global exploration is limited because of the prescription of either environment or technology, which make one to fit with the other.

The purpose of E-C-K and T-C-K is to design simultaneously the environment and the technology to maximize both explorations and then generate more fits between both of them. To limit any fixation, the exploration of E and T are dissociating considering two C-K mappings: E-C-K and T-C-K. Let assume a technological company A, and a company B which have needs and clients:

In the T-C-K mapping, the concept space explores the features of the technology starting from the concept "Demonstration of the technology", while the knowledge space considers various environments.

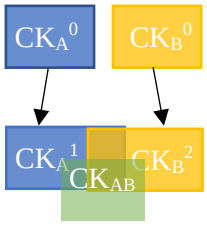
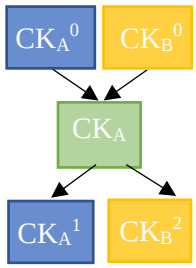
In the E-C-K mapping, obtained by inversing the T-C-K mapping, the concept space explores the various environment according to the starting concept "Value of the technology", while the knowledge base considers the features (value) of the technology.

At the end of the two C-K creations, the partners analysis all the concepts to realise fits between technologies and environments. Each consolidated concept is followed by a feasibility case study.

This method allows actors to have a huger view of all the technological and environment fits, since a double exploration leads to more consolidated concepts, and allow each actor to take the role of technological designer and environmental designer. These new concepts also open partnership opportunities with unconsidered actors.

The Table 1 summarizes all the interactions between the individual and mutual C-K mapping of partners in generativity design partnership models.

Table 1. Model of generativity design methods

	Matching	Building	C-K Co-Generation	E-C-K / T-C-K
C-K co-construction				

CK_A: realised by actor A on A | CK_B: realised by actor B on B | CK_{AB}: realised by actor A&B on A&B

3. Research methods

3.1. Collaborative management research in car maker industry

This research has been conducted from January to November 2019 at Renault, a French industrial car maker. This study is based on a collaborative management research (Shani et al., 2008),

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conducted by academics and practitioners, and gives actionable knowledge for the organization and new theoretical models in management research (David and Hatchuel, 2008). The research was carried out by a research engineer in management science and by members of the domain of the strategic expertise (DES), specialised in breakthrough innovation management at Renault. The DES, which has been created in June 2018, counts a dozen of experts in engineering design, who has been trained for years to systematic and innovative design through the C-K theory, and are involved in several innovative projects for Renault since the beginning of their careers. In particular, the study has been carried out by the "expert leader", who is in charge of the domain of expertise, an expert who has also competences in marketing, and another expert specialised in creativity methods and forecasting.

The study is based on the Renault-Google partnership, which has been recognised by all the expert-leaders in Renault as the most innovative partnership that Renault has had in a long time. Indeed, it is the first time that a car maker signs a partnership with Google, and that Renault let a GAFA design the main part of the software of the car. The domain of expertise in management of breakthrough innovation decided to use this innovative project to demonstrate how the design theories support the firm's innovative capabilities. This study observes these experts using design theories in the Renault-Google partnership. To be more precise, we observe only the experts, since they are not the operational actors of the Renault-Google partnership, and they had no contact or access to Google.

From an industrial point of view, the question is to know how the domain of expertise in breakthrough innovation management can identify and run more efficiently new design paths, while from an academic perspective, the point is to observe how the co-design methods are used by the domain of expertise in this partnership.

3.2. Data collection process and research material

As all the experts at Renault qualified the Renault-Google partnership as the most innovative partnership for Renault, the DES decided to understand in which way this partnership was really innovative. A C-K-mapping with the starting concept "Synergic co-design aiming for innovation" was done to identify all the kinds of partnership that could exist in a given industry, and to see with which kind the Renault-Goole partnership fit. This C-K-mapping is based on some scientific literature (Gillier and Piat, 2008; Maniak et al., 2007), and on research and analysis of fora, blogs, and specific internet pages. This C-K mapping counts thirty-five C5, which mean thirty-five kinds of potential partnerships with a technical established firm.

The DES also wanted to improve its knowledge on the mobility project of Google and on the partnership with Renault. An historical C-K mapping of the Google's mobility projects was done through several analysis of fora, blogs and wiki contents. In the same time, thirteen semi-directed interviews with Renault 'employees impacted or close to the partnership, have been carried out to get information about the origins of the partnership, and what has been decided in the partnership's contracts. The thirteen people interviewed shared with us their experiences, their points of view, their impressions and their interpretations on the topic, with at times a lot of emotion. The emotional aspects required from us to constantly double or triple check all the data, to confirm the veracity of testimonies.

The work of organisation and modelling of these interviews' notes takes the form of knowledge bases through fourteen different thematic. During team workshops, these knowledge bases were analysed and screened to identify needs or pain-points that the current partnership missed or created. Those needs and pain-points have been translated into unknown and desirable concepts such has "the ethical user experience on their data". Each found concept was identified to be potentially developed by either Renault and or Google. Then, twelve workshops were organised to stimulate these concepts by creating C-K-mapping for each, and by presenting them to potential sponsors at Renault in order to develop them. Fours sponsors supposed to be interested in the development of some concepts were identified. Presentation workshops have been organised with them. Some results of their reactions and of the development of these concepts are still expected at the time of the redaction of this paper.

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Table 2. Data collection at Renault

Data sources	Number and length of research activities	Type of data collection
C-K mapping on the chronology of Google's mobility projects	20 x 3h	Analysis of fora, blogs and wiki content
C-K mapping on Renault's partnerships	4 x 3h	Analyse of scientific literature Analysis of fora, blogs and wiki content
Interviews at Renault: Renault Products Manager Alliance Product Manager Legal Officer Different Product Managers Marketing Managers	13 x 1h30	Written field notes Written interviews notes Audio Records
Mapping of knowledge and concepts	3 x 4h	Cloud of k-bases Screening of the needs and pain-points formulated in concepts Analysis of the partners in charge of the concepts development
Workshop on the concepts	12 x 2h	4 C-K-mappings only for Renault 6 C-K-mappings for Renault or Renault and Google 2 C-K mappings for Google or Renault and Google
Presentation workshop	4 x 1h30	Presentation page per concept Sharing and discussing field notes Analysis Written field notes
Regular progress points	36 x 1h	Written field notes Sharing and discussing field notes Analysis
Organising project team members	3 x 4h	Sharing and discussing field notes Analysis

4. Data analysis & findings

We decided not to consider the partnership in the first part, but in the second one. The first part aims to analyse the role of the breakthrough innovation experts in Renault's innovative capabilities, while the second observe their impacts on the partnership.

4.1. First role of the domain of expertise: The identification of high potential design paths to feed the Renault's C-K mapping

The objective of the experts in breakthrough innovation was to prove how the design theories could support the firm's innovative capabilities, and three ways has been distinguished.

First, the experts succeeded in creating new design paths for Renault by using the C-K theory. As all the co-design methods suggested, the experts have created two C-K-mappings: one on Google's historical mobility project without any exchange with Google and one on Renault's partnerships. These two C-K-mappings feed the cloud of K-bases the experts have created thanks to all the interviews they organized with some specific Renault's managers. This cloud of K-bases helped the experts to identify the needs and the pain-points of the current partnership. They transform theses needs and pain-points in desirable and unknown concepts which potentially can create a lot of value for Renault. The creation of these concepts can be considered as buildings phases for Renault. Indeed, these concepts have been the occasion for the experts to generate four C-K-mapping, according to the Table 1, which means four new innovative design paths that Renault can explore and develop.

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Second, the experts succeeded in organising all the C-K-mapping by priority. One of the experts in breakthrough innovation is specialised in marketing. An expert at Renault cannot be just expert, he has to occupy another job, which is his main job. This double job obligation contributes to get more capacities among the experts. Thus, the "marketing" expert is able to understand under which criteria he may validate some projects or not. Thanks to this expert's work, the others were able to estimate which concepts were the most valuable for Renault, and the more urgent to develop.
Finally, the experts partially succeed in exploiting some design paths. Indeed, they have already presented their C-K mappings to four potential sponsors, who may be interested in developing these concepts:

- The first sponsor recognised the value of some concepts and ask for their presentation page. The sponsor presented them to an internal committee, which has yet to evaluate them. The next steps are still pending at this time of the study.
- The second sponsor has also found some of the concept to be of huge interest, because he plans to integrate them to the current development of the connected car of the partnership. How he will process remains unknown.
- The third seemed also really interested during the presentation of the concept but did not understand that we expected him to develop the concept. Despite the misunderstanding, he expressed a strong interest a strong interest in the concept, confirming its potential value for Renault. Unfortunately, he was not in capacity to develop it, but he was ready to support the sponsor who will decide to develop it.
- The fourth sponsor also recognised the potential value in the concept he was presented, and he decided to take part in the construction of the C-K-mapping. Thanks to his experience, he could mainly contribute to the construction of the K space, and therefore to the concept space. The sponsor regularly participated to the team workshop on the C-K-mapping.

The evolution of this C-K mapping helped the experts and the sponsor to highlight a shortage of expertise in a strategic domain for Renault. With the expert leader of the domain of expertise in breakthrough innovation, the experts and the sponsor have decided to organise an exploration of this shortage. To assure a maximum of impact and efficiency in Renault, this exploration will gather several experts of other strategic domains of expertise in Renault. Indeed, the role of any industrial expert is to take part in the definition of the strategy of their firm. Implicated all these experts in this exploration group aimed two goals: it will help to accelerate the confirmation of the interest of this exploration by the firm, as it will convince and involve a huge group of influent persons implicated in the definition of the strategy, who will after constitute an strong exploration community; and then they will contribute to spread fully the results of their interactions in Renault as they will independently share the results with the other experts of their domains, or with other employees. Currently, the experts in breakthrough innovation and the sponsor are defining the strategic framing of this exploration.
Thus, the experts in breakthrough innovation received the confirmation by all these sponsors that the generated concepts present a lot of interest, and so carry some value for Renault. One of these concepts allowed the organisation of an intern exploration. However, some sponsors were not able to develop them for many reasons: lake of time, budget… These repetitive situations motivate the breakthrough innovation experts to explore how they can foster the development of new projects in tense situations. It can be considered as a second exploration organised by the experts. These both explorations have another consequence on the organisation of the experts in Renault: the expert fellow, who is in charge of all the expert-leaders and experts of Renault, become the sponsor of all the activities of the experts in breakthrough innovation, to justify and support them.

4.2. Second role of the domain of expertise: the identification of innovative design paths for the Renault-Google partnership

Another way for the breakthrough innovation experts to prove how the design theories support the firm's innovative capabilities, is to see how they can use design theories in this partnership.

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The first step is to identify the innovative degree of this partnership thanks to the design theories. For this purpose, the experts analysed the C-K-mapping on Renault's partnerships (the C-K-mapping with the starting concept "Synergic co-design aiming for innovation" to identify all the kinds of partnership that could exist in a given industry) to find with which concept of partnership the Renault-Google partnership fit. Among the thirty-five types of partnerships, Renault-Google did not correspond to one, but to nine types. By observing the characteristics of these nine partnerships, the experts identified all the characteristics of the Renault-Google partnership. They were able to describe the Renault-Google partnership, to understand in which purpose it was a never-seen-partnership for Renault, and then to qualify its innovative degree.

Another way to understand why this partnership is innovative, is to start from the E-C-K and T-C-K model: in the model, the core business of one actor is the technology while it is the environment for the other actor. As they complete each other, it is interesting for them to design in the same time the environments and technologies, in order to make them the most generative as possible. However, in the Renault-Google partnership, the role of both actors is not so obvious. The core business of Renault is the car (T) while Google needs car to create a connected car (E). But the core business of Google is the operating system (T) development while Renault need it to create connected car (E). As Renault, and Google, may assume the two roles, it may be possible for them to create in the same time their own E-C-K and T-C-K mapping. This point underlines differently in which way this partnership in innovative.

The second step for the experts is to demonstrate how they can support the employees of Renault directly involved in the partnership. The experts first decided to better understand the partner's activities by studying its projects in mobility, and how they were developed (if Google bought a start-up, if the project is developed in an open innovation program, etc.). This historical work helped the experts to formulate hypotheses on Google's global motivations in this partnership, and its strategy. Simultaneously the experts realised a similar work for Renault by creating another C-K mapping and by organising interviews. They could also better express Renault's main motivations in this partnership. This works thereby gave to the experts a huge understanding of the partnership's origins and of the two partners main motivations and strategies, which can be useful for the employees at Renault directly involved in the partnership.

Another contribution brought by the experts to the people involved in the partnership is the common innovative paths. As for the four C-K-mappings for Renault, the experts used the design theories to identified six concepts which can be developed either by Renault or by Renault and Google, and two concepts which can be developed either by Google or by Renault and Google, according to the Table 1. These design paths can help the employee to formulate innovative proposition for the current or the next version of the connected car. In both cases, these disruptive concepts provide a support to the partnership.

The last contribution of the experts results from the previous one. The experts can be a support in the development of these design paths. As they are trained to the design theories, they can realise a deeper exploration of all the concepts. They also may help these explorations by mobilizing specific actors of their networks, since to be expert it is necessary to be recognised such as, in intern and in extern of the firm. After the exploration, begins the development phase. The experts have already demonstrated their capacities to find sponsors for the four concepts for Renault, so they can do the same for the common concepts in the partnership. Finally, if the partnership presents some difficulties, the experts can contribute to the proceeding thanks to their high level of knowledge on the partnership models, and the co-operation design theories. They can first analyse the situation, then suggest the best co-design method between the matching building, the C-K-cogeneration, and the E-C-K & T-C-K method, and of course, supervise the proceeding.

5. Conclusion and discussion

This study contributes to the research question "Can radical innovation expertise be organized to identify and exploit more effectively new design paths for radical innovation?", and results in managerial implications as well inside as outside the firm.

In the firm, the organisation of the experts can be first considered to exploit more effectively emerging learnings from new design paths for radical innovation. Cabanes et al. (2016) propose to organise

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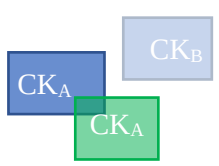
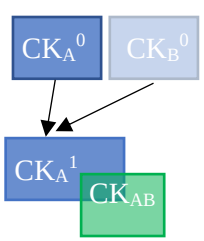
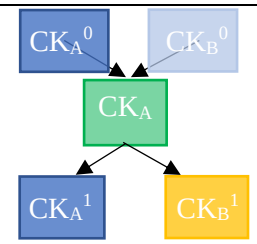
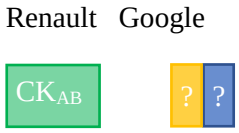
them in "proto-epistemic society", where the experts from different established fields bring together new strategic skills in emerging expertise area for the company and reorganise relations inter-domains of expertise to provoke the destabilisation of dominant designs. In our study, the results showed that the experts in breakthrough innovation needed a sponsor, the expert fellow, to support and legitimate their activities in Renault, such as their exploration activities. Through one of these explorations, the experts in breakthrough innovation seemed to organise the experts of the other fields in a proto-epistemic group. Thus, the experts in breakthrough innovation may take in charge the organisation and animation of the interactions of other experts in Renault to identify new strategic domain of expertise for Renault, which should foster the innovation capacities of Renault. Further research on this new organisational model would be interesting to the describe dynamics of fields of experts.

Still in the firm, the activities of the experts in breakthrough innovation contribute to exploit more effectively new design paths for radical innovation in three ways. First, the experts have created a new tool (a C-K mapping) to identify the nature of all the kinds of partnership that could exist in a given industry. This tool can help the project or operational actors to identify the type of the current or future generative partnership, and to better comprehend their impact for firm's innovation capability. Second, the experts used the current co-exploration partnership models of design reasoning (Matching-Building – C-K co-generation – E-C-K T-C-K) and adapted them into new models. Based on the feedbacks of collaborators involved in the operations of the partnership and secondary data, these tools help experts to identify new design paths for Renault, its partner, and both, without having any interaction with the partner (Table. 3). Thus, these new models help to identify new design paths either by simulating co-exploration partnerships, or in future co-exploration partnerships. In the first case, it fosters the intern innovation proposition, in the second one, it maximises the potential of innovation of the partnership. Finally, these tools can improve the strategy of Renault in terms of partnership. Indeed, these tools facilitate the evaluation of the innovative potential in any-partnership. In this way, the strategic actors may use it to compare different possible partners, and according to the potential of innovation, select the best partner according the expertise background of the firm.

Table 3. Model of generativity design methods in the Google-Renault partnership

	Matching without interaction	Building without interaction	C-K Co-Generation	E-C-K / T-C-K with one actor for E and T
C-K co-construction				

CK_A: realised by actor A on A

CK_B: realised by actor A on B

CK_B: realised by actor B on B

CK_{AB}: realised by actor A on A&B

Outside the firm, the experts in breakthrough innovation have an opportunity to interact with their equivalents in other firms to identify and exploit more effectively new design paths for radical innovation. In our study, Renault's experts in breakthrough innovation had no contact with a Google's counterparts during the C-K mapping sessions and the concept development. The information from Google has not been given first-hand but was based on the analysis of historical material from fora, blogs and wikis. As a consequence, the results from a "classic" co-generation partnership would be quite different from these of the study at hand. It would be also interesting to consider the results of the C-K mapping sessions and the concept development realised by experts in breakthrough innovation from both compagnies. Indeed, as experts, they should have been trained for years to systematic and innovative design through the C-K theory, and be involved in several innovative projects, which is less the case for

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project or operational employees. The meeting of experts from different firms should be organized in a specific space to support and improve their exchanges on emerging expertise fields, such as the Renault Innovation Community where they can stimulate their sociotechnical imaginaries by exchanging on exploration tracks (Hooge and Le Du, 2014). However, this space should also allow the creation of tools upstream partnership for the strategic development and the design of innovative paths. It should be interesting to investigate in further researches how experts (and not operational actors) from different compagnies may lead the upstream stages of a co-generative partnership.

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