Gérer le patrimoine de création Dom Pérignon : Modéliser et organiser la transmission de connaissances pour la générativité

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Gérer le Patrimoine de Création Dom Pérignon : Modéliser et organiser la transmission de connaissances pour la générativité

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PARTIE I

INTRODUCTION

1. Motivation empirique : gérer et transmettre les connaissances de Dom Pérignon pour favoriser la création de nouvelles expériences

Dom Pérignon porte une promesse, celle d'interpréter les saisons afin de rendre unique chacun de ses champagnes. A l'inverse des Champagnes brut sans année, issus de l'assemblage de raisins de plusieurs récoltes, Dom Pérignon ne peut être que millésimé. Ainsi, chaque Dom Pérignon est un acte de création authentique où l'Homme réinvente le vin et où le vin inspire l'Homme.

Pour satisfaire ses amateurs, Dom Pérignon doit sans cesse « repousser les limites de l'expérimentation » en proposant des vins et des expériences uniques et exclusifs. Cette quête nécessite des capacités de conception incarnées non seulement dans les esprits du chef de cave et des œnologues de la Maison mais aussi dans ceux des marketeurs et gestionnaires de la marque. De nouvelles façons de découvrir les mystères de Dom Pérignon sont ainsi pensées, conçues et développées par des membres des fonctions œnologie, marketing et commerciale afin d'être déployées dans le monde entier. Pour ce faire, ces acteurs doivent connaître et s'approprier la singularité de Dom Pérignon et s'inscrire dans la vision du Chef de cave. Ce travail conjoint est fondamental pour le rayonnement de la marque.

Les impératifs de renouvellement de Dom Pérignon sont donc intimement liés aux moyens mis en œuvre pour assurer les échanges et la transmission des capacités de conception des différents services. Mais comment garantir cette transmission au

sein d'une structure internationale dont la marque est plus que centenaire et dont les représentants sont répartis sur tous les continents ?

Dom Pérignon persiste à travers le temps alors que les générations de « concepteurs » qui participent à la réinvention de la marque, se succèdent. Les futures générations de concepteurs doivent être en mesure de renouveler l'expérience de la marque tout en préservant son identité. Pour réussir dans cette entreprise, Dom Pérignon s'est investi dans une démarche importante de formalisation et de transmission de son patrimoine à destination des récepteurs de ces connaissances. Ainsi, la Maison Dom Pérignon a débuté un programme appelé « Decoding Dom Pérignon – Patrimoine de Création Dom Pérignon » dont l'objectif est de retranscrire le « Patrimoine de Création » de la marque, c'est-à-dire, l'ensemble des éléments qui font de Dom Pérignon, une marque unique. Ce patrimoine de création a pour vocation d'être le socle qui lui permettra de concevoir son futur.

C'est dans ce contexte que j'ai intégré l'équipe de la Recherche et Développement pendant trois ans dans le cadre d'une thèse CIFRE, pour assurer le suivi et la vie du projet de Dom Pérignon, et afin de l'aider à répondre à la question suivante : Comment gérer le « patrimoine de création » de Dom Pérignon afin de favoriser la capacité des concepteurs de la Maison à créer des nouvelles expériences innovantes tout en respectant l'identité de la marque ?

2. Problématique académique : la transmission de connaissances pour la générativité à l'intérieur d'un domaine, une question ouverte en sciences de gestion et sciences de la conception

Cette question nous renvoie à une problématique ouverte dans les sciences de gestion et les sciences de la conception : celle de la transmission de connaissances pour la conception et l'innovation à l'intérieur d'un domaine. En effet, que sait-on de la transmission de savoirs pour la conception ?

Si on s'en tient aux idées reçues, la créativité est innée. Cela impliquerait qu'il n'est pas possible d'apprendre à transmettre un savoir de création et de conception. Toutefois, des recherches récentes montrent que la créativité peut être enseignée (Scott et al., 2004) et qu'elle est même spécifique à un domaine (Baer, 1998, 2016; Baer and Kaufman, 2005). En outre, en étudiant les méthodes de formation à la conception des architectes, ingénieurs et designers, on peut citer quelques exemples où des concepteurs ont réussi à transférer leurs connaissances afin de favoriser la générativité des récepteurs dans des domaines particuliers :

- Par exemple, Eilouti (2009) décrit comment l'auteur a enseigné à un groupe d'étudiants une méthode systématique pour construire une base de connaissance de précédents, et à utiliser cette connaissance pour concevoir des nouveaux objets architecturaux. Les précédents sont des objets créés par le passé par d'autres concepteurs et ont des attributs intéressants du point de vue architectural ou ingénierique, grâce à leurs propriétés formelles, structurelles, syntactiques, sémantiques ou systématiques.
- Par ailleurs, en Allemagne, les théories et méthodes de la conception en ingénierie développées par des professeurs comme Redtenbacher (Redtenbacher, 1874) ou Pahl et Beitz (Pahl et al., 2007a), ont permis de former des ingénieurs aux processus et heuristiques pour concevoir de nouveaux systèmes techniques et machines (Le Masson and Weil, 2013).
- Et finalement, des individus créatifs comme Johannes Itten (Itten, 1973, 1975) et Paul Klee (Klee, 1966, 2004) ont enseigné à leurs étudiants designers des théories et méthodes pour comprendre les styles anciens et nouveaux, mais aussi pour créer des nouveaux styles en design (Le Masson, Hatchuel and Weil, 2016).

Nonobstant, même si ces recherches suggèrent qu'il est possible de transférer un savoir de conception, comment peut-on garantir que la connaissance transmise permet de favoriser ce que l'on appelle la générativité d'un concepteur donné ? À savoir : sa capacité à créer de nouveaux objets possédant des propriétés souhaitées, différents de tout autre objet connu et ne pouvant pas être déduits à partir des connaissances actuelles (Hatchuel, Le Masson, Reich, et al., 2011; Le Masson and Weil, 2013). Comment peut-on s'assurer que la transmission de connaissances

permet à la fois de préserver le domaine, de conserver la générativité de la source, et ce sans fixer le concepteur-récepteur ?

En effet, la littérature en innovation et sciences de la conception nous montre l'effet paradoxal que peut avoir la connaissance sur la générativité des concepteurs.

D'un côté, les littératures en apprentissage organisationnel et en design nous apprennent que la connaissance peut avoir des effets négatifs sur la générativité : Les capacités-clés (*core capabilities*) d'une organisation peuvent se transformer en rigidités-clés (*core rigidities*) (Leonard-Barton, 1992). Ainsi, à cause d'effets de trajectoire, les connaissances clés d'une organisation peuvent être des inhibiteurs de l'innovation, en l'empêchant de réaliser des nouveaux apprentissages et en la confinant aux savoirs anciens (Audia and Goncalo, 2007). En outre, la connaissance peut provoquer des effets de fixation (Crilly, 2015; Jansson and Smith, 1991; Purcell and Gero, 1996). En effet, pendant les processus de conception, les concepteurs sont tentés de mobiliser des connaissances facilement accessibles en dépit de connaissances plus originales.

D'un autre côté, les recherches récentes en théories de la conception montrent que les connaissances peuvent aussi, dans certaines circonstances, être des moteurs de la nouveauté (Hatchuel, Le Masson, Reich, et al., 2017). Ces théories présentent la structure de connaissances comme une caractéristique importante quant à l'étude de la générativité provoquée par la connaissance (Brun et al., 2016; Hatchuel et al., 2013; Le Masson, Hatchuel, Kokshagina, et al., 2016). Ainsi, certaines structures de connaissance seraient plus favorables que d'autres quand il s'agit de concevoir de nouveaux objets.

Pour les concepteurs expérimentés l'enjeu est donc de transmettre leurs connaissances aux nouvelles générations de concepteurs, tout en garantissant un effet positif de la connaissance transmise sur la capacité des récepteurs à être génératifs à l'intérieur d'un domaine. Cette thèse posera donc la problématique de recherche suivante : ***Comment la transmission de connaissances peut contribuer à la puissance générative des concepteurs à l'intérieur d'un domaine ?***

L'objectif de cette recherche est, d'un point de vue théorique, d'éclaircir le rôle de la transmission de connaissances sur la générativité des concepteurs à l'intérieur d'un domaine. Pour ce faire, nous introduirons la notion de patrimoine de création comme un ensemble de propositions qui sont transmises par un concepteur source à un concepteur récepteur afin de favoriser la puissance générative de ce dernier. L'objectif de cette thèse sera donc d'étudier comment un patrimoine de création peut à la fois être garant du domaine et favoriser la générativité des concepteurs. Pour y parvenir, nous caractériserons un patrimoine de création au travers de trois facettes : ce qu'il est, ce qu'il permet de faire et la manière de le concevoir.

D'un point de vue empirique, notre objectif est de donner à Dom Pérignon des éléments de pilotage pour la conception, la transmission et le partage de son propre patrimoine de création afin de favoriser la création de nouvelles expériences sans trahir la singularité de la marque.

Cette notion nous permet d'introduire trois questions de recherche originales auxquelles nous nous efforcerons de répondre pendant cette thèse.

3. Questions de recherche

Les concepteurs du secteur du luxe, travaillant souvent au sein d'équipes transverses, sont confrontés à trois tensions bien connues dans la littérature en innovation mais qui, spécifiquement dans le luxe, sont exacerbées par l'importance de la marque :

- Tout d'abord, ils doivent innover tout en restant fidèles au patrimoine et à l'identité de la marque – tension « innovation – tradition » (Bastien and Kapferer, 2012; Chevalier and Mazzalovo, 2012; Kapferer, 2008; Letzelter et al., 1996).
- Ensuite, ils doivent faire face à la tension entre les effets de fixation-convergence ou de défixation-divergence provoqués par la connaissance lors des processus de conception –tension cognitive- (Crilly, 2015; Jansson and Smith, 1991; Purcell and Gero, 1996).

- Et finalement, ils sont confrontés au dilemme de coopérer à l'intérieur des équipes innovantes ou d'être intégrés au reste de l'organisation –tension organisationnelle- (Griffin and Hauser, 1996; McDermott and O'Connor, 2002).

Ce qui nous invite à poser notre première question de recherche (QR1) : Comment un patrimoine de création peut-il aider les collectifs de concepteurs dans l'industrie du luxe à surmonter les tensions qu'ils rencontrent lors des projets d'innovation ?

Des recherches récentes en théories de la conception montrent que la transmission de savoirs de conception peut provoquer des types de générativité différents. De la simple sélection d'objets (Larralde and Ocampo, 2010a, 2010b) jusqu'à la création de nouveaux langages et styles (Le Masson, Hatchuel and Weil, 2016), en passant par la sélection et la composition à partir de bases de connaissances complexes (Le Masson and Weil, 2013). Cette variété de générativités dans divers domaines laisse présager que plusieurs types de patrimoine de création peuvent exister et qu'ils peuvent favoriser des types de générativité très différents. En outre, ces théories montrent aussi que la structure de connaissances peut conditionner la générativité des concepteurs (Brun et al., 2016; Hatchuel et al., 2013; Le Masson, Hatchuel, Kokshagina, et al., 2016).

Ce qui nous invite à nous interroger sur (QR2) : Quelles sont les formes de patrimoine de création et les types de générativité associés ?

Même si l'extériorisation de connaissances, c'est-à-dire la conversion de connaissances tacites en connaissances explicites, est indispensable pour la transmission de connaissances (Akbar and Tzokas, 2013; Nonaka, 1994; Nonaka and Takeuchi, 1995), cette seule étape n'est pas suffisante pour doter le récepteur de capacités de conception. Afin de provoquer la génération de nouveautés, les récepteurs doivent s'approprier ces connaissances, les socialiser et les intérioriser (Nonaka, 1994; Nonaka and Takeuchi, 1995; Schulze and Hoegl, 2006, 2008). Cette assimilation se fait dans l'action, au fur et à mesure que les membres d'une communauté s'engagent dans des pratiques socioculturelles (Amin and Roberts,

2008; Brown and Duguid, 1991, 2011; Harvey et al., 2015; Wenger, 1998). En outre, la littérature en théories de la conception nous parle de l'effet génératif des phénomènes de restructuration de connaissances pendant les processus de conception (Brun et al., 2016; Hatchuel et al., 2013; Le Masson, Weil, et al., 2017). Ainsi, la construction d'un patrimoine de création semble ne pas se limiter à un certain niveau d'explicitation et d'utilisation de ces connaissances.

Nous posons donc notre troisième question de recherche (QR3) : Comment un patrimoine de création est-il conçu ?

4. Matériau empirique

Pour répondre à ces questions de recherche nous avons eu l'opportunité de participer au programme « Decoding Dom Pérignon – Patrimoine de Création Dom Pérignon ». Ce programme avait pour objectif de concevoir une nouvelle forme pour le patrimoine de création de Dom Pérignon, de le formaliser et de le partager. Le but étant de favoriser la naissance de projets d'innovation et de nouvelles expériences pour les amateurs de la marque. Dom Pérignon nous a sollicité pour l'accompagner dans cette démarche inédite à laquelle participent plusieurs fonctions de la Maison dont l'œnologie, la recherche & développement, le marketing et la documentation & histoire, ainsi que des partenaires externes comme des écrivains et des designers.

Pendant ces trois ans de thèse, nous avons pu participer et avoir un accès total aux différents projets qui ont permis de formaliser et de partager ces connaissances, ainsi que concevoir de nouvelles expériences. Cela nous a donné l'occasion de recueillir un matériau très riche composé, entre autres, de briefs, de textes, de schémas, de retranscriptions de séances de travail et de documents historiques de la marque. Nous avons complété ce matériau par des échanges et interviews avec les parties prenantes du programme dont le chef de cave, les œnologues, les marketeurs, de même que d'autres participants.

En outre, nous avons souhaité étudier les patrimoines de création d'une autre industrie créative : la cuisine. Ainsi, nous avons étudié un corpus de livres culinaires dont leurs auteurs, de grands cuisiniers comme La Varenne, Escoffier ou Adrià, ont investi des efforts considérables pour léguer à leurs successeurs les clés de la création et de la créativité culinaire de leur époque.

Ces deux matériaux empiriques riches ont été étudiés grâce à un effort de modélisation basé sur les théories de la conception afin de mieux comprendre les caractéristiques, les effets et le processus de conception d'un patrimoine de création.

5. Structure du Manuscrit

Cette thèse est structurée en quatre parties. Même s'il s'agit d'une thèse en sciences de gestion, elle se situe à la croisée de plusieurs disciplines.

Ainsi, la **partie I** présente une revue de la littérature sur les trois champs disciplinaires mobilisés dans cette recherche : 1) la gestion des marques dans le secteur du luxe, 2) la gestion de l'innovation ; en particulier les théories de la conception, 3) la gestion et la transmission des connaissances. Ensuite nous présenterons succinctement trois articles, chacun traitant une des questions de recherche. Ultérieurement, nous présenterons une synthèse des contributions et discuterons des apports pour la théorie ainsi que pour Dom Pérignon et les Maisons de luxe. Nous finaliserons la partie I en évoquant les limitations de notre recherche et les possibilités d'expansion pour les Maisons de luxe et les Industries Créatives.

Les **parties II, III et IV** contiennent chacune un article répondant respectivement aux questions de recherche QR1, QR2 et QR3.

REVUE DE LITTERATURE

L'industrie du luxe, à l'instar d'autres domaines contemporains, nécessite, pour prospérer, d'animer une dynamique d'innovation intensive. Toutefois, cette industrie séculaire est très attachée à la tradition et au patrimoine. Pour cette raison, l'innovation dans le secteur du luxe est une quête de nouveauté qui se doit d'être respectueuse de la tradition.

Ainsi, les concepteurs expérimentés de l'industrie du luxe doivent être en mesure de transmettre aux concepteurs récepteurs une capacité d'innover à l'intérieur du domaine délimité par la marque. Ces concepteurs récepteurs doivent à la fois respecter un certain nombre de principes et de règles incarnées dans la marque et en même temps chercher leur renouvellement. Quelle tension engendre cette opposition entre l'innovation, la tradition, le patrimoine et l'identité de marque ? Quelles autres tensions se présentent aux concepteurs du luxe ? Comment font-ils face à ces tensions ? Pourquoi ces solutions ne sont-elles pas suffisantes et quelle alternative serait envisageable aux solutions classiques ? Voilà les questions auxquelles cette revue de littérature cherche à répondre. Ce qui nous permettra par la suite d'introduire nos trois questions de recherche.

1. Manager l'innovation dans le secteur du luxe : faire vibrer la tension entre la tradition et la nouveauté

1.1. La consommation des biens de luxe : une consommation de sens

Le luxe accompagne l'humain depuis ses origines (Bastien and Kapferer, 2012) : historiquement, il résulte de la stratification sociale héritée qui est rendue visible de manière volontaire. Il permettait d'exhiber l'écart social entre la royauté et la noblesse

par opposition aux gens du peuple (Bastien and Kapferer, 2012; Kapferer and Bastien, 2009).

Bien qu'aujourd'hui, cette consommation ostentatoire continue à motiver l'achat de biens de luxe, permettant au consommateur de montrer une aisance économique, synonyme de statut social, de position et de pouvoir (Bastien and Kapferer, 2012; Seo and Buchanan-Oliver, 2017; Veblen, 1899; Vigneron and Johnson, 1999; Wiedmann et al., 2009), les motivations des amateurs pour acquérir des biens de luxe se sont multipliées :

La consommation d'objets de luxe est aussi un moyen pour l'individu de satisfaire un besoin de transformation de son identité et de démonstration de son unicité (Seo and Buchanan-Oliver, 2017). De cette manière, l'objet de luxe permet au consommateur d'ajuster la projection qu'il a de lui-même avec la projection de ce qu'il souhaite être (Ko et al., 2017), ou bien de renvoyer une identification socio-culturelle, de montrer qu'il est unique et qu'il adhère à un mode de vie particulier (Seo and Buchanan-Oliver, 2017).

Le consommateur est aussi motivé par une volonté de se faire plaisir grâce à la sollicitation sensorielle provoquée par l'objet de luxe et de s'évader temporellement (Seo and Buchanan-Oliver, 2017). C'est ce que certains auteurs appellent la consommation hédonistique (Vigneron and Johnson, 1999; Wiedmann et al., 2009) ou ce que Berthon et al., (2009) appellent la consommation esthétique.

Que ce soit une consommation pour soi ou pour les autres, ces motivations ont en commun d'être toutes une quête de sens. En effet, même si plusieurs valeurs peuvent être associées à l'objet de luxe, comme les valeurs fonctionnelle, expérientielle et symbolique (Berthon et al., 2009; Keller, 2003; Vickers and Renand, 2003), c'est notamment grâce à cette dernière que les consommateurs se procurent des produits de luxe (Atwal and Williams, 2009; Bastien and Kapferer, 2012; Han et al., 2010).

1.2. Innover dans le luxe : faire rêver les consommateurs du luxe avec des objets qui respectent et renouvellent une identité de marque.

Or, avec le plaisir vient aussi l'ennui. C'est pourquoi les consommateurs de luxe veulent être surpris et sont toujours à la recherche de nouveautés. Pour cette raison, les marques de luxe doivent innover, mais pas de n'importe quelle manière ! Le consommateur de luxe est la plupart du temps un connaisseur (Letzelter et al., 1996). Il ne suffit donc pas de fixer un prix élevé, de mener une politique de rareté ou d'ajouter le logo d'une marque pour qu'un objet soit considéré comme un objet de luxe (Bastien and Kapferer, 2012). La marque de luxe doit imprégner chacune de ses nouvelles manifestations de la valeur symbolique forte tant recherchée par les consommateurs : "*the customer naturally expects a great deal of originality within what he perceives to be the aesthetic characteristics of the brand. He also expects the product to be recognizable and carry a part of the dream inherent to the brand*" (Chevalier and Mazzalovo, 2012, page 189). Mais d'où vient cette valeur symbolique ?

La valeur symbolique incarnée dans l'objet de luxe est un reflet de la marque et de son identité. Kapferer (2008) compare l'**identité de marque** à la vision et à la mission de la marque, à ses attributs invariables, à ses croyances, à ses principales valeurs et aux symboles qui permettent de reconnaitre la marque. En synthèse, *l'identité de marque fait référence à tous les attributs tangibles et intangibles qui définissent la marque et qui font d'elle une entité unique*.

L'identité de marque de luxe est principalement dérivée de deux éléments : son créateur et son patrimoine. Elle est héritée de son créateur car comme l'expriment Bastien and Kapferer, (2012, page 95), le luxe part d'une « *pulsion créative à l'origine, celle du créateur qui met en scène, en objets, en lieux, en images ses représentations sociales, ses fantasmes, ses goûts, ses visions, son imaginaire symbolique* ». L'identité de marque provient aussi de l'histoire, des mythes et du patrimoine de marque (Bastien and Kapferer, 2012; Briot, 2014; Clais, 2002; Kapferer, 2008; Urde et al., 2007). Ils donnent à la marque un encrage, une originalité, une singularité et contribuent à la valeur fonctionnelle, affective, et sociale perçue par les consommateurs (Wuestefeld et al., 2012).

Etant donné que l'objet de luxe est une incarnation de la marque de luxe, il est couramment accepté que l'identité de marque détermine son espace d'expression. En effet, plusieurs auteurs reconnaissent que cette identité conditionne le type de partenariat pouvant être établi, le style de communication pouvant être adopté et même les types de produits et services pouvant être créés par la marque (Gutsatz, 2001; Kapferer, 2008). Ainsi, les auteurs en marketing et en management du luxe suggèrent qu'avant tout projet d'extension de marque, il est nécessaire d'étudier l'identité de marque afin de décider si elle peut être acceptée ou non (Bastien and Kapferer, 2012; Keller, 2013). Plusieurs facteurs participent à la réussite de l'extension, mais c'est principalement l'ajustement entre la marque et les nouveaux produits qui détermine son succès aux yeux des consommateurs (Albrecht et al., 2013; Moon and Sprott, 2016; Völckner and Sattler, 2006). Spiggle et ses collaborateurs l'ont exprimé ainsi : « *Les consommateurs perçoivent une extension de marque comme authentique quand elle préserve et soutient l'unicité, l'originalité, l'héritage, les valeurs, et l'essence de la marque mère* » (Spiggle et al., 2012, page 969). En outre, les consommateurs évaluent cet ajustement à un niveau abstrait en relation avec l'imaginaire et la valeur hédonique des nouveaux produits plutôt que par rapport à leurs fonctionnalités (Albrecht et al., 2013; Roux, 1995).

Ainsi, **la création de nouveaux produits et services de luxe doit garantir une cohérence avec l'identité de marque**.

1.3. Transcender la temporalité des marques et la temporalité des humains

Les marques de luxe et les personnes qui y travaillent n'ont pas le même rapport au temps. En effet, la grande majorité des marques de luxe est au minimum centenaire : Berluti a été fondée en 1895 ; Guerlin en 1828 ; Chomet en 1780 et Moët & Chandon, en 1743… Ainsi, plusieurs générations de créatifs et concepteurs se succèdent dans le temps pour nourrir et faire avancer la marque. Par exemple, Thierry Wasser, directeur de la création de parfums chez Guerlain depuis 2008, incarne la cinquième génération de parfumeurs de cette grande Maison. Afin de perpétuer le rayonnement des marques de luxe, les générations successives de créatifs et de

concepteurs doivent pouvoir se « passer le relais » et conserver une capacité de création qui soit alignée avec l'identité de marque.

Ici, l'enjeu n'est pas réduit à conserver et transmettre un patrimoine établi et immuable car une identité stable figerait les nouveaux concepteurs dans un espace restreint de conception. Bastien et Kapferer l'expriment ainsi : « *Lorsque le créateur disparaît, il faut bien codifier l'identité de marque pour la pérenniser dans le temps. [...]. [P]our en faire un guide interne, sans le muer en carcan* » (Bastien and Kapferer, 2012, page 192). Même si longtemps le marketing a vu l'identité de marque comme un objet statique, les recherches récentes montrent l'évolutivité de cette identité et son adaptation au temps (da Silveira et al., 2013). Les concepteurs expérimentés du luxe ont donc besoin de transférer une ressource qui rende les nouveaux concepteurs capables de renouveler en même temps l'identité des objets et l'identité de la marque, sans pétrifier cette dernière, et tout en garantissant une adaptation à son époque.

1.4. Diffuser les capacités de conception

L'expérience (d'achat, de consommation, de post-achat) ajoute une dimension à l'offre de produits et de services de la marque de luxe et est tout aussi importante que l'objet en lui-même (Bastien and Kapferer, 2012; Pine II and Gilmore, 1998). L'expérience constitue une parure pour l'objet de luxe qui contribue à créer un moment mémorable et à renforcer l'imaginaire de la marque dans l'esprit de ses amateurs.

Ce sont des concepteurs, au-delà du créatif, qui doivent s'occuper de créer ces expériences. Ils font partie des organisations ou collaborent avec elles en tant que partenaires. Ces concepteurs doivent aussi être dotés d'un ensemble de ressources leur permettant de renouveler l'expérience et avec elle, l'identité de la marque. La cohérence est aussi le mot d'ordre pour la création de ces nouvelles expériences. En effet, concevoir une expérience de marque exige la coordination entre les personnes, les processus et les produits avec la proposition de la marque (Atwal and Williams, 2009; Smiths, 2003) ; c'est-à-dire avec son identité.

Le consommateur contemporain du luxe veut être surpris et est à la recherche de nouveaux produits, services et expériences qui le fassent rêver. Il veut ressentir des émotions nouvelles, mais encore faut-il rester fidèle et cohérent à l'identité de la marque qu'il connait et avec laquelle il puisse s'identifier. Les créatifs et concepteurs expérimentés doivent être en mesure de transférer aux futures générations de concepteurs la capacité de renouveler à leur tour l'identité des objets et l'identité de la marque de luxe, sans la pétrifier ni la trahir. Et pour cause, le patrimoine doit être conservé, restauré et enrichi (Clais, 2002).

Alors, *comment transmettre aux concepteurs du luxe des capacités de conception leur permettant d'innover, tout en respectant la tradition, le patrimoine et l'identité de marque ?*

2. La tension « innovation – tradition » et les tensions qui en découlent à l'intérieur de l'organisation

La tension entre l'innovation et la tradition, entre le renouvellement de l'identité de marque et le besoin de cohérence de nouveaux objets et expériences, se traduit par des tensions cognitives et organisationnelles à l'intérieur des collectifs de concepteurs :

2.1. Tension cognitive : concevoir à l'intérieur d'un domaine et surmonter le paradoxe de la connaissance

Nous avons vu précédemment que l'identité de marque détermine les formes d'expression de la marque. Certains auteurs parlent même de l'existence d'un territoire de marque (Changeur and Chandon, 1995), c'est-à-dire d'un certain type d'objets que la marque peut faire en restant légitime. En revanche, la littérature en gestion des marques de luxe parle peu de la manière dont les concepteurs mobilisent cette identité de marque pour créer des nouveaux objets et expériences. Pour mieux

comprendre cette problématique, nous nous intéresserons aux théories de la conception qui étudient les raisonnements de conception. Ces théories nous éclairent sur le rôle capital joué par la connaissance dans les processus de conception. (Pour une présentation des théories de la conception voir (Hatchuel and Weil, 2003, 2009), pour une synthèse récente voir (Hatchuel, Le Masson, Reich, et al., 2017)). A la lumière des théories de la conception, nous pouvons dire que l'identité de marque définit un certain domaine de conception. Ainsi, dire que les créatifs et concepteurs expérimentés du secteur du luxe doivent être en mesure de transmettre à des concepteurs récepteurs les capacités d'innover tout en gardant une cohérence avec l'identité de la marque de luxe équivaut à dire que ces premiers doivent être en mesure de transmettre aux deuxièmes des capacités de conception à l'intérieur d'un domaine.

Or pour les concepteurs concevant à l'intérieur d'un domaine, la connaissance peut jouer un rôle paradoxal. En effet, la connaissance peut à la fois inspirer et limiter l'effort de conception. Nous appellerons « tension cognitive » cet effet paradoxal de la connaissance sur les processus de conception.

2.1.1. Effets positifs des connaissances sur les processus de conception

Evoquons d'abord les effets positifs que la littérature attribue à la connaissance sur les processus de conception à l'intérieur d'un domaine :

Tout d'abord, les connaissances du domaine permettent de *générer les briefs des nouveaux objets*. Un processus de conception démarre avec la formulation d'une expression qui décrit un objet de manière incomplète et dont les conditions d'existence sont partiellement connues (Hatchuel and Weil, 2009), ce qu'on identifie traditionnellement comme étant des « briefs », ou des « spécifications ». Ainsi, à partir des connaissances existantes du domaine, au tout début du processus de conception, les parties prenantes peuvent identifier les propriétés désirées que le nouvel objet devra posséder. Dans le luxe, les propriétés désirées peuvent par exemple être suggérées par les créatifs, par le marketing, par la R&D, ou bien elles peuvent être voulues par la marque. Pour illustrer cette notion, prenons l'exemple d'un œnologue qui souhaite concevoir une nouvelle expérience de dégustation. La

connaissance de l'œnologue sur ce qui constitue une expérience de dégustation du vin ainsi que des goûts des consommateurs, lui permettent d'identifier les propriétés désirables d'une nouvelle expérience de dégustation, comme la présence ou l'absence de mets d'accompagnement, la luminosité de la salle, la couleur des meubles, ou l'intervention d'un animateur.

La connaissance du domaine peut être combinée et recombinée afin de générer des nouveaux objets à partir d'éléments anciens. C'est le cas par exemple de la conception systématique allemande où la connaissance est organisée en fonction des langages de conception, sous forme de « catalogues » et où chaque nouvelle connaissance est accumulée dans ces catalogues (Le Masson, Weil, et al., 2017). Ainsi, au moment de concevoir un nouvel objet (comme une machine), le concepteur choisit les éléments du catalogue qui s'adaptent le mieux à ses spécifications et les combine en suivant une logique séquentielle.

Le processus de conception implique la *génération de nouvelles connaissances pour le domaine* (Hatchuel and Weil, 2009). Etant donné que la création de nouveaux objets ne peut pas se faire par déduction à partir des connaissances acquises, de nouvelles connaissances doivent être produites ou assimilées par les concepteurs afin de poursuivre le raisonnement de conception. Ainsi, la connaissance est dite expansible. Pendant les processus de conception, les concepteurs revisitent leurs bases de connaissances et celles du domaine : ils les augmentent, les suppriment, les restructurent (Brun et al., 2016).

Finalement, *la connaissance du domaine permet de valider si l'objet conçu est similaire ou différent de tout autre objet connu* (Béjean, 2008; Le Masson, Weil, et al., 2017; McTeague et al., 2018). Cette validation a lieu tout au long du processus de conception et non pas seulement à l'issue de celui-ci. En effet, pendant le processus de conception, le concepteur compare l'objet en devenir avec les objets existants ou qu'il a conçu précédemment. On dit d'un nouvel objet qui présente des propriétés similaires aux objets connus (c'est-à-dire suivant un dominant design) qu'il « conserve l'identité de l'objet » (Hatchuel and Weil, 2009). En revanche, si le nouvel objet présente une ou plusieurs propriétés nouvelles faiblement associées aux propriétés

typiques de l'objet ou si le nouvel objet nie une des propriétés constitutives des anciens objets on dit qu'il « revisite l'identité de l'objet » (Hatchuel and Weil, 2009). Ainsi par exemple une expérience de dégustation où on ne déguste pas de vin mais où on sollicite les 5 sens par le biais de l'hypnose ou de la réalité virtuelle (Carulli et al., 2018) revisite l'identité de l'objet « expérience de dégustation » !

2.1.2. Effets négatifs des connaissances sur les processus de conception

Or, même si les théories de la conception ont mis en évidence le rôle primordial et positif de la connaissance sur la générativité ; la littérature en conception et en innovation montre que la connaissance peut avoir des effets nuisibles pour la générativité des individus et des organisations (Audia and Goncalo, 2007; Benner and Tushman, 2003; Crilly, 2015; Jansson and Smith, 1991; Leonard-Barton, 1992; Purcell and Gero, 1996). Au niveau individuel par exemple, les chercheurs ont mis en évidence comment les concepteurs peuvent être fixés pendant le processus de conception, car ils mobilisent des connaissances facilement accessibles et négligent la possibilité d'explorer des connaissances plus originales (Jansson and Smith, 1991; Purcell and Gero, 1996). Au niveau organisationnel, les chercheurs montrent que l'ensemble de connaissances qui distingue et donne un avantage compétitif aux organisations, leurs compétences clés (*core capabilities*), peuvent aussi agir en tant que « rigidités clés » (*core rigidities*) (Leonard-Barton, 1992). En effet les connaissances anciennes peuvent nuire à l'innovation quand elles sont un obstacle pour de nouvelles explorations et de nouveaux apprentissages (Audia and Goncalo, 2007).

2.2. Tension organisationnelle : coopérer ou être intégrés, explorer ou exploiter

Pour relever le défi de l'innovation, les collectifs de concepteurs provenant souvent des fonctions R&D et Marketing s'organisent en équipes projets. Cependant, leur travail est confronté au problème de la coopération et de l'intégration. En effet, soit les concepteurs sont soudés en tant qu'équipe mais ont des difficultés à être intégrés dans leur organisation mère, soit ils sont bien intégrés mais ont des

difficultés à travailler en équipe. C'est ce que nous appellerons la « tension organisationnelle ».

En outre, les organisations possèdent des ressources limitées, qu'elles doivent partager entre des projets d'exploration et d'exploitation (March, 1991), c'est-à-dire, entre des projets qui conservent les connaissances acquises afin de produire de nouveaux produits et des projets qui cherchent à faire évoluer ces connaissances pour concevoir de nouveaux produits (Calantone and Rubera, 2012). Quand les deux fonctions, marketing et R&D manquent d'une vision commune ou quand l'organisation a tendance à privilégier certaines dynamiques d'exploitation, le temps et les ressources dédiés à la concentration sur des projets nécessitant la création de nouvelles connaissances peuvent se voir ralentis. Dans ce cas, l'intégration l'emporte sur la coopération.

De plus, les équipes de concepteurs peuvent être confrontés à des frontières épistémiques et à des barrières liées aux responsabilités organisationnelles qui peuvent rendre difficile la coopération entre fonctions :

2.2.1. Frontières épistémiques

La littérature en management décrit l'existence de trois frontières différentes entre fonctions (Carlile, 2002, 2004) : les frontières syntactique, sémantique et pragmatique. Chacune de ces barrières représente un niveau croissant de complexité pour la coopération à l'intérieur des équipes.

Les *frontières syntactiques* se manifestent à travers les différentes formes d'utilisation du langage (Edmondson and Harvey, 2017; Griffin and Hauser, 1996). Par exemple, les fonctions marketing et R&D utilisent des termes techniques différents. Le partage de connaissances entre fonctions est facilité par le partage d'un lexique commun. Or, quand il s'agit de parler de l'inconnu et de la nouveauté, les mots actuels ne suffisent plus pour partager la connaissance (Carlile, 2004).

Les *frontières sémantiques* sont associées à l'ambigüité de sens (Carlile, 2004). Les fonctions R&D et marketing possèdent des significations différentes pour les

mêmes mots, ce qui peut rendre la coopération difficile (Carlile, 2002, 2004; Griffin and Hauser, 1996). En outre, lors des projets d'innovation, plus que de traduire des mots entre fonctions, le sens des mots doit être créé et négocié collectivement (Brown and Duguid, 1991; Carlile, 2004; Wenger, 1998).

Les *frontières pragmatiques* surviennent pendant l'exploration de l'inconnu. Lors des projets d'innovation, les fonctions doivent résorber les conséquences négatives des éventuels intérêts différents et potentiellement conflictuels des acteurs (Carlile, 2004). Pour ce faire, les membres de l'équipe doivent altérer leurs connaissances actuelles et influencer ou transformer la connaissance utilisée par les autres fonctions (Carlile, 2002).

2.2.2. Responsabilités organisationnelles

A l'intérieur des organisations, les fonctions R&D et marketing se voient attribuer des responsabilités et des activités différentes, ce qui peut provoquer une barrière organisationnelle (Griffin and Hauser, 1996). De fait, ils ont souvent des indicateurs de mesure du succès qui ne soutiennent pas la coopération ainsi qu'un manque de systèmes de récompense de la coopération de la part du top management (Edmondson and Nembhard, 2009; Griffin and Hauser, 1996). Par ailleurs, les projets d'innovation ont souvent des objectifs flous (Lenfle, 2012; Lenfle et al., 2016), ce qui peut représenter un obstacle pour la coopération des collectifs de concepteurs (Edmondson and Nembhard, 2009; Holland et al., 2000).

Or, quand les collectifs de concepteurs réussissent à coopérer dans des projets d'innovation, ils s'exposent au risque de perdre l'intégration avec leur organisation mère. En effet, afin de protéger les équipes projet des forces contreproductives issues de l'organisation mère, les projets d'innovation radicale ont tendance à être isolés (McDermott and O'Connor, 2002). Toutefois, cette pratique peut compromettre la survie du projet sur le long terme (McDermott and O'Connor, 2002) : premièrement, elle isole le projet de ses sources d'apprentissage, de ses compétences et de ses ressources. Et deuxièmement, elle peut provoquer une perte de légitimité au moment de restituer le projet à l'organisation mère.

3. Deux approches extrêmes pour résoudre les tensions

Nous avons vu dans les paragraphes précédents que l'innovation dans le secteur du luxe peut soumettre les collectifs de concepteurs à trois tensions : la tension « innovation – tradition », la tension cognitive et la tension organisationnelle. Comment les collectifs de concepteurs font-ils face traditionnellement à ces trois tensions ? Deux possibilités extrêmes s'offrent à eux : soit rester dans le domaine en négligeant le besoin de nouveauté, soit ignorer les limites propres au domaine.

Transmission de bonnes pratiques et conduite de projets peu innovants : Une première possibilité qui pourrait consister à rester fixés dans le domaine impliquerait que la résolution des tensions se traduirait par un compromis sur le caractère innovant des projets. L'objectif serait donc de préserver la tradition en essayant d'innover un peu. Dans ce type de cas, il n'existerait pas de révision de l'identité des objets : les objets conçus seraient de simples recombinaisons d'objets connus ou de remise au goût du jour d'objets conçus par le passé et s'inscriraient donc dans un « dominant design » (Le Masson, Weil, et al., 2017). Pour ce type de projets, la transmission de bonnes pratiques pourrait être suffisante (Szulanski, 1996; Winter et al., 2012).

Conception innovante et conduite de projets trop innovants : Une deuxième possibilité consisterait à négliger volontairement les limites imposées par le domaine. Ici, les tensions seraient dépassées en se concentrant sur le caractère nouveau de l'activité de conception. Cette approche est celle privilégiée par les régimes de conception innovante ou par certains projets d'innovation de rupture qui cherchent une révision radicale et complète de l'identité des objets (Hatchuel, 2013). Pour ce type d'approche, la transmission de connaissances sur les théories et méthodes de la conception innovante seraient nécessaires (Hatchuel, Le Masson and Weil, 2011).

Or ces deux propositions extrêmes ne sont pas absentes de risques : d'un côté, si les propositions faites par la marque sont peu originales, il existe un risque de lassitude de la part des consommateurs (Perrin-Martinenq, 2010). D'un autre côté, quand les innovations détruisent le patrimoine et provoquent une diminution de la

cohérence de l'identité de marque, il existe un risque d'effroi des consommateurs, qui, ayant perdu leurs repères, peuvent s'éloigner de la marque (Perrin-Martinenq, 2010).

Quelles autres solutions pourrions-nous envisager afin de résoudre le paradoxe entre la tradition et l'innovation ? Entre les effets génératifs de la connaissance et la fixation ? Entre la coopération des équipes et leur intégration avec l'organisation ?

4. Un patrimoine de création pour gérer les tensions de la conception dans le luxe

Et si la solution ne résidait pas dans l'opposition entre le patrimoine et l'innovation mais plutôt dans un sage mélange des deux ?

Les concepteurs du luxe doivent détenir une connaissance approfondie des propriétés tangibles et intangibles de la marque, de ses valeurs, de son imaginaire, de son histoire, de ses produits. En parallèle, ils doivent maîtriser la manière d'utiliser ces connaissances pour la création, pour renouveler les espaces d'expression de la marque. La solution aux tensions rencontrées par les collectifs de concepteurs résiderait donc non pas dans la volonté de conserver un patrimoine mais dans une capacité de création au sein de ce que nous pourrions appeler un *patrimoine de création*. Il s'agirait d'un ensemble de connaissances permettant aux concepteurs d'augmenter leur générativité, de créer de nouveaux produits, de nouveaux services et de nouvelles expériences cohérentes avec l'identité de marque, tout en lui permettant d'être évolutive. Les connaissances porteraient à la fois sur ce que la marque est, et son devenir, ce qui serait la clé permettant de comprendre l'état actuel de la marque et simultanément d'envisager les champs d'exploration possibles. Si un tel patrimoine de création existait, il devrait pouvoir aider les concepteurs à résoudre les tensions énoncées précédemment.

5. Comment surmonter les tensions entre innovation et tradition grâce à un patrimoine de création ?

Ainsi, notre première question de recherche consiste à étudier si l'apport d'un type de connaissances particulières, qu'on appellera un patrimoine de création, peut permettre aux collectifs de concepteurs de gérer les tensions entre l'innovation et la tradition, et les tensions cognitives et organisationnelles qui en découlent :

QR1 : Comment un patrimoine de création peut-il aider les collectifs de concepteurs dans l'industrie du luxe à surmonter les tensions qu'ils rencontrent lors des projets d'innovation ?

6. Quelles propriétés intrinsèques sont-elles nécessaires pour un patrimoine de création

Si un tel patrimoine de création existe, c'est-à-dire s'il est capable d'aider les collectifs de concepteurs à surmonter les tensions rencontrées lors des projets d'innovation, il doit nécessairement posséder des propriétés intrinsèques particulières.

Il ne suffit pas d'étudier la littérature sur la gestion des marques de luxe pour nous faire une idée du type des propriétés à espérer. A nouveau, la littérature en sciences de la conception nous offre des pistes de réflexion sur la manière de conjuguer patrimoine et innovation. En nous éclairant sur les pratiques d'enseignement dans des domaines éloignés comme l'ingénierie, la science ou les activités artistiques, la littérature en sciences de la conception nous montre qu'il est possible de transmettre un ensemble de connaissances qui permet à la fois de préserver le passé, de l'utiliser et en même temps de se projeter dans l'avenir.

L'ingénierie peut être parfois considérée comme un domaine peu créatif. C'est surtout la grande quantité de connaissances mobilisées par les ingénieurs et leur

caractère sédimentaire qui est à l'origine de cette perception. Et pourtant, il y a bien une activité générative dans l'ingénierie !

6.1. La méthode de ratios de Redtenbacher et la conception systématique allemande. Transmission de langages de l'inconnu aux ingénieurs

Pendant les XIX^{ème} et XX^{ème} siècle l'Allemagne s'est lancée dans une campagne de formalisation et de transmission des savoirs de conception des ingénieurs. Durant cette époque, plusieurs méthodes de conception ont vu le jour comme la méthode des ratios de Redtenbacher pour inventer des nouvelles machines hydrauliques (Redtenbacher, 1874), jusqu'à la méthode de la conception systématique allemande dont Pahl et Beitz sont les plus grands représentants (Pahl et al., 2007b; Pahl and Beitz, 1986). Alors que l'enseignement en sciences de l'ingénieur donnait à l'ingénieur en formation une capacité d'analyse et de raisonnement sur des objets connus basée sur la modélisation conceptuelle (Arciszewski, 2016; Le Masson and Weil, 2013), les méthodes de conception allemandes donnaient à ceux qui les apprenaient une capacité à raisonner sur des objets inconnus basée sur des objets connus (Le Masson and Weil, 2013). D'une certaine manière ces approches tentaient à répondre à la question suivante : comment organiser un patrimoine afin de transmettre plus qu'une capacité d'analyser des machines existantes, une capacité à concevoir de nouvelles machines ?

6.1.1. La méthode des ratios de Redtenbacher

Redtenbacher proposait à ses concepteurs récepteurs un modèle paramétrique des machines. Ce modèle paramétrique se basait sur un système de règles issues du travail d'ingénieurs et de scientifiques, complété par Redtenbacher. Avec ce modèle, le concepteur récepteur était capable de concevoir une nouvelle machine (comme une roue hydraulique) adaptée à un contexte particulier. Pour ce faire, le concepteur récepteur alimentait le modèle paramétrique avec des données propres à son client, en suivant une série d'étapes qui lui permettaient de calculer les détails d'une

nouvelle machine qui satisfaisait les besoins du client. Le concepteur récepteur commençait par définir les caractéristiques principales de la machine (comme le matériau adapté au budget du client, la hauteur de la chute d'eau et le flux disponible, ce qui permettait d'orienter le type de roue à concevoir) ainsi que les parties avec le plus de charge. Le concepteur finissait par préciser les détails de la machine jusqu'au moment où il était possible de la construire. Ainsi, à partir d'un patrimoine, d'un ensemble de connaissances, les concepteurs récepteurs étaient capables de créer des nouvelles machines. Toutefois, la générativité de cette méthode est conditionnée par une structure de connaissances bien particulière. Le Masson and Weil, (2013) argüent que cette méthode sert à résoudre des problèmes où le concepteur récepteur est déjà très savant : elle permet de concevoir de nouveaux objets à condition qu'il existe une théorie complète des objets connus associés ainsi qu'une série de ratios construits grâce à cette théorie.

6.1.2. La conception systématique allemande

Pahl et Beitz (Pahl et al., 2007b) ont formalisé une méthode pour concevoir de nouveaux objets, des systèmes techniques, qui fait encore référence aujourd'hui pour la formation des ingénieurs mécaniques. La méthode est structurée en quatre langages différents permettant d'avancer dans le processus de conception (Le Masson, Weil, et al., 2017) : le langage fonctionnel, le langage conceptuel, le langage physico-morphologique et le langage détaillé. Cette méthode servait à apprendre au concepteur récepteur que la conception d'une nouvelle machine (un objet inconnu) exige la mobilisation séquentielle de ces quatre langages. En effet, si le concepteur souhaitait concevoir une machine pour transporter un fluide, il décrivait d'abord les fonctions de la machine comme par exemple la capacité à transporter des fluides chauds, contenant des acides, pouvant rentrer en contact avec des aliments ; il décrivait ensuite les modèles conceptuels comme le bilan d'énergie qui régit le transport de fluides. Il continuait avec la description physico-morphologie de la machine comme le matériau à utiliser, si c'était une pompe et son type (péristaltique, centrifuge, ...) ; et finalement il décrivait en détail les dimensions de chacune des

pièces de la pompe. Ici encore, à partir d'un langage du connu, d'un patrimoine de connaissances techniques, les concepteurs sont capables d'explorer l'inconnu et de créer de nouveaux objets. La générativité provoquée par cette méthode est plus élevée que celle favorisée par la méthode des ratios. Cela tient à deux choses : premièrement, à la différence de la méthode des ratios, la conception systématique est indépendante des objets à concevoir (Le Masson and Weil, 2013). Deuxièmement, la conception systématique favorise l'acquisition et la création de connaissances en tant que ressource du processus de conception. La méthode guide les concepteurs récepteurs dans l'augmentation de leurs bases de connaissances par l'incrément des éléments dans chacun des quatre langages de la méthode.

Réciproquement, en étudiant les métiers du design, généralement connus comme des métiers très créatifs, nous pouvons nous apercevoir que ce sont des métiers qui s'appuient sur l'héritage passé comme le montre l'enseignement au Bauhaus que nous décrirons par la suite.

6.2. L'enseignement au Bauhaus. Apprendre aux designers à créer leur propre style

Les méthodes de formation dans le Bauhaus nous offrent aussi un cas intéressant de transmission d'un patrimoine pour la création et la générativité. Entre 1919 et 1933 des concepteurs considérés comme très créatifs, ont transmis des méthodes de création à plusieurs générations d'élèves. En particulier, Le Masson, Hatchuel and Weil, (2016) ont mis récemment en évidence comment les enseignements des professeurs Itten (Itten, 1973, 1975) et Klee (Klee, 1966, 2004) favorisaient chez leurs récepteurs une grande générativité par l'acquisition d'une capacité à comprendre les anciens styles et à construire leur propre style de conception. Cette habilité reposait sur la transmission aux élèves d'une capacité à prendre conscience des obstacles à la créativité. En effet, les concepteurs sont souvent soumis à des effets de fixation provoqués par des associations communes entre attributs, comme des liaisons déterministes entre les formes, les matériaux, les textures et les significations (un bois chaleureux, un métal froid, ...) (Le Masson, Hatchuel, et al., 2017) et par des modularités comme le fait de relayer les textures à

une propriété secondaire. Une fois conscients de ces obstacles, les concepteurs étaient invités à construire leur propre base de connaissances, structurée de manière à se débarrasser de ces déterminismes et de ces modularités. Chaque propriété des nouveaux objets à concevoir devenait importante et avait des conséquences sur le processus de création. Des propriétés comme les textures qui avaient un rôle secondaire, devenaient des propriétés primordiales pour l'originalité de l'œuvre. La générativité de ces méthodes d'enseignement résidait aussi dans l'amélioration de la perception et de la sensibilité des concepteurs grâce à l'étude du patrimoine et des anciens maîtres. Finalement, grâce à l'enseignement de ces grands professeurs, les concepteurs étaient capables de conduire des processus de conception grâce à l'accumulation et à la superposition des langages de l'objet.

Ce bref aperçu du monde de la conception nous montre que l'apparente opposition entre innovation et tradition n'est pas si simple, et nous invite à la revisiter. Il semblerait qu'il existe plusieurs formes différentes de patrimoine de création, comme celles retrouvées dans l'ingénierie et le design. Nous nous interrogerons donc sur la manière dont les théories de la conception contemporaines nous permettent aujourd'hui de penser et de modéliser un patrimoine de création. Ce modèle devrait pouvoir nous permettre de retrouver ces modèles historiques, et de tenir compte des cas originaux dans le secteur du luxe. Ainsi, nous tâcherons de répondre à la question de recherche suivante :

QR 2 : Quelles sont les formes de patrimoine de création et les types de générativité associées ?

7. Comment concevoir un patrimoine de création ?

Maintenant, si un tel patrimoine de création existe, permettant de surmonter les tensions liées à la conduite de projets d'innovation dans le secteur du luxe, et dans la mesure où nous serions capables de caractériser ses propriétés, comment pourrions-nous le concevoir ?

La littérature en sciences de gestion nous offre plusieurs paradigmes de la transmission de connaissances qui nous donnent des pistes de réponse à cette question (Blackler, 1995; Lave and Wenger, 1991; Liyanage et al., 2009; Nonaka and Takeuchi, 1995; Szulanski, 1996).

Nonaka et ses co-auteurs (Nonaka, 1994; Nonaka et al., 2000; Nonaka and Takeuchi, 1995; Nonaka and Toyama, 2003) argumentent que les individus créent et étendent la connaissance au travers de l'interaction sociale. Ils décrivent l'existence de quatre mécanismes permettant de transmettre les connaissances d'un individu source à un individu récepteur : la socialisation (conversion de connaissance tacite en connaissance tacite), l'extériorisation (conversion de connaissance tacite en connaissance explicite), la combinaison (conversion de connaissance explicite en connaissance explicite) et l'intériorisation (conversion de connaissance explicite en connaissance tacite).

La **socialisation** est le processus de conversion de connaissances tacites en nouvelles connaissances tacites. La connaissance tacite peut être acquise uniquement à travers l'expérience partagée par le biais des interactions sociales, comme faire des choses ensemble, passer du temps avec l'autre, travailler au même endroit que l'autre, ou mener des réunions formelles ou informelles (Nonaka and Toyama, 2003). Un individu peut acquérir des connaissances tacites en utilisant le dialogue mais pas nécessairement. L'observation, l'imitation et la pratique permettent à un individu d'acquérir des connaissances tacites sans utiliser le langage. Grâce à la socialisation, deux individus peuvent partager des modèles mentaux et même des aptitudes techniques.

L'**extériorisation** est le processus de transformation de la connaissance tacite en connaissance explicite. Les actions de dialoguer ou d'écrire sont des manières de concrétiser la connaissance tacite. Par le biais de l'extériorisation, la connaissance tacite prend la forme de concepts, d'hypothèses, de métaphores, d'analogies et de modèles. Le grand avantage de l'extériorisation est que sous forme explicite la connaissance peut être partagée plus facilement car elle peut être stockée dans des textes écrits, images, concepts, symboles.

La **combinaison** est la conversion de connaissances explicites dans des nouvelles connaissances explicites, de nature plus complexe. Par le processus de combinaison, les connaissances explicites existantes sont reconfigurées par le biais d'actions comme la collecte, l'édition, le tri, la catégorisation et la synthèse.

L'**intériorisation** est l'incorporation de connaissances explicites en connaissances tacites. Il s'agit ici d'incarner des connaissances grâce à la pratique, à l'action de l'individu sur le monde, lui permettant d'intégrer des modèles mentaux et des savoir-faire techniques. Pour l'individu, cela peut impliquer de mettre à jour des connaissances explicites grâce à l'action, à la réflexion et à la pratique (Nonaka and Toyama, 2003).

Or, comme suggéré par Blackler, dans cette vision de la transmission de connaissances, la création de connaissances est absente. Ce sont surtout les mécanismes de partage entre acteurs qui sont représentés. En suivant ce modèle, on pourrait donc penser que les concepteurs expérimentés n'ont qu'à transmettre une partie de leurs connaissances aux concepteurs récepteurs par les biais de l'extériorisation ou de la socialisation. Les concepteurs récepteurs assimileraient les connaissances transmises par le biais de l'intériorisation. Mais, y a-t-il des mécanismes spécifiques à la logique d'extériorisation et de partage propre à la conception d'un patrimoine de création ?

Par exemple, la littérature en théories de la conception nous offre une piste sur l'effet génératif des phénomènes de restructuration de connaissance pendant les processus de conception (Brun et al., 2016; Hatchuel et al., 2013; Le Masson, Weil, et al., 2017). En particulier, cette littérature décrit deux phénomènes connus sous les noms de knowledge reordering et de knowledge preordering.

Le « knowledge reordering » ou la restructuration de connaissances (Le Masson et al., 2006; Le Masson, Weil, et al., 2017) : lors des processus de conception, les nouveaux objets conçus sont intégrés à la base de connaissances du concepteur et doivent être cohérents avec les objets anciens. Ainsi les concepteurs restructurent leurs bases de connaissances pour permettre de « préserver le sens » en créant une nouvelle définition des objets qui tienne compte à la fois des anciens et des nouveaux

objets. Ce phénomène est mis en évidence par l'attribution de nouveaux noms et de nouvelles nomenclatures pour donner du sens aux objets conçus. Cette restructuration de la base de connaissances permet ainsi de générer des nouvelles règles de conception.

Le « knowledge preordering » ou la prestructuration générative de connaissances (Brun, 2016; Brun et al., 2016) est une restructuration de la base de connaissances qui vise à se débarrasser des déterminismes et des modularités de la structure de connaissances pendant le processus de conception et ainsi d'augmenter leur générativité.

Si pendant la formalisation d'un patrimoine de création, les concepteurs source cherchent à favoriser certains types de générativité plutôt que d'autres, nous pourrions donc nous attendre à voir apparaître des phénomènes de création et de restructuration de connaissances pendant le processus d'extériorisation et de socialisation d'un patrimoine de création.

Par ailleurs, des auteurs comme Wenger (Wenger, 1998), Brown et Duguid (Brown and Duguid, 1991, 2000, 2011) et Blackler (Blackler, 1995) défendent l'idée que la connaissance est maintenue socialement et se manifeste dans les actions et la pratique. Ce paradigme se concentre sur l'étude de l'action des personnes qui possèdent les connaissances et leurs pratiques, sur le dialogue (Tsoukas, 2009), l'interaction sociale (Swap et al., 2001) et les différentes communautés de savoir auxquelles ils contribuent (Amin and Roberts, 2008; Cohendet et al., 2014).

En particulier, Blackler (Blackler, 1995) suggère que la structure de connaissance et la structure organisationnelle sont étroitement liées. En étudiant la littérature référente à l'apprentissage organisationnel, Blackler propose une classification où il distingue cinq types de connaissance en fonction de leur localisation : les **connaissances intellectuelles** (*embrained knowledge*), les **connaissances incarnées** (*embodied knowledge*), les **connaissances culturelles** (*enculturedknowledge*), les **connaissances embarquées** (*embedded knowledge*) et les **connaissances codifiées** (*encoded knowledge*)

Les **connaissances intellectuelles** (*embrained knowledge*) sont des connaissances abstraites associées aux compétences conceptuelles et aux aptitudes cognitives des individus. Elles sont appelées aussi savoir-quoi (*knowledge that* ou *knowledge about* en anglais) par d'autres auteurs ([James, 1950; Ryle, 1949) cités par (Blackler, 1995)].

Les **connaissances incarnées** (*embodied knowledge*) sont des connaissances qui sont contenues dans le corps de l'individu (Collins, 1993), orientées vers l'action, et partiellement explicites. Elles sont aussi connues sous le nom de savoir-faire (*knowledge how*) ou de connaissances directes (*knowledge by acquaintance*) (James, 1950; Ryle, 1949 cités par Blackler, 1995). Ce sont des connaissances situées, associées à la présence physique des personnes, aux informations sensibles et sensorielles, et qui sont acquises dans l'action, enracinées dans des contextes spécifiques (Zuboff, 1989 cité par Blackler, 1995). Ainsi, Blackler classifie dans ce type de connaissances les techniques de résolution de problèmes qui dépendent davantage de la connaissance intime d'une situation que de règles abstraites (Scribner, 1986 cité par Blackler, 1995).

Les **connaissances culturelles** (encultured knowledge) font allusion aux connaissances contenues dans les systèmes sociaux (Collins, 1993). Ce sont des connaissances impliquées dans l'atteinte d'une compréhension mutuelle et partagée entre individus (Blackler, 1995). Elles peuvent dépendre du langage et être soumises à négociation.

Les **connaissances embarquées** (*embedded knowledge*) sont des connaissances qui se trouvent dans les routines systémiques de l'organisation résidant dans les relations entre les individus et les groupes, dans les normes, les attitudes, les flux d'informations et les manières de prendre des décisions (Badaracco, 1991 cité par Blackler, 1995). Pour Blackler, la connaissance embarquée peut être analysée grâce aux relations entre les technologies, les rôles, les procédures formelles et les routines émergentes de l'organisation.

Finalement, les **connaissances codifiées** (*encoded knowledge*) sont des connaissances pouvant être transmises grâce à des signes ou des symboles. Elles

peuvent être emmagasinées sous forme de livres, manuels, codes de pratiques, systèmes électroniques. Toutefois, étant donné que ces connaissances peuvent manquer de contexte elles peuvent avoir un pouvoir de représentation limité.

Il identifie ensuite quatre archétypes d'organisations différentes en fonction des principaux types de connaissances mobilisés :

1 - Des organisations qui dépendent des experts et qui sont basées principalement sur la connaissance incarnée, comme c'est le cas des bureaucraties professionnelles qu'on retrouve dans les hôpitaux.

2 – Des organisations basées sur les routines et qui dépendent principalement de la connaissance embarquée, comme c'est le cas des bureaucraties mécanistes des usines traditionnelles.

3 – Des organisations dépendantes des analyses symboliques, basées principalement sur la connaissance intellectuelle, comme les « *knowledge-intensive-firms* » des consultants informatiques. Et finalement,

4 – Des organisations à communication intensive, qui dépendent principalement de la connaissance culturelle, comme les adhocraties.

En plus de Blackler, d'autres auteurs ont aussi évoqué l'existence d'un lien entre la structure de l'organisation et la structure de connaissance (Garud, 1997; Lam, 2000). Ainsi, nous pourrions donc espérer que la transmission de savoirs dans la conception du patrimoine de création soit en phase avec les pratiques et les logiques organisationnelles.

Finalement, cette revue de la littérature nous indique que d'une certaine manière la conception d'un patrimoine de création doit englober un effort de formalisation des connaissances et un effort de formalisation de l'organisation porteuse de ce transfert. Notre troisième et dernière question de recherche est donc :

QR 3 : Comment un patrimoine de création est-il conçu ? Comment créatifs et concepteurs interagissent-ils pour concevoir un ensemble de règles transférables permettant au récepteur de bénéficier de la générativité des sources ?

MÉTHODOLOGIE

Les trois questions de recherche de cette thèse tentent de caractériser cette notion « étrange » que nous avons appelé « patrimoine de création » sous trois angles différents : ses effets sur un collectif de concepteurs du secteur du luxe, ses propriétés intrinsèques et la manière de le concevoir. Ainsi, nous avons préparé trois articles, chacun axé sur une des trois questions de recherche.

Le premier article cherche à montrer qu'il existe une notion que nous appelons « patrimoine de création », et qui a des propriétés surprenantes. Nous voulons montrer qu'un patrimoine de création supporte les projets d'innovation dans des structures organisationnelles complexes comme celles de l'industrie du luxe, qui sont à la fois contraintes par l'organisation et par le respect de certaines règles identitaires concernant la marque.

Le deuxième article cherche à modéliser la structure d'un patrimoine de création par un effort de qualification et mise en rapport de certaines classes de générativité avec certaines structures de connaissances. Ceci afin de caractériser les causes de l'apparente opposition qu'il y a entre patrimoine et innovation, entre fixation et défixation, entre ontologie fixe et révision de l'identité des objets et de la marque.

Enfin, le troisième article cherche à expliquer la manière dont le modèle d'un patrimoine de création peut se décliner dans un processus de conception, et à comprendre comment ce processus particulier permet de piloter la générativité provoquée par la transmission d'un patrimoine de création.

Etant donné que notre objectif est de générer des connaissances qui soient à la fois utiles pour Dom Pérignon et l'industrie du luxe, ainsi que des connaissances théoriques plus générales, pour le premier et le troisième article, nous avons mené une recherche intervention chez Dom Pérignon (David, 2012; David and Hatchuel, 2013). J'ai intégré les équipes de la Recherche & Développement (R&D) afin d'observer et participer au projet « Decoding Dom Pérignon - Patrimoine de Création Dom Pérignon » mené conjointement par les équipes de l'œnologie - R&D et du Marketing

et impliquant la participation de plusieurs fonctions de l'organisation ainsi que de partenaires extérieurs. Cela nous a permis de participer à la formalisation du patrimoine de création et à sa diffusion au sein de l'équipe transverse du programme. De plus, l'étude a été étendue aux projets de conception de nouvelles expériences, nés au cours du programme.

Pour le premier article, nous avons mené une étude de cas approfondie sur trois de ces projets de conception d'expériences. Ceci afin de comparer l'originalité et l'efficacité organisationnelle des trois cas entre deux phases : tout d'abord lors d'une première phase de conception avant la formalisation et la transmission du patrimoine de création de la marque. Ensuite, une deuxième phase après la réification de ce patrimoine de création et son partage au sein de l'équipe du programme.

Dans le deuxième article, nous avons entrepris une étude longitudinale des patrimoines de création de la cuisine. En effet, les recherches des historiens et des sociologues ont mis en évidence l'effet positif des livres sur la nouveauté en cuisine. Nous avons donc étudié un corpus de livres de cuisine écrits entre le XVII^{e} et le XXI^{e} siècle par des cuisiniers avides de léguer à leurs successeurs un patrimoine de création culinaire. L'idée étant de caractériser les variétés de patrimoine de création, en termes de structure de connaissance et de générativité, et d'évaluer l'existence et la compatibilité de plusieurs types de générativité ainsi que leur évolution dans le temps.

Dans le troisième article, nous avons étudié en profondeur le processus de conception du patrimoine de création de Dom Pérignon, grâce à une étude longitudinale, en participant au programme pendant l'expérimentation de quatre formes intermédiaires du patrimoine de création. Nous avons étudié les raisons d'acceptation et de refus de chaque patrimoine de création intermédiaire, les types de générativité provoqués par ces formes intermédiaires, ainsi que leur structure organisationnelle associée.

Synthèse des Articles

Les parties II, III et IV de cette thèse contiennent les trois articles évoqués précédemment. Chaque article a fait l'objet d'une présentation dans le cadre de conférences en gestion de l'innovation et de la conception en 2018 :

- Premier article - *Patrimoine de Création : comment surmonter les tensions entre innovation et tradition dans l'industrie du luxe.*

  Basé sur l'article : Carvajal Pérez, D., Araud, A., Chaperon, V., Le Masson, P. and Weil, B. (2018), "Generative Knowledge Management: How to Make Heritage a Wellspring of Creation in Luxury Industry", 25TH IPDMC: Innovation and Product Development Management Conference, Porto, Portugal.
- Deuxième article - *Patrimoine de Création : piloter la générativité grâce aux structures de connaissance dans les industries créatives. Apprentissages de la haute cuisine.*

  Basé sur l'article : Carvajal Pérez, D., Araud, A., Chaperon, V., Le Masson, P. and Weil, B. (2018), "Generative heritage: Driving Generativity through Knowledge Structures in Creative Industries. Lessons from Cuisine", 15th International Design Conference, Dubrovnik, Croatia.
- Troisième article - *Créer un Patrimoine de Création : comment les individus créatifs extériorisent les règles permettant aux récepteurs d'être plus génératifs ?*

  Basé sur l'article : Carvajal Pérez, D., Araud, A., Chaperon, V., Le Masson, P. and Weil, B. (2018), "Creating a Generative Knowledge Heritage. How Creative Individuals Foster Innovation by Transferring their Knowledge", R&D Management Conference, Milan, Italy.

Dans ce manuscrit, nous présentons une version revue et augmentée pour chacun des articles, et ceci afin de tenir compte des suggestions et commentaires proposés par les participants aux conférences.

Dans les pages qui suivent nous présentons une synthèse de chacun de ces articles en présentant successivement l'état de l'art, les questions de recherche, la méthodologie, les principaux résultats et les implications académiques et empiriques dressés par chacun des trois articles.

Premier article - Patrimoine de Creation : comment surmonter les tensions entre innovation et tradition dans l'industrie du luxe

Dans le secteur du luxe, comme dans beaucoup d'autres domaines, les projets d'innovation sont souvent menés par des équipes transverses constituées de membres issus des fonctions marketing et R&D (Letzelter et al., 1996; Madhavan and Grover, 1998; Sherman et al., 2005). Ces équipes se voient souvent confrontées à des tensions qui rendent difficile le succès des projets d'innovation. Une première tension, la tension « innovation-tradition », ou tension de la marque, est liée à la difficulté des équipes à concevoir des objets nouveaux, (que ce soit des produits, des services, ou des expériences), qui doivent être à la fois innovants et en même temps être en cohérence avec l'identité de la marque (Bastien and Kapferer, 2012; Chevalier and Mazzalovo, 2012; Kapferer, 2008). Une deuxième tension, la tension cognitive est provoquée par l'effet paradoxal de la connaissance sur les processus de conception. En effet, dans certains cas les concepteurs peuvent être fixés par des connaissances facilement mobilisables (Crilly, 2015; Jansson and Smith, 1991; Purcell and Gero, 1996), donc, ils arrivent facilement à converger vers des nouveaux objets qui s'avèrent être peu originaux. Dans d'autres cas, la connaissance peut contribuer à la défixation (Agogué et al., 2014) mais dans ce cas-là, les concepteurs ont du mal à converger vers de nouveaux objets. Une troisième tension, la tension organisationnelle est liée à la relation entre les équipes transverses et l'organisation. En effet, les membres de fonctions diverses se voient confrontés à choisir entre coopérer entre eux, et être soudés en tant qu'équipe (Griffin and Hauser, 1996) mais cela se fait en dépit de l'intégration avec le reste de l'organisation. La situation inverse est aussi plausible, c'est-à-dire que dans certains cas, quand les équipes sont bien intégrées à l'organisation et suivent les alignements stratégiques de l'organisation et de la marque, elles le sont au détriment de la coopération entre fonctions (McDermott and O'Connor, 2002). Dans certains cas, ces trois tensions peuvent conduire à la création

d'objets peu originaux, ainsi qu'à des inefficacités opérationnelles des projets d'innovation (Atuahene-Gima, 2003; McDermott and O'Connor, 2002; Sheremata, 2000).

L'objectif de cet article est d'étudier la manière dont la transmission de connaissances peut permettre aux équipes transverses de gérer ces trois tensions et donc de favoriser leur originalité et leur efficacité opérationnelle. Pour ce faire, nous avons participé à trois projets de conception d'expériences chez Dom Pérignon nés dans le cadre du programme « Decoding Dom Pérignon - Patrimoine de Création Dom Pérignon ». En mobilisant le cadre conceptuel des théories de la conception (Hatchuel, Le Masson, Reich, et al., 2017; Hatchuel and Weil, 2009), ces trois études de cas nous ont permis de comparer l'existence des trois tensions, ainsi que leur effet sur l'originalité et l'efficacité opérationnelle du processus de conception avant et après la formalisation et le partage du « Patrimoine de Création de Dom Pérignon ».

Ces trois études de cas montrent que la transmission du patrimoine de création de Dom Pérignon a permis à l'équipe transverse de gagner en originalité et en efficacité opérationnelle pendant la conception de nouvelles expériences, grâce à la gestion des trois tensions. Le patrimoine de création de Dom Pérignon formalise les éléments de connaissance les plus importants de la marque, tels que ses caractéristiques idiosyncratiques et le langage propre à la marque. Cela a permis à l'équipe de concevoir une vidéo, une application digitale et un espace architectural qui sont à la fois innovants ET cohérents avec l'identité de marque. Ensuite, le patrimoine de création de Dom Pérignon a aidé l'équipe à se libérer des effets de fixation ET de converger. Même si avant la formalisation et le partage du patrimoine de création l'équipe était fixée sur trois concepts explorés par d'autres marques ou par la Maison, l'introduction du patrimoine de création de Dom Pérignon a rendu possible la création de nouveaux concepts plus originaux et d'en déterminer les propriétés souhaitables. Finalement, le patrimoine de création de Dom Pérignon a contribué à que l'équipe puisse coopérer ET être intégrée au reste de l'organisation, grâce, entre autres, au partage d'une vision, d'un ensemble d'objectifs et d'une culture entre fonctions. De plus, le patrimoine de création de Dom Pérignon a donné naissance à un langage

commun entre les deux fonctions leur permettant de donner du sens aux objectifs du programme, de définir une méthodologie commune, ainsi qu'une feuille de route.

Nous apportons à la littérature en gestion de connaissances, et en particulier à la littérature sur la transmission de connaissances, la mise en évidence d'un effet positif de la formalisation et le partage de connaissances sur l'innovation qui n'avait jusqu'alors pas été décrit dans la littérature. Par ailleurs, concernant la littérature en sciences de la conception, nous démontrons que la construction d'une forme explicite de la connaissance peut, d'une part, agir en tant qu'objet frontière et faciliter la conception entre fonctions diverses et d'autre part, permettre de puiser de nouveaux concepts encodés dans la connaissance transmise. Finalement, nous contribuons à la littérature en gestion de marques de luxe en décrivant la manière dont la formalisation d'une identité de marque est à l'origine de son renouvellement et de la création de nouveaux objets.

Le Tableau I-1 récapitule la synthèse de ce premier article.

Tableau I-1. Synthèse du premier article

Article :	**Patrimoine de Création : comment surmonter les tensions entre innovation et tradition dans l'industrie du luxe ?**
Question de recherche :	Comment un patrimoine de création peut-il aider les collectifs de concepteurs dans l'industrie du luxe à surmonter les tensions qu'ils rencontrent lors des projets d'innovation ?
Connaissances actuelles :	Les collectifs de concepteurs menant des projets d'innovation dans le secteur du luxe sont confrontés à trois tensions : - Tension de la marque : les objets conçus (produits, services, expériences) doivent à la fois être innovants ET être en cohérence avec l'identité de la marque (Bastien and Kapferer, 2012; Chevalier and Mazzalovo, 2012). Tension cognitive : la connaissance peut créer des effets de fixation chez les concepteurs mais en favorisant la convergence ou bien elle peut contribuer à la défixation mais dans ce cas au détriment de la convergence (Hatchuel and Weil, 2009; Le Masson et al., 2016; Weisberg, 1999). Tension organisationnelle : les équipes transverses se voient confrontées à choisir entre coopérer, être soudées en dépit de l'intégration avec le reste de l'organisation, ou suivre les alignements stratégiques de l'organisation, être intégrés au détriment de la coopération entre fonctions (Edmondson and Harvey, 2017; Griffin and Hauser, 1996; McDermott and O'Connor, 2002). Ces trois tensions peuvent conduire à des projets avec faible originalité et faible efficacité organisationnelle.
Connaissances manquantes :	La littérature ignore l'effet de la transmission de connaissances sur l'intégrité des objets. Nous n'avons pas assez de preuves dans la littérature pour montrer que la transmission de connaissances puisse favoriser la défixation et la convergence des processus de conception dans des équipes transverses. La littérature est incomplète concernant la manière dont la transmission de connaissances peut favoriser la coopération dans des équipes transverses et l'intégration des projets innovants dans l'organisation.
Objectif de Recherche :	Eclaircir le rôle d'une nouvelle forme de transmission de connaissances orientée vers la générativité dans les processus de conception menés par des équipes transverses dans le secteur du luxe
Cadre Théorique :	Théories de la conception : théorie C-K Identité de marque et intégrité des produits Dilemme exploitation-exploration ; barrières à la coopération des équipes transverses en situation de conception et problèmes d'intégration des projets innovants dans les organisations. Transmission de connaissances.
Matériau :	Etude de cas de 3 projets de conception menés par une équipe transverse R&D-Marketing chez Dom Pérignon. Les projets sont tous issus du programme de gestion de connaissances « Décoding Dom Pérignon - Patrimoine de Création Dom Pérignon »
Méthode :	Etude du processus de conception de 3 nouvelles expériences avant et après avoir été extériorisé et socialisé le patrimoine de création de la marque pour comprendre l'effet de la nouvelle forme de patrimoine de création sur les 3 tensions et l'originalité et l'efficacité organisationnelle : Mesure de l'originalité par comparaison avec des objets conçus par le passé avant l'introduction du patrimoine et comparaison des bases de connaissances mobilisés avant et après l'introduction du patrimoine de création. Entretiens semi-structurées avec les membres de l'équipe et le haut management pour étudier la cohérence des objets intermédiaires avec la marque avant et après l'introduction du patrimoine de création. Entretiens semi-structurées avec les membres de l'équipe et le haut management pour étudier les barrières et facilitateurs à l'efficacité opérationnelle
Principaux résultats :	Un patrimoine de création permet aux équipes transverses de gérer les tensions de la marque, cognitive et organisationnelle. Un patrimoine de création favorise l'originalité et l'intégrité des objets conçus en leur permettant d'éviter les effets de fixation pendant les premières étapes de la conception ET en les aidant à converger dans ces voies originales Un patrimoine de création favorise l'efficacité opérationnelle des équipes transverses en aidant les équipes à surmonter les barrières du langage et de la responsabilité organisationnelle ET en favorisant une meilleure relation entre les projets innovants et l'organisation mère.
Principales implications académiques :	Mise en évidence d'une nouvelle forme de transmission de connaissances, que nous appelons un patrimoine de création permettant de favoriser la générativité des concepteurs dans le secteur du luxe, en aidant les concepteurs des équipes transverses à surmonter les tensions de la marque, cognitives et organisationnelles rencontrées pendant les processus de conception d'objets innovants.
Principales implications managériales :	Les managers peuvent s'inspirer de notre démarche pour formaliser et partager leur propre patrimoine de création et ainsi utiliser la gestion de connaissances de marque afin de souder les équipes transverses marketing-R&D.
Perspectives :	Tester la validité de notre approche sur des connaissances au-delà du patrimoine de marque : connaissances des consommateurs, d'anciens projets.

Deuxieme article - Patrimoine de Creation : piloter la generativite grace aux structures de connaissance dans les industries creatives. Apprentissages de la haute cuisine

Le premier article nous a permis de mettre en évidence l'existence d'une pratique originale de transmission de connaissances, pouvant favoriser l'originalité et l'efficacité organisationnelle des collectifs de concepteurs dans le secteur du luxe : la transmission d'un patrimoine de création. Il nous a aussi laissé aussi entrevoir que pour favoriser ces effets génératifs, un patrimoine de création doit posséder certaines propriétés intrinsèques particulières. Ce deuxième article tente de caractériser ces attributs.

La connaissance semble jouer un rôle paradoxal sur les processus de conception (Weisberg, 1999). En effet, dans certains cas elle semble être disjointe du raisonnement génératif (Guilford, 1950; Torrance, 1974), dans d'autres cas elle semble avoir des effets négatifs sur la générativité comme les effets de fixation (Crilly, 2015; Jansson and Smith, 1991; Purcell and Gero, 1996) et dans d'autres cas elle semble favoriser la générativité (Brun et al., 2016; Hatchuel et al., 2013; Hatchuel and Weil, 2007). Ainsi, quand un concepteur expérimenté souhaite transférer ses connaissances pour la conception à un concepteur récepteur, comment peut-il s'assurer que celles-ci provoqueront un certain niveau de générativité ?

La littérature en conception suggère que le transfert de connaissances d'un concepteur source à un concepteur récepteur peut provoquer plusieurs formes de générativité. Le concepteur source peut apprendre à son récepteur comment sélectionner des objets préconçus qui s'adaptent à une situation particulière, comme la sélection d'une pompe qui s'adapte au transfert d'eau en milieu industriel (Larralde and Ocampo, 2010a, 2010b). Il peut aussi enseigner la manière de chercher dans des bases de connaissances préétablies et de recombiner ces connaissances afin de

concevoir de nouveaux objets, comme la sélection des composants qui conformeront une roue hydraulique qui s'adapte à un flux et à une chute d'eau déterminés (Le Masson and Weil, 2013; Redtenbacher, 1874). Il peut aussi transmettre des manières de repérer les carences cognitives, de produire de nouvelles connaissances afin d'étendre les bases préexistantes pour ensuite combiner les anciennes et nouvelles connaissances afin de générer de nouveaux objets, comme l'apprentissage de nouvelles fonctions et les principes de stockage d'énergie pour la conception de machines (Le Masson and Weil, 2013; Pahl et al., 2007b). Finalement, le concepteur source peut apprendre à ses récepteurs à créer de nouveaux vides de connaissances et à les remplir pour repousser les limites de la connaissance actuelle, comme l'apprentissage de la création de nouveaux styles dans l'art ou dans le design industriel (Itten, 1973, 1975, Klee, 1966, 2004; Le Masson, Hatchuel and Weil, 2016). En outre, les avancées récentes en théories de la conception suggèrent que la générativité est associée aux structures de connaissances. (Brun et al., 2016, 2018; Hatchuel et al., 2013; Le Masson, Hatchuel and Weil, 2016; Le Masson and Weil, 2013). Toutefois, la relation entre ces différentes formes de générativité et les structures de connaissances restent peu connues à ce jour. Mieux connaître cette relation permettrait aux concepteurs souhaitant transmettre un patrimoine de création de piloter la générativité provoquée par la transmission de connaissances.

Ainsi, l'objectif de cette recherche est d'éclaircir le rôle des connaissances sur la générativité ainsi que la relation existante entre la structure de connaissances transmise et les types de générativité. Pour atteindre cet objectif, nous avons procédé en deux étapes. Tout d'abord, nous avons mobilisé le cadre conceptuel des théories de la conception afin de modéliser formellement un patrimoine de création. Ensuite, nous avons validé empiriquement ce modèle en utilisant les patrimoines de création explicités par des chefs cuisiniers créatifs sous forme de livres destinés à léguer à leurs successeurs des références pour la création en cuisine. Ces livres nous les avons sélectionnés pour le pouvoir génératif qui leur est reconnu par des sociologues, historiens et experts de la cuisine.

Nous avons conceptualisé un patrimoine de création comme étant composé non seulement de connaissances mais aussi de concepts, un langage du connu et un

langage de l'inconnu, et pouvant provoquer 4 types de générativité différentes : G0 - la sélection, G1 - la consultation et combinaison, G2 – la combinaison et l'apprentissage et G3 – la création de vides. Nous avons associé à chacune de ces générativités une structure de connaissance différente. En outre, nous avons mis en évidence ces 4 types de générativité et des structures de connaissance dans les patrimoines de création de la cuisine. Nous avons aussi pu constater qu'un même patrimoine de création peut contribuer à provoquer en même temps les 4 types de générativité, et qu'elles ne sont pas incompatibles. Nous avons aussi vu que le type de générativité supporté par le patrimoine de création semble se déplacer dans le temps avec les plus anciens livres favorisant les générativités de type G0 et G1 et les plus récents favorisant principalement les générativités G3 et G4.

Ces contributions permettent d'expliquer le fait que les résultats antérieurs concernant l'effet de la connaissance sur la générativité soient peu concluants. En effet, le niveau de lecture du patrimoine de création, de sa structure, peut expliquer pourquoi la connaissance peut fixer ou défixer. En outre, nous contribuons à la littérature en gestion de connaissances en caractérisant les propriétés d'un patrimoine de création permettant de renouveler les espaces de conception à l'intérieur d'un domaine.

Le Tableau I-2 récapitule la synthèse du deuxième article.

Tableau I-2. Synthèse du deuxième article

Article	Patrimoine de Création : piloter la générativité grâce aux structures de connaissance. Apprentissages de la haute cuisine
Question de recherche :	Quelles sont les formes de patrimoine de création et les types de générativité associées ? Peut-on trouver une variété de formes de générativité dans un même domaine ? Ces générativités sont-elles compatibles ?
Connaissances actuelles :	Le rôle des connaissances sur la générativité est un peu paradoxal : certains ne s'expriment pas, certains trouvent des effets positifs et d'autres des effets négatifs. La transmission de connaissances peut favoriser des types de générativité différents : Sélection (Larralde and Ocampo, 2010a, 2010b). Consultation et combinaison (Le Masson and Weil, 2013; Redtenbacher, 1874). Combinaison et apprentissage (Le Masson and Weil, 2013; Pahl et al., 2007b). Création de vides (Itten, 1973, 1975, Klee, 1966, 2004; Le Masson, Hatchuel and Weil, 2016). Ces différentes générativités semblent être dues à la structure de connaissances.
Connaissances manquantes :	Nous ignorons si un même domaine/patrimoine de création peut provoquer en même temps des formes de générativité ouvertes et closes. Nous ignorons quels types de structure de connaissance existent, et comment différentes structures de connaissance peuvent piloter la générativité.
Objectif de Recherche :	Eclaircir le rôle des connaissances sur la générativité. Eclaircir le pouvoir des structures de connaissance sur le pilotage de la générativité.
Cadre Théorique :	Théories de la conception : théorie C-K.
Matériau :	Livres de cuisine rédigés entre le XVII^{e} et le XXI^{e} siècles sélectionnés grâce au travail des sociologues et historiens, ainsi qu'au conseil d'experts en gastronomie.
Méthode :	Modélisation d'un patrimoine de création à l'aide de la théorie C-K et de son utilisation par les concepteurs récepteurs. Validation empirique grâce à l'étude des patrimoines de création de la cuisine : Sélection de livres dont les auteurs revendiquent un patrimoine de création et recherche de verbatims.
Principaux résultats :	Nous avons élucidé 4 types de générativité : G0 : sélection ; G1 : criblage et combinaison ; G2 : combinaison et apprentissage en K ; G3 : création de vides. Un même domaine peut contenir les 4 types de patrimoine de création. Le type de générativité provoqué semble être lié au type de structure de connaissances. Un même patrimoine de création peut contribuer à provoquer les 4 types de générativité. La générativité se déplace à travers le temps pour augmenter en niveau.
Principales implications académiques :	Les résultats antérieurs n'étaient pas concluants car ils ne tenaient pas compte de l'existence de structures de connaissance différentes. Nous pouvons comprendre la capacité d'un concepteur récepteur à être plus ou moins génératif comme un effet du niveau de lecture du patrimoine.
Principales implications managériales :	Les concepteurs expérimentés, souhaitant transmettre leur patrimoine de création peuvent s'inspirer de notre démarche pour concevoir les outils et les méthodes de transmission de connaissance en fonction du type de générativité à favoriser. Les managers peuvent utiliser ce cadre pour analyser leurs pratiques en place et comprendre les types de générativité de leurs concepteurs.
Perspectives :	Caractériser plus en profondeur les types de structures de connaissance. Réconcilier avec la littérature en méthodes non-verbales de conception.

Troisieme article – Creer un Patrimoine de Creation : Comment les individus creatifs exteriorisent les regles permettant aux recepteurs d'etre plus generatifs ?

Ayant montré le rôle positif de la transmission d'un patrimoine de création sur la générativité des récepteurs, et ayant caractérisé ses propriétés intrinsèques, il nous a semblé approprié de nous intéresser au processus de conception d'un patrimoine de création. Ainsi, ce troisième article étudie la manière dont le concepteur source conçoit et transmet au concepteur récepteur un patrimoine de création.

La littérature classique en gestion de la connaissance alerte sur l'importance de gérer à la fois des connaissances tacites et des connaissances explicites (Nonaka and Takeuchi, 1995; Polanyi, 1966). Elle nous indique que l'extériorisation de connaissances contribuerait à rendre plus facilement accessibles des métaphores, des analogies et des modèles de pensée qui seraient utiles pour la création (Akbar and Tzokas, 2013; Nonaka, 1994; Nonaka and Takeuchi, 1995). Toutefois, l'extériorisation de connaissances de la source n'est pas suffisante. La connaissance doit aussi être socialisée et intériorisée par les récipients afin de provoquer la nouveauté (Schulze and Hoegl, 2006, 2008). En outre, les auteurs ayant étudié les communautés de connaissance argumentent que la connaissance est produite, partagée et assimilée dans l'action, au fur et à mesure que les membres d'une communauté s'impliquent dans des pratiques socioculturelles (Brown and Duguid, 1991, 2011; Lave and Wenger, 1991; Wenger, 1998).

Cela voudrait dire que l'extériorisation par le concepteur source, la socialisation avec le concepteur récepteur, et l'intériorisation par le concepteur récepteur suffirait à transmettre un patrimoine de création. Or, dans les articles précédents, nous avons montré qu'un patrimoine de création est composé à la fois par un langage du connu et par un langage de l'inconnu, et que ce dernier est composé à partir d'éléments du premier. Par ailleurs, la littérature classique de gestion de connaissances ne tient pas

compte de la manière dont les connaissances sont mobilisées pendant les processus de conception et les dynamiques d'apprentissage qui en découlent, de même que l'effet de la structuration de connaissances sur la génération de la nouveauté (Brun et al., 2016, 2018; Hatchuel et al., 2013). Mieux comprendre la nature des connaissances transmises et les processus par lesquels les concepteurs source et récepteur interagissent pour transmettre un patrimoine de création permettrait de mieux piloter les processus et éviter des écueils, comme la pétrification du patrimoine.

L'objectif de cet article est de comprendre le processus de transmission d'un patrimoine de création d'un concepteur source à un concepteur récepteur. Pour atteindre cet objectif, nous avons mené une étude longitudinale chez Dom Pérignon, dans laquelle nous avons participé au programme de gestion de connaissances « Decoding Dom Pérignon - Patrimoine de Création Dom Pérignon ». Ce programme cherchait à concevoir une nouvelle formalisation pour le patrimoine de création de la marque, à le transférer à partir d'individus créatifs à d'autres concepteurs, et à concevoir de nouvelles expériences pour le consommateur. Nous avons caractérisé quatre formes de patrimoine de création expérimentées par l'équipe pendant le programme ainsi que les projets de conception d'expériences. Nous avons complémenté notre collecte de données par des entretiens semi-structurés avec les membres du programme et avec le chef de cave pour identifier les raisons d'acceptation ou de refus de chaque forme de patrimoine de création. Ainsi, nous avons caractérisé les langages du connu et de l'inconnu contenus dans chaque essai de formalisation du patrimoine de création.

Grâce à ce dispositif expérimental nous avons pu déterminer que le processus de transmission d'un patrimoine de création va au-delà de l'extériorisation et du partage de connaissances de la part d'un concepteur source. Il s'agit plutôt d'un processus de conception où les concepteurs source et récepteur interagissent pour formaliser, réorganiser et partager un langage du connu et un langage de l'inconnu. En outre, notre étude montre que la structure du patrimoine de création reflète la structure de l'organisation de conception. Cette dernière, diffère de la structure inscrite dans les organigrammes de l'organisation. Dans le cas de Dom Pérignon, le chef de cave, est au centre de cette structure en tant que créatif, et les œnologues et marketeurs

forment un deuxième cercle de concepteurs, s'étendant jusqu' aux consommateurs qui vivent une expérience de la marque.

Nous contribuons à la littérature en au moins trois aspects : Tout d'abord, nous enrichissons la littérature en gestion de connaissances en décrivant la nature duale de la connaissance qui doit être extériorisé pour favoriser la générativité des concepteurs à l'intérieur d'un domaine, ce qui nous permet de revisiter le rôle des ressources cognitives dans la littérature en communauté de connaissances. Deuxièmement, nous étoffons la littérature en transmission de connaissances en montrant que cette transmission pour la générativité nécessite la recherche d'espaces de conception, qui servent d'espaces d'exploration et d'apprentissage et qui permettent d'ajuster la générativité de la connaissance transmise. Finalement, nous étendons la littérature en sciences de gestion en montrant que la « mirroring hypothesis » peut s'étendre à l'organisation de conception.

Le Tableau I-3 récapitule la synthèse de cet article

Tableau I-3. Synthèse du troisième article

Article	**Créer un Patrimoine de Création : Comment les individus créatifs extériorisent les règles permettant aux récepteurs d'être plus génératifs ?**
Question de recherche	Comment un patrimoine de création est-il conçu ? Comment créatifs et concepteurs interagissent-ils pour construire un ensemble de règles transférables permettant au récepteur de bénéficier de la générativité des sources ?
Connaissances actuelles	L'extériorisation de connaissances peut avoir des effets positifs sur la capacité de conception des récepteurs des connaissances. Or, l'extériorisation ne suffit pas : les sources et récipients doivent socialiser et intégrer. Un patrimoine de création est composé d'un langage du connu et d'un langage de l'inconnu. Ce dernier est composé à partir du langage du connu. La restructuration de connaissances permet d'augmenter la générativité des concepteurs. La structure des produits a tendance à refléter la structure organisationnelle
Connaissances manquantes	Nous ne connaissons pas bien les particularités de l'extériorisation et de la socialisation d'un patrimoine de création Nous ne connaissons pas bien le type de structure organisationnelle reflétée
Objectif de Recherche	Eclaircir la manière dont les individus créatifs construisent un patrimoine de création permettant d'augmenter la capacité de conception des récepteurs
Cadre Théorique	Théories de la conception Gestion de connaissances et organisation Transfert de connaissances Communautés de savoir
Matériau	Projet de conception d'une nouvelle forme pour le patrimoine de création de la marque Dom Pérignon. Transmission de connaissances de la marque d'individus créatifs à d'autres concepteurs.
Méthode	Etude longitudinale du projet de conception. Entretiens semi-dirigés avec les individus créatifs et les participants au projet
Principaux résultats	La transmission d'un patrimoine de création ne se limite pas à l'extériorisation et au partage de la connaissance des concepteurs source. Il s'agit plutôt d'un processus de conception dans lequel les concepteurs source et récepteur formalisent, réorganisent et partagent un langage du connu et un langage de l'inconnu. Un patrimoine de création reflète l'organisation de conception qui lui est associée. Cette structure organisationnelle peut différer des structures formelles décrites dans les organigrammes.
Principales implications académiques	La nature des connaissances formalisées (langage du connu et de l'inconnu) nous permet de revisiter les ressources cognitives des communautés de connaissances, comme les répertoires partagés et les « codebooks ». Extension de la « mirroring hypothesis » à l'organisation de conception.
Principales implications managériales	Les managers souhaitant concevoir et transmettre leur patrimoine de création peuvent s'appuyer sur notre recherche afin de piloter les phases d'extériorisation, de restructuration et d'expérimentation
Perspectives	Etudier la conception d'un patrimoine de création permettant de concevoir des objets techniques. Etudier la validité de nos résultats sur d'autres industries créatives où le rôle du créatif est plus distribué

Discussion Et Conclusion

1. Contributions

Cette thèse prétend atteindre deux objectifs : Tout d'abord, d'un point de vue théorique, d'éclaircir le rôle de la transmission de connaissances sur la générativité des concepteurs en répondant à trois questions de recherche : QR1 – Comment un patrimoine de création peut-il aider les collectifs de concepteurs dans l'industrie du luxe à surmonter les tensions qu'ils rencontrent lors des projets d'innovation ? QR 2 - Quelles sont les formes de patrimoine de création et les types de générativité associés ? et QR 3 - Comment un patrimoine de création est-il conçu ? Comment créatifs et concepteurs interagissent-ils pour construire un ensemble de règles transférables permettant au récepteur de bénéficier de la générativité des sources ?

Ensuite, et de manière plus pratique, l'objectif était d'apporter à Dom Pérignon des éléments pour piloter la transmission et le partage de son propre patrimoine de création afin de favoriser la création de nouvelles expériences en accord avec la singularité de la marque.

Dans cette thèse nous avons conceptualisé la notion de patrimoine de création. Nous l'avons définie comme un ensemble de concepts et de connaissances qui est transmis d'un concepteur source à un concepteur récepteur et qui permet de favoriser la générativité de ce dernier. Ce patrimoine de création contribue à la conception innovante dans l'industrie du luxe et aide à surmonter les tensions de la transmission intergénérationnelle des connaissances ainsi que la distribution géographique des capacités de conception.

Nous avons montré comment dans les industries du luxe la formalisation et la transmission d'un patrimoine de création à une équipe transverse de concepteurs peut avoir un triple effet bénéfique sur les projets d'innovation : 1- il favorise la naissance de projets qui sont à la fois innovants et en cohérence avec l'identité de marque, 2- il favorise la défixation des équipes et la convergence dans le processus de conception

et finalement 3- il favorise la coopération entre les différents membres de l'équipe et leur intégration au reste de l'organisation. Cela se traduit par un gain en originalité et en efficacité opérationnelle des projets d'innovation.

Nous avons aussi décrit les caractéristiques formelles d'un patrimoine de création. Nous avons mis en évidence qu'il est constitué par un langage du connu et par un langage de l'inconnu et que ce dernier est composé à partir d'éléments du premier. Nous avons mis en évidence quatre types différents de générativité : 1- sélection, 2-consultation et combinaison, 3- combinaison et création de connaissances et 4 – création de vides. A chaque type de générativité, nous avons associé une structure dans les espaces des concepts et des connaissances. Nous avons montré qu'un même domaine, comme c'est le cas pour celui de la cuisine, peut contenir les quatre types de générativité. En outre, nous avons montré que les quatre types de générativité sont compatibles et peuvent être provoqués par un même patrimoine de création. Et finalement, nous avons pu montrer que dans le domaine de la cuisine, la générativité, provoquée par les patrimoines de création, a évolué à travers le temps pour atteindre un niveau de plus en plus élevé.

Finalement, ayant démontré l'intérêt d'un patrimoine de création et ses principales caractéristiques, nous avons élucidé que la transmission d'un patrimoine de création est un processus de conception dans lequel concepteurs source et récepteur interagissent, afin de formaliser, réorganiser et partager un langage du connu et un langage de l'inconnu. Nous avons montré qu'au-delà de l'effort nécessaire d'explicitation et de partage entre les concepteurs source et récepteur, la conception d'un patrimoine de création implique la restructuration de l'espace de connaissances et de concepts afin de favoriser des générativités de plus en plus élevées. Cette restructuration est le fruit de l'appropriation et de l'expérimentation du pouvoir génératif du patrimoine de création grâce à l'espace d'apprentissage créé par les projets d'innovation. En outre, nous avons pu constater que le patrimoine de création contient un modèle explicite de l'organisation de conception qui peut différer de la structure formelle de l'organisation.

2. Implications académiques

Nous contribuons à enrichir la littérature en gestion de marques de luxe, la littérature en sciences de la conception et la littérature en sciences de gestion.

2.1. Apports à la littérature en gestion de marques de luxe

Premièrement, la conceptualisation de la notion de patrimoine de création nous permet de revisiter et d'étendre la notion d'identité de marque d'au moins trois manières :

Tout d'abord, la définition traditionnelle de l'identité de marque, faisant référence à tous les attributs tangibles et intangibles qui définissent la marque et qui font d'elle une entité unique (Bastien and Kapferer, 2012; Kapferer, 2008), considère l'identité de marque comme constituée seulement de connaissances (Richards et al., 1998). Notre définition d'un patrimoine de création suggère que la capacité à provoquer la générativité chez les concepteurs qui assimilent cette identité réside en réalité dans sa structure à double nature : pour que l'identité de marque soit source de générativité, elle devrait être composée d'un espace de connaissances et d'un espace de concepts, d'un langage du connu et d'un langage de l'inconnu, rendant explicites la structure des objets, les critères de valeur, les connaissances manquantes et les principes de progrès.

Par ailleurs, l'identité de marque est vue dans la littérature en marketing comme un ensemble de connaissances qui permettent de *valider* si de nouveaux objets, de nouveaux produits, services et expériences créés par les concepteurs de l'organisation sont cohérents avec la marque (Albrecht et al., 2013; Gutsatz, 2001; Kapferer, 2008; Keller, 2013; Monga and John, 2010; Moon and Sprott, 2016; Völckner and Sattler, 2006). Or, cette littérature ne renseigne pas le concepteur sur les règles et raisonnements de conception qu'il peut suivre pour créer de nouveaux objets intègres et cohérents avec l'identité de marque. Un patrimoine de création encode, au-delà des critères de validation, les raisonnements de conception qui permettent de

transformer les facettes et les structures de la marque. Ce même patrimoine de création contient non seulement des connaissances mais aussi des concepts qui dirigent le concepteur vers les champs de connaissance qui doivent être explorés afin de contribuer à la redéfinition de l'identité de marque. Cette vision du patrimoine de création permet de mieux saisir la vision récente de l'identité de marque comme étant une notion dynamique et évolutive (da Silveira et al., 2013; von Wallpach et al., 2016).

Finalement, la littérature décrit la formalisation de l'identité de marque comme un exercice d'explicitation des critères les plus importants de la marque (comme sa personnalité, ou son physique) (Kapferer, 2008; Michel, 2013). Nous arguons que pour favoriser la générativité d'un patrimoine de création et d'une identité de marque, une nouvelle approche est nécessaire. Ainsi la codification d'un patrimoine de création requiert d'adopter une démarche de conception afin de rendre tangibles les langages de description et les langages de conception propres à la marque, ce qui implique la restructuration des connaissances et nécessite des espaces d'apprentissage qui permettent aux concepteurs de tester les raisonnements génératifs et d'ajuster la générativité associée au patrimoine de création.

Deuxièmement, nous contribuons à la littérature en gestion de marques de luxe en décrivant les mécanismes organisationnels qui permettent au patrimoine d'être un générateur de nouveautés. En effet, la littérature reste limitée sur la manière dont les concepteurs mettent en place au sein des organisations de luxe des projets innovants basés sur le patrimoine, ou se concentre sur des manifestations spécifiques comme les musées et les expositions (Briot, 2014; Clais, 2002). Ainsi, nous proposons, afin que le patrimoine soit source de création, une nouvelle forme d'organisation pour la conception et l'innovation dans l'industrie du luxe. Cette organisation est basée d'abord sur un étagement de la création entre créatifs et concepteurs et puis sur la transmission du patrimoine de création des créatifs aux concepteurs. Cette transmission repose sur deux types d'activités : la conception du patrimoine de création et la conception de nouveaux objets. Ces deux activités sont complémentaires car elles se nourrissent mutuellement : la conception de nouveaux objets agit comme

un champ d'exploration et d'apprentissage pour tester la générativité du patrimoine de création. Quant à la formalisation et la restructuration du patrimoine de création, elle rend explicite les facettes de la marque, les structures et les critères de validation assurant l'intégrité des objets nouveaux.

2.2. Apports à la littérature en sciences de la conception

Nous contribuons à la littérature en gestion des équipes pour l'innovation en montrant que, pendant leur exploration de l'inconnu, le processus de transmission d'un patrimoine de création permet aux membres de fonctions diverses de se construire une vision commune et un système de valeurs partagés. Certains auteurs ont argumenté qu'une vision partagée, des valeurs et des objectifs communs permettent aux membres d'une organisation d'échanger plus facilement des ressources comme la connaissance et de s'engager dans des efforts d'innovation (Tsai and Ghoshal, 1998; Van Wijk et al., 2008). De manière similaire, d'autres auteurs ont montré que le partage de modèles mentaux au sein d'une équipe (Mohammed and Dumville, 2001) et d'une « compréhension croisée » (Huber and Lewis, 2010) favorisent l'apprentissage et la performance des équipes. Toutefois, nos résultats suggèrent que c'est la transmission du patrimoine de création et l'exploration de son pouvoir génératif grâce à des projets innovants qui permettent aux équipes de générer ces modèles mentaux et la compréhension des modèles des autres membres de l'équipe.

Nous contribuons aussi à la littérature en conception et développement de nouveaux produits en mettant en évidence la façon dont de nouveaux objets peuvent être générés par les connaissances de la marque. Certains auteurs ont montré que l'explicitation de la vision de la marque peut contribuer à la génération de nouveaux produits (Nonaka and Takeuchi, 1995). Nos résultats suggèrent que la formalisation et le transfert de connaissances du patrimoine de création de la marque peut contribuer à générer des concepts expansifs qui revisitent l'identité des objets à concevoir. Ces résultats sont en accord avec les recherches d'autres domaines tel que le biomimétisme qui défendent que le transfert de connaissances issues du domaine

biologique vers le domaine de l'ingénierie provoque la partition expansive de l'espace de concepts (Salgueiredo and Hatchuel, 2016).

L'effet positif du patrimoine de création sur la coopération et l'intégration des équipes transverses nous permet d'étendre la littérature en sciences de la conception ainsi que la littérature sur la gestion des connaissances entre frontières (Brown and Duguid, 2000; Carlile, 2002, 2004; Wenger, 1998). La formalisation et le partage du patrimoine de création présentent et décrivent le processus de conception d'un objet frontière qui permet de surmonter les barrières syntaxiques, sémantiques et pragmatiques entre les fonctions R&D et Marketing. En effet, grâce au travail sur le patrimoine de création de la marque, ces deux fonctions sont capables de parler une même langue, de donner le même sens à des mots nouveaux et de s'accorder sur l'importance d'explorer un inconnu désirable comme dans la conception de « l'application idéal esthétique de Dom Pérignon ».

En identifiant la compatibilité de quatre types de générativité qui semblaient antagonistes, nous contribuons à clarifier un débat longtemps resté ouvert concernant le rôle des connaissances sur la générativité. En effet, plusieurs auteurs ont apporté que la connaissance peut nuire ou favoriser la générativité (Brun et al., 2016, 2018; Crilly, 2015; Hatchuel et al., 2013; Jansson and Smith, 1991; Purcell and Gero, 1996). Ces travaux avaient prouvé que la structure de connaissances pouvait provoquer soit une générativité faible (comme quand la structure ne satisfaisait pas la condition splitting) soit une générativité élevée (comme quand la structure satisfaisait la condition splitting) (Brun et al., 2016, 2018; Hatchuel et al., 2013; Hatchuel and Weil, 2007; Le Masson, Hatchuel and Weil, 2016). Nos travaux suggèrent que les niveaux de faible générativité et les effets de fixation sont probablement provoqués par des patrimoines de création ne favorisant que des générativités de type G_0 ou G_1. La défixation et des niveaux élevés de générativité sont probablement provoqués par des patrimoines de création favorisant des générativités de type G_2 et G_3. Toutefois, nous argumentons que le niveau de connaissances du concepteur récepteur peut jouer un rôle important sur la générativité provoquée par la transmission : les facettes, les structures, les critères de valeur, les connaissances manquantes et les principes de progrès ne se présentent pas nécessairement de manière explicite dans les

patrimoines de création. Ainsi, ce sont probablement les connaissances préalables du concepteur récepteur qui lui permettront de lire le patrimoine de création à plusieurs niveaux et de classifier les propositions transmises par le concepteur source comme étant des concepts ou connaissances.

Par ailleurs, le double langage (du connu et de l'inconnu) d'un patrimoine de création peut être transposé aux processus de réduction en art et de codification des savoirs. La réduction en art est le fait de rassembler un savoir qui est épars, de le mettre par écrit, de l'organiser et de l'abréger, et de le diffuser à un grand nombre (Vérin, 2008). Or, la codification nécessaire à la réduction en art est souvent comprise comme antagoniste de l'invention. Et pour cause, pour le concepteur qui reçoit le savoir réduit en art, l'un des pièges est de se retrouver dans une logique de conception qui se limite à la sélection de la « meilleure alternative » (ce que nous avons appelé G_0 voire G_1). Toutefois, en mettant en évidence l'existence de deux langages, celui de la description et celui de la conception, comme étant les composantes d'un patrimoine de création, et en montrant comment leur interaction peut favoriser des générativités élevées, nous donnons aux concepteurs source et récepteur les clés pour piloter des codifications qui soient sources de générativité.

Nous pouvons interpréter la formalisation d'un patrimoine de création dans les industries du luxe comme la constitution d'une démarche de conception réglée. La littérature en sciences de la conception a déjà mis en évidence ce type de dynamique dans le cas de l'ingénierie (Le Masson and Weil, 2010, 2013). Nous présentons pour la première fois ce type de démarche dans un domaine en dehors de l'ingénierie et ainsi contribuons à la littérature en sciences de la conception.

Notre connaissance des caractéristiques du patrimoine de création nous permet d'identifier dans certains travaux de recherche des efforts de conception de nouveaux patrimoines de création au-delà du secteur du luxe : Ainsi, par exemple, nous pouvons voir dans les recherches de Mossé, (2018) les fondements d'un patrimoine de création. En effet, nous y identifions de nouvelles facettes (qui constituent autant de vides de connaissance) comme les matériaux actifs, ou encore les principes de progrès tel que la résilience de la maison. Grâce aux langages de la temporalité, qui jouent le rôle du

langage de l'inconnu, l'auteur offre à ces lecteurs des nouveaux espaces de conception leur permettant de repenser la maison comme une entité interconnectée avec son environnement.

Finalement, la description que nous faisons de la manière dont concepteurs sources et récepteurs conçoivent un patrimoine de création fait écho dans la littérature stipulant que lors du transfert de connaissances, il ne suffit pas de transférer un objet immuable mais qu'au contraire les récepteurs doivent adapter cette connaissance (Ansari et al., 2014; Majchrzak et al., 2004; Williams, 2007). Toutefois, dans le cas de la transmission d'un patrimoine de création nous montrons que cette adaptation est plus concrètement un mécanisme de restructuration guidé par les espaces d'apprentissage ouverts par les projets innovants.

2.3. Apports à la littérature en sciences de gestion

Cette thèse nous a permis de mettre en lumière le processus de conception d'un nouvel « objet » managérial et elle s'inscrit dans la lignée de travaux de chercheurs comme David, (2013, 2018). En effet, David considère que les idées et techniques du management sont des « objets à concevoir » par opposition à des « concepts naturels » (David, 2018). Il nous invite à penser l'innovation managériale comme un processus de conception. En reprenant la typologie proposée par ce même auteur (David, 1996), nous pourrions donc classifier la notion de patrimoine de création comme étant une innovation de typologie mixte car elle formalise à la fois des savoirs et des relations : D'un côté, sur le plan de la connaissance, le patrimoine de création cherche à formaliser, réorganiser et transmettre les langages du connu et de l'inconnu. D'un autre côté, le patrimoine de création rationnalise les relations entre acteurs car nous avons vu que sa conception nécessite aussi de penser de nouvelles formes d'organisations et d'interactions entre les sources et les récepteurs du patrimoine de création.

Nous apportons un nouveau regard sur la manière dont la gestion et la transmission de connaissances peuvent servir aux projets d'innovation. Même si

plusieurs auteurs ont rapporté des effets positifs de la gestion de connaissances sur les capacités d'innovation des organisations (Darroch, 2005; Gloet and Terziovski, 2004; Rhodes et al., 2008; Wang and Wang, 2012), il s'agit, pour la plupart de modèles de boite noire qui négligent l'effet des processus de conception sur l'innovation. Nous contribuons à relier les champs de littérature de la gestion de connaissances et de la conception en élucidant, d'une part, les mécanismes de restructuration et d'expérimentation liés à la transmission d'un patrimoine de création, et d'autre part l'effet d'un patrimoine de création sur le renouvellement de l'identité des objets.

De plus, nous apportons de nouveaux descripteurs des connaissances pouvant faciliter le succès d'un transfert de connaissances pour l'innovation. La littérature a mis en exergue plusieurs facteurs pouvant agir sur le succès de la transmission de connaissances (Argote and Fahrenkopf, 2016; Argote and Ingram, 2000; Kogut and Zander, 1992; Szulanski, 1996, 2000). Toutefois, la plupart de ces recherches se sont concentrées sur la transmission de bonnes pratiques (Szulanski, 1996, 2000; Szulanski et al., 2014). En considérant la structure de connaissances comme étant une des caractéristiques des connaissances à transmettre ayant un impact sur la générativité, nous ouvrons une piste pour des développements futurs.

Nous complémentons les modèles de transfert de connaissances en proposant une étape qui avait été négligée dans la littérature. Les modèles classiques de transfert de connaissances décrivent une étape d'adaptation (Szulanski, 1996) ou d'intégration (Nonaka et al., 2000; Nonaka and Takeuchi, 1995) de connaissances pendant le transfert. Or, nos résultats suggèrent que pour que le patrimoine de création provoque une générativité chez son récepteur, son pouvoir génératif doit être expérimenté dans l'action grâce à des espaces d'apprentissage comme des projets d'innovation.

Finalement, l'étude de l'effet génératif du patrimoine de création, nous permet d'éclaircir la manière dont les cartes de connaissance influencent la création de nouvelles connaissances. La littérature en gestion de connaissances a mis en évidence l'importance des cartes de connaissance en tant qu'indicateurs de la connaissance tacite et de la connaissance à acquérir (Burnett et al., 2013; Eppler,

2008). Nos résultats confirment ces affirmations. Toutefois, nous ajoutons que les cartes de connaissances peuvent parfois permettre de mettre en évidence un manque et que dans ce cas-là, elles permettent d'amorcer la création de nouvelles connaissances. De cette manière, deux types de création de connaissances peuvent être initiés : Premièrement, les vides identifiés peuvent être dus à des connaissances difficiles à expliciter, possédées par les concepteurs source. Donc, ces connaissances pour être assimilées, doivent être créés à nouveau par les concepteurs récepteurs par le biais d'une expérimentation. C'est le cas par exemple de la compréhension du sens du mot « tactile » pour Dom Pérignon qui exige du concepteur récepteur d'expérimenter une dégustation comparative de Dom Pérignon avec l'un de ses concurrents. Deuxièmement, les vides identifiés peuvent être dus à des connaissances qui n'existent ni chez le concepteur source, ni chez le concepteur récepteur. Ces connaissances sont des concepts au sens de la théorie C-K et représentent des pistes d'exploration pour les concepteurs récepteurs. C'est le cas par exemple du concept « Application Idéal Esthétique Dom Pérignon » ou « Vidéo Elaboration Dom Pérignon ».

3. Implications empiriques

Nos résultats et nos contributions académiques suggèrent plusieurs implications empiriques pour les gestionnaires de l'industrie du luxe et autres industries créatives.

Nous mettons en évidence que le patrimoine de création peut avoir un effet positif sur la nouveauté. Ceci nous permet de suggérer aux manageurs que gérer un patrimoine de création afin de provoquer la nouveauté implique de considérer le patrimoine tant comme un réservoir de connaissances que comme un réservoir à concepts. Cet ensemble de concepts et des connaissances du patrimoine contient une ample gamme d'inconnus désirables, des embryons d'idées pour des nouveaux produits, services et expériences que les managers peuvent exploiter.

Nos résultats indiquent que les équipes transverses participant à la formalisation et au partage d'un patrimoine de création voient leur générativité augmenter tout en

gardant une cohérence avec l'identité de la marque. Ainsi, les managers souhaitant améliorer la générativité et la coopération de leurs équipes transverses pourraient s'inspirer de notre étude pour initier des plateformes de conception de leur propre patrimoine de création. Leurs équipes seraient amenées à réaliser deux activités en parallèle : tout d'abord, formaliser les caractéristiques idiosyncratiques de leurs marques en décrivant leurs facettes, leurs structures d'objets, leurs critères de valeur, leurs vides de connaissance, leurs principes de progrès ainsi que leurs raisonnements de conception ; deuxièmement, expérimenter la générativité de cette configuration grâce à la conduite de projets d'innovation basés sur la forme actuelle de leur patrimoine de création. Ces managers devront prendre en compte les écueils liés au temps nécessaire pour mener à bien ces activités. En effet, extérioriser la connaissance existante dans les esprits des concepteurs source et expérimenter la générativité des formes intermédiaires du patrimoine de création sont des étapes chronophages mais nécessaires tant elles permettent aux concepteurs récepteurs de s'approprier le patrimoine de création.

Dans les industries créatives, telles que celles des jeux vidéo et de la littérature, le patrimoine joue un rôle tout aussi important que dans l'industrie du luxe. Par conséquent, nous suggérons que nos implications sont aussi applicables à cette industrie. Certaines fois, le consommateur connaît mieux l'identité de l'objet que le concepteur lui-même. Et pourtant, ce même consommateur s'attend à ce que chaque nouvelle création, que ce soit un livre, un jeu vidéo, ou une bande son, le surprenne, lui offre de nouvelles émotions tout en restant cohérent avec la saga. La manière de gérer un patrimoine de création que nous décrivons dans cette thèse pourrait inspirer les gestionnaires des industries créatives pour faciliter le travail de créatifs, concepteurs et marketeurs.

Notre description des processus menant à la conception d'un patrimoine de création ainsi que l'identification de ses caractéristiques nous permettent de penser de nouvelles manières de concevoir la formation des futurs concepteurs, que ce soit en école ou en entreprise. Grâce à notre classification en quatre types de générativité, les concepteurs sources (professeurs ou gestionnaires), pourraient mieux structurer leurs programmes de transmission pour cibler un ou plusieurs types de générativité

à transmettre. Ainsi, ils pourraient donner aux récepteurs des leçons sur les méthodes de sélection entre objets, sur la manière de consulter leurs propres bases de connaissances et de recombiner leurs éléments, sur la valeur de combler certains manques de connaissances ou sur les méthodes pour reconstruire leurs bases de connaissances, leurs propres langages et de créer des nouveaux vides de connaissance pour favoriser l'innovation. En s'inspirant de l'apprentissage par problèmes nous pourrions envisager une évolution vers un apprentissage par types de génératívités.

Notre compréhension sur le processus de conception d'un patrimoine de création a aussi des implications sur la conception des programmes de transmission. Ainsi, les nouveaux programmes de formation pourraient tenir compte de la nécessité des concepteurs récepteurs d'expérimenter et de restructurer le patrimoine de création qu'ils assimilent.

4. Limitations et Perspectives de Recherche

Notre étude s'est basée sur deux pans du secteur du luxe bien particuliers qui sont le champagne et la gastronomie, ce qui limite la robustesse de notre étude. Pour la renforcer, il serait intéressant d'expérimenter la conception de patrimoines de création d'autres marques de sous-domaines variés comme la parfumerie ou la maroquinerie. Cela permettrait d'étudier l'effet d'autres facteurs comme le contexte organisationnel, la structure organisationnelle, la culture d'entreprise ou des facteurs liés aux types de produits à concevoir sur la générativité provoquée par le patrimoine de création.

De la même façon, notre recherche s'est concentrée sur la transmission d'un patrimoine de création dans l'industrie du luxe pour la conception de nouvelles expériences. Ce type d'objets est caractérisé par une composante narrative forte qui limite la généralisation de nos résultats à des domaines où cette valeur est moins importante, comme dans les domaines techniques. De futures recherches pourraient considérer la conception et la transmission d'un patrimoine de création dans des

industries comme l'ingénierie mécanique ou l'ingénierie de procédés où l'accumulation de connaissances est importante et où l'enjeu du renouvellement de l'identité des objets est forte (Potier et al., 2015).

Dans notre étude, nous avions un accès limité à l'état initial de la connaissance chez les concepteurs récepteurs, que ce soit les concepteurs de Dom Pérignon ou les chefs cuisiniers. Il serait pertinent d'explorer dans de futures recherches la manière dont la structure de concepts et de connaissances du concepteur récepteur interagit avec la structure de connaissances et de concepts du patrimoine de création et comment cette interaction modifierait la générativité provoquée par la transmission.

Nous avons identifié quatre types de générativité dans le domaine de la cuisine. Ces quatre générativités se retrouvent aussi représentées dans les différents niveaux du patrimoine de création de Dom Pérignon. Cependant, nous n'excluons pas la possibilité de l'existence d'autres types de générativité ainsi que l'existence d'autres structures de connaissances pouvant provoquer les quatre types de générativité décrites. Il serait intéressant de tester notre modèle théorique sur d'autres domaines en dehors du champagne et de la gastronomie comme l'architecture ou le design, voire l'ingénierie, à la recherche de nouvelles structures de connaissance et de nouvelles formes de générativité. En outre, il serait aussi enrichissant de se doter d'un appareil méthodologique fort et automatique (comme les théories de graphes ou la théorie des catégories) afin de caractériser plus finement et plus largement les structures de connaissances.

Dans cette thèse nous nous sommes concentrés sur la formalisation et la transmission d'un patrimoine de création contenant notamment des connaissances et concepts propres à la marque ou propres à un seul domaine comme la cuisine. Nous avons donc négligé l'apport des connaissances et concepts exogènes dans la construction du patrimoine de création. Des recherches futures pourraient intégrer des propositions extérieures comme les connaissances sur le consommateur, des connaissances sur les nouvelles technologies, leurs imaginaires et leur impact sur la générativité du patrimoine de création.

Nous avons étudié le processus de conception d'un patrimoine de création dans lequel les concepteurs sources et récepteurs participaient conjointement à la formalisation, restructuration et expérimentation des connaissances. Nous avons ainsi mis de côté d'autres types de processus de conception de patrimoines de création comme dans le cas de la formation d'entreprise ou dans le cas de l'écriture d'un livre, et où le concepteur source n'interagit pas directement avec le concepteur récepteur. Des études futures pourraient contempler la manière dont les concepteurs source extériorisent leur patrimoine de création pour favoriser un ou plusieurs types de générativité, ainsi que la manière dont les concepteurs récepteurs assimilent ces connaissances quand les deux concepteurs n'interagissent pas directement. Il serait intéressant de suivre l'état de leurs connaissances au départ et l'évolution progressive de leur structure de connaissances.

Nous avons concentré notre étude sur la manière dont les structures de connaissances favorisent une ou plusieurs sortes de générativité. Toutefois, la manière dont l'espace de concepts est structuré pourrait aussi jouer un rôle important sur la générativité. Une future recherche pourrait étudier les effets de la structure de concepts sur la générativité provoquée par le patrimoine de création et la manière dont cette structure se modifie avec l'expérimentation de la générativité du patrimoine de création.

Finalement, la littérature nous a rappelé que lorsque la connaissance devient un obstacle pour la performance, l'oubli devient un mécanisme important pour favoriser les dynamiques d'innovation (Barley et al., 2018; Holan and Phillips, 2004a, 2004b). Il serait ainsi intéressant d'étudier quelle partie de la connaissance doit être oubliée pour pouvoir favoriser certains types de générativité, et comment les théories de la conception et le patrimoine de création peuvent aider à aller dans ce sens.

5. Conclusion Générale

Les concepteurs dans le secteur du luxe ont la grande responsabilité de satisfaire le désir de nouveauté de leurs consommateurs. Pour ce faire, ils doivent sans cesse

renouveler les objets et l'identité de marque tout en gardant une cohérence avec l'esprit insufflé par les créatifs et le patrimoine dans la marque. Ainsi, les concepteurs sur lesquels repose l'enjeu de l'innovation doivent se doter de capacités de conception qui ont permis à leurs prédécesseurs de contribuer au rayonnement de la marque. L'enjeu est donc de transférer un patrimoine qui soit source de création.

Néanmoins, la littérature de la transmission de connaissances, bien que prolifique, s'est surtout concentrée sur la transmission de routines et de bonnes pratiques cherchant la réplication de savoirs précédents. Cette gestion de connaissances patrimoniales, caractérisée par la transmission d'entités et de règles stables, prédispose les concepteurs à répéter le passé, et risquent de voir leurs efforts d'innovation bloqués par des effets de fixation. D'un autre côté, la négation du patrimoine pourrait conduire les concepteurs à l'innovation disruptive, certes, mais qui risquerait d'être délétère pour l'identité de la marque et pour les attentes fortes de ses amateurs.

Cette recherche visait donc à poser les bases pour une meilleure compréhension de la manière dont la transmission de connaissances peut servir à la conception pour l'innovation dans le secteur du luxe. Nous arguons que quand le patrimoine, l'histoire et l'héritage sont vus sous l'angle de la conception, et que ceux qui les reçoivent assimilent les concepts et connaissances idiosyncratiques du patrimoine de création, comme les facettes, les structures, les critères de valeur, les vides de connaissance et les principes de progrès, la transmission de patrimoine favorise la genèse de nouveautés. Ainsi, nous avons introduit la notion de patrimoine de création nous permettant d'offrir une explication formelle de la façon dont le patrimoine peut devenir une source de création. Nous avons montré l'effet positif de la transmission d'un patrimoine de création sur le relâchement des tensions expérimentées par les collectifs de concepteurs dans l'industrie du luxe. Nous avons modélisé les caractéristiques d'un patrimoine de création et mis en évidence leur structure composée de concepts et de connaissances, et nous avons montré comment au moins quatre types de générativités différentes peuvent découler d'un même patrimoine de création. Nous avons découvert que la transmission d'un patrimoine de création relève d'une dynamique de conception d'un langage du connu et d'un langage de l'inconnu.

Et finalement, nous avons mis en exergue que le patrimoine de connaissances reflète l'organisation de conception.

Notre recherche constitue une première brique dans la construction d'une nouvelle forme de gestion de connaissances qui se veut d'être un support des processus de conception pour l'innovation. Nous espérons qu'elle trouvera un écho chez l'ensemble des industries du luxe et industries créatives. Nous voudrions aussi qu'elle puisse inspirer tous les concepteurs expérimentés souhaitant léguer à leurs successeurs un patrimoine pour la conception, un patrimoine de création.

PARTIE II

CREATIVE HERITAGE: OVERCOMING TENSIONS BETWEEN INNOVATION AND TRADITION IN LUXURY INDUSTRY

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1. Abstract

Luxury customers are relentlessly in quest of surprise produced by innovative objects from their favorite luxury brands. For this reason, luxury organizations must manage their design capacities, which often involve the participation of R&D and Marketing in cross-functional teams. Nonetheless, during design processes, those teams are confronted to at least three tensions that can hinder their success: First, designed objects must satisfy customers avidness for novelty while exhibiting integrity with respect to the brand. Secondly, at the cognitive level, cross-functional teams face the paradoxical effect of knowledge in the design reasoning. And thirdly, at the organizational level, teams encounter several barriers to balance cooperation between functions and integration with their mother organization. Based on a longitudinal study of a knowledge management program in a luxury champagne

house, we put in evidence a new form of knowledge transmission, that we call a *creative heritage*, that we show can help cross-functional teams in luxury organizations to overcome the tensions to which they are confronted.

2. Introduction

Luxury customers, avid of novelty and surprise (Bastien and Kapferer, 2012; Poulsson and Kale, 2004), are seeking for new products, services and experiences. Hence, in order to assure their existence, luxury organizations must innovate (Foray, 2013). However, in those industries, heritage plays a critical role as it is part of brand identity, creates consumer appeal (Hudson 2011; Urde, Greyser, and Balmer 2007; Clais 2002), contributes to brand and product differentiation (Briot and De Lassus 2014), and is associated with brand authenticity and reliability (Beverland 2005; Beverland 2006). Hence, collectives of designers working on the design of new luxury objects are confronted to the tension of both satisfying customers desire for novelty and maintaining a coherence of new objects with brand heritage and identity (Bastien and Kapferer, 2012; Chevalier and Mazzalovo, 2012).

Moreover, those collective of designers composed by cross-functional teams (Basadur and Gelade, 2006; Griffin and Hauser, 1996; Letzelter et al., 1996; Sherman et al., 2005) encounter several cognitive and organizational tensions that, even if well known in the innovation management literature, are exacerbated in luxury organizations due to the tension between innovation and tradition:

At the cognitive level, knowledge seems to play a paradoxical role in the design process. Scholars have shown that usage of knowledge can hinder individuals and organizations' creativity (Audia and Goncalo, 2007; Benner and Tushman, 2003; Jansson and Smith, 1991; Leonard-Barton, 1992; Purcell and Gero, 1996). However, researchers also describe how firms use old knowledge to recognize the value of new knowledge (Cohen and Levinthal, 1990; Shane, 2000; Zahra and George, 2002), and how they reinterpret and recombine old knowledge and tradition in order to create new

products and value, while staying anchored in their heritage (Garel, 2015; De Massis et al., 2016; Messeni Petruzzelli and Savino, 2014; Savino et al., 2017).

At the organizational level, scholars report that several barriers exist for cross-functional team to balance their capacity to cooperate (Carlile, 2002, 2004; Edmondson and Nembhard, 2009; Edmondson and Harvey, 2017; Griffin and Hauser, 1996; Holland et al., 2000), with the integration of the innovative teams with their mother organization (Dougherty and Hardy, 1996; Holland et al., 2000; McDermott and O'Connor, 2002).

Literature reports several strategies used by project cross-functional teams in order to overcome those tensions that include: providing to individuals and teams a creative autonomy (Amabile, 1998), adjusting team structure and composition (Atuahene-Gima, 2003; McDermott and O'Connor, 2002; Sheremata, 2000), adapting project management processes and practices (Atuahene-Gima, 2003; Cohendet and Simon, 2007; McDermott and O'Connor, 2002; Sheremata, 2000), among others. Yet, failing to overcome those tensions could be a cause of failure of innovation projects. Indeed, the tensions can translate into projects that yield objects being not innovative enough or new objects that are incompatible with brand identity. Organizationally, tensions can also be the source of low operational efficiency of the projects, that are retarded, costly or that finish by being stopped (McDermott and O'Connor, 2002; Sheremata, 2000). Thus, finding alternative ways to cope with the brand, cognitive, and organizational tensions during innovation projects in luxury industries is of paramount importance.

Hence, the objective of this study is to put in evidence an epistemic alternative used by cross-functional teams in luxury houses to manage those tensions. We present three innovative projects, from a same luxury house, exhibiting the three aforementioned tensions and hence suffering from low originality and operational efficiency. We show how the transmission of a particular epistemic resource that we call a "creative heritage" helped the cross-functional team to manage the three tensions and hence gain in originality and operational efficiency.

The paper outline is as follows: First, we review the literature on brand – product coherence. Then we review the place of knowledge in creativity and generativity. We

also present an overview of the literature on the organizational difficulties that cross-functional teams encounter during innovation projects, and we review the literature on the impact of knowledge management in creativity, innovation and NPD. Second, we state three hypotheses of the effects of transferring a *creative heritage* to a cross-functional team working on innovative projects in luxury industries. After that, we describe the results of three case studies coming from a collaborative research with a luxury champagne house in which we participated. For the three case studies, we highlight how working on the brand *creative heritage* had an impact in the manner of conducting innovative projects. Finally, we discuss our results with respect to current literature, and we present some conclusions and implications for researchers and managers.

3. Literature Review and Hypothesis

To introduce to the market successful innovations, organizations have to design new objects (Le Masson et al., 2006). Designing new objects is at the same time a mode of reasoning as well as a collective process to be generative (Hatchuel and Weil, 2003; Le Masson et al., 2006), that "requires action that is creative as well as collective" (Sheremata, 2000). Hence, in complex organizations like luxury organizations, the design of new objects is often a collective action that involves cross-functional teams, composed by members coming from the R&D and Marketing functions (Basadur and Gelade, 2006; Clark and Fujimoto, 1990; Griffin and Hauser, 1996; Letzelter et al., 1996; Madhavan and Grover, 1998; Sheremata, 2000; Sherman et al., 2005). Both Marketing and R&D contributes to the design process by bringing disparate bodies of knowledge (Madhavan and Grover, 1998), enhancing team ability to acquire, assimilate and exploit knowledge (Açikgöz et al., 2016; Sherman et al., 2005). However, during the process, those teams must cope with several tensions:

3.1. Brand tension: innovation and object integrity

Luxury customers are in search of novelty (Bastien and Kapferer, 2012; Foray, 2013; Poulsson and Kale, 2004; Roux and Floch, 1996). Hence, innovation processes carried out by cross-functional teams must converge to the design of new products, services, places, experiences, that "make customers dream" (Bastien and Kapferer, 2012) .... Nonetheless, as luxury consumption is motivated by symbolic values coming from the luxury brand (Atwal and Williams, 2009; Bastien and Kapferer, 2012; Han et al., 2010), and as luxury customers are often big connoisseurs (Berthon et al., 2009; Chevalier and Mazzalovo, 2012), new objects must be coherent with the luxury brand (Bastien and Kapferer, 2012). As expressed by Chevalier and Mazzalovo, (2012, page 189): "*the customer naturally expects a great deal of originality within what he perceives to be the aesthetic characteristics of the brand. He also expects the product to be recognizable and carry a part of the dream inherent to the brand*". For this reasons, cross-functional teams in charge of designing new objects in luxury industries are confronted to the tension of managing both innovation and object integrity.

We borrow the term *integrity* from Clark and Fujimoto, (1990), who named *product integrity* the consistency between a product's function and its structure (*internal product integrity*) and the consistency between a product's performance and customers' expectation (*external product integrity*). Thus, we will call *object integrity* the consistency between an object's identity and a brand identity.

3.2. Cognitive tension: knowledge and generativity

Knowledge can have a paradoxical effect on creativity and generativity (Weisberg, 1999). We understand generativity as the capacity to generate novel objects with desired properties, different from any other known object and that cannot be deduced from existing knowledge (Hatchuel, Le Masson, Reich, et al., 2011; Le Masson and Weil, 2013). In the one hand, knowledge can provoke fixation effects and hence it can

enhance convergence. In the other hand, knowledge can help to get rid of fixation, but it can then hinder convergence:

3.2.1. Fixation and convergence

Literature shows that usage of knowledge and heritage can hinder individuals and organizations' creativity (Audia and Goncalo, 2007; Benner and Tushman, 2003; Crilly, 2015; Jansson and Smith, 1991; Leonard-Barton, 1992; Purcell and Gero, 1996). For example, at the individual level, researchers argue that designers can get fixated during the design process, as they mobilize easily accessible knowledge and neglects the possibility of exploring more original knowledge (Jansson and Smith, 1991; Purcell and Gero, 1996). At the organizational level, researchers show that core capabilities, that is, the knowledge set that distinguishes and provides a competitive advantage to the firm, can act as core rigidities, hence hindering innovation (Leonard-Barton, 1992) as old knowledge impedes new knowledge explorations (Audia and Goncalo, 2007).

However, the same knowledge and tradition that fixes designers let them accomplish meaningful innovations, especially on design-driven organizations. Authors have reported how individuals and firms reinterpret and recombine old knowledge (Kogut and Zander, 1992) and tradition in order to create new products and value, while staying anchored in their heritage (De Massis et al., 2016; Messeni Petruzzelli and Savino, 2014; Savino et al., 2017). Authors have also reported how a genealogical knowledge about the making techniques of certain products can enable an organization to design a new class of objects (like the Swatch watch) (Garel, 2015). Hence, knowledge can help individuals and organizations to converge in the design reasoning process. Nonetheless, in those cases, designed objects are often recombination of past known elements and thus can be considered not so novel by customers.

3.2.2. Defixation and non-convergence

Recent evidence suggests that, under certain circumstances, knowledge can help designers to overcome fixation effects. Indeed, recent advances in design theories suggests that in order to be generative, a knowledge base must respect a condition called the splitting condition (Hatchuel et al., 2013; Hatchuel and Weil, 2007). Hence, generativity is conditioned by two properties of the knowledge base (Hatchuel et al., 2013; Hatchuel and Weil, 2007): the non-modularity and the non-determinism. Non-determinism means that the new design is not directly determined by initial knowledge, thus requiring new knowledge (Hatchuel, Le Masson, Reich, et al., 2017). And, non-modularity means that the new design is not a modular combination of old designs, thus requiring new concepts (Hatchuel, Le Masson, Reich, et al., 2017). Thanks to the splitting condition, we can understand that the value of knowledge "is not only in rules, ontologies, algebra, and integrated structures; it is also in the independencies in knowledge structures" (Hatchuel, Le Masson, Reich, et al., 2017).

However, the other side of the coin is that new, original knowledge can be difficult to integrate to the design processes (Brun et al., 2018). Thus, in the cases where knowledge help designers to get rid of fixation, convergence is not guaranteed.

3.3. Organizational tension: cooperation and integration

Teams working on innovation projects are confronted to the dilemma of cooperation and integration. Either they are a solid group, with a strong capacity to cooperate, but in that case, they have difficulties to be integrated into the organization. Either they are well integrated with the rest of the organization, but in that case, they encounter several obstacles to cooperation:

Scholars report that several barriers exist for cross-functional team cooperation and communication (Edmondson and Nembhard, 2009; Edmondson and Harvey, 2017; Griffin and Hauser, 1996; Holland et al., 2000). In this paper we are interested in two of those barriers associated with knowledge and organizational structures.

Knowledge boundaries: According to Carlile, (2002, 2004), there exist three different types of boundaries between functions: syntactic, semantic and pragmatic boundaries. Each boundary represents a growing level of complexity for team cooperation.

- Syntactic boundaries are manifested through differences in how language is used (Edmondson and Harvey, 2017). For example, marketing and R&D functions use different technical terms (Griffin and Hauser, 1996). When a common lexicon is shared between functions, knowledge can be easily transferred. However, when novelty arises, the current words are no longer sufficient to share knowledge (Carlile, 2004).
- Semantic boundaries are associated to meaning ambiguity (Carlile, 2004). Marketing and R&D functions have different meanings for the same words, which can make cooperation difficult (Carlile, 2002, 2004; Griffin and Hauser, 1996). Furthermore, during innovation projects, more than translating meanings between functions, those meanings have to be collectively created and negotiated (Brown and Duguid, 1991; Carlile, 2004; Wenger, 1998).
- Pragmatic boundaries: When they explore novelty, functions have to resolve the negative consequences coming from different and potentially competing interests among actors (Carlile, 2004). For this, team members have to alter their current knowledge and also influence or transform the knowledge used by the other function (Carlile, 2002).

Organizational responsibilities: In organizations, marketing and R&D functions have different task priorities and responsibilities, provoking an organizational barrier (Griffin and Hauser, 1996). Also, they often have functional success measures that do not support cooperation, as well as a lack of top management support rewarding cooperation, (Edmondson and Nembhard, 2009; Griffin and Hauser, 1996). Moreover, innovative projects most often exhibit fuzzy objectives (Lenfle, 2012; Lenfle et al., 2016) that may hinder the ability of cross-functional teams to cooperate (Edmondson and Nembhard, 2009; Holland et al., 2000).

Furthermore, when cross-functional teams collaborate in innovation projects and cooperate successfully, they are exposed to a risk of isolation from their mother organization. In order to protect the project from counterproductive forces coming from the mainstream organization, radical innovation projects tends to be isolated (McDermott and O'Connor, 2002). However, this practice can compromise the project long term survival, as it cut off the project from its most important sources of learning, competencies and resources, and as it can provoke a loss of legitimacy when returning to the mother organization (McDermott and O'Connor, 2002).

3.4. Common strategies for overcoming the brand, cognitive and organizational tensions and consequences

In practice, collective of designers make use of several strategies to cope with those tensions:

Some strategies are based on providing teams with good conditions for creative work, like making them benefit from freedom and autonomy (Amabile, 1998), as well as from a stimulating environment adapted to creativity (Amabile et al., 1996).

Other strategies are based on the adjustment of project teams structure and composition, like: including influent project managers and members into the project team (Sheremata, 2000), benefiting from the participation of champions that have a privileged relationship with top management individuals, and that manage the boundaries between project team and outsiders (McDermott and O'Connor, 2002). Or constituting project teams composed by members that have access to diverse informal networks and a relationship with several communities of expertise, hence facilitating the access to resources and knowledge (Cohendet and Simon, 2007; McDermott and O'Connor, 2002). Also, the teams can benefit from the participation of top management individuals acting as sponsors that provide encouragement from the top of the hierarchy, and financial resources for the projects (McDermott and O'Connor, 2002).

Some other strategies rely on the adaptation of project management processes and practices, like: dynamically balancing between emergent and planned styles of

managing innovation projects (Lewis et al., 2002), temporally pacing the projects through milestones (Atuahene-Gima, 2003; Sheremata, 2000), facilitating knowledge and information sharing through direct and regular contact among project members (Atuahene-Gima, 2003; Sheremata, 2000), and favoring learning and knowledge acquisition coming from different sources, as the organization itself or its exterior (v. gr. from customers) (Sheremata, 2000).

In some cases, those strategies enable cross-functional teams to overcome the aforementioned tensions and hence to design new, original objects, while respecting a certain schedule and cost goal (McDermott and O'Connor, 2002; Sheremata, 2000). However, in some cases, even when all those strategies are mobilized, the tensions can persist and be so strong that innovative projects suffer from low originality and low operational efficiency.

3.5. Knowledge transmission: an answer to the negative effects of the three tensions?

Recent literature highlights the important role played by knowledge management and knowledge transfer in innovation and firm performance (Darroch, 2005; Gloet and Terziovski, 2004; Wang and Wang, 2012). Researchers put in evidence that knowledge transfer can enhance new product development processes effectivity and efficiency (Bandinelli et al., 2014; Madhavan and Grover, 1998; Pitt and MacVaugh, 2008; Sherman et al., 2005) as it helps designers become aware of the available knowledge (Pitt and MacVaugh, 2008; du Plessis, 2007), and that can be used to design new objects. Furthermore, scholars argue that knowledge management can also be helpful in identifying what is not known, hence highlighting knowledge gaps occurring between existing knowledge and knowledge requirements that are necessary to innovate (Hall and Andriani, 2002).

However, this same literature suggests that knowledge transmission can have negative consequences on team originality and operational efficiency. Elaborating on Nonaka and Takeuchi's SECI model of knowledge conversion (Socialization,

Externalization, Combination, Internalization) (Nonaka and Takeuchi, 1995), Schulze and Hoegl, (2008) found a positive relationship between socialization and internalization and the novelty of product ideas during the ideation phase. Furthermore, Schulze and Hoegl, (2006) shown a positive effect of socialization during the concept phase, and of combination during the development phase on new product success (evaluated by achievement of expectations regarding revenues and profits). However, they also found a negative relationship between externalization and combination and the novelty of product ideas during the ideation phase (Schulze and Hoegl, 2008). Moreover, they shown a negative effect of externalization during the concept phase and of socialization and internalization during the development phase on new product success (Schulze and Hoegl, 2006).

We can then doubt about the positive impact of knowledge transmission on helping cross-functional teams to manage the aforementioned tensions and obtaining high originality and high operational efficiency. Yet in this paper, we present some evidence that suggests that a transmission of a certain kind of epistemic support, that we call a "creative heritage" can help cross-functional teams in the luxury industries to manage the brand, cognitive and organizational tensions and hence favor the projects originality and operational efficiency.

Hence, we are interested in answering the following research question: *how can a creative heritage help cross-functional teams in luxury industries to manage the tensions to which they are confronted and contribute to originality and operational efficiency?*

We posit the following hypothesis:

Cross-functional teams undergo tensions due to the fact that designed objects must be innovative yet possess integrity with respect to the brand identity.

Hypothesis 1: Brand tension has a negative effect on innovation project originality and operational efficiency. Knowledge transmission do not help cross-functional teams to overcome this tension.

Cross-functional teams undergo cognitive tensions between the fixation/convergence and defixation/non-convergence effects of knowledge during the first stages of the design process.

Hypothesis 2: Cognitive tension has a negative effect on innovation project originality and operational efficiency. Knowledge transmission do not help cross-functional teams to overcome this tension.

Cross-functional teams undergo organizational tensions due to the necessity of both coordination between different functions and integration with the rest of the organization during the design process.

Hypothesis 3: Organizational tension has a negative effect on innovation project originality and operational efficiency. Knowledge transmission do not help cross-functional teams to overcome this tension.

4. Methodology

4.1. Research design

The reader could by surprised by the negative phrasing of our hypothesis. In the next sections of this paper, our work will not be to support but to reject those hypotheses by providing a counter-example that refutes their validity. Hence, our methodology is based on finding several cases of innovation projects carried by a cross-functional team and exhibiting the following characteristics: The cases possess at least three phases, a first design phase before the transmission of knowledge to the cross-functional team, a second phase of knowledge transmission, and a third design phase after the transmission of knowledge to the cross-functional team. During the first phase, the brand, cognitive and organizational tensions should be present and conduct to negative effects in terms of originality and operational efficiency. During the third phase, the transmission of knowledge should have helped the cross-

functional team to manage the three tensions and exhibit positive effects in terms of originality and operational efficiency.

We had the unique opportunity to conduct an intervention research (David and Hatchuel, 2013) inside Dom Pérignon champagne house during which we followed a cross-functional team as they designed several experiences, all part of a same program called "Decoding Dom Pérignon - Patrimoine de Création Dom Pérignon". The objectives of the program were to formalize and to transmit the brand knowledge, or as they called it, "Dom Pérignon's creative heritage", and to design new experiences. The design of experiences of the program exhibited three phases: 1- a design phase before formalizing and sharing the brand *creative heritage* (brand CH); 2- a phase of transmission, formalization and sharing of the brand CH, and 3- a design phase after the transmission the brand CH. This case represents an excellent opportunity for studying the effects of knowledge transmission on overcoming the aforementioned tensions because it gives us access to three case studies inside a unique organization, in which we can observe the differences in the management of innovative projects before and after formalizing and sharing the brand *creative heritage*.

4.2. Data collection process

We collected our data from July 2015 until March 2018 in the headquarters of the organization in France. We followed the different actors involved in the "Decoding Dom Pérignon – Patrimoine de Création Dom Pérignon" program, carried out by a team composed by members of the Research & Development, Marketing, Communication, Heritage, and Training functions. This team was also accompanied by several external partners (such as a writer, and two design agencies). We followed the team during the design process of three new brand experiences having as objective to design physical or digital objects, that embodied a part or the whole brand CH. Here follows a description of the three cases:

Case 1 is a project to design a digital application that should let the user feel and understand the meaning of the brand wine vocabulary. Case 1 was co-led by two project managers coming from the Marketing and R&D departments, members of the program operational committee.

Case 2 is a project to design a video that should convey the key characteristics that make the winemaking process of the brand unique. Case 2 was led by a project manager from the Marketing department, member of the program operational committee. After the transmission of the brand CH this project manager left the project and was succeeded by a new marketing project manager, member of the program operational committee.

Case 3 is a project to design an architectural space that should embody the whole brand creative heritage. It was led by a project manager from the Marketing department, member of the program operational committee. After the transmission of the brand CH this project manager was succeeded by a new R&D project manager member of the program operational committee.

We participated to meetings of the three projects, and had total access to the meeting reports, briefs, proposals, schemas, prototypes and intermediate objects of the three projects. We complemented this data acquisition with 10 semi-structured interviews with the participants of the program in order to evaluate the existence of the three tensions as well as the originality and operational efficiency of the projects.

For the transmission of the brand creative heritage, the program team, accompanied by partner design agency A and by a writer, socialized and externalized a new knowledge structure for the brand. Based on several sharing sessions of tacit knowledge with brand experts, and on an inventory of the explicit knowledge of the brand (like written brand stories and history, documented past realizations and created objects), the team conceptualized a new integrative definition of the brand CH. This helped the team members to gain in knowledge about the brand CH. It also gave to the team some explicit knowledge in the form of:

- A textual and graphical description of the brand CH, that defines the seven most important *knowledge elements* of the brand as well as the relationships that

exist among those knowledge elements. We will call the graphical representation of the brand CH the "brand creative heritage map".

- A textual and graphical description of two of the knowledge elements of the brand CH: the "*Aesthetic Ideal*" and the "*Winemaking*" knowledge elements. The textual and graphical descriptions are called "source text" and "source schema", respectively. (As the program is still ongoing, the other five knowledge elements representations are yet to be socialized and externalized).

Besides the knowledge gained by team members, the transmission of the brand CH provided the team members with some explicit knowledge:

Case 1 benefited from the introduction of the graphical form of the brand CH, the brand creative heritage map, and the formalization of the knowledge element "Aesthetic Ideal". The brand creative heritage map describes the position of the "Aesthetic Ideal" with respect to the other knowledge elements of the brand and defines a taxonomy for the brand "Aesthetic Ideal".

The transmission of the brand creative heritage brought to *Case 2* the introduction of the brand creative heritage map, as well as the textual and graphical description of the brand "Winemaking" knowledge element.

The transmission of the brand CH brought to *Case 3* the introduction of the brand creative heritage map to this project. After the transmission of the brand CH, this project also beneficiated from a functional analysis.

4.3. Data analysis

For evaluating the existence of the brand, cognitive and organizational tensions, we analyzed the briefs of each project, as well as the interview transcriptions in search of quotes that explicitly prompted the team to design new, innovative objects that exhibit brand integrity. We also studied the composition of the project team as well as the functions of the team members.

For evaluating the originality, we compared the intermediary objects designed by the cross-functional team with objects developed by the brand in the past as well as with objects developed by other luxury houses. We looked for the existence of digital applications, videos and architectural spaces previously designed by the brand and by other champagne and luxury brands. We searched for similarities and differences between objects in terms of content, structure and functionality. We argue this is an appropriate method to measuring originality as this allow us to produce a baseline of the ideas that have already been implemented and to identify if the ideas and intermediary objects produced during the project are different from this baseline. Furthermore, we evaluated the brand-object integrity by searching in the interview transcriptions quotes about the degree of adaptation of the intermediary objects with the brand requirements and expectations.

For evaluating the operational efficiency of the projects, we searched for simple indicators as whether the projects suffered from deadline extensions, or delays, whether the project's results were accepted by the brand experts or whether the projects were put in stand-by. We also scanned the interview transcriptions in search of verbatims highlighting difficulties to make the projects advance, to obtain resources, to respect delays or to respect a budget. We also searched for quotes about facilitators of projects advancement. As the three projects were part of the same program, the verbatims are aggregated at the program level.

Finally, in order to characterize if the change in originality observed before and after the transmission of the brand CH were caused by the brand CH itself, we needed a conceptual framework that let us model the generative processes and take into account the role of knowledge in this process, as well as knowledge expansions (i. e. the emergence of new knowledge domains, new knowledge structures and new description languages). In consequence, we modeled this process by using Design Theories (Hatchuel, Le Masson, Reich, et al., 2011, 2017, Hatchuel and Weil, 2002, 2003, 2009). Indeed, Design Theories, and in particular C-K Theory, have proven their utility to model with success the generative reasoning of several creators like engineers, architects, designers, and artists (Hatchuel, 2005; Hatchuel and Weil, 2009). For each of the three studied cases, we modeled the design reasoning thanks

to a C-K map. We compared the knowledge bases (in the K-space) related with the concepts (in the C-space) before and after introducing the brand CH. We searched for expansive partitions by studying the similarities and differences in the meaning of words used to formulate each concept. Finally, we followed the addition of properties from the K-space to the C-space.

Furthermore, in order to assure the veracity and reliability of our interpretation, we discussed our findings with the participants to the program during the writing process of this article.

5. Results

5.1. Before introducing the brand CH, the program team suffered from the brand, cognitive and organizational tensions

Before the formalization of the new definition of the brand CH, when only a brand inventory and some primitive forms of the brand knowledge structures were available, the program team and the partner design agencies A and B worked on three projects to design objects in order to "elevate the brand customer experience". They worked on the design of a new application, a new video and a new architectural space. The briefs that the program team and design agencies A and B worked for those objects witness a research of novelty and of coherence with the brand: For example, the architectural space (case 3) was supposed to "reveal the singularity of Dom Pérignon through a creative and innovative project", and to "convey the richness, deepness and complexity of Dom Pérignon". Also, the video brief (case 2) stated that it was necessary to "avoid pitfalls" in the final video like doing a "video for experts" or an "expected video". Thus, for each project, the team was prompted to design an experience that was at the same time innovative and that at the same time embedded Dom Pérignon's identity. This suggests that the program team was submitted at the same time to the brand tension and to a cognitive tension.

Furthermore, before the formalization of the new definition of the brand CH, the team composition and its member roles suggest that the team was submitted to an organizational tension. Indeed, the program team was a cross-functional team composed mainly by members of the R&D and the Marketing departments. Besides dedicating time to the program and the design of the three experiences, team members conserved their own operational roles inside the organizations. Thus, they had to assure at the same time the projects advancement and the continuity of their daily responsibilities. Moreover, the program and the three projects possessed an exceptional nature as they were different from all other development projects that were carried out at the moment by the organization and hence was in competition for resources.

5.2. Before introducing the brand CH, the projects exhibited low originality and low operational efficiency

5.2.1. Originality

At the end of the first design phase, before the transmission of the brand CH, the team designed the following three intermediary objects for each of the projects: 1/ a graphical sketch representing the tasting notes data visualization, 2/ a video of the harvest and 3/ a three-dimensional representation of an architectural space to embody the brand heritage.

In the three cases, the first intermediary objects possessed low object integrity and low originality. Indeed, program team members referred to the intermediary objects as not having enough "Dom Pérignon spirit", not being enough "Dom Pérignon proprietary", or resembling more to an information system than to a brand experiential object (Table II-1).

Table II-1. Tensions of product integrity

Project	Verbatim
Digital Application	*"[…] [Design agency A] proposed to us this first app, but to answer your question, was it not on the spirit [of the brand]? Well, yes, because the idea is not to do data visualization. What was the idea? To arrive to something that is sensorial, emotional. We are not here to do some mathematics nor to show something complex in a flat manner. […] We are not here to do something complicated, we are here for… The idea is to arrive to represent a meaning. The idea is not to represent know… Data visualization allows to understand. The idea is not to understand. The idea is to show that there is complexity but that it is organized. And complex yet organized is harmony."*
Harvest Video	*" Of not enough Dom Pérignon spirit, I do not know how to say it, but I think that there was something missing, something artistically Dom Pérignon, that gives an emotion as Dom Pérignon search to convey in every single experience. "* *" I find that this video, if you change the final logo, it could be a video from [Brand 1] or [Brand 2], it could be a video from any other champagne house…"*
Architectural Space	*"This was the point I saw as the weakest of this approach, it was a point that lead us to think about the [architectural space] as isolated spaces, non-connected among them. You know, it was an absolutely Cartesian partition of the knowledge that was being analyzed or acquired, but that did not allow to string together this knowledge beyond its structure. Even if it is a good approach to think about an information system to store data, at the moment of telling a story, there was not… I think that at this moment there was not a guiding thread that linked wat was being stored in each one of the dimensions of the matrix. So, I think that the inconvenient with this possibility was that it was quite programmatic, in the most abstract sense of the word."*

Furthermore, in each of the three cases, the first intermediary objects were similar to past objects designed either by the brand or by other luxury brands (Table II-2).

Case 1 first intermediary object was similar to a past physical experience designed by the brand and by partner design agency A. As confirmed by one of the program team members: "*I think that it is the fact that we had a lot of feedbacks ([on the past experience]) "wow, wow, it is amazing!" when people went to [this place]. I remember [program team member 2] came back to me and [expert] […] and he told us "wow, it was really great, people loved it, they found that amazing!" […], they found it aesthetically beautiful. Aesthetically, I find that… the layout that [design agency A]*

gave [to the past experience], get the attention of people. So, I think [the first intermediary object] started from that, too…".

The intermediary object designed in case 2, designed by the program team and design agency B, transposed the time sequence of the harvest process to the sequential scenes of the video. This mode of audiovisual representation for the harvest has already been exploited by at least 12 other champagne brands.

Moreover, the primary functional requirement explored by the 3D representation designed in case 3 has already been explored by more than 7 other luxury brands.

Table II-2. Similarities of designed intermediary objects with objects created in the past by luxury brands

Project	Fixation
Digital Application	First intermediary object was similar to a past object designed by the brand.
Harvest Video	First intermediary object transposed the harvest time sequence into the sequences of a video. At least 12 other champagne houses have already designed similar videos.
Architectural Space	Primary function of the intermediary object has already been explored by at least 7 other luxury houses.

5.2.2. Operational efficiency

At the end of the first design phase for each project, before the transmission of the brand CH, the program team found themselves with projects that got stuck:

- The digital application project was put into standby during almost 6 months. The team decided to temporally stop the design of the application as presented in the graphical sketch.
- The team made a first version of the harvest video. However, the program team was invited by the top management and by brand experts to redesign it, in order to better take into account the identity of the brand. Furthermore, they suggested not to diffuse this video.

- The program team delayed several times the deadline for the design of the architectural space. Finally, they decided not to continue with the design of the architectural space in the form originally proposed.

Before the transmission of the brand CH, participants to the program manifested several cooperation challenges that lowered the projects operational efficiency, such as: a difficulty to give sense to the program, its objectives, and activities (Table II-3.a), a program that is a long-term time-consuming approach that requires investment from busy people (Table II-4.b) as well as a difficulty to communicate with external partners that were part of the program team (Table II-5.c).

Table II-6. Challenges for cross-functional team cooperation

Challenge	Supporting verbatim	
Difficulty to give sense to the program, its objectives, and activities	*"For me, from [date 1] to [date 2], [...] this project was really fuzzy. Each time we saw [program team member 3], I came out and said to myself "what is this project? What are we going to do? I do not understand at all, and I think it was the time when we were framing the project, we had written this definition of the brand creative heritage, [...], at the time we talked about [...] formalize, transmit and elevate consumer experience, [...], but at that time, behind all those things, there was nothing concrete... [...]* *"When we started to look at the key points of the brand and that we saw that, maybe, they were missing of cohesion among them, it was because a lot of things have never been explained, we did not have a definition. And so, maybe they were clear in the head of [program team member 1], in the head of [program team member 3], in the head of [program team member 4], and less in the head of [program team member 8], in my head, so we realized that due to the lack of definitions, we lost the primary sense that we want to convey."*	a
A long-term time-consuming approach that requires investment from busy people	*"[one of the challenges] is time. In order to gather 12 persons today, we need six months. We all have busy schedules, and to free a whole day or a half day today is an incredible luxury [...]."*	b
Difficulty to communicate with external partners (part of the project team)	*"I think that at the beginning, [design agency A] did not understand very well where we were going. So, I think that since the beginning, I knew that I didn't wanted something like what they proposed to us, even before doing it."*	c

Furthermore, during the first phase of the program, the program team worked autonomously with respect to the rest of the organization. One of the program team members, referring to the whole program expressed: "during a certain time we worked stealthily, without really presenting this project". During our interviews, program team members identified several challenges for the program with respect to the integration of the projects with the organization that also affected the operational efficiency of the projects: the program culture differs from the organizational culture (Table II-7.a), the program is a long-term time-consuming approach that must face with member turnover (Table II-7.b). Moreover, the program is considered as hard to communicate while demanding to be shared with the top management and the organization in order to have access to resources (Table II-7c).

Table II-7. Challenges for program team – organization integration

Challenge for program integration	Supporting verbatim	
The program culture differs from the mother organization culture	*"Since the beginning, [one of the challenges of the program] has been to lead a project like this in an enterprise like ours which is oriented to the short-term and which is operative… That is to ameliorate short-term objects. To be able to convince people about the interest of getting out of the box, of doing original things, and that will only have results at mid-term. That is the most complicated thing."*	*a*
A long-term time-consuming approach that must face member turnover	*"Recently, there has been a lot of turnover in the team… ([One of the risks]) is to finally loose the initial flame that persons from the initial project used to carry. That is true that there are a lot of persons who left. I think that at least half of the people is gone, so, how can we do to keep this energy, this necessity of continuing."*	*b*
An approach that can be hard to communicate and that needs to be shared with the top management and the rest of the organization.	*"I couldn't figure out what does it mean "Patrimoine de Création", from a conceptual point of view. […]. So I listened people talk to me about the project, and I thought it was a little too complicated to write down and to explain the project, […] For me, it was a little bit fuzzy, a little bit complicated […] I think this brand is at the same time complex yet essential, and I think that if we work on a project, and people are not in, and if they see us work like this during three years, and ask for this or that, at one point, we must be able to communicate. Because if we are not able to communicate, that is because either things are not clear, either things are too complicated, so, we must be able to explain what we do."*	*c*

5.3. After introducing the brand CH, the projects managed the brand, cognitive and organizational tensions and succeeded to design original experiences.

After the socialization and externalization of the brand CH, its transmission, the program team and the partner design agencies A and B restarted the projects and designed three new intermediary objects. The three designed objects were: 1/ a first version of an "aesthetic ideal" digital application, 2/ a detailed structure for a "winemaking video" and, 3/ a three-dimensional representation of a "brand laboratory" to transfer and transform the brand creative heritage.

5.3.1. Originality

The new intermediary objects were more adapted to the brand expectations, as expressed by team members in Table II-8 for two of the studied cases.

Table II-8. Verbatims supporting object integrity

Project	Verbatim
Digital Application	*"I think that having done the [brand creative heritage map] and having named the "aesthetic ideal" … I do not know if we had the premonition or the intuition of where we wanted to go… when we asked for the first brief. Anyway, certainly all the work we had done on the [brand creative heritage map], the identification of the aesthetic ideal inside the concepts of the [brand creative heritage map], all this certainly contributed to better explain to [design agency A] what we wanted to do. And what we wanted to do is to make available in an organized manner a set of information that corresponds to a narrative structure of the aesthetic ideal ([a subset of the brand creative heritage map]). In order, not to explain the complexity, but to make [people] feel. We do not seek people to understand everything, but to feel, to understand the global picture. To understand that there is a meaning. So yes, I think that even the word "aesthetic ideal" helped us to change the path."*
Winemaking Video	*Was this winemaking video bringing out enough the creation, the harmony, the emotion? Because I think that those are the things that every tool or creation, coming from each process, has to make feel… Yes, it is a winemaking video, but it is Dom Pérignon's winemaking video, so it has to make feel the whole [brand creative heritage map] through the winemaking it expresses."*

Furthermore, even if the primary functionality of the aesthetic ideal digital application (case 1) shares a similarity with an application designed by a distilled

beverage brand, the content and the structure of the three intermediary objects designed after the transmission of the brand CH was different from that of objects designed by other brands or by Dom Pérignon itself. This suggests that after the transmission of the brand CH the projects gained in originality (Table II-9).

Table II-9. Similarities and differences of designed intermediary objects with objects created in the past by luxury brands

Project	Characteristics
Digital Application	Primary function similar to that of a digital application designed by a luxury brand. Content and structure are different from digital applications designed by other luxury brands
Harvest Video	Content and structure are different from videos designed by other luxury brands
Architectural Space	Functionalities are different from architectural spaces designed by luxury brands. Content and structure are different from architectural spaces designed by other luxury brands.

5.3.2. Operational efficiency

We observe that the transmission of the brand CH had a positive effect on the operational efficiency. Indeed, after the introduction of the brand CH, the three projects were resumed, or new projects were started:

- A first version of the "aesthetic ideal" digital application was designed without major delays.
- A detailed structure for a "winemaking video was designed by program team members and design agency B after few iterations. (However, organizational changes at design agency B forced the program team to put in stand-by this project).
- A three-dimensional representation of a "brand laboratory" to transfer and transform the brand creative heritage was designed without major delays. (At the moment, the project is still in progress).

Program team members verbatims suggest that the introduction of the brand CH helped the team to cope with the challenges for cross-functional team cooperation, and integration of the program with the organization.

Concerning the cross-functional team cooperation: Most of the cooperation tensions were relieved thanks to the formalization of the brand CH in the form of the brand creative heritage map. Indeed, the transmission of the brand CH was focused on building and sharing a knowledge structure of the brand. This knowledge structure gave to the team: a common objective across functions, a common language that helped them to give sense to program objectives, projects and activities, a common knowledge structure that helped them to share key messages and brand values, to define a roadmap and a working methodology for this roadmap, and a shared vision and culture between different services.

Team members developed a common language that was shared by all the participants to the program and was partially materialized in tools like the brand creative heritage map, the "source texts" and the "source schemas" (Table II-10a and Table II-10.b). This common language improved the understanding of program objectives and contributed to give a sense to a collection of projects that were perceived as dispersed and not being related among them. Thus, thanks to the introduction of the brand creative heritage map, the meaning of the three objectives of the program: to formalize, to transmit and to create new experiences became clear for the program team members of both functions.

During the program, brand experts that participated to the project formalized and shared with other team members their meanings of brand value criteria (Table II-10c). Furthermore, when those value criteria were hard to codify in words, the socialization of team members with brand experts helped to share a common understanding of those values. This common understanding of brand values had an impact on the pertinence and clarity of the exchanges between team members and partners as evidenced by a higher lexical richness of written briefs after introducing the brand CH.

After formalizing the seven constitutive knowledge elements of the brand and their relationships, the team members agreed to apply a three-step methodology to

each knowledge element (Table II-10.d and Table II-10.e). The methodology consisted in 1/ carrying a session of knowledge sharing, that served as a base for 2/ the externalization of the knowledge chapter in a "source text" and in a "source schema", and 3/ the creation of one or several experiences based on each knowledge element. This method breakdown had an impact on task division and prioritization as the team identified which knowledge elements had to be formalized quickly, which knowledge elements had already a sufficient knowledge structure enabling the team to create an experience without needing a knowledge sharing session, as well as which kind of experiences did not need a knowledge formalization before designing new experiences.

As the program required a high time investment from knowledge sources with busy schedules, the brand creative heritage map and the defined three-step methodology played a key role in the dialogues to determine the program activities and priorities (Table II-10.g).

And finally, the formalization of the brand CH gave to the team a common language that helped to share a common objective, a common vision and culture among functions (Table II-10.f). Team members described several effects of the program on team cohesion, specially an improvement of cross-functional relationships with positive impacts on the development of projects, even of those not originally related with the program.

Table II-10. Facilitators of cross-functional team cooperation

Addressed Challenge	Effect of brand GH on cross-functional team cooperation	Supporting verbatim	
Difficulty to give sense to the program, its objectives, and activities	A common language that helps to give sense to program objectives	*"And since we started to crystallize all those things in the [brand creative heritage map] all became clearer, more organized, we started to put the same words on the same things, all became quite precise, we started to write the things that… We resumed our approach in a different manner, related to the organization of this new structure. And since that, I felt like things were really logical and clear, because we also started to focus in certain projects, which found direct applications […]"*	a

Addressed Challenge	Effect of brand GH on cross-functional team cooperation	Supporting verbatim	
Difficulty to give sense to the program, its objectives, and activities	A common language that helps to give sense to projects	*[…] I think that thanks to the process of clarifying all those things, to start putting words in concepts which did not have until there, having defined Dom Pérignon is this process, that allowed us to elaborate a common language which allowed us to advance in those projects which didn't… which were maybe a little dispersed in our heads, dispersed in a lot of different projects which at the moment were not projects as such. […] That clarified a lot of things…*	b
Difficulty to give sense to the program, its objectives, and activities **Difficulty to communicate with external partners**	A common knowledge structure that helps to share key messages and brand values	*So, there are some things that I really understood thanks to "Patrimoine de Création", because it brought me nearer their way of seeing things, their way of talking about things, that took them, in particular [program team member 1] to make explicit a lot of things, that all became clearer, more precise, more objective and shared.*	c
Difficulty to give sense to the program, its objectives, and activities **Difficulty to communicate with external partners**	A common knowledge structure that helps to define a roadmap	*Before, ([the brand creative heritage map]), did not exist at the beginning… That's true! For one year and a half it didn't exist at all. And today, everything starts from this [brand creative heritage map], and everything is in coherence with this structure, so for me now it is really the… it is part of our methodology, to decode each [brand knowledge element], to understand the organization of each one and its relationships to each other […] Today, it is our roadmap to our functioning and methodology*	d
Difficulty to give sense to the program, its objectives, and activities **Difficulty to communicate with external partners**	A shared knowledge structure that helps to define a working methodology	*Yes, today the [brand creative heritage map] is fixed, there is a film that results to explain it, a text and a film that allows to depict the [brand creative heritage map]. Then, we will have a "source text" for each of the different chapters ([brand knowledge elements]), with their respective graphic designs, that is, the schema that corresponds to each chapter, and after that, a third level is the content that we are going to create, that could target either the people we train, the final consumer, […], but it can take a lot of forms, be it a video, a film, an artwork, […]. And that is what makes this beautiful, it is not defined in advance, rather it depends on the orientation we want to give to each content.*	e

Addressed Challenge	Effect of brand GH on cross-functional team cooperation	Supporting verbatim	
Difficulty to give sense to the program, its objectives, and activities	Shared objectives, vision and culture among services	*"Necessarily, ([the program]) had a really positive effect, to engage a collective, […], to create a dynamics that didn't exist, […], and it is true that "Patrimoine de Création" allowed us to share this common direction, more profound, […], a more aspirational common direction, so it really had a motivating effect, it strengthened the ties for all those who participated to this project."* *[…]* *"The fact of being all ([working]) on the same project, and to arrive to […] agree on the foundational speech, for example, it means that we all share the same vision, that we all share the same culture […], what I saw is a collective, people passionate about the approach, about their searches, […] and that were really close. And I do not know if it was the case before, of such a proximity between the winemaking and the marketing."* *[…]* *"I think that today, there is a big relational comfort, there is a big freedom, there is a big trust that has been built. I think that in projects, there is, yes, the project, the involved persons, the objective, the result, and then there are also some things which are results that were not initially expected in the objectives, but which are finally extremely important, like the feeling of belonging to a same collective, like the feeling of trust, of sharing… so, from that point of view, this project has enormous virtues, I think we do not interact as we used to, we do not work as we used to."*	f
A long-term time-consuming approach that requires investment from busy people	Prioritization thanks to the roadmap and the breakdown	*"[…] and you have a lot of projects drawing energy from all the team… Necessarily, if you have less resources, you work on priorities, and what is the priority? It is the first step, […], the organization of the semantic network of the [brand creative heritage map] […]"*	g

Concerning the program team integration with the organization: The program team developed several strategies that facilitated the integration of the program into the organization. First, the program benefited from the active participation of the top management. The program had a steering committee that was composed by both directors of the marketing and winemaking functions as well as by both directors of the brand marketing department and the research & development service. Those four top managers played a key role in the program thanks to their extensive knowledge of

the brand and their commitment as project sponsors. They participated to the program as knowledge sources as well as knowledge validators, ensuring the accuracy and the coherence of the formalized knowledge structures, as well as the pertinence of project intermediary objects. Furthermore, even in difficult times for the program, when for example other projects, not being part of the program, required a particular attention from the program team members, the top management maintained their support and expressed their expectative on the program outputs, keeping the program alive (field notes).

Second, even if the program approach was considered as "too conceptual", the program team used several strategies for facilitating the communication with the rest of the organization and the obtainment of resources (Table II-11.a and Table II-11.b): The explicit nature of the brand creative heritage map, the simple three-step methodology and the presentation of experiential intermediary objects were considered as important elements for maintaining an appetite for the program from the top management and the rest of the organization.

Third, the enhanced communication with other organization services that emerged as a consequence of the brand CH transmission, was viewed also as a facilitator for program integration (Table II-11.c). The brand CH and the project outputs served as vectors of communication with other services as the Brand Training service which integrated the program at the end of its first year, as well as other services involved in several projects of the program.

Finally, the program team members, which had other roles besides participating to the program, manifested having obtained some benefits for their daily work from the program outputs. For instance, the knowledge structure and the outputs of the projects (like texts, schemas, and tools) have served to better structure the discourse and the communication strategies with consumers (Table II-11.d).

Those results suggest that the transmission of the brand CH helped the team to manage the brand, cognitive and organizational tensions and hence to improve the operational efficiency of the three projects.

Table II-11. Facilitators of program – organization integration

Addressed Challenges	Facilitator	Supporting verbatim	
The program culture differs from the mother organization culture **An approach that can be hard to communicate and that needs to be shared with the top management and the rest of the organization.**	Using experiential intermediary objects as communication tools with top management	*"[…] What is really important is to make people live an experience. It is not to show them a slide. For example, if I take the real example of the aesthetic ideal, when we started the project, that we have shown it to [top manager 1] and to [top manager 2] […], they told us something like: "ok, well, that sounds interesting, a database…", they didn't realize what it was, and we are going to use all the tasting notes, good… Today, I think that when we make them live an experience, that we show them the app while we are in [place], and that we do the tasting, and that we use this tool, it makes sense, and everybody agree with that […]"*	a
An approach that can be hard to communicate and that needs to be shared with the top management and the rest of the organization.	Easily understandable methodology	*"When they explained to me the methodology, I found it was quite more limpid, clearer, and I think that it translates well… […], either way, the process, is to decode the brand in all its forms of existence, be it a press kit, a place, […]"*	b
The program culture differs from the mother organization culture **An approach that can be hard to communicate and that needs to be shared with the top management and the rest of the organization.**	Favors communication with other services	Communication with the Brand Training function: *Of course, the [brand creative heritage map], and its discourse gave birth to the […] new brand training module. […]*	c
The program culture differs from the mother organization culture **An approach that can be hard to communicate and that needs to be shared with the top management and the rest of the organization.**	Benefit program team members in their daily work.	*"Right now, we are writing the leaflet for [new product], we don't write it the same way, because there is the [brand creative heritage map], there is now a certain manner of talking about the [brand products]."* *"[the brand creative heritage map], this little conceptual scheme, […], not a day goes by without using it […]"* *"Everybody having involved with the project, everybody having participated to the project, to the "Patrimoine de Création" program, is unknowingly touched by all the content that we are creating, by all the messages we have, and it is visible in the result [[of their tasks]]"*	d

5.4. The brand CH is responsible for the gain of originality

Until now we have shown that before the introduction of the brand CH the team was submitted to the brand, cognitive and organizational tensions and that this originated low originality and low operational efficiency on the three projects. We have also shown that after the transmission of the brand CH the team succeeded in managing the tensions and attained a high originality and a high operational efficiency. Until now, our results suggest that the transmission of the brand CH is responsible for the gain in operational efficiency. However, how can we be sure that the transmission of the brand CH is the factor that enabled the team to manage the tensions and to gain in originality?

By comparing the knowledge bases mobilized by the concepts produced before and after the introduction of the brand CH our data show that in the three cases the program team succeeded to gain in originality and to converge thanks to the transmission of the brand CH.

First let us show how the transmission of the brand CH contributed to the attainment of expansive partition in the three projects. Figure II-1 shows the design reasoning process before the transmission of the brand CH as modeled thanks to C-K design theory. Figure II-2 shows the design reasoning process just after the transmission of the brand CH. In case 1, the concept to design a digital application of "tasting notes data visualization" (Figure II-1.a), explored before the transmission of the brand CH, is linked with knowledge that is common to several other brands. Furthermore, this concept is linked with the past experience designed by the brand. In contrast, the concept "aesthetic ideal digital application" (Figure II-2.a), introduced after the transmission of the brand CH, is linked with the "Aesthetic Ideal", one of the seven knowledge elements that compose the knowledge map of the brand. It refers to the brand lexical field for describing sensorial perceptions and key wine descriptors. This new concept places the object to be designed in a context. Indeed, thanks to the transmission of the brand CH, this knowledge element shares strong relationships with the other six knowledge elements of the brand as the "Winemaking" knowledge element, and the product portfolio knowledge element. As one of the program team

members expressed: "*And to tell that the Aesthetic Ideal App is a manner of representing the aesthetic ideal [[of the brand]], is instantly clearer too, because you know what it serves, and to what it is linked, indeed*".

Figure II-2.b depicts the design process of case 2 just after introducing the brand CH. Before the transmission of the brand CH the words "harvest" and "winemaking" had a generic meaning, common to several other wine producing brands. However, after the transmission of the brand CH, the meaning of those words for the brand is revisited. Instead of just focusing on the tangible aspects of the winemaking process, the team has worked on codifying some of the intangible, cognitive and philosophical features that underlies the winemaking process of the brand. Furthermore, the program team made explicit the relationships this knowledge element entertains with other knowledge elements of the brand. Hence the new concept for a video is not intended to translate in images the consecutive steps of the process but to represent the idiosyncratic features of the brand's way of making wine, and its connections with other knowledge elements of the brand. As expressed by one of the participants to the project: "*yes, it is a video about winemaking, but it is a video about Dom Pérignon's winemaking! So, it must make feel the whole [brand creative heritage map] thanks to the winemaking it expresses*"

In case 3 (Figure II-3.a), before the transmission of the brand CH, the concept "embodying the whole brand CH with primary functionality F0" is associated with a knowledge base that contains several different forms of embodying a brand heritage. However, the transmission of the brand CH makes explicit the interactive character of the brand knowledge, something that was missing in the first part of the design process. In consequence, the program team revisited the primary functionality of the place to be designed, in order to design a "brand laboratory", a place where the CH is transmitted and transformed.

Figure II-3 shows the evolution of the design process after the introduction of the brand CH. This data suggests that the introduction of the brand CH helped the program team to advance in the design reasoning process, that is, to define the characteristics that the objects being designed must possess. As claimed by one of the program team

members: *"As soon as you organize a space in coherence as it was done with the [brand creative heritage map], I think that, indeed, it allows you to simply revisit all those issues in a more profound manner, because you address them in terms of the entirety of the brand instead of looking at them without a structure".*

In one of the cases (case 1) the program team and design agency A finalized the design process with a digital application that is being used for educating new brand members (Figure II-3.a). In the other two cases, the program team and design agencies A and B have produced two intermediary objects: For case 2, they produced a detailed brief of the new video (Figure II-3.b); and for case 3, they described a set of functional specifications and a 3D representation of the architectural space (Figure II-3).

In two out of three cases (case 1 and 2), the structure of the brand creative heritage map as well as the knowledge element descriptions developed during the transmission of the brand CH were used as a source of functional requirements and design parameters. As claimed by one of the team participants: "*[The brand] has an extremely strong personality, with some really strong attributes, that allow us to make the difference, and I think that ([the brand creative heritage map]) allows to add a lot of things to the brief, but finally, that allows to create a tool really [brand] proprietary. Then, effectively, we feed them ([design agency B]) with all what we have, of all the constitutive elements of the brand. Then, it is their job to do with that and to do something that it is clear, coherent, consistent. But, yes, indeed, I think that ([the brand CH]) allows to feed the reflection anyway*"

In case 3, the interactive nature of the new place being designed required the participation of several actors of the organization, involved in the transmission and experience of the brand CH. Hence, the analysis of these shareholders needs as well as the analysis of the activities needed to manage the brand CH, served to determine the functional specifications of the architectural space. After designing the 3D representation of this new place, the designed object received a new name in order to better represent the role it plays in the interaction and transformation of the brand CH.

Those results highlight that the transmission of the brand CH, and its mobilization as a resource of the design process of the 3 studied cases, helped the team both to gain in originality and operational efficiency. This invites us to refuse our three hypothesis and to say:

Brand, cognitive and organizational tensions have a negative effect on innovation project originality and operational efficiency. *The transmission of a creative heritage helps cross-functional teams to manage those tensions* and hence gain in originality and operational efficiency.

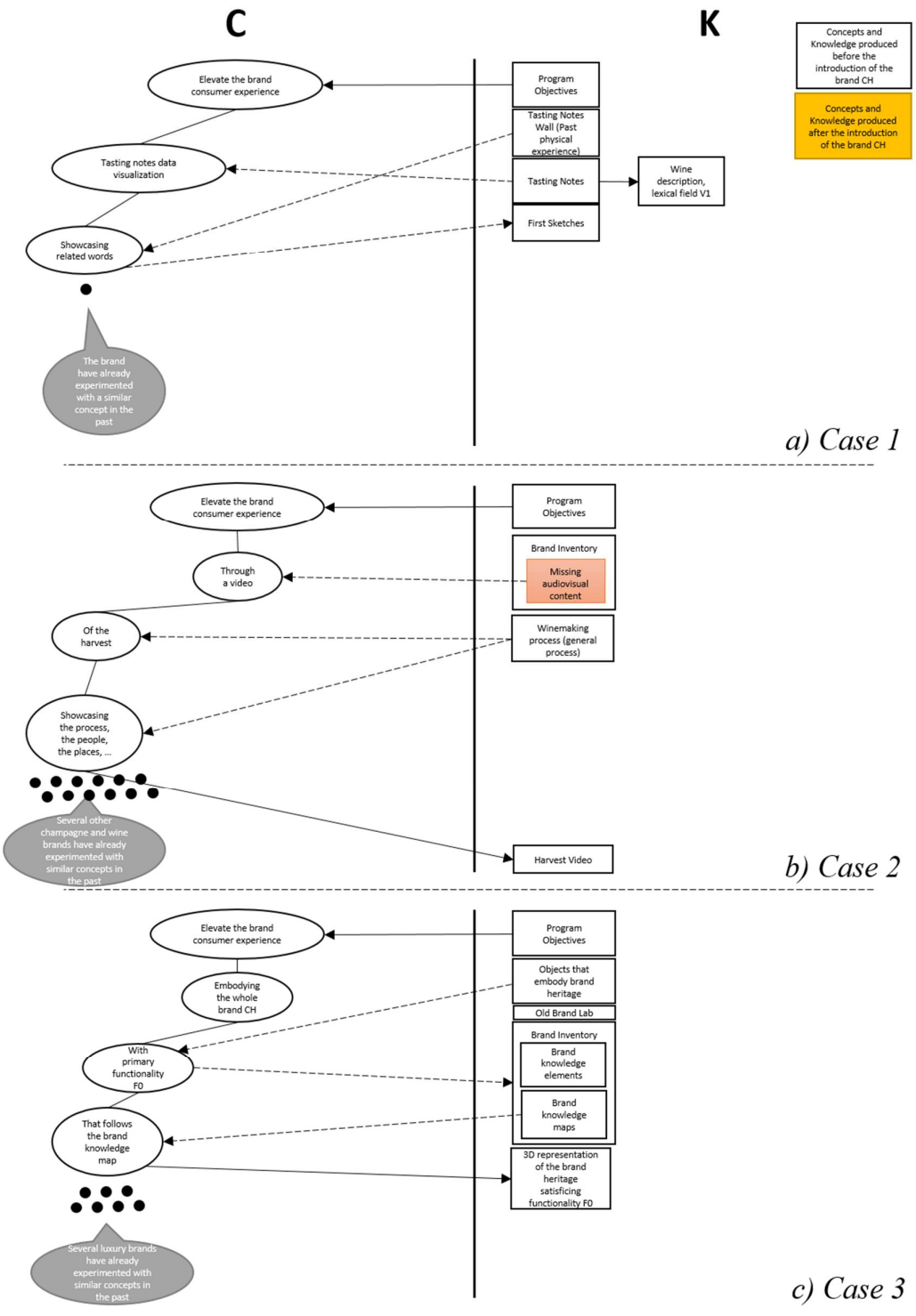

Figure II-1. C-K representation of the design process before the introduction of the brand CH

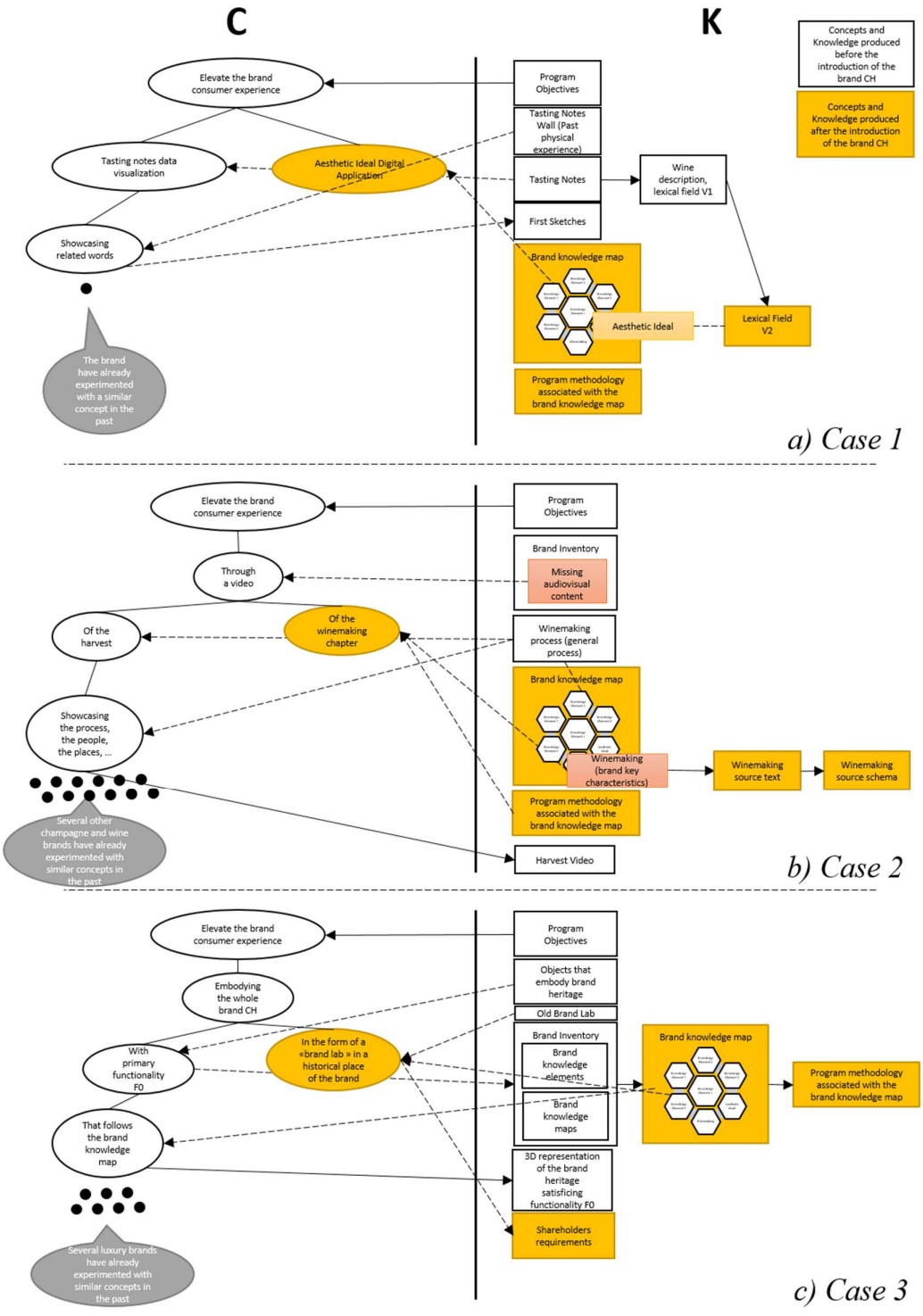

Figure II-2. C-K representation of the design process just after the introduction of the brand CH

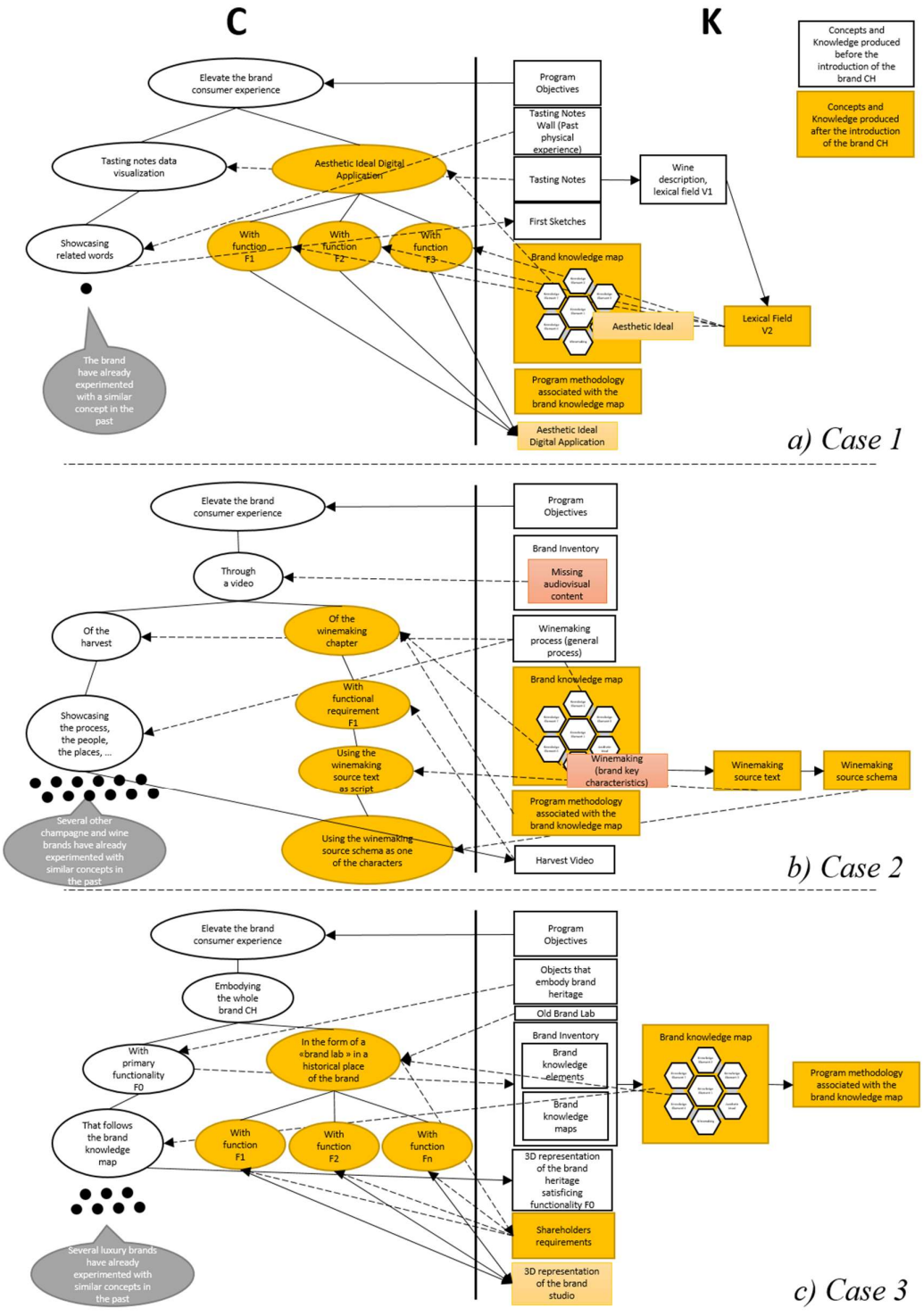

Figure II-3. C-K representation of the design process after the introduction of the brand CH

6. Discussion and Conclusion

In this paper we investigate the effects of a particular kind of knowledge transmission, that we called a creative heritage, on the manner in which cross-functional teams in luxury industries drive innovation projects. Based on the study of three projects of an innovative program, we were able to show that this new approach helps the team to manage the brand, cognitive and organizational tensions encountered during the design process of new experiences and hence to gain in originality and operational efficiency.

Firstly, we find a positive effect of the transmission of a creative heritage on cross-functional team's capacity to manage the brand tension between innovation and object integrity, thus contributing to the originality and operational efficiency of innovation projects. This effect is probably due to several reasons:

The formalization and transmission of a creative heritage provides the project team members with an extensive understanding of the most important knowledge elements of the brand that can be mobilized during the design process. For Dom Pérignon, the identification of important knowledge elements such as the "winemaking" and the "aesthetic ideal", as well as the sub-parts composing each knowledge element, like the philosophy or the gestures associated with the winemaking process, helped the team to identify new properties for objects (an aesthetic ideal digital application, a winemaking video) that were at the same time innovative and representative of the brand. Moreover, a creative heritage probably provides to its recipients a set of validation criteria that allows them to judge the pertinence and the coherence of new designed objects. In the case of Dom Pérignon, the transmission of the brand CH allowed the team members to identify they were not being original enough and they were lacking integrity with respect to the brand. Finally, a creative heritage probably contains not only knowledge but also concepts (in the sense of the C-K theory), desirable unknowns, ideas for future designs that could be explored and developed, demonstrated or rejected, before being metamorphosed into new objects. For Dom Pérignon, besides "winemaking" and "aesthetic ideal", each one of the seven knowledge element represents a latent concept for new experiences that

make customers feel what the "Genesis", or the "Vision" means for the brand. In the same manner, a creative heritage probably shows to its recipients a variety of knowledge gaps, inviting them to expand their knowledge to fill the gaps, and giving them some manners for recognizing the value of new knowledge. As those concepts are all related with the brand knowledge, they contribute to the coherence of the still unknown desired objects. Even if the marketing literature describes the power of brand platforms (brand identity, brand image, positioning, ...) on assuring brand coherence (Bastien and Kapferer, 2012; Chevalier and Mazzalovo, 2012; Kapferer, 2008), in this paper we go a step further by showing how in practice brand strategic management is related with the originality and operational efficiency in the design practices carried out by cross-functional teams.

Secondly, we find a positive effect of the transmission of a creative heritage on cross-functional team's capacity to manage the cognitive tension, to get rid of fixation and to converge during the design process, thus contributing to the originality and operational efficiency of innovation projects. As a creative heritage formalizes the important knowledge elements of the brand, the knowledge elements that are mobilized during the design process can help the designers at the same time to diverge and to converge. For example, when the project manager of the winemaking video decided to use the "winemaking source text" as a script for the video, the team diverged by proposing a video that differs from classical winemaking videos as no other brand possess the same philosophical principles as Dom Pérignon. At the same time, this knowledge element helped the designers to advance one step further towards the convergence to a real object. Thus, the knowledge elements formalized during the transmission of the brand creative heritage have the possibility to become a property of the new object being designed. Those findings suggest that there is no real opposition between defixation and convergence. Or at least that the creative heritage let its recipients to overcome this apparent opposition. Hence, we extend the literature on design science that found a defixating effect of knowledge (Hatchuel, Le Masson, Reich, et al., 2017; Hatchuel and Weil, 2007). Nonetheless, our results disagree with the study of Schulze and Hoegl (2008) who shown a negative effect of knowledge externalization in the novelty of product ideas. It is possible that this discrepancy is

originated by the source of knowledge employed during the design process: In their study, Schulze and Hoegl (2008) considered externalization of customers and designer's knowledge, while our approach is based on the transmission of brand values and brand key knowledge elements. Hence, we show that sharing and formalizing brand idiosyncratic features can help designers to find new ideas for objects during the design process and to converge while using those ideas.

Thirdly, we find a positive effect of the transmission of a creative heritage on cross-functional team's capacity to manage the organizational tension between cooperation and integration, thus contributing to the originality and operational efficiency of innovation projects.

Concerning cross-functional team cooperation, we find three major challenges for cooperation success that lowered operational efficiency: a necessary common understanding of program objectives and activities by the cross-functional team members, the investment of busy team members, and good communication with external partners. We recognize in those challenges the barriers of "language", of knowledge, and of "organizational responsibilities" described in the literature (Carlile, 2002, 2004; Griffin and Hauser, 1996). We show that the transmission of the brand CH helps the program team circumvent those barriers by the collective construction of a common language, a common methodology and a shared objective, vision and culture. Also, the positive consequences that the program has on team members for their daily work, and on the daily work of other functions, contributes to the interest worn by individuals and the organization on the project. In a sense, a creative heritage can act as a boundary object (Carlile, 2002, 2004) thus favoring the cooperation among the program team members. By giving a common set of words, symbols, meanings and methods, that are shared by designers coming from different services, a creative heritage can help designers overcome the syntactic boundary. By collectively constructing the meaning of the explicit symbols and words, and by mobilizing them to design new objects, the creative heritage can help designers overcome the semantic boundary. And finally, the pragmatic barrier can be overcome thanks to the collective objective of designing objects that invites team members coming from different functions to rebuild their own knowledge bases.

Furthermore, by acting as a boundary object between services, a creative heritage can act as a common resource for project actors and for other organizational actors that can be useful for cooperation and integration. Indeed, the transmission of a creative heritage helps the program members to design a common vision that facilitates the cooperation between functions. A common vision and a common understanding of shared objectives has already been identified as important elements for the creation and exchange of knowledge (Tsai and Ghoshal, 1998; Van Wijk et al., 2008).

The transmission of a creative heritage also favors the development of shared mental models, as exemplified by the formalization of the seven most important knowledge elements for the brand, and its relationships. Shared mental models have been reported to contribute to team coordination and performance (Converse et al., 1991; Mohammed and Dumville, 2001; Stout et al., 1999). However, our results suggest that the shared mental models developed by the transmission of a creative heritage are not only models of the known but also models of the unknown. This common sensibility to the unknown is probably what enables the team to pace the project and divide the activities to be accomplished even when the project objectives are fuzzy, or when the architecture of the objects to be designed is not well defined.

Moreover, our results suggest that by sharing a common creative heritage and by developing a shared language, team members develop an understanding of other member's mental models. This is called cross-understanding and have been shown to affect group performance (Huber and Lewis, 2010). By understanding what the other person knows and their unknowns, they can also better coordinate their actions and pace the progress of the projects.

Concerning the integration of the innovative project with the organization, we also find several barriers that negatively affect the operational efficiency. They concern difference in culture of the program and of the mother organization, the turnover of program team-members, the time-demanding nature of the approach, as well as the need of a clear communication of the program to the top managers and the rest of the organization. However, we show that thanks to the creative heritage the program

benefits from several facilitators that help to overcome those challenges: Firstly, the top management that act as experts and as sponsors for the program play a paramount role in the program integration and survival. This results are in agreement with the work of McDermott, C. M.; O'Connor, (2002), and Ancona and Caldwell, (1992) that highlighted the importance of project leaders for managing interfaces between the project and the organization. However, in our study, the program leaders play also a role as experts of the brand knowledge. This expertise is probably associated with the enthusiasm and expectative they put on the program and on its results. Secondly, the program team uses the outputs of the program in order to communicate with the top management and the organization and to establish the priorities for their efforts. Those results are in accordance with findings reported by Ancona and Caldwell (1992) who found that product development teams managing both the power structure and the workflow structure are able to maintain performance over time. We can also say that a creative heritage helps the cross-functional teams to design boundary objects to better dialog with top management.

Our study has some limitations. First, due to the brand-centered scope of the program, we limited ourselves to study the brand heritage as the primary source of a creative heritage. Hence, we did not study the impact of other sources of past knowledge as customer's knowledge, or past projects knowledge. Furthermore, the advancement state of the projects did not allow us to evaluate the reception of the innovative experiences by customers. Thus, further research could explore the impact of managing both the brand creative heritage and other knowledge sources, as customer's knowledge, in the design of innovative experiences and its reception by customers. Second, the projects that emerged from the program were all intended to embody a part or the whole brand creative heritage. Thus, in order to further understand the impact of knowledge transmission on team's originality and operational efficiency, future research should include an experimental setup including projects that do not necessarily have as primary function to embody the brand creative heritage. Finally, future research may investigate other kinds of knowledge heritage, like technical knowledge. Our study was focused on the design of brand experiences by a cross-functional team composed by the Marketing and R&D. Focusing on the

design of new products or new processes may allow us to evaluate the impact of managing a technical heritage on the generativity of cross-functional teams composed by for example members of the production and the R&D functions.

Finally, our study suggests some managerial implications. Managers of luxury organizations, where brand heritage plays a paramount role, can be inspired by our approach. They could start a program to transmit their own brand creative heritage in order to strengthen the ties of their R&D and marketing teams. Thanks to our study, managers could be aware of the challenges to which they could be confronted when driving such a program. Similarly, they could be inspired by the strategies we describe in order to guarantee the cooperation of their teams and the integration of their program with their mother organization.

In conclusion, we identify a new research object that we call a creative heritage, based on the effects of the transmission of Dom Pérignon's "Patrimoine de Création". With this new conception of knowledge transmission, we pave the way to a better dialog between the literatures in luxury brand management, knowledge transmission and design science. We can define a creative heritage as a heritage that when transmitted, it enhances the generativity of those who assimilate it. Above, we presented the effects of transferring a creative heritage to cross-functional teams, that let us describe some external properties of a creative heritage and to expect certain internal properties that merit further research. For this reason, future research should investigate the internal properties of a creative heritage.

PARTIE III

CREATIVE HERITAGE: DRIVING GENERATIVITY THROUGH KNOWLEDGE STRUCTURES IN CREATIVE INDUSTRIES. LESSONS FROM CUISINE

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1. Abstract

Sometimes, an experimented designer needs to share a "creation heritage" to support the generativity of his pairs, in the form of a book. What should be its content? The literature has shown that knowledge in such books might be fixating or defixating, leading to inconclusive results. Using recent advances in design theories we illustrate the varieties of heritages oriented towards generativity. We show that a creative heritage is composed by a description of facets, structures, validation criteria, desired unknowns, and progress principles. Relying on the literary tradition in Cuisine, we show that a creative heritage can contribute to attaining four different types of generativity according to its architecture. We put in evidence that the four kinds of generativity are compatible. And we also expose that there is a time evolution of the kinds of generativities fostered by the creative heritages of cuisine.

Keywords: *design creativity, knowledge management, knowledge transmission, C-K design theory, generativity*

2. Introduction

How can heritage be generative? The transfer of knowledge heritage is a subject of paramount importance for the survival and performance of organizations. Knowledge, skills and competences transfer is important in order to avoid losses of know-how (Dalkir, 2017), to reproduce best practices in geographically dispersed units (Szulanski, 1996; Winter et al., 2012; Winter and Szulanski, 2001), to avoid rediscovering what is already known by individuals and organizations (Szulanski et al., 2004) and to transfer knowledge between partner organizations (Schulze et al., 2014). Hence, organizations are confronted to managing both spatial transfer of knowledge from one individual, team, department or geographical division to another (Argote and Ingram, 2000), as well as transfer of knowledge through time (De Massis et al., 2016). Furthermore, innovation and design are knowledge dependent and knowledge creating activities (Hatchuel and Weil, 2009; von Krogh et al., 2000; Madhavan and Grover, 1998; Pitt and Clarke, 1999). Hence, to perpetuate the innovative capacities of organizations, experimented designers must be able to transmit resources for creating new objects to new generations of designers.

However, is it possible to transmit a knowledge OF generativity? What should be transferred in order to assure that the transfer keeps not only the heritage but keeps also the "creative" spirit in it? Indeed, the literature is rather inconclusive concerning the transfer of resources for creativity and generativity (Weisberg, 1999): In the one hand, research has highlighted that knowledge could limit and kill creativity (Audia and Goncalo, 2007), as knowledge can be fixing due to easily available knowledge (Jansson and Smith, 1991) and as old knowledge can hinder new learnings, transforming core capabilities in core rigidities (Benner and Tushman, 2003; Leonard-Barton, 1992). In the other hand, scholars and practitioners have described the positive effects of knowledge on creativity and ideation, especially as knowledge quantity can influence

the number of possible idea recombination (Amabile, 1997; Mednick, 1962; Rietzschel et al., 2007; Teres Enix Scott, 1999; Young, 2015), as past knowledge helps to recognize the value of new knowledge (Cohen and Levinthal, 1990; Lane et al., 2006; Shane, 2000), and as past knowledge can be a source for innovating product functionalities and meanings (De Massis et al., 2016; Messeni Petruzzelli and Savino, 2014).

In addition, recent progresses in design theory (for a synthesis, see (Hatchuel, Le Masson, Reich, et al., 2017)) shows that knowledge plays an important role in generativity and that the structure of knowledge might be the critical feature to support creativity. Hence it might be possible to derive, from Design Theories, hypotheses on how a "heritage" can be a "creative heritage". Hence, we are invited to ask: *what are the characteristics of a "creative heritage"?*

This study has two objectives: First, to characterize the varieties of creative heritages from the point of view of their generativity, and secondly, to illustrate those varieties thanks to a single domain. For attaining those objectives, we will rely on design theories to propose a classification of creative heritages according to their generativity and we will show how the generativity is related to the internal properties of a creative heritage. Furthermore, we will illustrate our findings thanks to the analysis of "creative heritages" in a creative industry: Cuisine. Using cuisine books, written by important chefs that were eager to share their knowledge heritage and generativity with their colleagues, we will characterize the properties possessed by creative heritages. We will expose that a creative heritage can contribute to attaining four different types of generativities, and that this is dependent on the creative heritage architecture. We will put in evidence that, surprisingly, the four kinds of generativity are compatible. And we also expose that there is a historicity of the fostered types of generativities.

This paper outline is as follows: We start by reviewing the literature on design sciences to find different types of generativities. We then propose a theoretical model describing the properties of a creative heritage, and their relationship with several types of generativity. We then illustrate our theoretical model thanks to creative

heritages from cuisine, we discuss our results and finally we conclude the paper and propose some clues for future research.

3. Literature Review

A creative heritage is a set of propositions that when transmitted from a source designer to a recipient designer, they foster the generativity of those who receive it (Carvajal Pérez et al., 2018a). Recently, we characterized the positive effects on innovation projects stimulated by the transmission of a creative heritage to a collective of designers in the luxury industries. However, we are now interested in better understanding the internal properties of a creative heritage. For this, we start by reviewing the literature in design sciences.

Design sciences, or design theories are theories of the generative reasoning (Hatchuel, Le Masson and Weil, 2017; Hatchuel, Le Masson, Reich, et al., 2011). They offer us a formal definition of generativity as the capacity to generate a novel object with desired properties, different from any other known object and that cannot be deduced from existing knowledge (Hatchuel, Le Masson, Reich, et al., 2011; Le Masson and Weil, 2013). Furthermore, they offer us several examples of designers that have succeeded to transfer a knowledge heritage for generativity. We know cases in which professors transfer to their students some methods for selecting between alternative objects, or in which professors teach to their students how to build new knowledge bases and generate new styles (Hatchuel, Le Masson and Weil, 2011; Le Masson, Hatchuel and Weil, 2016; Le Masson and Weil, 2013). Thanks to those knowledge transmission strategies, recipient designers seem to attain at least four different levels of generativity:

3.1. Transmission of selection procedures

Firstly, certain experimented designers have compiled extensive amounts of knowledge in the form of catalogues, books or databases. Thus, the source designer

gives to the recipient designer a collection of objects (atomic objects), whose value have been validated inside certain operating conditions by the source designer or others before him/her. The source designer also gives to recipient designers a set of selection criteria and procedures for selecting the atomic object that fit the best a particular situation. This is the case of selection procedures for choosing a bearing (Fagan, 1987; "Processus de sélection des roulements", n.d.; Siang Kok Sim and Yiu Wing Chan, 1991), for selecting a pump (Goulds Pumps, 2013; Larralde and Ocampo, 2010a, 2010b), or even for selecting a dish from a menu. For example, if the recipient designer wants to transfer a fluid from a point a to a point b, once he/she has acquired this knowledge, he/she can "query" his/her knowledge base by starting with some requirements, like the type of fluid, the nominal flow, the required pressure, the temperature, etc. and he/she can select the most appropriated pump.

Hence, the atomic objects contained in the creative heritage can be used again by other designers in similar conditions. In some cases, the source designer gives to the recipient designer the procedures for reproducing those objects. However, once operational or environmental conditions differ from those described in the collection, the choice procedure is no longer valid.

3.2. Transmission of search and combination procedures

Secondly, some other source designers go a step further and instead of compiling lists of atomic objects, they conceptualize a language to describe existing objects, as well as frameworks to guide the elaboration of still unknown objects with the help of known objects. Recipient designers are hence able to search inside a high space of knowledge elements and to combine them.

This can be exemplified by the method of ratios to design machines conceived by Ferdinand Redtenbacher (Redtenbacher, 1874). The method of ratios gave to recipient designers the capacity to design a known object adapted to a specific context by using a set of rules (Le Masson and Weil, 2013). The method of ratios gave to its recipients two kinds of knowledge (Le Masson and Weil, 2013): First, it gave a *language of the*

known, constituted of models of known objects. That is, a body of knowledge on a particular type of object (like waterwheels) in the form of a set of rules derived from known objects of the same type. It also made explicit the relationships between the parts of the machine or between parts and properties of the machine. Second, the method of ratios also provided its recipients with a *language of the unknown*, constituted by procedures to be followed in order to design a new object of the same nature by using the given rules.

Hence, starting with a general description of the context in which the machine was going to be used, the recipient designer used a sequence of calculations that gradually enabled him/her to define the object, proceeding from main requirements described by the customer until enough details were made explicit to make possible to build the machine. At the end, thanks to the ratio method the recipient designer was able to define the values of the constitutive properties of the machine to be designed, like the material, the size, the height, the types and number of blades, etc.

What is interesting about this type of generativity is that by giving some knowledge elements to the recipient designers, source designers do not need to instantiate or make explicit the whole space of possible combinations in the creative heritage. However, they guarantee that by using the described knowledge elements, a new object can be obtained.

3.3. Transmission of combination and learning methods

Thirdly, a different generativity is provoked by source designers who transmit systematic design process for designing new objects based on known ones. They also give to recipient designers a language of the known and a language of the unknown. However, the biggest difference is that in this type of generativity, the source designer invites the recipient designer to expand and acquire new knowledge by learning and by experimenting. The number of knowledge elements is not fixed in advance, instead, some knowledge gaps or voids are present and made explicit by the creative heritage.

This can be exemplified by the systematic design method of Pahl and Beitz (Pahl et al., 2007a; Pahl and Beitz, 1986). In their method, Pahl and Beitz give to recipient designers four different languages to describe the objects: the language of functions, the language of the main techniques (or conceptual language), the language of components and their inclusion in a coherent whole (or embodiment language), and the language of dimensionalization and product reference (or detailed language) (Le Masson, Weil, et al., 2017). The design of a new object requires the mobilization of those four languages in a sequential manner. Pahl and Beitz method also provide designers with theories of controlled knowledge expansion. The recipient designer is invited to continue the acquisition of knowledge about new functions, new concepts, new embodiments, new materials, etc. This new acquired knowledge can then be accumulated in the existing reservoirs and used for new designs.

3.4. Teaching how to explore the unknown

Finally, design theories predict that the highest level of generativity is provoked by knowledge transfers that invite the recipient designer to learn and develop new languages for describing objects, and to get rid of all the determinisms and modularities of his/her own knowledge base (Hatchuel et al., 2013; Hatchuel and Weil, 2007; Le Masson, Hatchuel and Weil, 2016). The Bauhaus teaching can help us understand what those properties of a knowledge base means.

In the school of Bauhaus, courses of professors like Johannes Itten (Itten, 1973, 1975) and Paul Klee (Klee, 1966, 2004) gave elements to design students not only to understand old and new styles, but also to create new styles (Le Masson, Hatchuel and Weil, 2016). Thanks to Bauhaus' teaching, students were able to create their own knowledge structure characterized by *non-modularity* and *non-independence*. That is, at each step of the design process, the designer could not use a deterministic law in order to choose the next property of the emerging object. Moreover, each new step was critical and influenced the whole work. Furthermore, thanks to Bauhaus teaching, designers were able to learn a design process that helped them to be generically creative. This design process was based on a progressively accumulation of general

languages on the object in a robust way. This accumulation was based on two principles: First, even if each step of the design process addressed 'parts' of the object, each step also addressed an aspect that was valid at the level of the whole object. Hence, each step led to the 'validation' of one dimension of the 'whole' object. Second, the process of language accumulation was neither deterministic nor modular. It was based on transitions between languages that kept the possibility of multiple paths open at each level, and propagated the originality won at one level to the following level.

This literature review helps us understand that in the transmission of a creative heritage one can expect the transfer of atomic objects definitions, and knowledge elements but also the transfer of capacities to use this knowledge to design: that is, a creative heritage contains design operators, languages of the unknown. Moreover, we can also recognize that transfer of a creative heritage can nurture a gain of different kinds of generativity, as the newly acquired knowledge base can help designers to design new objects: 1) without producing additional knowledge, 2) while facilitating knowledge expansions, to fill identified knowledge voids either present in the new knowledge base, or already present in the recipient knowledge base, or 3) while enabling the generation of new unknowns, of new languages, not originally present in the design space of the recipient designer nor in the design space carried by the heritage. Hence, we are motivated to answer the following questions:

Q1: *What are the varieties of creative heritages and their associated generativities?*

Q2: *Can we find a variety of creative heritages within a same domain?*

Q3: *Are those generativities compatible?*

4. Theoretical Proposition

4.1. Creative heritage

To begin, let us restate our definition of a *creative heritage (H) as a set of propositions, that when transferred from a source designer, and assimilated by a recipient designer (B), it enhances recipient designer's generativity*. Hence, in order to characterize the effects of a creative heritage on generativity, we need a conceptual framework that let us model the generative reasoning responsible both for rule-based and innovative design. This framework must take into account the role of knowledge in the generative process, as well as knowledge expansions (*i. e.* the emergence of new knowledge domains, new knowledge structures and new description languages). In consequence, we will model a creative heritage using Design Theories. Indeed, Design Theories, and in particular C-K Theory, have proven their utility to model with success the generative reasoning of several creators like engineers, architects, designers, and artists (Hatchuel, 2005; Hatchuel and Weil, 2009).

C-K theory models the design process as an interaction of two spaces: the concept space (C) and the knowledge space (K). Both spaces are constituted by propositions, but they differ in terms of structure and logics: The knowledge space is constituted by propositions with a logical status (they are true or false), while the concept space is constituted by propositions without a logical status with respect to the knowledge space propositions. Concepts are interpretable propositions using the propositions in the K space. However, they are undecidable using this same knowledge, that is, we cannot say whether they are true or false.

A design process starts with an initial Concept C0, an undecidable proposition in K space, formulated in a manner "There exists an object X having some properties Pi". It finishes when knowledge and concept expansions guarantee the logical status of a proposition derived from C0 in the C-Space (the proposition "There exists an object X having some properties P1, P2, P3... is true). Between the start and the end, the design process proceeds through the interaction and expansion of the C and K spaces,

through four kinds of operators: K→C, C→C, K→K and C→K: 1) K→C is the addition of properties from the K-space to the initial concept in the C-space, partitioning the C-space in subsets; or the substraction of properties from K to include the C-space in a set that contains it. 2) C→C is the generation of undecidable propositions by using only other undecidable propositions. 3) K→K represents the transformations of the K-space through inference, deduction, decision, optimization, modeling, experimentation, etc. and, 4) C→K is the creation of decidable propositions through undecidable propositions.

Taking advantage of the C-K theory, we can model the design reasoning of designer B as a C-K map, containing a space of knowledge (K), a space of concepts (C), and a set of operators representing the interactions between those two spaces (K → K, K → C, C → K, C→ C). Recipient designer has a knowledge base (K_B) and a set of instantiated concepts (C_B) associated to his/her knowledge base. To accomplish a design task, designer B has to navigate between the C and K spaces thanks to operators, while expanding his/her knowledge base and partitioning his/her concept space.

We can now develop our definition of a creative heritage as *a collection containing a knowledge base (K_H), a reservoir of concepts associated with this knowledge base (C_H), and a set of C-K operators.*

4.1.1. Architectural elements of a creative heritage

We will model K_H as composed by three subspaces: the *facets*, the *structure* and the *validation criteria*. We will model C_H as composed by two subspaces: the *knowledge voids*, and the *progress principles*:

The **facets subspace** represents the several elements that the designer can use to design, the language that the designer uses to describe object properties. Two kind of facets are possible: a description facet and a composition facet, that is properties that even serve to describe or to compose an object. We can find a parallel between this definition of the facets and the functional requirements and the design parameters

of Axiomatic Design (Suh, 1990, 2001). An example of a facet could be a type of object like the "blades" of a waterwheel, or the ingredients of a meal.

The **structure subspace (S)** contains the different relationships among the elements of the facets subspace. The different facets can be related in several forms, through classifications, taxonomies, rules, models. Those relationships can vary in their degree of strength and explicitness and certain relationships are not allowed, thus being expressed in negative sentences. An example of structure are the composition rules of a machine or of a meal, like the rule that states that a meal should not contain at the same time a meat and a fish.

The **validation criteria subspace (VC)** contains designers and user's beliefs, expectations, needs of desired outcomes. It is manifested through claims and sentences of desired states, desired functions, desired functional requirements, and performance criteria. They are explicit or implicit compositions of facets and structures and serves to validate the integrity of new objects.

By using these descriptors, *Objects* (O) can be interpreted as associations between elements of the *facets* subspace and elements of the *structure* subspace that are validated thanks to the elements of the *validation criteria* subspace.

The **knowledge voids** (**KV**) correspond to identified but missing elements of the facets, of the structure or of the facet-structure subspaces.

The **progress principles** (**PPs**) are identified validation criteria that remain unsatisfied and then possess no associated facet-structure relationships.

4.1.2. Varieties of creative heritages according to their generativity

We argue that the propositions as well as the C-K design operators that are transmitted in the creative heritage and that make use of its architecture determine the level of attained generativity. For each of the four types of generativity described in the literature review, we describe the creative heritage associated structure by using our previous model (Figure III-1):

G_0. Selection generativity (Figure III-1.a): The creative heritage associated with this type of generativity contains a collection of *objects* that have been already created and validated by the source designer, thanks to validation criteria. It also contains some description criteria but that do not let the recipient designer to decompose the objects in facets and structures. That is, the facet-structure relationships are hidden from the recipient designer. It can also contain a process for reproducing the selected atomic object. This creative heritage does not necessarily contain knowledge voids nor progress principles.

Hence, G_0 - selection generativity is fostered by the transfer of C-K operators that give to the recipient designer the basic capacity to select and reproduce an object belonging to the collection of new atomic objects presented in K_H and that respect a set of validation criteria.

G_1. Search and combination generativity (Figure III-1.b): The creative heritage that encourages this type of generativity provides the recipient designer with objects, facets, relationships among the facets (that is structures), and validation criteria. However, this kind of creative heritage do not necessarily put at the recipient designer's disposal a complete list of all possible combinations of facets-structures, nor a complete list of objects that respect the validation criteria. Recipient designer's mission will be to explore several different compositions by starting with concepts contained in his/her own knowledge base or in creative heritage's knowledge base and following a precise procedure. Hence, this type of generativity is stimulated by the transfer of C-K operators that give the capacity to the recipient designer to even:

1. Create a new object by composing the facets contained in K_H while respecting the rules fixed by the structure and validation criteria of K_H, or
2. Modify an object contained in K_H to prepare a new object while using the facets and structures proposed by K_H

However, in G1- search and combination generativity, new knowledge expansions are dismissed or discouraged.

G_2. Combination and learning generativity (Figure III-1.c): The creative heritage nurturing this type of generativity also provides the recipient designer with knowledge

(K_H) such as objects, facets, structures, and validation criteria. However, it also encourages, and primes knowledge expansions by providing the recipient designer with concepts (C_H) in the form of knowledge voids and in the form of progress principles. The first ones are even missing facets, missing structures, or couples of facets-structures not explicitly contained as objects in K_H but allowed by the rules and validation criteria. The second ones correspond to unsatisfied validation criteria. In certain occasions, the knowledge heritage can even give guidance concerning where to search for filling the knowledge voids. Hence, in the case of the G2- combination and learning generativity, the generativity is not only the result of a composition of elements in the knowledge bases of the recipient designer and of the creative heritage ($K_B \cup K_H$) as in G_1, but the result of new knowledge expansions ($K_B \cup K_H'$).

This type of generativity is stimulated by the transfer of C-K operators that give the capacity to the recipient designer to:

1. Do knowledge expansions to fill the knowledge voids and satisfy the progress principles (Expand $K_B \cup K_H$ to $K_B \cup K_H'$).
2. Create a new object by composing the facets contained in the expanded knowledge base $(K_B \cup K_H)'$, while respecting the rules fixed by the structure and validation criteria of K_H, and
3. Modify an object contained in K_H to prepare a new object while using the facets and structures contained in the expanded knowledge base ($K_B \cup K_H'$).

G_3. Unknown exploration generativity (Figure III-1.d) : The creative heritage that stimulates this type of generativity proposes some facets, structures, and validation criteria. It can also give knowledge voids and progress principles. However, it invites the recipient designer to recompose his/her own list of facets, structures, and validation criteria by introducing new languages to describe those properties. Hence, recipient designer is able to generate new unknowns with respect to the concepts already contained in both knowledge bases, that is to generate C_0 not in $C_B \cup C_H$. This class of generativity is possible thanks to the transmission of C-K operators that invites to the expansion of $K_B \cup K_H$ in directions primed by K_H, and to the introduction of new languages.

For example, the introduction of new languages for describing validation criteria can motivate the acquisition of new knowledge in the form of facets and structure subspaces: the introduction of the "environmental performance" as a new language for talking about validation criteria for the design of a technical system, can motivate the recipient designer to research about new sources of energy and new energy conversion principles that will in turn invite him/her to explore new design spaces like the design of the whole environment of the technical system instead of just generating a new machine.

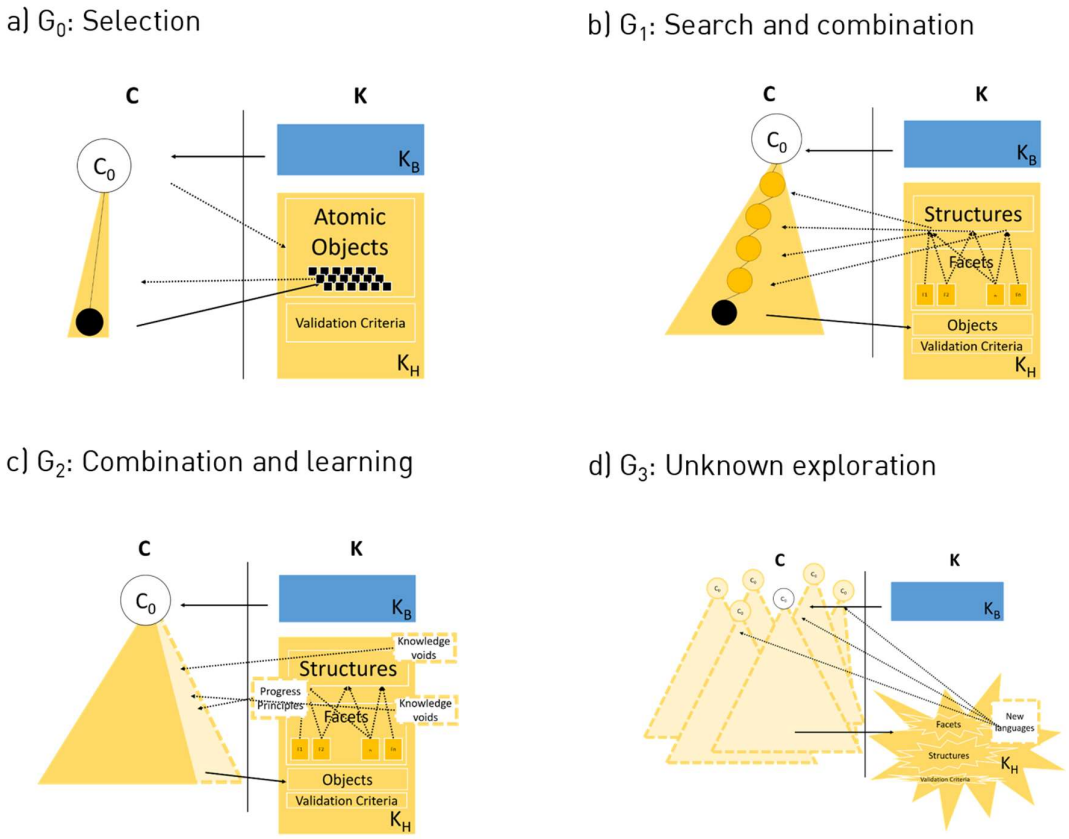

Figure III-1. C-K theory representation of the 4 types of creative heritages

5. Methodology

To test the validity of our theoretical model that predicts a variety of four different creative heritages, to see if we can find this variety of creative heritages in a same

domain and to see if the four generativities are compatible we needed a material with special characteristics: First, we needed a material coming from a domain in which novelty is highly appreciated and researched. Second, we needed several cases of experimented designers that have transmitted with success a set of propositions that enhanced recipient designers' generativity. Finally, we needed a material that let us easily characterize the structure of the set of transmitted propositions.

For those reasons we choose to study the creative heritages in a creative and luxury industry: cuisine. Indeed, scholars acknowledge that through history, cuisine has constantly been in search of novelty (Beaugé, 2012, 2013, Capdevila et al., 2015, 2018, Opazo, 2012, 2016). Furthermore, several renown Chef-creators have formalized their knowledge in the form of books, and have transferred it to their pairs, in order to share with them a certain generative capacity (Beaugé, 2013; Capdevila et al., 2018; Fink, 1995; Opazo, 2016; Rambourg, 2010). Moreover, cuisine books represent sources of codified knowledge that let us access to the structure of knowledge as presented by the experienced chefs. It is true that the propositions contained in books let us only access to the explicit knowledge and not to the tacit knowledge. However, scholars agree to say that enough codified knowledge is encoded in books so as to diffuse their generativity to several generations of cooks (Beaugé, 2012, 2013; Capdevila et al., 2018; Opazo, 2012, 2016). As expressed by Beaugé (2013, p. 42): "*It seems that this proliferation of cookbooks has had a mechanical effect on novelty production* [...]"

We proceeded through a 2 stages process. First, starting from a corpus of cuisine books written in several epochs and languages, we retained the books whose authors claimed to be "creative heritages". Then, we characterized the types of generativity and the characteristics of the creative heritage.

5.1. Book selection

In order to constitute a corpus of creative heritages, we have first selected a collection of 40 cuisine books written in different years from 1651 to 2017, available in French, Spanish or English language. This initial sample was selected because of their

influence in the cooking world as described by sociologists, historians and management scholars (Beaugé, 2012, 2013, Capdevila et al., 2015, 2018, Opazo, 2012, 2016; Rambourg, 2010). The sample was also complemented by a selection of published books as recommended by experienced cuisine practitioners to one of the authors. Using our theoretical proposition described above, we retained only the books in which the author claimed to have written a creative heritage as evidenced by three types of claims: The book describes a recipient designer (Collective value claim), it intends to give a complete heritage to the recipients (Completeness claim), and the heritage is intended to promote generativity (Novelty claim). Hence, we analyzed the contents of the title, the preface, the introduction and the foreword of each book in order to search for the presence of each one of the three claim categories. Table III-1 contains a description of each claim category and an example of verbatims found in books.

In total, we classified 13 books as "creative heritages". In the rest of the paper, we will call a *creative heritage a collection of books written by a same author or collective*. We will focus the illustration of our propositions using the creative heritages of three authors:

1. François La Varenne, writer of "Le Cuisinier François" (The French Cook) (La Varenne, 1651),
2. Auguste Escoffier, writer of "Le Guide Culinaire, aide-mémoire de cuisine pratique" (The Complete Guide to the Art of Modern Cookery) and "Le Livre des Menus" (The Menu Book) (Escoffier, 1903, 1907, 1912a, 1912b, 1921), and
3. elBulli, a collective lead by the chef Ferran Adrià, writers of several books describing the management of the elBulli restaurant (Adrià, 1998; Adrià et al., 2014).

However, we will also complement our results with quotes coming from the creative heritages of L. S. R., writer of “L’art de bien traiter” (The Art of Catering) (L. S. R., 1693) ; Urban Dubois and Emile Bernard writers of “La cuisine classique” (Classic Cooking) (Dubois and Bernard, 1856), and Jules Gouffé, writer of “Le Livre de Cuisine” (The cookbook) (Gouffé, 1867).

Whenever the texts were written in Spanish or in French, the first author translated the verbatims in English.

Table III-1. Description and examples of the claim categories used to distinguish the "creative heritages"

Claim Category	Description	Example
Collective value	The author claims to define a target audience for his/her work, and consider his/her target as creators/designers	"My intention is not to shock nor to offend anyone. [...] But to serve and help those who will need, several of whom do not have the experience, nor the present memory, and who do not want or do not dare to become fully involved in learning what they do not know, in part due to glory, in part due to consideration. [...] That is why, while particularly appreciating those of my profession, I thought I should share with them the little I know [...] " (La Varenne 1651)
Completeness	The author claims to describe the state of the art of the cuisine and defends his/her work as a sufficient material to practice the cuisine according to the most up to date rules	"I wanted to do a tool more than a book and, while letting each one to operate according to his personal view, I was keen, [...], to fix, at least in principle, the traditional basis of work" (Escoffier 1921)
Novelty	The author claims having taken a new and different approach with respect to other authors. He/she might claim improving extant knowledge bases or breaking with the old knowledge bases.	"[...] It was Ferran Adrià's appointment as sole head chef in 1987, however, that signalled the real turning point in the restaurant's creative development. It finally closed its doors on 30 July 2011. During that time the field of gastronomy changed enormously, and it would have evolved very differently without the work of Ferran Adrià. During his 27-year tenure as head chef at elBulli, he and his team began a sustained programme of innovation that has had no parallel in the food world." (Adrià et al. 2014)

5.2. Book analysis

Objects, Facets and Structure: In order to understand the objects, facets and structure proposed by the books of a same author, we have done first a text analysis. We have analyzed the introduction of each book in order to find the general framework proposed by the author, as well as the actions undertaken by him and their consequences. Thanks to the introduction, we have also analyzed the environment in which the book was written, and the author's objectives. We have analyzed the language used by the authors in the table of contents, as well as in the introductory paragraphs of each chapter. We have also done an analysis of the objects described, the general logics and rules proposed by each author. We have complemented our

approach with the analysis done by other scholars (mostly historians or sociologists). Once we have understood the books' objects, facets and structure, we compared each architecture with the other two architectures.

Validation criteria: To elucidate the validation criteria embedded in the knowledge base, we have done a text analysis in search for definitions of "desirable", and "good things" as expressed by the author. We also searched to highlight how those value criteria are linked to elements of the facets and structure subspaces concerning the production (process or routines descriptions) or the validation (time, temperature) processes. In addition, we conducted a text analysis in order to find author's recommendations to fulfil those requirements. That is, the relationships between validation criteria, facets and structures.

Knowledge voids and progress principles: To elucidate the knowledge voids and the progress principles proposed by the authors, we have done a text analysis in order to find the "holes" clearly identified or suggested by the author and his/her structure. Moreover, we searched for author's recommendations to the manner of "filling" those "holes".

6. Results

6.1. Creative heritages contain objects, facets, structures, and validation criteria in the K-space

François Pierre de La Varenne (1618-1678) wrote the cookbook "Le Cuisinier françois", published for the first time in 1651 (La Varenne, 1651). He was chef to the Marquis d'Uxelle. Until La Varenne's work, most cookbooks were written by maîtres d'hôtel instead of by cooks (Beaugé, 2013), and before him, books were simply recipe repositories without much structure (Beaugé, 2013). La Varenne's book organize the *recipes* according to a rational, modular logic (Beaugé, 2013; Fink, 1995), creating an arrangement of facets (a structure) that was useful to the management of the kitchen

of his epoch: Products, like *meats* or *vegetables*, are listed and classified according to their availability in a certain moment of the year. For example, La Varenne specifies that ortolans (a particular species of little birds), could be found from Easter (in March, April) until the feast of St Remy (in January), while suckling pigs were available from the feast of St Remy until times of Lent (in March). *Basic recipes*, useful for several culinary preparations, are identified and described. This is the case for example of *broths*, useful for preparing several types of soups; as well as mushroom juice, useful for sauces and ragouts. Furthermore, recipes are separated by service (in *Soups, Entrées, Second service*, and *Entremets*). And they are also classified according to the liturgical year in "fat days", "lean days" and times of Lent. He details methods of preparation and conservation of several elements intervening during the cooking process as is the case for *sauces*, and "*liaisons*". The validation criteria proposed by La Varenne to his readers, is to follow his specifications to obtain a meal, as suggested in the title of his book: "*The French Cook. Showing the manner to prepare and to season all kind of fat and lean meats, vegetables, pastries, and other dishes that are served in the Table of the Greats as well as in private Tables*".

Auguste Escoffier (1846-1935) was a renowned French cook, director of the kitchens at the Savoy Hotel and at the Carlton Hotel in London. His master piece, "Le Guide Culinaire" (The Complete Guide to the Art of Modern Cookery) knew 4 editions between 1903 and 1921 and is still a reference book for chefs all over the world. Escoffier separates his set of facets in two big categories: 1/ the fundamental elements of cooking, and 2/ the recipes and mode of procedures. This separation is explicit in the English edition of "Le Guide Culinaire" appeared in 1907 (Escoffier, 1907), however it is subtle exposed in French versions of the book. *The fundamental elements of cooking* constitute basic definitions and procedures, common for different culinary preparations in Escoffier's knowledge base. This is the case of *sauces* and *garnishes*, root elements used for several culinary preparations. Moreover, culinary operations are also part of the *fundamental elements*. Escoffier establish precise definitions of what objects like *Sauces* and *Soups* are. He describes for example, that a *Sauce* is composed by a *juice* (like beef stock) and a *roux* (a mix of flour and butter that thickens the sauce). The *recipes and procedures* detail different preparation routines for

obtaining the several types of dishes composing a *Menu*. He uses a rich nomenclature to identify and differentiate his recipes (for example, the *purée à la Conti* is a purée made of lentils, while the *purée à la Condé* is made of beans). Furthermore, Escoffier proposes a list of the different garnishes that can accompany each dish, and the sauces that might be used. Escoffier classifies recipes according to their order of presentation in the Menu. And he provides also detailed classifications inside each type of culinary preparation. Hence, for example, he proposes a classification of *soups* in *clear* and *thick soups*. The former is divided in *plain* and *garnished consommés*, and the latter comprise the *Purées, Veloutés, and Creams*, all different types of culinary preparations that he defines in his work. Escoffier's creative heritage identifies validation criteria like simplicity, rapidity, as well as client satisfaction.

elBulli was not a person but a restaurant led by the chef Ferran Adrià. elBulli's facets clearly distinguishes several levels and try to work with the identity of the objects of cuisine: The facet *Products* contains the set of raw materials and elements that can be used for conceiving a dish. They introduce a distinction between two kinds of products: non-elaborated products (like grapes or raw meat) and elaborated products (like wine, oil, chocolate or sugar). elBulli gives to the reader an exhaustive list of products and new products used by the restaurant in particular years. They present the efforts they made to research new products coming from all around the world, as well as to how to use the normally discarded parts of products (for example they report the use of granadillas' skin). The module *Elaborations* contains a list of classes of culinary preparations that are classified according to a classification system that take roots on older classification like those of Carême and Escoffier. However, they extend the classical words with new ones issued from new techniques, or from foreign classifications (like "Spherification", "Nitro" or "Sashimi"). This classification system differs from the name of the courses used in elBulli. *Techniques (applied to products)* presents the several techniques and preparation modes undergone by one or several *Products* as well as by *Elaborations*. Examples of techniques are Cutting, Sphérification and Lyophilisation. Moreover, elBulli introduces the notion of *Concept*, a sort of generalisation of Carême's and Escoffier's nomenclature: for elBulli: a sauce is a *Concept*; a soup is a *Concept*. There is a relationship with the notion of elBulli's

Concept and object identities. In *Technology*, elBulli exposes the different tools, devices and utensils intervening in the transformation of *Products* and *Elaborations*. Typical culinary devices such as silicon moulds, frying pans and juice extractors are accompanied by freeze dryers, and coating drums, devices commonly used in chemistry laboratories. *Recipes*: During its existence, elBulli created several dishes. However, only 1846 dishes were given a number identifier, a name, and were served in the restaurant. They are inscribed in a repertory called the "Evolutive Catalogue". Furthermore, dispatched in several modules, elBulli works on a language of the reception of the dishes. They describe how the five senses play a role in the perception of the culinary preparations. elBulli identifies validation criteria like novelty, knowledge acquisition, and client satisfaction.

Table III-2 gives some examples of the objects, facets, structures and validation criteria of those three creative heritages. All three analyzed creative heritages propose facets composed by several categories. However, the nature of the categories is different for each creative heritage. These differences, as well as differences in the structures and validation criteria will have some consequences in the generativity that we will explore in the next subsections.

Table III-2. Examples of the objects, facets, structures and validation criteria of the three creative heritages of La Varenne, Escoffier and elBulli

Creative heritage	Objects	Facets	Structures	Validation criteria
La Varenne	Named recipes (Pottage of boneless stuffed lamb heads, ...)	Recipes Products (meats, vegetables, ...) Basic recipes (broths, mushrooms...) Services (Soups, Entrées, ...)	Basic recipes compose more elaborated recipes Recipes to be served on lean or fat days, ...	Follow the recipe
Escoffier	Named recipes (Peach Melba, ...)	Fundamental elements of cooking Recipes and Modes of Procedure	Sauces and garnishes as root elements for more elaborated preparations Sauces are composed of a juice and a roux...	Simplicity Rapidity Client Satisfaction Edible character of dishes

Creative heritage	Objects	Facets	Structures	Validation criteria
elBulli	Named recipes (1846 Peach Melba, ...)	Products Elaborations Techniques Concepts Technologies	A product P1 is submitted to techniques T1, T2 and T3 to become elaboration E1 Elaborations E1 and E2 yields elaboration E3	Novelty Knowledge Acquisition Client satisfaction

6.2. The domain of cuisine possesses the four varieties of generativity

6.2.1. The domain of cuisine possesses G_0- Selection generativity

The three analyzed creative heritages contain a rich set of objects like recipes that enable recipient designers to reproduce a huge amount of culinary preparations thanks to the presence of lists of ingredients, and descriptions of successive culinary operations. Furthermore, inside each book, authors expose their identified validation criteria and propose to readers already tested recipes responding to those criteria. Hence, recipient designers can choose one or several recipes from a previously validated list of dishes. Furthermore, the nomenclature introduced by the three shown creative heritages play a paramount role in G_0- selection generativity, as selecting a named recipe among a set of validated recipes, is probably economic in terms of cognitive resources. For example, using La Varenne's creative heritage, a recipient designer can choose between reproducing a *Soup of partridge and cabbage*, or a *Soup of duck and turnips*; while using Escoffier's creative heritage, the designer can reproduce a *Soup Olla-Podrida* (made with partridge) or a *Danish soup* (made with duck).

6.2.2. The domain of cuisine possesses G_1- Search and combination generativity

G_1- Search and combination generativity is the result of the combinatory power of a creative heritage. All three analyzed creative heritages propose facets composed by

several categories (Table III-3). However, the nature of the categories is different for each creative heritage. La Varenne talks of facets like Meats, Stocks, Sauces, Soups, Entrées, Second service, and Entremets, and the manners to prepare them. Escoffier proposes a set of basic facets like Sauces and Garnishes, and then a set of derived categories in accordance with the Menu of his epoch: Soups, Eggs, Relevés, Entrées, among others. elBulli pushes the classification system of its facets and gains in generality to talk of facets like Products, Techniques and Elaborations. Inside each category of facets, the different creative heritages propose a set of elements (which in turn are also facets). For example, inside the category Meats of La Varenne, we can find elements like chickens, lambs, or pheasants. Furthermore, the different structures propose a complex language of composition with hierarchies inside it: In Escoffier's creative heritage, certain facets like Stocks are the basis of several culinary preparations, like sauces. And one single Stock enables the elaboration of several different Sauces, which in turn give origin to several different dishes. Thus, recipient designers can use those facets and combine them to design new objects (dishes, or Menus) using several combinatorial strategies (Table 3): recipient designers can modify a recipe contained in the book to prepare a dish while using the facets proposed by the book, they can compose new dishes by combining the facets contained in the book, they can compose a Menu using recipes contained in the book but modifying them, using both the facets, the structure and the validation criteria of the book, they can recombine old facets, from the designers knowledge base or from K_H, (like the ingredients of a particular dish) with a new facet from K_H (a new type of elaboration). Thus, for example using Escoffier's structure new objects can be created by replacing the principal ingredient of a recipe with another, or by variating some of the elements used as garnish. This is in accordance with Fink's description of La Varenne's cookbook as composed by several modules thanks to which a new dish can be "conceived as a modular structure with variants, following the laws of a system of assembly and disassembly." (Fink, 1995). Nonetheless, elBulli's creative heritage do not invite recipient designers to use strategies leading to G_1- Search and combination generativity as evidenced by the few number of verbatims found. This can be partially

explained because more than a cookbook, elBulli literary production describes the restaurants life in search for novelty, subject of the next subsection.

Table III-3. Creative heritages possessing G1- Search and combination generativity show different forms of facets recombination

	François Pierre La Varenne	Auguste Escoffier	elBulli
Modifying a recipe contained in the book to prepare a dish while using facets and structures proposed by the book	"All kind of meats, like beef, sheep, lamb, pork, from everywhere, can be used to prepare a ragout [...], but take care of clean them, and make sure that they have a good taste."	"The principle of composition of garnishes, as of all culinary preparation, is intangible. If in several cases, modifications are required, they only imply a change in the disposition or in the form, according to the object to which the garnish is intended, and not to a change in the elements."	(No supporting verbatim found)
Composing a new dish using the facets and structures contained in the book	"All kind of fat or lean pastry, that can be eaten hot, are seasoned in the same way, following the type of used meat. You can even put garden garnishes, like mushrooms, truffles, asparagus, egg yolk, artichoke heart, capers, chards, pistachios. To flesh pies, besides the garden garnishes, you can use sweetbreads, kidneys, crests, etc."	"Fonds de cuisine Before undertaking the description of the different kinds of dishes whose recipes I purpose giving in this work, it will be necessary to reveal the groundwork whereon these recipes are built. [...] Indeed, stock is everything in cooking, at least in French cooking. Without it, nothing can be done. [...] Sauces The fundamental basis of its work are the stocks. Either a brown stock or "estouffade" for brown sauces; or white stock for the Veloutés [...]"	(No supporting verbatim found)
Composing a Menu using recipes contained in the book but modifying them. Usage of the facets, structures and validation criteria of the book	"[...]. I have drawn up four services, in front of which you will find the Table and then the speech. I have divided them according to the several ways of serving the meal as used in the days of meat, of fish, and of Lent. And particularly for Good Friday, I have adjusted a lot of general things, for which you will see the tables and the discourses. [...]"	"In the different series that compose this work, I have roughly gathered all kind of menus needed in the current circumstances of culinary life. And if sometimes, their full application is difficult or impossible, a simple imagination effort suffices for providing the desired transformations, in order to conform them to their destination."	(No supporting verbatim found)
Recombining facets contained in both K_H and K_B	(No supporting verbatim found)	(No supporting verbatim found)	"In 2010 we served three cocktails with a snack incorporated. Although some of those preparations were cocktails as far as their taste went, their structure was likened to that of a snack"

6.2.3. The domain of cuisine possesses G_2- Combination and learning generativity

G_2- Combination and learning generativity is a consequence of knowledge expansions guided by the creative heritage itself. Knowledge heritages with G_2- Combination and learning generativity invite the recipient designer to expand the knowledge heritage. They invite designers to nourish each category of the facets and structure with new elements, or to create new categories of facets. Two out of three analyzed creative heritages showcase G_2- Combination and learning generativity (Table III-4): Escoffier and elBulli's creative heritage. Several characteristics of the knowledge heritage contributes to this generativity: First, they possess progress principles (PPs), that is, identified yet not satisfied validation criteria. Escoffier's creative heritage identifies PPs like simplicity, as well as client satisfaction. Even if he proposes some facets related to those validation criteria, like the reduction of the volume of the meal, or the diminution of the number of elements composing a garnish, he invites the recipient designer to continue to progress in this direction. elBulli identifies novelty, and the satisfaction of client's thirst of novelty as their PPs. Those principles guided their work and invite also the recipient to continue explorations in this direction. Second, they have knowledge voids (KV), that is, desired but missing facets and structures. Escoffier is in search of facets like food without inert matter in order to obtain concentrated nourishing principles, or pure starch for sauces in order to simplify and shorten the culinary operations to reproduce a Sauce. elBulli identifies missing facets as new Techniques and new Concepts that could be combined in order to produce new types of dishes. KV acts as primers for future knowledge expansion, orienting recipient designers on where to invest their research efforts. As explained by Adrià, the discovery of new facets like Concepts offers to the recipient designer a dimension of new possibilities (Adrià, 1998): "*That's wonderful, the day somebody discovered that we could add an onion to an omelette. From that moment on, appeared the onion omelette. But the actual significant milestone occurred long time before, with the creation of the Concept "Omelette", which enabled besides the creation of the onion omelette, the appearance of an infinity of additional recipes created using a plethora of ingredients.*" And finally, in certain cases, the knowledge heritage orients the designer on how to "fill" the knowledge voids by highlighting the possible sources

of facets. That is the case of elBulli's creative heritage, which identifies traditional and foreign cuisine as sources of Products, Techniques, Concepts, etc.

Table III-4. Creative heritages possessing G2- Combination and learning generativity show different forms of knowledge expansions

	François Pierre La Varenne	Auguste Escoffier	elBulli
Identified validation criteria	(No supporting verbatim found)	*Simplicity and Nutritional value* "We will take simplicity to the outmost limits. But, in the same time, we will increase the flavor and nutritive value of dishes. We will make them lighter, more easily digestible for the weaken stomachs; we will concentrate them; we will strip them of the most part of their inert matter. [...]"	*Novelty, Knowledge of the extant, knowing the client and his referential* "[...] The anxiety [of the cook] for discovering what has been done, or what others are doing, for bring himself up to date and for knowing the most recent interesting trends, is a factor of paramount importance. [...]. It is not the same to cook for a diner accustomed to go twice a year to a creative cooking restaurant, compared to serve a person who constantly visit all the creative restaurants in the world. The first one can be surprised by every novelty, even the smallest one. The second one, will be able to classify each new experience according to its merited value, according to a scale composed by a wide range of parameters."
Unknown desired facets	(No supporting verbatim found)	*Food without inert matter* "[...]. From then on, a gradual change in the human dietary regime will be inevitably required. Supposing that the same quantity of active nutritional principles will be necessary to our grand-nephew, they will search for them in food mostly stripped of inert and useless matter, in a more concentrated nutrition, made possible and necessary by a modification of the capacity of the digestive organs."	*Techniques and Concepts* "In the creative cuisine field, there exists a phenomenon called conceptual avant-gardist cuisine. As its name indicates, it pretends to promote the progress of cuisine thanks to new techniques and concepts."
Identified sources of facets	(No supporting verbatim found)	(No supporting verbatim found)	*Sources of Techniques and other elements* "Western cuisines, different from ours, as well as the so-called ethnical cuisines, can be an important part of the knowledge heritage of a cook, who will adopt the most interesting findings of those cuisines in terms of ingredients, elaborations, techniques and even forms of eating. Hence, for the creator, the main appeal of these cuisines, lies in their differences."

6.2.4. The domain of cuisine possesses G_3- Unknown exploration generativity

Creative heritages showing G_3- Unknown exploration generativity also guide the recipient designer through knowledge expansions that in turn become translated in new concepts. However, compared to G_2- Combination and learning generativity, those concepts were not originally present nor in the recipient designer's knowledge base, nor in the transferred creative heritage. Knowledge expansion is primed, and new concepts can emerge throughout the exploration and creation of new knowledge. Two out of three analyzed creative heritages show G_3- Unknown exploration generativity (Table III-5). Escoffier see in science a source of future evolutions: "*In a word, cuisine, without ceasing to be an art, will become scientific and should submit its formulae, often still too empirical, to a method and a precision that will leave nothing to chance*". The set of creative techniques of elBulli structure the acquisition of new knowledge in a controlled manner. Furthermore, G_3- Unknown exploration generativity is also attained thanks to the introduction of new languages to describe the objects to be designed. In particular, elBulli's creative heritage make an effort to describe the reception of the dishes. They develop conceptual models about the influence of commensal's knowledge on the reception of the culinary experience and about the role played by the five senses with food (Adrià, 1998): "*when contemplating a canvas, a sculpture, a movie, a piece of music, the produced emotion can be perceived through the senses. It is the same in the case of cuisine, where the senses enable our brain to receive this sensation*". They develop a language about dishes presentation, forms, colors, temperatures and textures and invites the recipient designer to continue to construct this new language in order to create new concepts.

Table III-5. Creative heritages possessing G3- Unknown exploration generativity shows appetite for new languages for describing objects

	François Pierre La Varenne	Auguste Escoffier	elBulli
Introduction of new languages for facets and structures	(No supporting verbatim found)	*Science as a new language for cooking* "In a word, cuisine, without ceasing to be an art, will become scientific and should submit its formulae, often still too empirical, to a method and a precision that will leave nothing to chance"	*Language of the senses and about diner's senses interaction with food* "The senses in gastronomy. When contemplating a canvas, a sculpture, a movie, a piece of music, the produced emotion can be perceived through the senses. It is the same in the case of cuisine, where the senses enable our brain to receive this sensation" "VIEW: dishes presentation, forms, colors, identification of the product. [...] TOUCH: Textures. Temperatures [...]"

6.2.5. A same creative heritage contains several types of generativity

By extending our analysis to three additional creative heritages, those of L. S. R., Dubois & Bernard, and Gouffé, we find that only two out of the six studied creative heritages contain the architecture and operators to foster the four varieties of generativities (Table III-6). Indeed, even if in the creative heritages of La Varenne, L. S. R., Dubois & Bernard, and Gouffé we only found verbatims supporting generativity types G_0 and G_1, both Escoffier's and elBulli's creative heritages showed supporting verbatims for generativity types G_0 to G_4. These results suggest that the different generativities are not incompatible.

Furthermore, by looking at Table III-6, an unexpected result arises: Through time, it seems that the provoked generativity displaces from the lower levels (G_0 and G_1), to the highest levels (G_2, and G_3). Indeed, even if Escoffier and elBulli's creative heritages propose a collection of recipes (G_0), and their writings highlight the facets and the structures of cuisine (G_1), the richness of their heritages resides in their invitations to

continue the expansion of those facets and structures, and on their invitation to develop new languages like those of science and of the reception of the dishes.

Table III-6. The six creative heritages and their associated types of generativities

	Author	La Varenne	L. S. R.	Dubois and Bernard	Gouffé	Escoffier	elBulli
Type of generativity	Year of publication	1651	1693	1856	1867	1903, 1907, 1912, 1921	1998, 2014
G0	Selection	✓	✓	✓	✓	✓	✓
G1	Search and combination	✓	✓	✓	✓	✓	✓
G2	Combination and learning	×	×	×	×	✓	✓
G3	Void creation	×	×	×	×	✓	✓

7. Discussion and Conclusion

In this paper, we characterized a variety of creative heritages by proposing a theoretical model linking the internal properties of a creative heritage (objects, facets, structures, validation criteria, knowledge voids and progress principles) with four different types of generativities. Previous research put in evidence, separately, the existence of this four different varieties of generativity in different domains like engineering, design or arts (Fagan, 1987; Larralde and Ocampo, 2010a, 2010b; Le Masson, Hatchuel and Weil, 2016; Le Masson and Weil, 2013; Siang Kok Sim and Yiu Wing Chan, 1991). We hence build on these dissimilar pieces of knowledge to contribute a new regard of knowledge transmission to the literature of design science. Moreover, we contribute to bridge the literatures on knowledge transmission and design science (Argote and Fahrenkopf, 2016; Argote and Ingram, 2000; Hatchuel, Le Masson, Reich, et al., 2017; Szulanski, 1996) by showing that besides the transmission of skills and competences, transmitting knowledge for generativity requires also

transferring knowledge in the form of facets, structures, validation criteria, as well as desirable unknowns in the form of knowledge voids and progress principles. That is, transmitting knowledge for generativity requires transmitting a language of the known, as well as a language of the unknown. The latter is built upon the constitutive elements of the former.

We also showed that the domain of cuisine contains the four varieties of generativity. Through time, scholars have recognized in cuisine a domain in constant search of novelty (Agogué and Hatchuel, 2016; Beaugé, 2012, 2013; Capdevila et al., 2018; Opazo, 2016). Hence, our findings of a promotion of the four types of generativity by the creative heritages written by expert cooks confirms this tendency.

Furthermore, we put in evidence that the four varieties of generativity are compatible, as they all can be provoked by a single creative heritage. This can be explained by the way in which knowledge and concepts architectures are imbricated. The highest level of generativity, the G4 – unknown exploration generativity, is encouraged by a knowledge architecture that besides making explicit the facets, structures and validation criteria as well as the progress principles and the knowledge voids of a domain, it proposes the construction of new languages for rebuilding this architecture. By fixing a language, and by mobilizing only subsets of this knowledge architecture during the design process, this same architecture could help to provoke type 2, type 1 or type 0 generativity.

Additionally, by showing how different generativities can be provoked by different structures of a creative heritage, and that the four types of generativities are non-incompatible, we shed some light on the reasons of the inconclusiveness of previous research concerning the ambiguous effect of knowledge on generativity (Audia and Goncalo, 2007; Benner and Tushman, 2003; Jansson and Smith, 1991; Leonard-Barton, 1992; De Massis et al., 2016; Messeni Petruzzelli and Savino, 2014; Rietzschel et al., 2007; Shane, 2000; Weisberg, 1999). Indeed, low levels of generativity and fixations effects are probably provoked by creative heritages containing only G_0 and G_1 associated structures. On the contrary, we could expect highest levels of generativity and hence defixation effects to be provoked by creative heritages containing mostly G_2

and G_3 associated structures. Furthermore, in the case in which a same creative heritage contains the four types of generativities, it is possible that prior knowledge of the recipient designer affects the types of generativity he/she can indeed exhibit by assimilating the creative heritage. For example, some propositions corresponding to generativity types G_2 or G_3 contained in the creative heritage could be considered as too complicated or too fuzzy by an inexperienced designer.

Finally, we exposed that the generativities provoked by the creative heritages seem to shift through time from the lowest to the highest levels. This is probably due to the growing importance given to novelty in cuisine and to the role played by books as prescriptors of this novelty. The absence of the higher levels of generativity on the creative heritages written in the 17th and 19th centuries are possibly related to the social context of the epoch. For example, at the 17th century, French cooks like L. S. R. criticized the usage of foreign ingredients and types of meals in order to affirm a French identity for haute cuisine, (Ferguson, 2004). Cookbooks hence prescribed what to do and what to avoid. By closing the domain of cuisine to knowledge expansions in the form of new ingredients and new forms of preparing food, those cookbooks enhanced only the lowest levels of generativity.

Our study presents several limitations that constitute opportunities for future research:

First, we characterized the creative heritages of a single domain: cuisine. It would also be interesting to go further in the analysis of formalized creative heritages inside the domain of cuisine as well as in other domains, like engineering, architecture and art handbooks, to test if other kinds of structures are related to the four classes of generativity.

Secondly, we focused on the content of already written cookbooks, and hence neglected the process of reification of those writings by the source designer, as well as the process of assimilation by the recipient designer. It is well known that during knowledge transfer, the recipient can transform and adapt the assimilated knowledge (Williams, 2007). Future research should take into account the process of designing a creative heritage to better understand the mechanisms used by source and recipient

designers to transfer a creative heritage. Furthermore, we should keep in mind that the recipient of the creative heritage may play a paramount role in the transfer. The gain or lost in generativity, is probably related to recipient's previous knowledge base. Hence, it would be interesting to deepen the understanding of the interactions between previous recipient's knowledge base and the transferred creative heritage.

Thirdly, even if we show that the four types of generativities are compatible, recent research suggests that to influence the generative use of smart products, there is necessary to provide the user of those products with some expansive examples (Bénade et al., 2016). Hence, future research should consider studying the implications of examples of usage of the creative heritage on the generativity it provokes on its recipients. Hence it will be interesting to study if the presence of generativities G_0 and G_1 in the creative heritage have an impact on the manifestation of generativities G_2 and G_3.

Finally, we paved the way to the exploration of varieties of generativity. Our model is based on four varieties of generativities and we do not discard the possibility of finding more types of generativity. Future research should explore generativities in other domains like arts and poetics.

Our findings have some implications for practitioners. For all those who want to transmit a creative heritage, like managers or teachers, this paper gives them a general framework thanks to which they can keep in mind the importance of transferring knowledge about objects, facets, structures, validation criteria as well as progress principles and knowledge voids. That is, transferring a language of the known and a language of the unknown. Furthermore, we give to source designers a framework that could let them consider the way in which they should structure their knowledge in order to favor a particular type of generativity: The *a priori* measurement of generativity is a hard task. However, our framework and ordinal classification of four types of generativity: G_0 – selection, G_1 – search and combination, G_2 – combination and learning and G_3 – unknown exploration, can help source designers to position the type of generativities they want to transmit to their peers. Finally, let us

end our paper by asking to teachers the following open question: what kind of generativity are we teaching in engineering design courses?

PARTIE IV

CREATING A CREATIVE HERITAGE: HOW DO CREATIVE INDIVIDUALS EXPLICIT THE RULES THAT ENABLE RECIPIENTS TO BE MORE GENERATIVE?

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1. Abstract

By transmitting their knowledge, creative individuals may enable other designers to beneficiate from their design capacities. However, the processes by which creative individuals build an explicit base of rules that enables recipient designers to benefit from their generativity are still not well known. Based on a longitudinal study of an innovation and knowledge transmission program in a luxury champagne house, we study the way in which creative individuals externalize and share their knowledge to transform it into a creative heritage. We put in evidence that to assimilate this creative heritage, designers interact with creative individuals in order to formalize a language of description of the known and a language of description of the unknown. They do this while engaging in design-based learning processes to collectively adjust the generativity promoted by the creative heritage. Additionally, we show that the design

of a creative heritage is accompanied by the formalization of its associated design organization.

2. Introduction

Over the centuries, several expert creators have engaged in the colossal endeavor of writing down into books the knowledge they have used to design new objects (Beaugé, 2013; Dubourg Glatigny and Vérin, 2008; Garçon, 2003). Renown agronomists like Columella, erudites like Agricola, architects like Vitruvius, cooks like Carême, have worked on making explicit, on "reducing in art" vast amounts of knowledge in order to make others benefit from their creative capacities to design new objects and practices (Beaugé, 2013; Dubourg Glatigny and Vérin, 2008; Garçon, 2008). Thanks to this humble effort, successive generations of designers have beneficiated from a corpus of powerful resources for innovation.

How have they done? What is this knowledge they have codified and put into words and symbols? Scholars recognize that it is hard, perhaps impossible, to make explicit the whole knowledge base of experienced individuals (Nonaka, 1994; Nonaka and Takeuchi, 1995; Polanyi, 1966). Have they concentrated their efforts on externalizing the knowledge about the tools they use to design new machines or new dishes? Or the knowledge about the unique gestures they use? Scholars also agree to say that the process of codification has a collective dimension, and that it often takes place within specific communities (Cohendet and Meyer-Krahmer, 2001). How do those experienced designers have taken into account the collective, and the knowledge receivers into their codification processes? Those questions are still active in management and design sciences and answering them could contribute to the perpetuation of design capacities inside design-oriented organizations.

Hence, the objective of this study is to better understand the particular form in which creative individuals externalize a set of explicit (design) rules and interact with recipient designers to transfer them the cognitive resources that contribute to enhance their generativity. We call those cognitive resources a creative heritage. We

present a unique case in which we followed expert and recipient designers of a luxury champagne house (Dom Pérignon) during the genesis of the creative heritage of the brand. This creative heritage already demonstrated its capacity to enhance the generativity of a collective of designers (Carvajal Pérez et al., 2018a). We followed the team for three years as they experimented with four different forms of their creative heritage until they obtained a satisfactory version, which is nowadays probably the only creative heritage in champagne to have been formalized.

To do this, we first review the literature on the process of knowledge externalization and internalization and the place knowledge plays in design reasoning. Then we review the literature in search for relationships between organizational structures and knowledge structures. Second, we propose two original hypotheses about the manner in which creative individuals formalize a set of propositions that enhances the generativity of recipient designers. Then, we describe the results of a longitudinal study from a collaborative research carried out at Dom Pérignon champagne house. Finally, we discuss our results and we present some conclusions and implications for researchers and managers.

3. Literature Review and Hypothesis

Knowledge management can contribute to innovation (Basadur and Gelade, 2006; Goh, 2002; Hall and Andriani, 2002; Iles et al., 2001; Martín-de Castro et al., 2011). In particular, recent research suggests that certain knowledge transmission practices can help new designers to benefit from the creative resources of more experienced designers (Le Masson, Hatchuel and Weil, 2016; Le Masson and Weil, 2013). By assimilating those cognitive resources, designers can hence become more generative inside a domain, that is to create new objects while staying coherent with a heritage and tradition (Carvajal Pérez et al., 2018a, 2018b). However, *how do expert designers build an explicit and transferable set of rules that help other designers to benefit from their generative capacities? What is the nature of the knowledge that have to be codified? What must be learnt by the recipient designer?*

3.1. Creative heritage

We define a creative heritage as a set of propositions that when transferred from a source expert designer to recipient designers, it enhances the generativity of those who receive it (Carvajal Pérez et al., 2018a, 2018b). We understand generativity as the capacity to generate a novel object with desired properties, different from any other known object and that cannot be deduced from existing knowledge (Hatchuel, Le Masson, Reich, et al., 2011; Le Masson and Weil, 2013). We recently showed that a creative heritage contains both 1/ a description language, that is, a language of the known, and 2/ a design language, a description of a desirable unknown. The latter is built on the base of the language of the known. Furthermore, we have shown that the generativity promoted by the creative heritage results from the interaction of the description and the design languages (Carvajal Pérez et al., 2018b).

Nonetheless, until now we have studied already extant creative heritages, contained in the forms of book, without studying the manner in which those creative heritages are formalized. Hence, we are first interested in understanding how do experienced designers formalize a creative heritage, that makes others benefit from their generativity.

3.2. Making explicit and sharing? Yes, but to formalize a description and a design language

Externalization, the process of transforming tacit knowledge into explicit knowledge (Nonaka, 1994; Nonaka and Takeuchi, 1995) seems a good first candidate for exploring the transmission process of a creative heritage. Indeed, scholars describe the positive effects on team creativity of crystallizing strong concepts during the design process of new products (Nonaka and Takeuchi, 1995). Moreover, knowledge crystallization, where knowledge is formalized in concrete and explicit forms is considered as a paramount phase of new product development processes (Akbar and Tzokas, 2013).

Externalization can yield metaphors that illustrate contradictions, analogies that resolve them and new prototypical models (Nonaka, 1994). The elaboration of metaphors is considered an effective method of converting tacit knowledge into explicit knowledge as it creates a network of concepts which can help to generate new knowledge by using existing knowledge (Nonaka, 1994). Furthermore, the exteriorization of knowledge can help individuals to be aware of existing knowledge gaps (Hall and Andriani, 2002).

However, authors also argue that just extracting knowledge from individuals is not sufficient to succeed in knowledge transmission process (Nonaka and Takeuchi, 1995). Knowledge must also be socialized and interiorized in order to elicit novelty (Schulze and Hoegl, 2006, 2008). Moreover, the literature on communities of practice argues that knowledge is produced, shared and assimilated in action, collectively, as members of a community participate in sociocultural practices (Wenger, 1998). This dynamic view of the reconstruction of knowledge say that new meanings are renegotiated in action while experts and novices interact to solve problems (Brown and Duguid, 1991, 2011; Wenger, 1998) and to create new knowledge, and innovate (Amin and Roberts, 2008; Cohendet and Meyer-Krahmer, 2001). Furthermore, as argued by Nonaka (1994) internalization processes are facilitated by experimentation. Thus, knowledge externalization must probably be accompanied by processes of sharing, internalization and learning.

Moreover, researchers on design theories have put in evidence the powerful role of knowledge reordering on generative processes (Brun et al., 2016; Le Masson, Hatchuel and Weil, 2016). By strategically reconfiguring the structure of their knowledge bases before and after design processes, that is, by creating new names, selecting, testing, removing knowledge, exploring new knowledge, designers build a new knowledge base that favors creative and generative processes (Brun et al., 2016).

According to the previous literature review, it is possible that during the transmission process of a creative heritage, in order to support its appropriation by recipient designers, expert designers and recipient designers codify, transform and reorder both a description and a design language, a language of the known as well as

a language of the unknown, in order to promote a generativity in the recipients of the creative heritage. The transmission of a creative heritage can hence be viewed as a design process. Thus, we posit:

Hypothesis 1: The transmission of a creative heritage is a design process in which expert and recipient designers interact in order to formalize, reorder and share a language of the known and a language of the unknown.

3.3. Mirroring hypothesis: Product structure mirrors organizational structure. But which organization is mirrored?

Furthermore, as codification processes take place collectively within specific communities (Cohendet and Meyer-Krahmer, 2001), and as a creative heritage is intended to support the creation of designers in particular organizational contexts, a creative heritage should contain in some way an image of the collective. We are thus interested in better understanding the manners in which a creative heritage enables source and recipient designers to cooperate. We will hence explore the relationships between the creative heritage structure and the organizational structure.

The mirroring hypothesis predicts a correspondence between product architecture and the formal structure of an organization (Colfer and Baldwin, 2016; MacCormack et al., 2012; Querbes and Frenken, 2018). Several versions of the mirroring hypothesis coexist in the literature:

In the one hand, certain authors argue that the technical dependencies of products and knowledge structures can shape the structures adopted by organizations (Colfer and Baldwin, 2016; Henderson and Clark, 1990; Thompson, 1967). According to Garud (1997), for example, knowledge components are historically generated in different parts of the organization: know-why is produced in the R&D function, know-how in the production function and know-what in the marketing and sales functions. Thus, the staged and sequential creation and usage of knowledge in traditional organizations shapes the organizational structure in forms similar to relay teams. Additionally, building on Mintzberg's description of organizational structures

(Mintzberg, 1978), authors like Lam (2000) and Blackler (1995) argue that certain organizational forms are associated with dominant knowledge types. They associate for example "professional bureaucracy" structures with organizations mostly based on the competencies of key members, on individual-explicit knowledge, as well as "operating adhocracy" structures with organizations whose knowledge mostly lies on individuals in tacit form.

In the other hand, certain other authors defend a view in which organizational structures are the causes of technical dependencies and knowledge structures (Colfer and Baldwin, 2016; Conway, 1968). This version of the hypothesis is also known as the "Conway's law" and says that: "Any organization that designs a system [...] will inevitably produce a design whose structure is a copy of the organization's communication structure" (Conway, 2001). Conway worked on the design of complex systems. He argued that before starting the design process of a system, the organization divides the system into subsystems and components. Hence, the organization divides itself into task groups and divide the labor between those task groups. In consequence, within the task groups a lot of communication links will be expected, while few communications will be expected across groups. When two components of the system are dependent, groups negotiate an interface specification in order to permit communication between the corresponding responsible for designing the components.

However, some authors argue that the mirroring hypothesis is not always true. They suggest that organizations can only respect the mirroring hypothesis if they can specify product architectures *ex ante* and if they remain stable (Cabigiosu and Camuffo, 2012; Magnusson and Lakemond, 2017). However, as during the design of new products, knowledge is also created, it is difficult to consider the architecture as a pre-specified and fixed parameter (Magnusson and Lakemond, 2017). Hence, mirroring is recently considered not a static but a dynamic process (Colfer and Baldwin, 2016).

Besides the dynamic nature of the mirroring hypothesis, authors diverge concerning the nature of the organization that is mirrored. Some authors describe that

R&D organizations are designed as reflections of the systems they develop (Sanchez and Mahoney, 1996). Some others argue that there is a mirroring between the degree of product modularity and the nature of interorganizational relationships (Cabigiosu and Camuffo, 2012). While some others talk about the mirroring of development organizations and systems architecture (MacCormack et al., 2012).

But in the case of a creative heritage, of which organization are we talking about? What is the mirrored organization? Due to the design nature of the process, we posit:

Hypothesis 2: A creative heritage mirrors its design organization. This hypothesis discusses alternative hypothesis, such as a creative heritage follows from organizational chart, or a creative heritage mirrors a decision organization.

4. Methodology

We conducted a collaborative research inside a luxury champagne house in which we followed a team of expert designers during the exploration and implementation of a knowledge transmission program focused on Dom Pérignon's brand called "Decoding Dom Pérignon – Patrimoine de Création Dom Pérignon". We argue this case represents a unique chance of studying the design process of a creative heritage due to the following reasons: First, a team of creative expert designers, possessing each "a piece" of knowledge about Dom Pérignon brand, started a long-term program in order to exteriorize and share their knowledge among them and with other less experienced designers. Second, as the objective of the program was to formalize a creative heritage that did not previously exist, we had the unique chance to follow the team of Dom Pérignon designers in a longitudinal study during the whole design process. Finally, the actors (source and recipient designers) were interested in experimenting with several forms of the creative heritage and were interested in the link existing between generativity and organizational mechanisms. Thus, we followed and participated to the organization through the process of formalization, and in particular through four iterations before the experts arrived to formalize a satisficing codified form for the brand creative heritage.

We collected our data from July 2015 until May 2018 in the headquarters of the organization in France. We followed a team composed by members of the Winemaking, Research & Development, Marketing, Communication, Heritage, and Training functions during the process of formalization of their knowledge and the brand creative heritage. This team was also accompanied by two external partners: a writer, and a design agency. Some of the authors participated to exteriorization meetings that gathered both brand experts, a writer and a designer. Five of those meetings were recorded and transcribed by the writer. After the meetings, the program participants elaborated conceptual map representations and written texts to make explicit the brand creative heritage. We analyzed the transcriptions and the documents produced during those meetings. We had also access to other supporting documents for the meetings (like schemas, presentations, briefs, budgets, and videos). We had also access to more than 700 documents of archival information on the brand and its experts. Furthermore, we were in constant interaction with the participants to the process of exteriorization which enabled us to enrich the data acquisition with extensive field notes. We complemented this base with semi-structured interviews of the participants to the process (10 interviews with members of the program team and 3 interviews with the brand chef de cave) of a duration of 30 minutes to two hours. The interviews were recorded and transcribed.

We identified the sources, the recipients and the intended usages of the creative heritage. We identified the candidate creative heritages and the design spaces for each candidate creative heritage, that is the projects that were related with the development of a particular form of the creative heritage. We analyzed the claims of acceptance or refusal of the candidate creative heritages and we identified the outputs of each phase and the projects that led the creative heritage sharing.

We analyzed the content of each candidate heritage, as well as the reasons of acceptance/refusal of the candidate creative heritages as expressed by members of the program during the interviews, in order to determine the parts of this heritage that defined languages of the known and languages of the unknown. We attributed the status of "language of the known" to elements having a logical status, describing categories of objects (products, experiences), properties of those objects as present in

objects already designed by the brand, general descriptors of the brand manifestations, actors, stories, and myths. We attributed the status of "language of the unknown" to elements not possessing a logical status and expressing "desirable unknowns", like general principles that should be satisfied each time a new wine is created, or each time a new experience must be designed. We also considered as languages of the unknown the vision statements, and the statements concerning missing properties.

Furthermore, we analyzed the organizational structure that was depicted in each of the candidate creative heritages by identifying actors and their interactions (CHs).

5. A longitudinal study of the design of a creative heritage in a luxury brand

At Dom Pérignon, the luxury organization in which we carried out this study, brand knowledge is distributed between explicit and tacit forms: it is partially codified in the traces of past brand experiences, in the documents produced by past winemakers, in the brand assets. It also resides in the head of members coming from varied functions such as the winemaking, the marketing and the heritage. Those individuals have been working for the brand during longtime (for example, 25 years for the chef de cave). They are at the same time guardians of the legacy of the brand and designers of the brand future. This organization started a knowledge transfer program on one of their brands, called "Decoding Dom Pérignon -Patrimoine de Création Dom Pérignon", with three objectives in mind: first, to manage the brand "creative heritage" in order "to transmit" it ("to capitalize, to make it accessible"), second, "to innovate" ("continuing the brand reinvention") and third, "to elevate consumer experience" ("give to consumer more experiences, more variated and complete"). The program started as a collaboration of the Research & Development and Marketing Departments with a foundation who was developing and experimenting with a new knowledge management method. Hence, the objectives of the program were at the same time to make explicit the brand creative heritage and to design new brand experiences with it.

Figure IV-1 synthetically represents the four phases we describe in the next sections. We invite the reader to refer to this figure in order to follow the candidate creative heritages, the program phases, the design spaces, and the program milestones.

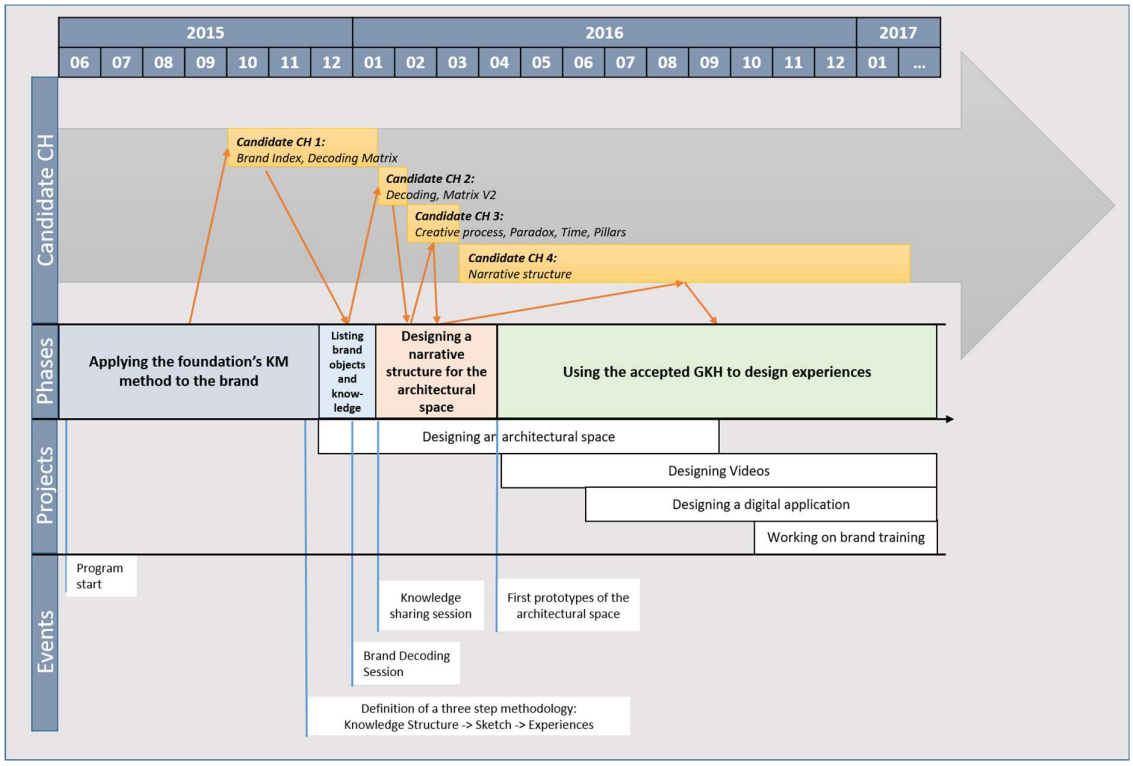

Figure IV-1. "Decoding Dom Pérignon - Patrimoine de Création Dom Pérignon" program timeline

5.1. Decoding the brand: Candidate CH 1

During the first six months, the program team was composed of a steering and an operational committee. The steering committee (SC) comprised members of the Marketing department (the Marketing Director and the Brand Marketing Director), members of the winemaking department (the brand chef de cave and the Research and Development Director) and members of the partner foundation (two heads of the

foundation). The operational committee (OC) included two of the participants of the SC: The Brand Marketing Director and the R&D Director. It was joined by two members of the R&D department (a Winemaker-R&D project manager, and a Ph. D. student), and by a member of the foundation (specialized in wine). The OC called upon the expertise of several actors of the organization as the Heritage department and two R&D engineers. Furthermore, the OC was helped by two external partners: a writer and a design agency. The SC, the OC, the internal and external partners conformed the program team.

The first design space explored by the team was to formalize the brand CH by applying a proprietary knowledge management (KM) method developed by the partner foundation. During this phase, the OC agreed to work following a three-step working methodology. Hence for each knowledge element important for the brand they decided to: first, gather and structure the available (explicit and tacit) knowledge. Then, to transform this knowledge into a sketch, and finally to design consumer experiences based on each knowledge element. However, at that moment, the team was not able to determine which kind of experiences they were going to create (several candidate forms of experience were enounced but the kind of objects to be designed were still unknown) nor to define the knowledge elements to submit to this process.

The OC met once a month in order to work on formalization sessions and to discuss the future activities of the program. R&D members of the team started by familiarizing themselves with the KM method developed by the foundation and by applying it to formalize the brand CH. During this phase, the OC designed two explicit versions of the brand CH. Both versions constitute the candidate CH 1:

5.1.1. Brand Index

The "Brand Index" was a description of the brand CH according to the foundation's KM method. It consisted in a complex description of the brand knowledge elements, with several levels of depth. It was intended to serve as a roadmap for the program. This candidate CH mixed the brand language and the KM proprietary method language.

However, the team was not able to design new experiences by using this knowledge structure. As one of the members of the SC expressed:

> *"For me, from [date 1] to [date 2], [...] this project was really fuzzy. Each time we saw [program team member 3], I came out and said to myself "what is this project? What are we going to do? I do not understand at all, and I think it was the time when we were framing the project, we had written this definition of the brand creative heritage, [...], at the time we talked about [...] formalize, transmit and elevate the consumer experience, [...], but at that time, behind all those things, there was nothing concrete... [...], all of that was really intangible, we did not have real objectives, we did not have perspectives, we did not have concrete projects, we were doing a lot of things, [...]"*

Moreover, due to its complexity, it excluded some actors of the program from appropriating this formalization of the brand.

5.1.2. Decoding Matrix

The "Decoding Matrix" was a two-dimensional matrix decomposition of the knowledge elements of the brand. It described the brand as composed by 5 key elements (called "chapters"): its product portfolio, a place associated with the brand, the brand experiences and the three most important values for the brand (called "pillars").

This first version of the brand CH did not satisfy the program team, so they refused it. When asked the reasons of refusal of the candidate CH 1 as a satisfactory CH, the brand chef de cave and one of the brand winemakers told us the "Brand Index" was considered not adapted to the organization because it was "too exhaustive", and it was "hard to memorize". Moreover, they considered that a lot of effort was needed before being able to design new objects and experiences from it:

"We couldn't just continue to do some research about Dom Pérignon, we had to be able to design, we were required to be performant, [...], to arrive to something. Now, we have to produce, and with the [brand index] you can stay ten years doing just research, [...], without having any objects, without any production going out of it".

The "Decoding Matrix" was described as being "basic", "simplistic", "reductive", "mechanistic", "immature", "underdeveloped", "insufficient", "redundant", and "unstructured" structured in "modules without relationships". Furthermore, it was also described as being inspired by a "classical manner of information storage" and being "hard to memorize".

Candidate CH1 described an organizational structure composed by a creative, by winemakers, by marketers and by customers, that can take part in the design activities of the brand. However, it implicitly depicted an atomic organization in which every actor has unique roles in the organization, in a form similar to a machine bureaucracy. This organization do not correspond to what is observed in practice, where a sharing of certain design roles exists and where the creative (the chef de cave), the winemakers, the marketing and the customer's relationships are concentrically organized.

The team then continued an exploration of new forms of the CH.

5.2. Listing the brand objects: Candidate CH 2

A new phase of the program started when the SC decided to explore a new design space: they decided to orient the team efforts on designing an architectural space, an object being able to embody the whole brand creative heritage. For this, the OC was joined by two members of the marketing (a brand manager and a communication manager). Before starting the architectural space design, the new, recomposed OC decided to list the available content on the brand. Two knowledge sharing meetings served to this purpose:

Firstly, six brand expert members from the program team carried out a meeting that had as first objective "to list the existing content about the brand" (called a "brand decoding session"). This meeting was intended to give a common awareness of the explicit knowledge of the brand and its objects. However, the session turned out to be a knowledge sharing session that made explicit the most important knowledge elements of the brand. The session was recorded and transcribed, but the transcription was exploited by the team only for the construction of the candidate CH 4.

Then, the OC carried out a knowledge sharing session where they listed and gathered available brand explicit knowledge: stories and myths about the brand, the product portfolio, places associated with the brand, the list of past experiences, brand codes, …. Those knowledge elements were further classified following the "Decoding Matrix" giving birth to the "Decoding Matrix V2".

However, candidate CH 2 was not considered as a satisficing form of the brand CH to design a brand architectural space because it lacked cohesion between its composing knowledge elements. Furthermore, members of the OC did not consider it as a candidate for a CH, but just as a list of the important elements of the brand. They thus rejected it as a satisficing form for the brand CH

Concerning the organizational structure depicted by this candidate CH, the place of the designers with respect to the creative, the chef de cave, is not clear. Implicitly, this candidate CH describes a structure composed by validators of the design tasks that check if the designed experiences contains all the objects of the brand.

5.3. Designing a narrative structure for the architectural space: Candidate CH 3

Having formalized the list of the most important elements for the brand, the OC worked during the following months on designing a "narrative structure" for the architectural space, before designing the objects that were going to be present on it. As the architectural space was intended to embody the brand creative heritage, the narrative structure had to be a complete, understandable and coherent representation

of the brand knowledge structure. As expressed by the head designer of the partner design agency:

> *"when an organization decides to do this kind of [architectural space], the first thing they must ask themselves is "what am I going to talk about?". If I am going to talk about me, I have to answer the question "Who am I?". And the fact that as a team we asked ourselves "who is Dom Pérignon?" led us to developing this narrative structure"*

The design of this narrative structure was an iterative process involving several knowledge sharing and formalization sessions. By using the elements contained in the "Decoding Matrix V2", the partner design agency worked on four propositions for a narrative structure for the brand that were submitted to the OC for critique:

- Pillars: which was a subset of the "Decoding Matrix V2" consisting of three brand values
- Time: used this important notion for the brand as a narrative structure
- Winemaking process: which was a subset of the "Brand Index" knowledge structure
- Paradox: one of the brand descriptors formalized during the first phase of the program.

However, the four knowledge structures that composed candidate CH 3 were refused due to their "incompleteness", "lack of concept interrelatedness", "a too academic character", and a high level of "complexity". The time was considered interesting as "all elements were there" but in a "deconstructed and reconstructed" manner. However, this narrative structure was considered as "too linear" yet it was "hard to decide where to place" each knowledge element on it. Moreover, "Paradox" was considered incomplete as there were more paradoxes that described the brand and as the listed paradoxes lacked interrelatedness.

Candidate CH 3 implicitly described an organizational structure composed by several types of designers. However, the articulation between those different types of

designers is not made explicit. As with the candidate CH 1, the organizational structure depicted by candidate CH 3 was not representative of what the team was living at the moment: a creative heritage that concentrically organizes the creative, the winemakers, the marketing and the customer's relationships.

5.4. Designing a narrative structure for the architectural space (Part 2): Candidate CH 4

After the rejection of the third candidate CH, the OC continued to work on a new narrative structure and the partner design agency dived again into the available knowledge. This time, in order to arrive to a new proposition, the partner design agency also used as an input the transcription of the knowledge sharing session carried out by the brand experts. By nourishing the design process of those elements, the head designer of the partner design agency proposed to the OC a new graphical candidate CH. It defined the seven most important knowledge elements of the brand as well as the relationships that existed among those knowledge elements. The OC received the new proposition with high enthusiasm. Several iterative sessions followed in order to refine the original proposition designed by the partner design agency. The discussions turned around which knowledge element had to be in the center of the diagram, which were the knowledge elements that were contained inside each primary knowledge element… After several minor modifications, the OC shared the brand knowledge structure with the rest of the members of the SC which validated it as the new "narrative structure" of the brand (Figure IV-2).

The team used the knowledge elements of this accepted CH (called "chapters") to classify the existing objects of the brand. Moreover, once this candidate CH was accepted, the brand experts realized that there was no explicit statement of the brand vision. Hence, they worked in order to formalize it. Four other sharing sessions ("brand decoding sessions") followed the formalization of the brand creative heritage, in order to make explicit the content of the "Winemaking" and "Genesis" knowledge elements of the brand.

When asked about the reasons for acceptance of this candidate CH, the winemakers recognized it as being: "harmonious", "beautiful", "complete", "exhaustive" "organized, "coherent", "organic". As said by one of the winemakers:

> *"You are able of moving inside this space, of entering by every corner, [...], and you are always able to follow the string... That is a huge quality, coherence and organization! [...] No matter where you are [in the structure], you know where you are, everything is organic, [...], everything is in resonance, with a form of completeness, of resonance of each concept with respect to each other."*

This candidate creative heritage depicted a particular concentric organization: at the center we can find the creative (the chef de cave), followed in the next level by the recipient designers (coming from the winemaking and the marketing functions), and finally the consumer itself. This structure describes the design process of the brand: the vision and creative spark that leads the brand comes from the creative, its chef de cave, and is nourished by the brand history (its genesis). Then, the chef de cave and winemakers make the wine, guided by the vision and by the aesthetic ideal of the brand. The wines in turn become the inputs of the design process of new consumer experiences carried out by winemakers and marketing teams. And finally, the consumers live an experience of the brand that in turn nourish the design process again.

At the end of this phase, the team composition underwent a modification: the partner foundation left the project, so the members of the foundation left the SC and the OC.

Figure IV-2. Creative heritage 4: Dom Pérignon's narrative structure

5.5. Using the accepted CH to design new experiences

The formalization of candidate CH4, the brand narrative structure, had several impacts on the project and transformed the way the program was managed. The brand "Narrative Structure" replaced the brand "Index" as roadmap for the knowledge transmission program. Nonetheless, the initial three step methodology (organize -->

sketch -→ create experience) remained alive. As expressed by one of the OC members:

> *"Yes, today the narrative structure is fixed, [...]. Then, we will have a "source text" for each of the different chapters ([brand knowledge elements or facets]), with their respective graphic designs, that is, the schema that corresponds to each chapter, and after that, a third level is the content that we are going to create, that could target either the people we train, the final consumer, [...], but it can take a lot of forms, be it a video, a film, an artwork, [...]. And that is what makes this beautiful, it is not defined in advance, rather it depends on the orientation we want to give to each content."*

Having both formalized the seven most important elements of the brand and defined a three-step working methodology for each knowledge element, the accepted CH enabled the team to organize their collective action by choosing which elements and steps needed the team's attention. Thus, several actions followed the acceptance of the brand CH:

Firstly, by using the narrative structure as central theme, the partner design agency proposed to the OC a first prototype of the architectural space. The architectural configuration of this intermediary object was a transposition of the brand narrative structure into a three-dimensional arrangement. Secondly, the OC carried out several ideation sessions that gave life to several project briefs:

- A text and a video to represent and explain the brand CH
- Several visual representations of one of the chapters ("winemaking video")
- An artwork for a second chapter ("Vintage")
- A digital application for a third chapter ("Aesthetic Ideal digital application")

The program team continued to work on the architectural space during several months. However, at the end of this phase, the SC and the OC agreed to abandon the idea of doing the architectural space. Meanwhile, they continued the design of new experiences for the brand. Moreover, several other design spaces followed after the

formalization of the brand CH, like the design of a training program for the brand based on the accepted CH and the design of another kind of architectural space. The former project required the participation of the brand training manager, that joined the OC of the program.

6. Results and interpretation

During the transmission of the brand CH, members of the SC and the OC worked to design an explicit form of the brand CH to both embrace the extant knowledge and promote novelty. During this process, the SC and OC, helped by partners, formalized four different candidate CH. The formalization of the 4 different forms of CH was guided by experimenting the design of new experiences based on it. Table IV-1 summarizes the four candidate creative heritages, the projects that served to learn and experiment the candidate CH's generativity and the reasons of acceptance/refusal of each candidate creative heritage. Hereafter, for each candidate CH we distinguish between the elements of its architecture that are related with the languages of the known and with the languages of the unknown. We present an analysis of each candidate CH generativity. We also present our analysis of the organizational structure depicted on each candidate CH.

Table IV-1. Synthesis of the four different candidate creative heritages

Candidate CH		Initiating Projects	Reasons of acceptance/refusal	Language of the known	Language of the unknown	Enhanced Generativity?	Organizational structure
1	"Brand Index" & "Decoding Matrix"	Applying a proprietary KM Methodology	Brand index: Basic, reductive, mechanistic, underdeveloped, insufficient, unstructured, modules without relationships, classical manner of information storage, hard to memorize Decoding Matrix: too exhaustive, hard to memorize,	Actors, processes, product portfolio, places, past designed experiences, value criteria		No: team was not able to design new experiences	Description of types of actors (creative, winemakers, marketing, consumers), divided by functions
2	"Decoding Matrix V2"	Designing an architectural space: Listing contents and objects for the architectural space	Lack of cohesion between elements. More a list of important elements of the brand than a description of its creative heritage	Actors, processes, product portfolio, places, past designed experiences, value criteria, brand codes, stories and myths, categories, past sources of inspiration		No: team was not able to design new experiences	Actors as validators of the presence of known objects
3	"Creative process", "Paradox", "Time" & "Pillars"	Designing an architectural space: Designing a narrative structure for the architectural space	Incompleteness, lack of concept interrelatedness, complexity, all elements were there yet in a deconstructed and reconstructed manner.	Similar to candidate CH2	Narrative structure: Pillars, Time, Winemaking process, Paradox	Low: some unsatisfying ideas for an architectural space	Independent designers (pillars for marketing, winemaking for winemakers, paradox for the creative)

Candidate CH		Initiating Projects	Reasons of acceptance/refusal	Language of the known	Language of the unknown	Enhanced Generativity?	Organizational structure
4	"Narrative Structure"	Designing an architectural space: Designing a narrative structure for the architectural space	Harmonious, complete, exhaustive, organized, coherent, "You are able of moving inside this space, of entering by every corner, [...], No matter where you are [in the structure], you know where you are"	Narrative structure: Seven most important knowledge elements of the brand (Contains knowledge from CH1, CH2 and CH3)	Narrative structure as the design process of new experiences, values for new experiences: Brand vision, aesthetic ideal, paradoxes	High: new architectural space, new experiences for the chapters of the narrative structure (video, app), new brand training program)	Concentrical organization with the creative at the center Creative -→ Designers (Winemaking, Marketing) -→ Consumers

6.1. The transmission of a creative heritage is a design process in which expert and recipient designers formalize and share a rich language of the known and multiple, organized languages of the unknown

6.1.1. Candidate CH 1 codified an incomplete language of the known and no language of the unknown

Both the "Brand Index" and the "Decoding Matrix", that were part of candidate CH 1, offered to designers an explicit description of the existing objects of the brand: Elements like the current brand portfolio and the past experiences, as well as a list of properties to describe existing tasting experiences, constitute a language of the known. However, the language of the known contained in candidate CH 1 was considered by source designers to be even incomplete (as in the Decoding Matrix) or not relevant to the brand (as in the case of the Brand Index) (Table IV-1, Reasons of acceptance/refusal). Moreover, its structure was considered insufficient ("modules without relationships").

Furthermore, candidate CH 1 did not contain a language of the unknown for the brand as evidenced by the absence of general descriptors of future experiences or other "desirable unknowns".

Candidate creative heritage 1 promoted no generativity on recipient designers as program team members were not able to use this version of the CH to design new experiences. By only describing the language of the known, candidate CH 1 gives the false impression that all the brand descriptors can be combined without following particular rules in order to create a new experience. However, this is not the case: the OC discarded the use of this option as a possible narrative structure to design the architectural space.

Hence, the incompleteness of the language of the known and the absence of a language of the unknown that promoted no generativity contributed to the decision of refusing candidate CH 1.

6.1.2. Candidate CH 2 codified a rich language of the known but no language of the unknown

Candidate CH 2 proposed a more complete version of the brand's language of the known: it described a collection of objects of the brand (like past wines and past experiences), of its processes (like the winemaking steps), and formalized some validation criteria of the brand, like the paradox as a descriptor of existing brand experiences. The detail level of those descriptors was higher compared to the "Decoding Matrix" of candidate CH 1. However, it did not contain the complex level and sub-level structure of the "Brand index". Nonetheless, the language of the known of creative heritage 2 was considered as lacking coherence.

However, even if candidate CH 2 offered a rich description of the language of the known, it did not provide to designers with a language to describe still unknown experiences. This can also be deduced from the absence of descriptors of future experiences.

Candidate CH 2 did not favor designer's generativity as demonstrated by its incapacity to favor the design of the architectural space. One could expect that the only

kind of experiences that would be designable by using this version of the CH would have been experiences in which all the brand descriptors are present without a particular structure to guide the designers in the choice of an order of appearance of the elements. And by doing this, the only designable experiences would be replications or adaptations of already extant experiences.

Hence, despite the richness of the language of the known proposed by candidate CH 2, the absence of a language of the unknown that promoted no generativity contributed to the decision of refusing candidate CH 2.

6.1.3. Candidate CH 3 codified several partial languages of the unknown

Candidate CH 3 shares the same language of the known as candidate CH 2. However, we can interpret the search of the team for a "narrative structure" as a research for a design language to talk about still unknown experiences: The "paradox" narrative structure, for example, constitute a language of the unknown because it refers to tensions existing between known elements of the brand (like the different grape varieties, Pinot Noir and Chardonnay, or like the light and the darkness) that must be solved at every new creation of the brand: a new wine created by the chef de cave, or a new tasting experience created by marketers and winemakers. The meaning of "paradox" in candidate CH3 is different from the meaning of the same word described in candidate CH 2: where in the former case it is used as a descriptor of future, still unknown experiences, in the latter case paradox is used as a descriptor of past knowledge. Hence, in candidate CH 3 the "paradox" codifies a desirable principle for every future product or experience of the brand. As the chef de cave expressed: "I only see tension lines [...], I think there is no creation without tension [...]". However, he also told us that the design language of "paradox" was incomplete: all the paradoxes that describe a desirable unknown for the brand and that can be used by designers to create new experiences, are not represented in this version of the candidate CH.

Candidate CH 3 offered to the team several design languages, that we can attribute to different types of actors: a design language for the marketers ("Pillars"),

a design language for winemakers ("Winemaking process"), a design language for the creative ("Paradox"), and a design language without actors ("Time"). They each offered a partial and incomplete view of the brand's language of the unknown.

Candidate CH 3 gave to designers a certain level of generativity: by mobilizing the different elements of this candidate CH, the head designer of the design agency was able to propose several concepts of architectural spaces. However, they each offered a partial view of the brand CH.

Hence, despite the richness of the language of the known proposed by candidate CH 3, the existence of several incomplete languages of the unknown that promoted a low generativity on designers, contributed to the decision of refusing candidate CH 3.

6.1.4. Candidate CH4 codified a rich language of the known and several embedded languages of the unknown

By summarizing in seven categories the most important elements of the brand, its "chapters", candidate CH 4 offered to experienced and recipient designers a complete, comprehensive, and structured description language of the brand.

Candidate CH 4 also gave to designers several languages of the unknown: it represented the design process of the brand and made explicit the existence of a lexical field as the "aesthetic ideal", that were useful for describing at the same time past vintages, but also the attributes for designing future vintages. Similarly, the "aesthetic ideal" also formalized descriptors of future experiences, such as "harmony", "paradox", "tension". Moreover, the formalization of the vision of the brand provided also designers with a common descriptor for all the future objects, products and experiences of the brand.

The formalization of candidate CH4, helped the team to attain a high generativity, as suggested by the high number of projects that were born just after the formalization and acceptance of candidate CH 4 as the brand creative heritage: the conceptual design of an architectural space, the design of a digital application to showcase the

aesthetic ideal, the design of a video to embody the winemaking philosophy of the brand.

Hence, it was only when the experienced and recipient designers formalized, shared and reordered a rich and complete description of the brand's language of the known and its complimentary language of the unknown that they were satisfied with the design process of the creative heritage:

In summary, during the test of the 4 different forms of CH, the team discarded the forms of creative heritage that exhibited a language of the known considered as incomplete, non-structured, too simple or hardly understandable by recipients. They also discarded the forms of creative heritage that did not possessed a language of the unknown or where this language was incomplete or weakly related with the language of the known. Those results sustain our first hypothesis, suggesting that *the transmission of a creative heritage is a design process in which expert and recipient designers interact in order to formalize, reorder and share a rich language of the known and multiple, organized languages of the unknown.*

6.2. A creative heritage mirrors the related design organization

Furthermore, it seems that the research of new forms of CH was also guided by a better description of the organizational model of the design process of the brand. Indeed, we observed that the design process of new experiences for the brand followed a hierarchy in which the chef de cave is at the center and other designers (winemakers and marketing members) organize themselves around him. However, the first three CH candidate did not contain an appropriate description of this relationships that exist between the creative individual and the designers. In contrast, CH candidate 4, by codifying the design process of the brand, by showing the most important knowledge elements and their relationships, showcased the roles of each actor of the design process (creatives and designers) and their hierarchy with the chef de cave at the center of the structure. Surprisingly, this design organization is different from the

organizational structure depicted by the organigram, which hierarchically separate the winemaking and the marketing functions.

Those results support our second hypothesis suggesting that: *a creative heritage mirrors the design organization, instead of the organizational chart, or the commercial or decision organization.*

7. Discussion and Conclusion

In this paper we investigated the manner creative individuals interact with other designers in order to transmit a creative heritage and enhance recipient designer's generativity. Based on the longitudinal study of a knowledge transmission program led by a luxury organization involving creative individuals and designers, we have shown that:

First, in luxury organizations, the transmission of a creative heritage is a design process in which expert and recipient designers interact in order to formalize, reorder and share a language of the known and a language of the unknown. Scholars argue that knowledge externalization, and socialization are important activities that can contribute to designer's capacity to find new and innovative ideas and advance in the design of new products (Akbar and Tzokas, 2013; Nonaka, 1994; Nonaka and Takeuchi, 1995; Schulze and Hoegl, 2006, 2008). We build on this literature to show that for designers to benefit from the generativity of more experienced designers, the nature of the knowledge to be transmitted concerns two categories of languages: 1/ a language of the known, describing extant objects and their properties, and 2/ a language of the unknown, built with "words" coming from the language of the known, but describing the desirable properties of still unknown objects.

It is tempting to neglect the importance of the language of the unknown: one could consider that once a designer receives a language of the known, he/she can combine its elements in a huge number of dispositions to create new objects. However, all the combinations of known elements are not equally valuable (as evidenced by the refusal

of candidate CH 2 as a narrative structure for the architectural space). Moreover, certain of those combinations can act as attracting poles, fixating the designer to easily accessible combinations (Jansson and Smith, 1991). Hence the value of the language of the unknown resides in the fact that it pre-structures "interesting" future combinations of known elements and also guides the future learnings in which recipient designers should engage (as put in evidence by the generative effect provoked by the formalization of candidate CH 4).

Furthermore, by considering a creative heritage as being the product of the design of two different languages, we can return to the literature on knowledge communities (Amin and Roberts, 2008; Cohendet et al., 2006) to discuss that not every heritage should be considered as a creation heritage. The literature of knowledge communities argue that knowledge is created, accumulated and diffused inside communities (Cohendet et al., 2006). Hence, in those communities, knowledge plays an important role by gathering individuals into a collective with similar epistemic interests. Scholars distinguish between several types of communities according to the types of knowledge they share, and the nature of their innovations. Among them we can distinguish the communities of practice (Brown and Duguid, 1991, 2011; Lave and Wenger, 1991; Wenger, 1998) and the epistemic communities (Cohendet et al., 2000, 2014; Cowan et al., 2000). Communities of practice are constituted by individuals who engage in a process of collective learning in a particular practice (Brown and Duguid, 1991, 2011; Lave and Wenger, 1991; Wenger, 1998). They exchange and develop a common shared repertoire (Wenger, 1998), not necessarily under codified form. The community members exchange solutions for problems they have encountered (Brown and Duguid, 1991), as well as mental models of the objects of their practice. This shared knowledge is in turn used by members of the community to solve problems they encounter. However, their innovation is mostly incremental in nature (Amin and Roberts, 2008). We can expect these communities to formalize and share overall a language of the known. In contrast, epistemic communities have a common goal of creating new knowledge addressed to the environment of the community (Cohendet et al., 2006). They share a "codebook" that codifies the "vocabulary", the "grammar" and the "messages" of the community (Cohendet et al., 2006; Cowan et al., 2000) ,that

support their knowledge creation processes (See for example the generative effects promoted by the codebooks of surrealists (Cohendet et al., 2006), of game designers (Cohendet and Simon, 2007) or of cooks (Capdevila et al., 2018)). As the object of this codebook is to facilitate the circulation and creation of new knowledge, we can expect that it codifies at the same time a language of the known and a language of the unknown, thus constituting a creative heritage.

Additionally, we observed that during the design process of a creative heritage, innovative projects play a paramount role as they are used by experienced and recipient designers to assimilate the creative heritage and to test and adjust its generativity. In the investigated luxury organization, the construction of each candidate CH was done in the framework of a project (the design of an innovative architectural space) that acted as a "design space" (Hatchuel et al., 2005): instead of just being an application of the current form of the CH, the project constituted an opportunity for experimenting and learning. This invite us to rethink the manner in which knowledge transmission is carried out inside organizations. Where the transmission of knowledge in a community of practice, like best practices and know-how, is carried out in action, as members exchanges stories and spend time together (Brown and Duguid, 1991; Wenger, 1998), the transmission of a creative heritage probably needs "design spaces", where the experienced and recipient designers spent time together designing new objects and adjusting together the languages of the known and of the unknown.

Second, we have shown that in luxury industries, a creative heritage contains a model of the design organization. That is, the creative heritage mirrors the associated design organization, that can differ from the formal organizational structure in charge of producing, selling, or financing the brand. In the case of Dom Pérignon, this is probably a consequence of the existence of the brand that occur inside an organization responsible for different brands. Indeed, Dom Pérignon share some material and financial resources with other brands. Hence, the mirrored design organization of the brand probably appears as a strategy for better coordinating and integrating the design tasks inside this complex organization.

This finding invite us to revisit the mirroring hypothesis: Typically, scholars depict that organizations mirror in their structure the type of objects they produce, or the types of actions they do (decision on design parameters of a system or their validation, …) (Colfer and Baldwin, 2016; Hao et al., 2017; Querbes and Frenken, 2018), thus facilitating communication and problem-solving. However, the same authors recognize that when systems become more complex, deviations from the logic of strict mirroring should be beneficial for organizations (Colfer and Baldwin, 2016). Those visions of the mirroring hypothesis do not take into account that a same organization can have several innovation regimes and that product architectures can be modified during these design processes. Thus, by mirroring the design organization instead of other organizations (production, selling, …) it is possible that a creative heritage can help designers to distribute and coordinate their roles in spite of an absence of a predefined object architecture.

Moreover, the mirroring of the design organization by the creative heritage structure suggests the existence of a contingent logic of knowledge transmission codified inside the creative heritage: The place occupied by the designer in the design structure, specifies his/her role in the design process. In consequence, the type of knowledge to be transmitted could vary according to the role played by the recipient designer and the relative positions of the source and recipient designers. For example, the creative heritage of Dom Pérignon defines the customer as a designer. However, it also describes that his/her design space is constrained to the experience domain and starts once the wine has been created by the chef de cave. This codification of the access to knowledge according to the levels of expertise and roles, finds an echo on the literature on knowledge communities that describe mechanisms like the peripheral legitimate participation that structure the communities of practice according to a level of expertise (Lave and Wenger, 1991).

Our study has some limitations that present us opportunities for future research. First, we investigated a luxury industry, in which creative individuals plays a paramount role as creators and depositaries of extensive knowledge on the brand. It will be interesting to extend our analysis to other industries where the creative individual figure is less present and in which the collective of designers organizes differently.

Second, the studied CH was intended to help the team to design new experiences in the luxury industry. Further research should explore the impact of designing other kind of objects like physical products. Thirdly, further research should also consider the transmission of a creative heritage to individuals not taking part in the design process, as in the case of training programs. Finally, even if we followed the program team for three years, it will be interesting to extend the investigation duration in order to explore the long-term changes in knowledge transfer practices of creatives and designers after the formalization of the CH.

Our study suggests some managerial implications. Firstly, we describe a process of transmission of a creative heritage from expert designers to recipient designers and we identify that to enhance the generativity of recipients, the transmission of two languages is necessary: a language of the known and a language of the unknown. Practitioners could be inspired by our process in order to allow their own designer teams to build and share a common language of the known and a language of the unknown. In this process, managers should take into account the need of design spaces that let designers experiment the generativity of their own creative heritages. This creative heritage transmission process could then serve as a platform for coordinating their team activities and as a trigger for new innovation projects. Finally, we propose that a creative heritage mirrors a design organization and that it can differ from the formal organizational structure. Managers should take this into account in order to be sure to include the members of their design structures into the knowledge transmission program teams. They also should take into account that this design structure can be latent in their own organizations.

Bibliographie

Açikgöz, A., Günsel, A., Kuzey, C. and Seçgin, G. (2016), "Functional Diversity, Absorptive Capability and Product Success: The Moderating Role of Project Complexity in New Product Development Teams", *Creativity and Innovation Management*, Vol. 25 No. 1, pp. 90–109, doi:10.1111/caim.12155.

Adrià, F. (1998), *Los Secretos de El Bulli*, Altaya, Barcelona.

Adrià, F., Soler, J. and Adrià, A. (2014), *elBulli 2005–2011*, Phaidon.

Agogué, M. and Hatchuel, A. (2016), "Reinventing classics: the hidden design strategies of renowned chefs", *Research in Engineering Design*, doi:10.1007/s00163-015-0210-3.

Agogué, M., Poirel, N., Pineau, A., Houdé, O. and Cassotti, M. (2014), "The impact of age and training on creativity: A design-theory approach to study fixation effects", *Thinking Skills and Creativity*, Vol. 11, pp. 33–41, doi:10.1016/j.tsc.2013.10.002.

Akbar, H. and Tzokas, N. (2013), "An Exploration of New Product Development's Front-end Knowledge Conceptualization Process in Discontinuous Innovations", *British Journal of Management*, Vol. 24 No. 2, pp. 245–263, doi:10.1111/j.1467-8551.2011.00801.x.

Albrecht, C.M., Backhaus, C., Gurzki, H. and Woisetschläger, D.M. (2013), "Drivers of brand extension success: What really matters for luxury brands", *Psychology and Marketing*, Vol. 30 No. 8, pp. 647–659, doi:10.1002/mar.20635.

Amabile, B.Y.T.M. (1998), "How to kill creativity", *Harvard Business Review*, pp. 77–87.

Amabile, T.M. (1997), "Motivating Creativity in Organizations", *California Management Review*, Vol. 40 No. I, pp. 39–59, doi:10.2307/41165921.

Amabile, T.M., Conti, R., Coon, H., Lazenby, J. and Herron, M. (1996), "Assessing the Work Environment for Creativity", *Academy of Management Journal*, Vol. 39 No. 5, pp. 1154–1184, doi:10.2307/256995.

Amin, A. and Roberts, J. (2008), "Knowing in action: Beyond communities of practice", *Research Policy*, Vol. 37 No. 2, pp. 353–369, doi:10.1016/j.respol.2007.11.003.

Ancona, D.G. and Caldwell, D.F. (1992), "Bridging the Boundary : External Activity and Performance in Organizational Teams", *Administrative Science Quarterly*, Vol. 37 No. 4, pp. 634–665.

Ansari, S.S., Reinecke, J. and Spaan, A. (2014), "How are practices made to vary? Managing practice adaptation in a multinational corporation", *Organization Studies*, Vol. 35 No. 9, pp. 1313–1341, doi:10.1177/0170840614539310.

Arciszewski, T. (2016), *Inventive Engineering. Knowledge and Skills for Creative Engineers*, CRC Press.

Argote, L. and Fahrenkopf, E. (2016), "Knowledge transfer in organizations: The roles

of members, tasks, tools, and networks", *Organizational Behavior and Human Decision Processes*, Elsevier Inc., Vol. 136, pp. 146–159, doi:10.1016/j.obhdp.2016.08.003.

Argote, L. and Ingram, P. (2000), "Knowledge Transfer: A Basis for Competitive Advantage in Firms", *Organizational Behavior and Human Decision Processes*, Vol. 82 No. 1, pp. 150–169, doi:10.1006/obhd.2000.2893.

Atuahene-Gima, K. (2003), "The Effects of Centrifugal and Centripetal Forces on Product Development Speed and Quality: How Does Problem Solving Matter ?", *The Academy of Management Journal*, Vol. 46 No. 3, pp. 359–373.

Atwal, G. and Williams, A. (2009), "Luxury brand marketing – The experience is everything!", *Journal of Brand Management*, Vol. 16 No. 5–6, pp. 338–346, doi:10.1057/bm.2008.48.

Audia, P.G. and Goncalo, J.A. (2007), "Past success inventors over time: A study and creativity in the hard disk drive industry", *Management Science*, Vol. 53 No. 1, pp. 1–15, doi:10.1287/mnsc.l060.0593.

Badaracco, J. (1991), *The Knowledge Link: How Firms Compete Through Strategic Alliances*, Harvard Business Press.

Baer, J. (1998), "The case for domain specificity of creativity", *Creativity Research Journal*, doi:10.1207/s15326934crj1102_7.

Baer, J. (2016), *Domain Specificity in Creativity*, Academic Press.

Baer, J. and Kaufman, J.C. (2005), "Bridging generality and specificity: The amusement park theoretical (APT) model of creativity", *Roeper Review*, Vol. 27 No. 3, pp. 158–163, doi:10.1080/02783190509554310.

Bandinelli, R., D'Avolio, E., Rossi, M., Terzi, S. and Rinaldi, R. (2014), "Assessing the Role of Knowledge Management in the New Product Development Process: An Empirical Study [Electronic version]", *IFIP Advances in Information and Communication Technology*, Vol. 442, pp. 397–406.

Barley, W.C., Treem, J.W. and Kuhn, T. (2018), "Valuing Multiple Trajectories of Knowledge: a Critical Review and Agenda for Knowledge Management Research", *Academy of Management Annals*, Vol. 12 No. 1, pp. 278–317, doi:10.5465/annals.2016.0041.

Basadur, M. and Gelade, G.A. (2006), "The Role of Knowledge Management in the Innovation Process", *Creativity and Innovation Management*, Vol. 15 No. 1, pp. 45–62, doi:10.1111/j.1467-8691.2006.00368.x.

Bastien, V. and Kapferer, J.-N. (2012), *Luxe Oblige*, Eyrolles.

Beaugé, B. (2012), "On the idea of novelty in cuisine: A brief historical insight", *International Journal of Gastronomy and Food Science*, Vol. 1 No. 1, pp. 5–14, doi:10.1016/j.ijgfs.2011.11.007.

Beaugé, B. (2013), *Plats Du Jour: Sur L'idée de Nouveauté En Cuisine*, Métailié, Paris.

Béjean, M. (2008), *Le Management Des Entreprises À Prestations Artistiques : Activités de Conception, Régimes de Signification et Potentiel de Croissance*,

MINES ParisTech.

Bénade, M., Brun, J., Masson, P. Le and Weil, B. (2016), "How smart products with built in flexibility empower users to self - design the use : A theoretical framework for use generation", *14th Open and User Innovation Conference*.

Benner, M.J.. and Tushman, M.L.. (2003), "Exploitation, Exploration, and Process Management : The Productivity Dilemma Revisited", *The Academy of Management Review*, Vol. 28 No. 2, pp. 238–256.

Berthon, P., Pitt, L., Parent, M. and Berthon, J.-P. (2009), "Aesthetics and Ephemerality: Observing and Preserving the Luxury Brand", *California Management Review*, Vol. 52 No. 1, pp. 45–66, doi:10.1525/cmr.2009.52.1.45.

Blackler, F. (1995), "Knowledge, knowledge work and organizations: An Overview and Interpretation", *Organization Studies*, Vol. 16 No. 6, pp. 1021–1046, doi:10.1177/017084069501600605.

Briot, E. (2014), "Le patrimoine des industries du luxe", in Briot, E. and De Lassus, C. (Eds.), *Marketing Du Luxe: Stratégies Innovantes et Nouvelles Pratiques*, Editions EMs, pp. 17–32.

Brown, J.S. and Duguid, P. (1991), "Organizational Learning And Communities Of-Practice : Toward A Unified View Of Working , Learning , And Innovation", *Organization Science*, Vol. 2 No. 1, pp. 40–57, doi:10.1287/orsc.2.1.40.

Brown, J.S. and Duguid, P. (2000), "Balancing act: how to capture knowledge without killing it.", *Harvard Business Review*, Vol. 78 No. 3, pp. 73–80, 212, doi:10.1016/j.clnu.2011.08.005.

Brown, J.S. and Duguid, P. (2011), "Knowledge and Organization: A Social-Practice Perspective", *Organization Science*, Vol. 12 No. 2, pp. 198–213.

Brun, J. (2016), *Modéliser Le Pouvoir Expansif de La Structuration Des Connaissances En Conception Innovante : Mise En Évidence Des Effets Génératifs Du K-Preordering Grâce À L'étude Du Non-Verbal*, MINES ParisTech.

Brun, J., Le Masson, P. and Weil, B. (2016), "Designing with sketches: the generative effects of knowledge preordering", *Design Science*, Vol. 2 No. e13, pp. 1–26, doi:10.1017/dsj.2016.13.

Brun, J., Masson, P. Le and Weil, B. (2018), "Getting Inspiration or Creating Inspiration ? the Role of Knowledge Structures in Idea Generation", pp. 1793–1804.

Burnett, S., Williams, D. and Grinnall, A. (2013), "The Strategic Role of Knowledge Auditing and Mapping: An Organisational Case Study", *Knowledge and Process Management*, Vol. 20 No. 3, pp. 161–176, doi:10.1002/kpm.1416.

Cabigiosu, A. and Camuffo, A. (2012), "Beyond the 'Mirroring' Hypothesis: Product Modularity and Interorganizational Relations in the Air Conditioning Industry", *Organization Science*, Vol. 23 No. 3, pp. 686–703, doi:10.1287/orsc.1110.0655.

Calantone, R. and Rubera, G. (2012), "When Should RD & E and Marketing Collaborate ? The Moderating Role of Exploration – Exploitation and

Environmental Uncertainty", *Journal of Product Innovation Management*, Vol. 29 No. 1, pp. 144–157, doi:10.1111/j.1540-5885.2011.00884.x.

Capdevila, I., Cohendet, P. and Simon, L. (2015), "Establishing New Codes for Creativity through Haute Cuisine: The Case of Ferran Adrià and elBulli", *Technology Innovation Management Review*, Vol. 5 No. 7, pp. 25–33.

Capdevila, I., Cohendet, P. and Simon, L. (2018), "From a local community to a global influence. How elBulli restaurant created a new epistemic movement in the world of haute cuisine", *Industry and Innovation*, Vol. 25 No. 5, pp. 526–549, doi:10.1080/13662716.2017.1327844.

Carlile, P.R. (2002), "A Pragmatic View of Knowledge and Boundaries:Boundary Objects in New Product Development", *Organization Science*, Vol. 13 No. 4, pp. 442–455, doi:10.1287/orsc.13.4.442.2953.

Carlile, P.R. (2004), "Transferring, Translating, and Transforming: An Integrative Framework for Managing Knowledge Across Boundaries", *Organization Science*, Vol. 15 No. 5, pp. 555–568, doi:10.1287/orsc.1040.0094.

Carulli, M., Bordegoni, M., Ferrise, F., Gallace, A., Gustafsson, M. and Pfuhl, T. (2018), "Simulating Multisensory Wine Tasting Experience", pp. 2177–2186.

Carvajal Pérez, D., Araud, A., Chaperon, V., Le Masson, P. and Weil, B. (2018a), "Generative Knowledge Management: How to Make Heritage a Wellspring of Creation in Luxury Industry", *25TH IPDMC: Innovation and Product Development Management Conference*, Porto, Portugal.

Carvajal Pérez, D., Araud, A., Chaperon, V., Le Masson, P. and Weil, B. (2018b), "Generative Heritage: Driving Generativity through Knowledge Structures in Creative Industries. Lessons from Cuisine", *15th International Design Conference*, pp. 1523–1534.

Changeur, S. and Chandon, J.-L. (1995), "Le territoire-produit : étude des frontières cognitives de la marque", *Recherche et Applications En Marketing*, Vol. X No. 2, pp. 31–51.

Chevalier, M. and Mazzalovo, G. (2012), *Luxury Brand Management : A World of Privilege*, Wiley.

Clais, A.-M. (2002), "Patrimoine et comportement des marques: actualité d'un paradoxe ?", *Revue Française Du Marketing*.

Clark, K.B. and Fujimoto, T. (1990), "The power of product integrity.", *Harvard Business Review*, Vol. 68 No. 6, pp. 107–18.

Cohen, W.M. and Levinthal, D. a. (1990), "Absorptive capacity: A new perspective on learning and innovation", *Administrative Science Quarterly*, Vol. 35 No. 1, pp. 128–152, doi:10.2307/2393553.

Cohendet, P., Creplet, F. and Dupouët, O. (2000), "Communities of Practice and Epistemic Communities: A Renewed Approach of Organisational Learning within the Firm", *Proceedings of the WEHIA 2000 Conference*, Marseille, p. 18.

Cohendet, P., Créplet, F. and Dupouët, O. (2006), *La Gestion Des Connaissances -*

Firmes et Communautés de Savoir, Economica, Paris.

Cohendet, P., Grandadam, D., Simon, L. and Capdevila, I. (2014), "Epistemic communities , localisation , and the dynamics of knowledge creation", *Journal of Economic Geography*, Vol. 14 No. 5, pp. 929–954.

Cohendet, P. and Meyer-Krahmer, F. (2001), "The theoretical and policy implications of knowledge codification", *Research Policy*, Vol. 30 No. 9, pp. 1563–1591, doi:10.1016/S0048-7333(01)00168-8.

Cohendet, P. and Simon, L. (2007), "Playing across the playground: paradoxes of knowledge creation in the videogame firm", *Journal of Organizational Behavior*, Vol. 28 No. 5, pp. 587–605, doi:10.1002/job.460.

Colfer, L.J. and Baldwin, C.Y. (2016), "The mirroring hypothesis: Theory, evidence, and exceptions", *Industrial and Corporate Change*, Vol. 25 No. 5, pp. 709–738, doi:10.1093/icc/dtw027.

Collins, H.M. (1993), "The Structure of Knowledge", *Social Research*, Vol. 60 No. 1, pp. 95–116.

Converse, S.A., Cannon-bowers, J.A. and Salas, E. (1991), "Team member shared mental models: a theory and some methodological issues", *Proceedings of the Human Factors Society 35th Annual Meeting*, pp. 1417–1421.

Conway, M.E. (1968), "How Do Committees Invent?", *Datamation*.

Conway, M.E. (2001), "How Do Committees Invent?", available at: http://www.melconway.com/research/committees.html (accessed 22 August 2018).

Cowan, R., David, P.A. and Foray, D. (2000), "The explicit economics of knowledge codification and tacitness", *Industrial and Corporate Change*, Vol. 9 No. 2, pp. 211–253, doi:10.1093/icc/9.2.211.

Crilly, N. (2015), "Fixation and creativity in concept development: The attitudes and practices of expert designers", *Design Studies*, Elsevier Ltd, Vol. 38, pp. 54–91, doi:10.1016/j.destud.2015.01.002.

Dalkir, K. (2017), *Knowledge Management in Theory and Practice*, 3rd ed., The MIT Press, Cambridge, Massachusetts.

Darroch, J. (2005), "Knowledge management, innovation and firm performance", *Journal of Knowledge Management*, Vol. 9 No. 3, pp. 101–115, doi:10.1108/13673270510602809.

David, A. (1996), "Structure et dynamique des innovations managériales", *Cinquième Conférence de l'AIMS*, No. 1, pp. 1–29, doi:10.1016/j.biortech.2017.07.176.

David, A. (2012), "La recherche-intervention, cadre général pour la recherche en management ?", in David, A., Hatchuel, A. and Laufer, R. (Eds.), *Les Nouvelles Fondations Des Sciences de Gestion*, Presses des Mines, Paris, France, pp. 241–264.

David, A. (2013), "La place des chercheurs dans l ' innovation managériale", *Revue Française de Gestion*, Vol. 6 No. 235, pp. 91–112, doi:10.3166/RFG.235.91-112.

David, A. (2018), "Understanding the invention phase of management innovation: A design theory perspective", *European Management Review*, doi:10.1111/emre.12299.

David, A. and Hatchuel, A. (2013), "Intervention Research in Management", *The SAGE Encyclopedia of Action Research*, SAGE Publications Ltd, 2455 Teller Road, Thousand Oaks, California 91320 , pp. 461–463, doi:10.4135/9781446294406.n195.

Dougherty, D. and Hardy, C. (1996), "Sustained Product Innovation in Large, Mature Organizations: Overcoming Innovation-to-Organization Problems", *The Academy of Management Journal*, Vol. 39 No. 5, pp. 1120–1153.

Dubois, U. and Bernard, E. (1856), *La Cuisine Classique: Études Pratiques, Raisonnées et Démonstratives de l'École Française Appliquée Au Service a La Russe Tome I*.

Dubourg Glatigny, P. and Vérin, H. (Eds.). (2008), *Réduire En Art. La Technologie de La Renaissance Aux Lumières*, Éditions de la Maison des sciences de l'homme, Paris.

Edmondson, A. and Nembhard, I. (2009), "Product development and learning in project teams: the challenges are the benefits*", *Journal of Product Innovation ...*, Vol. 26 No. 2, pp. 123–138, doi:10.1111/j.1540-5885.2009.00341.x.

Edmondson, A.C. and Harvey, J.-F. (2017), "Cross-boundary teaming for innovation: Integrating research on teams and knowledge in organizations", *Human Resource Management Review*, Elsevier Inc., doi:10.1016/j.hrmr.2017.03.002.

Eilouti, B.H. (2009), "Design knowledge recycling using precedent-based analysis and synthesis models", *Design Studies*, Elsevier Ltd, Vol. 30 No. 4, pp. 340–368, doi:10.1016/j.destud.2009.03.001.

Eppler, M.J. (2008), "A process-based classification of knowledge maps and application examples", *Knowledge and Process Management*, Vol. 15 No. 1, pp. 59–71, doi:10.1002/kpm.299.

Escoffier, A. (1903), *Le Guide Culinaire : Aide- Mémoire de Cuisine Pratique*.

Escoffier, A. (1907), *A Guide to Modern Cookery*, William Heineman, London.

Escoffier, A. (1912a), *Le Guide Culinaire, Aide-Mémoire de Cuisine Pratique*, 3rd ed., Imprimerie de E. Grevin, Paris.

Escoffier, A. (1912b), *Le Livre Des Menus: Complément Indispensable Du Guide Culinaire*, Imprimerie de E. Grevin, Paris.

Escoffier, A. (1921), *Le Guide Culinaire : Aide-Mémoire de Cuisine Pratique*, 4th ed., Flammarion, Paris.

Fagan, M.J. (1987), "Expert systems applied to mechanical engineering design — experience with bearing selection and application program", *Computer-Aided Design*, Elsevier, Vol. 19 No. 7, pp. 361–367, doi:10.1016/0010-4485(87)90036-4.

Ferguson, P.P. (2004), *Accounting for Taste: The Triumph of French Cuisine*, The University of Chicago Press, Chicago & London.

Fink, B. (1995), *Les Liaisons Savoureuses : Réflexions et Pratiques Culinaires Au XVIIIe Siècle*, Publications de l'Université de Saint-Étienne, Saint-Etienne.

Foray, D. (2013), "L'industrie du luxe et l'économie de la connaissance", *Innovations*, Vol. n°41 No. 2, pp. 71–90, doi:10.3917/inno.041.0071.

Garçon, A. (2003), "Innover dans le texte . L ' Encyclopédie Roret et la vulgarisation des techniques , 1830-1880", *Colloque Les Archives de l'Invention*, Paris, France.

Garçon, A.-F. (2008), "Réduire la mine en science...? Anatomie des De re metallica d'Agricola (1528-1556)", in Dubourg Glatigny, P. and Vérin, H. (Eds.), *Réduire En Art. La Technologie de La Renaissance Aux Lumières*, Éditions de la Maison des sciences de l'homme, pp. 317–335.

Garel, G. (2015), "Lessons in Creativity from the Innovative Design of the Swatch", *Technology Innovation Management Review*, Vol. 5 No. 7, pp. 34–40.

Garud, R. (1997), "On the distinction between know-how, know-why, and know-what", *Advances in Strategic Management*, Vol. 14, pp. 81–101.

Gloet, M. and Terziovski, M. (2004), "Exploring the relationship between knowledge management practices and innovation performance", *Journal of Manufacturing Technology Management*, Vol. 15 No. 5, pp. 402–409, doi:10.1108/17410380410540390.

Goh, S.C. (2002), "Managing effective knowledge transfer: an integrative framework and some practice implications", *Journal of Knowledge Management*, Vol. 6 No. 1, pp. 23–30, doi:10.1108/13673270210417664.

Gouffé, J. (1867), *Le Livre de Cuisine : Comprenant La Cuisine de Ménage et La Grande Cuisine*, Librairie de L. Hachette et Cie.

Goulds Pumps. (2013), "Pump Selection Guide", pp. 1–16.

Griffin, A. and Hauser, J. (1996), "Integrating R&D and Marketing: A Review and Analysis of the Literature", *Journal of Product Innovation Management*, Vol. 13, pp. 191–215.

Guilford, J.P. (1950), "Creativity", *American Psychologist*, Vol. 5 No. 9, pp. 444–454.

Gutsatz, M. (2001), "Le sage et le créateur : Éléments pour une analyse des stratégies des marques de luxe", *Décisions Marketing*, Vol. 23 No. 23, pp. 23–33.

Hall, R. and Andriani, P. (2002), "Managing knowledge for innovation", *Long Range Planning*, Vol. 35 No. 1, pp. 29–48, doi:10.1016/S0024-6301(02)00019-5.

Han, Y.J., Nunes, J.C. and Drèze, X. (2010), "Signaling Status with Luxury Goods: The Role of Brand Prominence", *Journal of Marketing*, American Marketing Association , Vol. 74 No. 4, pp. 15–30, doi:10.1509/jmkg.74.4.15.

Hao, B., Feng, Y. and Frigant, V. (2017), "Rethinking the 'mirroring' hypothesis: implications for technological modularity, tacit coordination, and radical innovation", *R and D Management*, Vol. 47 No. 1, pp. 3–16, doi:10.1111/radm.12106.

Harvey, J.-F., Cohendet, P., Simon, L. and Borzillo, S. (2015), "Knowing Communities

in the Front End of Innovation", *Research-Technology Management*, Vol. 58 No. 1, pp. 46–54, doi:10.5437/08956308X5801198.

Hatchuel, A. (2005), "Quelle analytique de la conception ? Parure et pointe en Design .", *Design*, pp. 1–12.

Hatchuel, A. (2013), "Deconstructing meaning : industrial design as Adornment and wit .", *Author Manuscript, Published in "10th European Academy of Design Conference: Crafting the Future, Gothenburg : Sweden (2013)"*, pp. 1–15.

Hatchuel, A., Le Masson, P., Reich, Y. and Subrahmanian, E. (2017), "Design theory: a foundation of a new paradigm for design science and engineering", *Research in Engineering Design*, Springer London, No. im, pp. 1–17, doi:10.1007/s00163-017-0275-2.

Hatchuel, A., Le Masson, P., Reich, Y. and Weil, B. (2011), "A Systematic Approach of Design Theories Using Generativeness and Robustness", *11th International Conference on Engineering Design*, pp. 1–12.

Hatchuel, A., Le Masson, P. and Weil, B. (2005), "The Development of Science Based Products : Managing By Design Spaces", *Creativity and Innovation Management*, Vol. 14 No. 4, pp. 345–354.

Hatchuel, A., Le Masson, P. and Weil, B. (2011), "Teaching innovative design reasoning: How concept–knowledge theory can help overcome fixation effects", *Artificial Intelligence for Engineering Design, Analysis and Manufacturing*, Vol. 25 No. 1, pp. 77–92, doi:10.1017/S089006041000048X.

Hatchuel, A., Le Masson, P. and Weil, B. (2017), "C-K Theory: Modelling Creative Thinking and its Impact on Research", in Darbellay, F., Moody, Z. and Lubart, T. (Eds.), *Creativity, Design Thinking and Interdisciplinarity*, Springer, pp. 169–183.

Hatchuel, A. and Weil, B. (2002), "La théorie C-K : Fondements et usages d'une théorie unifiée de la conception", *Colloque « Sciences de La Conception »*, p. 24.

Hatchuel, A. and Weil, B. (2003), "A new approach of innovative design : an introduction to C-K theory", *3rd International Conference on Engineering Design*, pp. 1–15.

Hatchuel, A. and Weil, B. (2007), "Design as forcing: Deepening the foundations of C-K theory", *16th International Conference on Engineering Design*, No. August, pp. 1–12.

Hatchuel, A. and Weil, B. (2009), "C-K design theory: An advanced formulation", *Research in Engineering Design*, Vol. 19 No. 4, pp. 181–192, doi:10.1007/s00163-008-0043-4.

Hatchuel, A., Weil, B. and Le Masson, P. (2013), "Towards an ontology of design: lessons from C–K design theory and Forcing", *Research in Engineering Design*, Vol. 24 No. 2, pp. 147–163, doi:10.1007/s00163-012-0144-y.

Henderson, R.M. and Clark, K.B. (1990), "Architectural Innovation : The Reconfiguration of Existing Product Technologies and the Failure of Established Firms", *Administrative Science Quarterly*, Vol. 35 No. 1, pp. 9–30, doi:10.1111/j.1469-8137.1987.tb04693.x.

Holan, P.M. de and Phillips, N. (2004a), "Remembrance of Things Past? The Dynamics of Organizational Forgetting", *Management Science*, Vol. 50 No. 11, pp. 1603–1613, doi:10.1287/mnsc.1040.0273.

Holan, P.M. and Phillips, N. (2004b), "Organizational forgetting as strategy", *Strategic Organization*, Vol. 2 No. 4, pp. 423–433, doi:10.1177/1476127004047620.

Holland, S., Gaston, K. and Gomes, J. (2000), "Critical success factors for cross-functional teamwork in new product development", *International Journal of Management Reviews*, Vol. 2 No. 3, pp. 231–259, doi:10.1111/1468-2370.00040.

Huber, G.P. and Lewis, K. (2010), "Cross-understanding: Implications for group cognition and performance", *Academy of Management Review*, Vol. 35 No. 1, pp. 6–26, doi:10.5465/AMR.2010.45577787.

Iles, P., Yolles, M. and Altman, Y. (2001), "HRM and Knowledge Management: Responding to the Challenge, Research and Practice in Human Resource Management", *Research and Practice in Human Resource Management*, Vol. 9 No. 1, pp. 3–33.

Itten, J. (1973), *The Art of Color : The Subjective Experience and Objective Rationale of Color*, John Wiley.

Itten, J. (1975), *Design and Form : The Basic Course at the Bauhaus and Later*, Van Nostrand Reinhold.

James, W. (1950), *The Principles of Psychology*, Dover Publications.

Jansson, D.G. and Smith, S.M. (1991), "Design fixation", *Design Studies*, Vol. 12 No. 1, pp. 3–11, doi:10.1016/0142-694X(91)90003-F.

Kapferer, J.-N. (2008), *The New Strategic Brand Management: Creating and Sustaining Brand Equity Long Term*, doi:10.1017/CBO9781107415324.004.

Kapferer, J.N. and Bastien, V. (2009), "The specificity of luxury management: Turning marketing upside down", *Journal of Brand Management*, Vol. 16 No. 5–6, pp. 311–322, doi:10.1057/bm.2008.51.

Keller, K.L. (2003), "Brand Synthesis: The Multidimensionality of Brand Knowledge", *Journal of Consumer Research*, Vol. 29 No. 4, pp. 595–600, doi:10.1086/346254.

Keller, K.L. (2013), *Strategic Brand Management. Building, Measuring and Managing Brand Equity*, 4th ed., Pearson, doi:10.2307/1252315.

Klee, P. (1966), *On Modern Art*, Faber.

Klee, P. (2004), *Paul Klee, Cours Du Bauhaus : Weimar 1921-1922 : Contributions À La Théorie de La Forme Picturale*, F. Hazan.

Ko, E., Costello, J.P. and Taylor, C.R. (2017), "What is a luxury brand? A new definition and review of the literature", *Journal of Business Research*, Elsevier, No. August, pp. 0–1, doi:10.1016/j.jbusres.2017.08.023.

Kogut, B. and Zander, U. (1992), "Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology", *Organization Science*, Vol. 3 No. 3, pp. 383–397, doi:10.1287/orsc.3.3.383.

von Krogh, G., Nonaka, I. and Nishiguchi, T. (Eds.). (2000), *Knowledge Creation: A Source of Value*, Palgrave Macmillan UK, London.

L. S. R. (1693), *L'art de Bien Traiter*.

Lam, A. (2000), "Tacit knowledge, organizational learning and societal institutions: An integrated framework", *Organization Studies*, Vol. 21 No. 3, pp. 487–513, doi:10.1177/0170840600213001.

Lane, P.J., Koka, B.R. and Pathak, S. (2006), "The reification of absorptive capacity: A critical review and rejuvenation of the construct", *Academy of Management Review*, Vol. 31 No. 4, pp. 833–863, doi:10.5465/AMR.2006.22527456.

Larralde, E. and Ocampo, R. (2010a), "Pump selection: a real example", *World Pumps*, Elsevier Advanced Technology, Vol. 2010 No. 3, pp. 28–33, doi:10.1016/S0262-1762(10)70061-4.

Larralde, E. and Ocampo, R. (2010b), "Centrifugal pump selection process", *World Pumps*, Elsevier Advanced Technology, Vol. 2010 No. 2, pp. 24–28, doi:10.1016/S0262-1762(10)70029-8.

Lave, J. and Wenger, E. (1991), *Situated Learning Legitimate Peripheral Participation*, doi:10.1007/s13398-014-0173-7.2.

Lenfle, S. (2012), "Exploration, project evaluation and design theory: a rereading of the Manhattan case", *International Journal of Managing Projects in Business*, Vol. 5 No. 3, pp. 486–507, doi:10.1108/17538370810883819.

Lenfle, S., Le Masson, P. and Weil, B. (2016), "When project management meets design theory: revisiting the Manhattan and Polaris projects to characterize 'radical innovation' and its managerial implications", *Creativity and Innovation Management*, Vol. 25 No. 3, pp. 378–395, doi:10.1111/caim.12164.

Leonard-Barton, D. (1992), "Core capabilities and core rigidities: A paradox in managing new product development", *Strategic Management Journal*, Vol. 13, pp. 111–125, doi:10.1002/smj.4250131009.

Letzelter, P., Weil, G. and Valerio, C. (1996), "Le luxe : acte créatif ou satisfaction du client", *Décisions Marketing*, Vol. 9 No. 9, pp. 7–14.

Lewis, M.W., Welsh, M.A., Dehler, G.E. and Green, S.G. (2002), "Product Development Tensions : Exploring Contrasting Styles of Project Management", *Academy of Management Journal*, Vol. 45 No. 3, pp. 546–564.

Liyanage, C., Elhag, T., Ballal, T. and Li, Q. (2009), "Knowledge communication and translation - a knowledge transfer model", *Journal of Knowledge Management*, Vol. 13 No. 3, pp. 118–131, doi:10.1108/13673270910962914.

MacCormack, A., Baldwin, C. and Rusnak, J. (2012), "Exploring the duality between product and organizational architectures: A test of the 'mirroring' hypothesis", *Research Policy*, Vol. 41 No. 8, pp. 1309–1324, doi:10.1016/j.respol.2012.04.011.

Madhavan, R. and Grover, R. (1998), "From Embedded Knowledge to Embodied Knowledge: New Product Development as Knowledge Management", *Journal of Marketing*, Vol. 62 No. 4, pp. 1–12.

Magnusson, T. and Lakemond, N. (2017), "Evolving schemes of interpretation: investigating the dual role of architectures in new product development", *R and D Management*, Vol. 47 No. 1, pp. 36–46, doi:10.1111/radm.12142.

Majchrzak, A., Cooper, L.P. and Neece, O.E. (2004), "Knowledge Reuse for Innovation", *Management Science*, Vol. 50 No. 2, pp. 174–188, doi:10.1287/mnsc.1030.0116.

March, J.G. (1991), "Exploration and exploitation in organizational learning", *Organization Science*, Vol. 2 No. 1, pp. 71–87, doi:10.1287/orsc.2.1.71.

Martín-de Castro, G., López-Sáez, P. and Delgado-Verde, M. (2011), "Towards a knowledge-based view of firm innovation. Theory and empirical research", *Journal of Knowledge Management*, Vol. 15 No. 6, pp. 871–874, doi:10.1108/13673271111179253.

De Massis, A., Fratinni, F., Kotlar, J., Messeni Petruzzelli, A. and Wright, M. (2016), "Innovation Through Tradition : Lessons from innovative family businesses and directions for future research", *Academy of Management Perspectives*, Vol. 30 No. 1, pp. 93–116, doi:10.5465/amp.2015.0017.

Le Masson, P., Hatchuel, A. and Benoit. (2017), "Design Theories, creativity and innovation", in Bathelt, H., Cohendet, P., Henn, S. and Simon, L. (Eds.), *The Elgar Companion to Innovation and Knowledge Creation*, Edward Elgar Publishing Limited, pp. 275–306.

Le Masson, P., Hatchuel, A., Kokshagina, O. and Weil, B. (2016), "Designing techniques for systemic impact: lessons from C-K theory and matroid structures", *Research in Engineering Design*, Springer London, pp. 1–24, doi:10.1007/s00163-016-0241-4.

Le Masson, P., Hatchuel, A. and Weil, B. (2006), *Les Processus D'innovation*, Lavoisier.

Le Masson, P., Hatchuel, A. and Weil, B. (2016), "Design theory at Bauhaus: teaching 'splitting' knowledge", *Research in Engineering Design*, Springer London, Vol. 27 No. 2, pp. 91–115, doi:10.1007/s00163-015-0206-z.

Le Masson, P. and Weil, B. (2010), "AUX SOURCES DE LA R&D : GENÈSE DES THÉORIES DE LA CONCEPTION RÉGLÉE EN ALLEMAGNE (1840-1960)", *Entreprises et Histoire*, Vol. 58, pp. 11–50.

Le Masson, P. and Weil, B. (2013), "Design theories as languages of the unknown: insights from the German roots of systematic design (1840–1960)", *Research in Engineering Design*, Vol. 24 No. 2, pp. 105–126, doi:10.1007/s00163-012-0140-2.

Le Masson, P., Weil, B. and Hatchuel, A. (2017), *Design Theory. Methods and Organization for Innovation*, doi:10.1017/CBO9780511566066.

McDermott, C.M. and O'Connor, G.C. (2002), "Managing radical innovation: an overview of emergent strategy issues", *Journal of Product Innovation Management*, Vol. 19, pp. 424–438.

McTeague, C.P., Duffy, A., Hay, L., Vuletic, T., Campbell, G., Choo, P.L. and Grealy, M. (2018), "Insights Into Design Concept Similarity Judgements", pp. 2087–2098, doi:https://doi.org/10.21278/IDC.2018.0479.

Mednick, S. (1962), "The associative basis of the creative process", *Psychological Review*, Vol. 69 No. 3, pp. 220–232, doi:10.1037/h0048850.

Messeni Petruzzelli, A. and Savino, T. (2014), "Search, recombination, and innovation: Lessons from haute cuisine", *Long Range Planning*, Elsevier Ltd, Vol. 47 No. 4, pp. 224–238, doi:10.1016/j.lrp.2012.09.001.

Michel, G. (2013), *Management Transversal de La Marque : Une Exploration Au Cœur Des Marques*, Dunod.

Mintzberg, H. (1978), *The Structuring of Organizations*, Pearson.

Mohammed, S. and Dumville, B.C. (2001), "Team mental models in a team knowledge framework: expanding theory and measurement across disciplinary boundaries", *Journal of Organizational Behavior*, Vol. 22 No. 2, pp. 89–106, doi:10.1002/job.86.

Monga, A.B. and John, D.R. (2010), "What Makes Brands Elastic? The Influence of Brand Concept and Styles of Thinking on Brand Extension Evaluation", *Journal of Marketing*, Vol. 74 No. 3, pp. 80–92, doi:10.1509/jmkg.74.3.80.

Moon, H. and Sprott, D.E. (2016), "Ingredient branding for a luxury brand: The role of brand and product fit", *Journal of Business Research*, Elsevier Inc., Vol. 69 No. 12, pp. 5768–5774, doi:10.1016/j.jbusres.2016.04.173.

Mossé, A. (2018), "Gossamer timescapes: A design-led investigation into electro-active and light responsive textiles for the home", *Smart Materials and Structures*, IOP Publishing, Vol. 27 No. 7, doi:10.1088/1361-665X/aac537.

Nonaka, I. (1994), "A dynamic theory of Organizational Knowledge Creation", *Organization Science*, Vol. 5 No. 1, pp. 14–37, doi:10.1287/orsc.5.1.14.

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge-Creating Company*, Oxford University Press.

Nonaka, I. and Toyama, R. (2003), "The knowledge-creating theory revisited: knowledge creation as a synthesizing process", *Knowledge Management Research & Practice*, Vol. 1 No. 1, pp. 2–10, doi:10.1057/palgrave.kmrp.8500001.

Nonaka, I., Toyama, R. and Konno, N. (2000), "SECI, Ba and Leadership: A Unified Model of Dynamic Knowledge Creation", *Long Range Planning*, Vol. 33 No. 1, pp. 5–34, doi:10.1016/S0024-6301(99)00115-6.

Opazo, M.P. (2012), "Discourse as driver of innovation in contemporary haute cuisine: The case of elBulli restaurant", *International Journal of Gastronomy and Food Science*, Elsevier, Vol. 1 No. 2, pp. 82–89, doi:10.1016/j.ijgfs.2013.06.001.

Opazo, M.P. (2016), *Appetite for Innovation: Creativity and Change at elBulli*, Columbia University Press, New York.

Pahl, G. (Gerhard) and Beitz, W. (1986), *Konstruktionslehre : Handbuch Für Studium Und Praxis*, Springer-Verlag.

Pahl, G., Beitz, W., Feldhusen, J. and Grote, K.H. (2007a), *Engineering Design: A Systematic Approach*, doi:10.1007/978-1-84628-319-2.

Pahl, G., Beitz, W., Feldhusen, J. and Grote, K.H. (2007b), *Engineering Design: A*

Systematic Approach.

Perrin-Martinenq, D. (2010), "Le détachement à la marque: Déterminants et répercussions sur la relation à la marque", *Décisions Marketing*, Vol. 59, pp. 29–37.

Pine II, J. and Gilmore, J.H. (1998), "Welcome to the experience economy . B . Joseph Pine II and James H . Gilmore . Harvard", *Harvard Business Review*, Vol. 4 No. August.

Pitt, M. and Clarke, K. (1999), "Competing on Competence: A Knowledge Perspective on the Management of Strategic Innovation", *Technology Analysis & Strategic Management*, Vol. 11 No. 3, pp. 301–316, doi:10.1080/095373299107375.

Pitt, M. and MacVaugh, J. (2008), "Knowledge management for new product development", *Journal of Knowledge Management*, Vol. 12 No. 4, pp. 101–116, doi:10.1108/13673270810884282.

du Plessis, M. (2007), "The role of knowledge management in innovation", *Journal of Knowledge Management*, Vol. 11 No. 4, pp. 20–29, doi:10.1108/13673270710762684.

Polanyi, M. (1966), *The Tacit Dimension*, doi:10.1017/CBO9781107415324.004.

Potier, O., Brun, J., Le Masson, P. and Weil, B. (2015), "How innovative design can contribute to Chemical and Process Engineering development? Opening new innovation paths by applying the C–K method", *Chemical Engineering Research and Design*, Vol. 103, pp. 108–122, doi:10.1016/j.cherd.2015.05.040.

Poulsson, S.H.G. and Kale, S. (2004), "The Experience Economy and Commercial Experiences", *The Marketing Review*, Vol. 4, pp. 267–277, doi:10.1362/1469347042223445.

"Processus de sélection des roulements". (n.d.). , available at: http://www.skf.com/fr/products/bearings-units-housings/principles/bearing-selection-process/index.html (accessed 25 July 2018).

Purcell, A.T. and Gero, J.S. (1996), "Design and other types of fixation", *Design Studies*, Vol. 17 No. 4 SPEC. ISS., pp. 363–383, doi:10.1016/S0142-694X(96)00023-3.

Querbes, A. and Frenken, K. (2018), "Grounding the 'mirroring hypothesis': Towards a general theory of organization design in New Product Development", *Journal of Engineering and Technology Management - JET-M*, Elsevier, Vol. 47 No. July 2016, pp. 81–95, doi:10.1016/j.jengtecman.2018.01.001.

Rambourg, P. (2010), *Histoire de La Cuisine et de La Gastronomie Françaises*, Tempus Perrin.

Redtenbacher, F. (1874), *Résultats Scientifiques et Pratiques Destinés a La Construction Des Machines*, 2nd ed., Librairie Polytechnique de J. Baudry, Paris.

Rhodes, J., Hung, R., Lok, P., Ya-Hui Lien, B. and Wu, C. (2008), "Factors influencing organizational knowledge transfer: implication for corporate performance", *Journal of Knowledge Management*, Vol. 12 No. 3, pp. 84–100, doi:10.1108/13673270810875886.

Richards, I., Foster, D. and Morgan, R. (1998), "Brand Knowledge Management: Growing Brand Equity", *Journal of Knowledge Management*, Vol. 2 No. 1, pp. 47–54, doi:10.1108/13673279810800762.

Rietzschel, E.F., Nijstad, B.A. and Stroebe, W. (2007), "Relative accessibility of domain knowledge and creativity: The effects of knowledge activation on the quantity and originality of generated ideas", *Journal of Experimental Social Psychology*, Vol. 43 No. 6, pp. 933–946, doi:10.1016/j.jesp.2006.10.014.

Roux, E. (1995), "Consumer evaluation of luxury brand extensions", *EMAC Conference, May, ESSEC, Paris*, pp. 1971–1980.

Roux, E. and Floch, J.-M. (1996), "GÉRER L'INGERABLE : La contradiction interne de toute maison de luxe", *Decisions Marketing*, Vol. 9 No. 9, pp. 15–23.

Ryle, G. (1949), *The Concept of Mind New York*, Hutchinson's University Library.

Salgueiredo, C.F. and Hatchuel, A. (2016), "Beyond analogy: A model of bioinspiration for creative design", *Artificial Intelligence for Engineering Design, Analysis and Manufacturing*, Vol. 30 No. 2, pp. 159–170, doi:10.1017/S0890060416000044.

Sanchez, R.O.N. and Mahoney, J.T. (1996), "Modularity , Flexibility , and Knowledge Management in Product and Organization Design", *Strategic Management Journal*, Vol. 17, pp. 63–76.

Savino, T., Messeni Petruzzelli, A. and Albino, V. (2017), "Search and Recombination Process to Innovate: A Review of the Empirical Evidence and a Research Agenda", *International Journal of Management Reviews*, Vol. 19 No. 1, pp. 54–75, doi:10.1111/ijmr.12081.

Schulze, A., Brojerdi, G. and von Krogh, G. (2014), "Those Who Know, Do. Those Who Understand, Teach. Disseminative Capability and Knowledge Transfer in the Automotive Industry", *Journal of Product Innovation Management*, Vol. 31 No. 1, pp. 79–97, doi:10.1111/jpim.12081.

Schulze, A. and Hoegl, M. (2006), "Knowledge Creation in New Product Development Projects", *Journal of Management*, Vol. 32 No. 2, pp. 210–236, doi:10.1177/0149206305280102.

Schulze, A. and Hoegl, M. (2008), "Organizational knowledge creation and the generation of new product ideas: A behavioral approach", *Research Policy*, Vol. 37 No. 10, pp. 1742–1750, doi:10.1016/j.respol.2008.07.002.

Scott, G., Leritz, L.E. and Mumford, M.D. (2004), "The effectiveness of creativity training : A quantitative review", *Creativity Research Journal*, Vol. 16 No. 4, pp. 361–388.

Scribner, S. (1986), "Thinking in action: some characteristics of practical thought", in Wagner, R.K. and Sternberg, R.J. (Eds.), *Practical Intelligence: Nature and Origins of Competence in the Everyday World*, pp. 13–30.

Seo, Y. and Buchanan-Oliver, M. (2017), "Constructing a typology of luxury brand consumption practices", *Journal of Business Research*, Elsevier, No. September, pp. 0–1, doi:10.1016/j.jbusres.2017.09.019.

Shane, S. (2000), "Prior Knowledge and the Discovery of Entrepreneurial

Opportunities", *Organization Science*, Vol. 11 No. 4, pp. 448–469.

Sheremata, W.A. (2000), "Centrifugal and Centripetal Forces in Radical New Product Development under Time Pressure", *The Academy of Management Journal*, Vol. 25 No. 2, pp. 389–408.

Sherman, J.D., Berkowitz, D. and Souder, W.E. (2005), "New product development performance and the interaction of cross-functional integration and knowledge management", *Journal of Product Innovation Management*, Vol. 22 No. 5, pp. 399–411, doi:10.1111/j.1540-5885.2005.00137.x.

Siang Kok Sim and Yiu Wing Chan. (1991), "A knowledge-based expert system for rolling-element bearing selection in mechanical engineering design", *Artificial Intelligence in Engineering*, Elsevier, Vol. 6 No. 3, pp. 125–135, doi:10.1016/0954-1810(91)90035-M.

da Silveira, C., Lages, C. and Simões, C. (2013), "Reconceptualizing brand identity in a dynamic environment", *Journal of Business Research*, Elsevier Inc., Vol. 66 No. 1, pp. 28–36, doi:10.1016/j.jbusres.2011.07.020.

Smiths, S. (2003), "Brand Experience", in Clifton, R. and Simmons, J. (Eds.), *Brands and Branding*, Profile, London, pp. 97–112.

Spiggle, S., Nguyen, H.T. and Caravella, M. (2012), "More Than Fit: Brand Extension Authenticity", *Journal of Marketing Research*, Vol. 49 No. 6, pp. 967–983, doi:10.1509/jmr.11.0015.

Stout, R.J., Cannon-Bower, J.A., Salas, E. and Milanovich, D.M. (1999), "Planning, shared mental models, and coordinated performance: an empirical link is established", *Human Factors*, Vol. 41 No. 1, pp. 61–71.

Suh, N.P. (1990), *The Principles of Design*, Oxford University Press, New York.

Suh, N.P. (2001), *Axiomatic Design: Advances and Applications*, Oxford University Press, New York.

Swap, W., Leonard, D., Shields, M. and Abrams, L. (2001), "Using Mentoring and Storytelling to Transfer Knowledge in the Workplace", *Journal of Management Information Systems*, Vol. 18 No. 1, pp. 95–114, doi:10.1080/07421222.2001.11045668.

Szulanski, G. (1996), "Exploring Internal Stickiness: Impediments to the Transfer of Best Practice Within the Firm", *Strategic Management Journal*, Vol. 17, pp. 27–43, doi:10.1002/smj.4250171105.

Szulanski, G. (2000), "The Process of Knowledge Transfer: A Diachronic Analysis of Stickiness", *Organizational Behavior and Human Decision Processes*, Vol. 82 No. 1, pp. 9–27, doi:10.1006/obhd.2000.2884.

Szulanski, G., Cappetta, R. and Jensen, R.J. (2004), "When and How Trustworthiness Matters: Knowledge Transfer and the Moderating Effect of Causal Ambiguity", *Organization Science*, Vol. 15 No. 5, pp. 600–613, doi:10.1287/orsc.1040.0096.

Szulanski, G., Ringov, D. and Jensen, R. (2014), "Up-Hill and Down-Hill Learning: Patterns of Knowledge Transfer Methods and Stickiness", *Academy of*

Management Proceedings, Academy of Management Briarcliff Manor, NY 10510, Vol. 2014 No. 1, p. 15252, doi:10.5465/ambpp.2014.15252abstract.

Teres Enix Scott. (1999), *Knowledge*, edited by Runco, M.A. and Pritzker, S.R. *Encyclopedia of Creativity*, Vol. 2, Academic Press, San Diego, California.

Thompson, J.D. (1967), *Organizations in Action : Social Science Bases of Administrative Theory*, McGraw-Hill, 1967.

Torrance, E.P. (1974), *The Torrance Tests of Creative Thinking*, *Norms-Technical Manual Research Edition-Verbal Tests, Forms A and B- Figural Tests, Forms A and B.*, Personnel Press, Princeton, NJ.

Tsai, W. and Ghoshal, S. (1998), "Social Capital and Value Creation : The Role of Intrafirm Networks", *Academy of Management Journal*, Vol. 41 No. 4, pp. 464–476.

Tsoukas, H. (2009), "A Dialogical Approach to the Creation of New Knowledge in Organizations", *Organization Science*, Vol. 20 No. 6, pp. 941–957, doi:10.1287/orsc.

Urde, M., Greyser, S.A. and Balmer, J.M.T. (2007), "Corporate brands with a heritage", *Journal of Brand Management*, Palgrave Macmillan UK, Vol. 15 No. 1, pp. 4–19, doi:10.1057/palgrave.bm.2550106.

La Varenne, F.P. de. (1651), *Le Cuisinier François*, Pierre David, Paris.

Veblen, T. (1899), "The Theory of the Leisure Class", *A Penn State Electronic Classics Series Publication*, Vol. 7 No. 4, p. 425, doi:10.1086/250610.

Vérin, H. (2008), "Rédiger et réduire en art : un projet de rationalisation des pratiques", in Dubourg Glatigny, P. and Vérin, H. (Eds.), *Réduire En Art. La Technologie de La Renaissance Aux Lumières*, Éditions de la Maison des sciences de l'homme, Paris, pp. 17–58.

Vickers, J.S. and Renand, F. (2003), "The Marketing of Luxury Goods: An exploratory study – three conceptual dimensions", *The Marketing Review*, Vol. 3 No. 4, pp. 459–478, doi:10.1362/146934703771910071.

Vigneron, F. and Johnson, L. (1999), "A review and a conceptual framework of prestige-seeking consumer behavior", *Academy of Marketing Science*, No. November 2015.

Völckner, F. and Sattler, H. (2006), "Drivers of Brand Extension Success", *Journal of Marketing*, Vol. 70 No. 2, pp. 18–34, doi:10.1509/jmkg.70.2.18.

von Wallpach, S., Hemetsberger, A. and Espersen, P. (2016), "Performing identities: Processes of brand and stakeholder identity co-construction", *Journal of Business Research*, Elsevier Inc., Vol. 70, pp. 443–452, doi:10.1016/j.jbusres.2016.06.021.

Wang, Z. and Wang, N. (2012), "Knowledge sharing, innovation and firm performance", *Expert Systems with Applications*, Vol. 39 No. 10, pp. 8899–8908, doi:10.1016/j.eswa.2012.02.017.

Weisberg, R.W. (1999), "Creativity and Knowledge: A Challenge to Theories", in Sternberg, R.J. (Ed.), *Handbook of Creativity*, Cambridge University Press, pp. 226–250.

Wenger, E. (1998), *Communities of Practice: Learning, Meaning, and Identity*, Cambridge University Press.

Wiedmann, K.-P., Hennigs, N. and Siebels, A. (2009), "Value-based segmentation of luxury consumption behavior", *Psychology and Marketing*, Vol. 26 No. 7, pp. 625–651, doi:10.1002/mar.20292.

Van Wijk, R., Jansen, J.J.P. and Lyles, M.A. (2008), "Inter- and intra-organizational knowledge transfer: A meta-analytic review and assessment of its antecedents and consequences", *Journal of Management Studies*, Vol. 45 No. 4, pp. 830–853, doi:10.1111/j.1467-6486.2008.00771.x.

Williams, C. (2007), "Transfer in context: Replication and adaptation in knowledge transfer relationships", *Strategic Management Journal*, Vol. 28 No. 9, pp. 867–889, doi:10.1002/smj.614.

Winter, S.G. and Szulanski, G. (2001), "Replication as Strategy", *Organization Science*, Vol. 12 No. 6, pp. 730–743, doi:10.1287/orsc.12.6.730.10084.

Winter, S.G., Szulanski, G., Ringov, D. and Jensen, R.J. (2012), "Reproducing Knowledge: Inaccurate Replication and Failure in Franchise Organizations", *Organization Science*, Vol. 23 No. 3, pp. 672–685, doi:10.1287/orsc.1110.0663.

Wuestefeld, T., Hennigs, N., Schmidt, S. and Wiedmann, K.-P. (2012), "The impact of brand heritage on customer perceived value", *Der Markt*, Vol. 51 No. 2–3, pp. 51–61, doi:10.1007/s12642-012-0074-2.

Young, J.W. (2015), *A Technique for Producing Ideas: A Simple Five Step Formula for Producing Ideas*, CreateSpace Independent Publishing Platform.

Zahra, S.S. a. and George, G. (2002), "Absorptive Capacity: A Review, Reconceptualization, and Extension", *The Academy of Management Review*, Vol. 27 No. 2, p. 185, doi:10.2307/4134351.

Zuboff, S. (1989), *In The Age Of The Smart Machine: The Future Of Work And Power*, Basic Books.

RÉSUMÉ

Comment la transmission de connaissances peut aider les concepteurs du secteur du luxe à réinventer les objets et l'expérience de la marque tout en restant ancrés dans son patrimoine ? Cette question ouverte dans les sciences de gestion et de la conception intéresse le domaine du luxe, tout particulièrement la Maison Dom Pérignon en constante quête de renouvellement. En effet, innover sans trahir les traditions est à l'origine de plusieurs tensions. Dans cette thèse, nous montrons comment la transmission d'un « patrimoine de création » peut aider les concepteurs du secteur du luxe à surmonter ces tensions. En étudiant celui de la Maison Dom Pérignon et ceux contenus dans divers livres de la haute cuisine, nous mettons en évidence trois caractéristiques de ce patrimoine de création qui constituent autant d'axes de recherche : Premièrement, nous décrivons les effets positifs sur l'originalité et l'efficacité opérationnelle que la transmission d'un patrimoine de création peut avoir sur les collectifs de concepteurs conduisant des projets d'innovation. Deuxièmement, en faisant appel aux théories de la conception, nous construisons un modèle formel mettant en relation les structures de connaissance et les types de générativité qu'un patrimoine de création peut provoquer. Nous montrons qu'un même domaine peut en contenir plusieurs, qu'un même patrimoine de création peut favoriser plusieurs types de générativité qui pourraient sembler en principe incompatibles, et que ces différents types de générativité peuvent évoluer à travers le temps. Finalement, nous montrons que la conception d'un patrimoine de création exige des interactions entre concepteurs expérimentés et concepteurs récepteurs afin de formaliser, réorganiser et partager un langage du connu et un langage de l'inconnu. Ce dernier est composé des éléments du premier. Nous mettons aussi en exergue que la structure formelle d'un patrimoine de création peut refléter la structure de l'organisation de conception.

MOTS CLÉS

Gestion de connaissances ; Luxe ; Conception innovante ; Conception d'expériences

ABSTRACT

How can knowledge transmission help designers in the luxury industries to reinvent the brand's objects and experiences while remaining rooted in its heritage? This open question in the management and design sciences is of interest to the luxury sector, and especially to Dom Pérignon, in constant quest of renewal. Indeed, to innovate without betraying tradition is at the origin of several tensions. In this thesis, we show how the transmission of a "creative heritage" can help designers in the luxury industry to overcome these tensions. By studying the creative heritage of Dom Pérignon and those contained in various haute cuisine books, we highlight three characteristics of this creative heritage that constitute as many lines of research: First, we describe the positive effects on the originality and the operational efficiency that the transmission of a creative heritage can have on the collectives of designers leading innovation projects. Secondly, by using design theories, we construct a formal model linking the knowledge structures and the types of generativity that a creative heritage can promote. We show that a same domain can contain several generativities, that a same creative heritage can favor several types of generativity that might seem incompatible in principle, and that these different types of generativity can evolve over time. Finally, we show that the design of a creative heritage requires interactions between experienced and recipient designers to formalize, reorganize and share a language of the known and a language of the unknown. The latter is composed of the elements of the former. We also highlight that the formal structure of a creative heritage can reflect the structure of the design organization.

KEYWORDS

Knowledge management; Luxury; Innovative design; Experience design