Precipitated Convergence :

An approach for Design Sprints by joining Technologies and Arts.

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Innovation by Design

A nos Dualités.

To everybody who was part of this journey, they will recognize themselves.

Executive Summary

Design is an ambivalent discipline. Rooted both in *Arts* and *Technics*, it gives *Forms* to *Functions*, working in uncertain and evolving environments. For this reason, it is often related to *Innovation*, which is the *Diffusion* of *Inventions* in the Social Body.

Innovation seen through the prism of *Economy* will favor a *Design* based on *Uses* to manage its *Diffusion*.

Innovation seen through the prism of *Technical Evolutions* will focus on the *Design* of new *Forms to Inventions*, bringing *Design* to the field of *Creation*.

I show through a first series of use-cases that the form of *Innovation Sprints* is an efficient and reliable way to lower the risk of an *Invention* and facilitate its *Diffusion* in the *Economic* systems. It is however not meant to produce *Radical Innovation* in the sense of strong and diverse *Concepts* and *Forms*.

On the other hand, the field of *Human Computer Interaction* proposes a *User-Centered* approach to produce *Radical Innovation*, which relies on the study of *Extreme Users* and *Extreme-Situations* including *Artists* and *Creation*.

In a second use-case, I present the *Creartathon*, a *Creative Hackathon* mixing *Arts* and *Technologies* in the Frame of a *Sprint*.

From the analysis of this use-case, I propose the model of *Precipitated Convergence* to represent *Creation Processes*. Precipitated Convergence relies on three principles to create *Radical Forms* and *Radical Concepts: High-Level Concepts Anchoring, Rapid Incarnation,* and the use *of Arts and Technologies as Creative Tools*.

Precipitated Convergence offers an interesting Framework for the understanding and implementation of *Creation* activities as it complements existing methods such as CK-P or TRIZ.

Finally, I formulate the basis of a Project in which *Precipitated Convergence* could be utilized in the context of an individual *Creation Practice*: *Identitie(s)*.

Content

Lui :
Ca va ?

Lui :
Je crois.

Lui :
Tu fais quoi en ce moment ?

Lui :
J'écris.

Lui :
Sur quoi ?

Lui :
Pas mal de choses à vrai dire.

Lui :
Ca tombe bien, j'ai pas mal de temps.

1. Introduction

Design Sprints are events during which multi-disciplinary teams tackle specific challenges in a limited type and space. They are commonly used in both industry and academia to encourage collaborative approaches for *Innovation.* Sprints' supporters claim they allow to address complex problems rapidly and concretely[1]. Opposers on the other, support that the method lacks rigor and fails to keep its promises[2].

In this Thesis, I show there are different formats of *Design Sprints,* relying on different conception of *Innovation* and *Design.* Analyzing *Design Sprints* run with my company *A.Samble,* I show *Innovation Sprints* ie. *Design Sprints* applied to *Economic Innovation*, focus on reducing the risks of a project. Doing so they do not encourage Radical *Forms* and *Concepts*.

To overcome this problem, I participated to the *Creartathon,* a *Creation Sprint* mixing *Arts* and *Technologies*, that was organized by the Ex-Situ Laboratory. This use-case provides the purpose of the Thesis, encompassed in a *Research Objective* which is:

Research Objective:

How to encourage Radical Innovation in design Sprints, by using Art and Technologies ?

I address this question by proposing an approach to *Creation Sprints: Precipitated Convergence.* I will detail it principles and articulate it with existing approaches. I conclude with the formulation of a project to apply it.

This work is also the occasion to reflect more broadly on my professional practice of *Design* and *Innovation*, and to explore the theme of *Artistic Creation*. These are theme that I hold dear. Joining a *Design* school was part of the process of a personal research. I encompass these themes in a *Personal Objective* serving my practice of *Design*.

Personal Objective:

What does it mean to research in Design?

These two purposes are addressed conjointly in a *Research through Design* approach.

I hope you will have as much interest reading through these questions as I had dancing with them.

[1] Zeratsky, J. (2016). *Sprints Are the Secret to Getting More Done.* Harvard Business Review.

[2] Davidson, J. (2020). Design Sprints are Absurd: It's Time to Get Serious. On medium: https://medium.com/swlh/design-sprints-are-absurd-a462e6413b7e

Lui :
Dis ?

Lui :
?

Lui :
C'est quoi le design ?

Lui :
Pourquoi tu me demandes ça ?

Lui :
Bah, au fond, tu as passé un an à travailler dessus et tu ne m'a jamais dis ce que c'était vraiment.

Lui :
C'est compliqué. Chaque époque, chaque personne construit sa propre définition du design.

Lui :
Tu veux dire que tu ne peux pas me dire ce que c'est que le design ?

Lui :
C'est compliqué.

2. Historical Perspective on Designs and their driving principle

A recurrent figure of *Design* is Janus, the multi-faced God. This is no surprise as, rarely in any discipline has the cliché formula of « there are as many conceptions of Design as there are designers » been truer.

Over my past year studying *Design,* a favorite question of mine has been to ask speakers and practitioners « *What is your definition of Design ?* ». In one year, I do not think I received the same answer twice.

The discipline indeed stands on a thin line. It constantly balances between its roots in fine Arts and a development related to the rise of industrial consumption. The core concepts of *Design* range from humanism to formalism, from expressionism to constructivism, from conception to production, from fine arts to high technologies.

As such, *Design* prove difficult to apprehend for me, who came from another discipline, as it challenged most of my attempts of characterization. *Design* rooted in *Arts*, it built itself on practices, not on rules. As such, it should be described more than defined. This section defines the background of *Design* discipline that support the Thesis.

2.1. Currents of Design

Design was built on succeeding currents. From its first characterization by Vasari during Italian Renaissance, to contemporary approaches like Design thinking, it has evolved and transformed. *Design* embraced or opposed tendencies of its time, both within and outside of dominant systems. I do not expect this section to be exhaustive but to present an overview of the discipline, as well as outline its diverse principles.

Design and fine arts: *Disegno* as the bridge between form and end

Renaissance, Italy

> *Seeing that [disegno], the parent of our three arts, Architecture, Sculpture and Painting, has its origin in the intellect, draws out from many single things a general judgement, it is like a form or idea of all objects in Nature. - Artisti del Disegno.*[3]

The concept of *Design* is formalized by artist and art critique Giorgio Vasari, in 1568 : « *Le vite de'piu eccellentipittori, scultori, et architettori* ». *Disegno*, for Vasari, represents conjointly the notions of drawing and project. It encompasses both *Form* and *Intention*.

[3] Vasari, G. (1568). *Le vite dei più eccellenti architetti, pittori et scultori italiani.* Translated by Brown, B. B.et al. (1960). *Vasari on Technique.* Dover Publications.

Three things are worth remembering from this origin. First, *Design* originated within fine arts. Second, *Design* was a bridge between formal embodiment and projective intention. Also, more subtly, Design appears as an ethic supporting existing artistic practices (fine Arts and architecture) more than a discipline per se. From the beginning, the purpose of *Design* is ambivalent and stands across disciplines. From this point on, *Design* will develop through several key milestones that will bring their own practices and concepts.

Massification of production and the rise of Design in the *Arts and Crafts* movement

Industrial Revolution, UK

Fine Art is that in which the hand, the head, and the heart of man go together.[4]

Design truly develops as a discipline parallel to the industrial revolution. First it opposed the industrialization and automatization of processes, that challenged existing craft practices. Designer William Morris, art critic John Ruskin, and historian Thomas Carlyle criticized what they considered impoverished aesthetic for production and « *dishonesty of machines work » (Ruskin, J. (1883), p55).* In response, they founded the *Arts and Crafts* movement, which developed in the UK from 1880 and later progressed to the rest of Europe. The movement brought the first industrial aesthetic as well as a social conception of production. Its style, based on the use of interlaced patterns spread across Europe, had a lasting impact across the world. The movement also confirmed the aforementioned ambivalence of Design, which at the same time, built itself within and opposed the industrial revolution, sharing the objective to democratize production for everybody, while adopting a critical view on industrial systems.

The *Bau* as the object of Design: the Bauhaus

1919-1933, Germany

The ultimate goal of all art is the Building (the Bau).[5]

Probably the most iconic and most influential institution in *Design* history, the Bauhaus was funded in 1919 by architect, designer and urbanist Walter Gropius, in the city of Weimar, Germany. Born from the fusion of the schools of fine and applied arts, the Bauhaus radically challenges education practices of the time. The Bauhaus funding manifesto encompasses the objective of Gropius: to place the *Bau* at the center of all artistic practices. The school defines fine arts as belonging to crafts as for any other practices. Students are attached to two referents : one craftsman or Craft-master (*Werkmeister*) and an artist as Form-master (*Formmeister*), supplemental training in science is also provided[6]. Between its creation in 1919

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[4] Ruskin, J. (1883) *The Seven Lamps of Architecture.* George Allen. p.57.

[5] Gropius, W. (1919). *Program of the Staatliche Bauhaus in Weimar.* Translated from German by Design Museum of Chicago, In Website, www.bauhausmanifesto.com.

[6] Findeli, A. (1999). *La tradition du Bauhaus peut-elle nous instruire aujourd'hui?.* In book, Canadian Museum of Civilization, & The Institute for Contemporary Canadian Craft (1999). *Common Ground: Contemporary Craft, Architecture and the Decorative Arts.* University of Ottawa Press. pp. 29–44.

and its shut down in 1933, the Bauhaus hosted some of the most influential designers and artists of the time, amongst which were designers Mies van der Rohe, Marcel Breuer and Marianne Brandt, and painters Vassily Kandinsky and Paul Klee. The Bauhaus is probably the most important period for the history of *Design*. Amongst the main contributions are the definition of the *Bau* as the object of all arts, reuniting fine and applied Arts under the same concept of crafts.

Design and marketing in the US

late 1920s, USA

La Laideur se vend mal ([Ugliness doesn't sell]).[7]

The apparition of mass consumption in the USA will also shape the evolution of *Design*, proving the capacity of the discipline to constantly reinvent itself. Raymond Loewy is certainly the key figure of this period. Often regarded as the father of modern *Industrial Design*, he participated in the creation of a modern industrial aesthetic through projects across diverse industries. He carried out emblematic projects for companies such as *Coca-Cola, Lucky Strikes* or *Studebackers.* While previous movements were prone to challenging industry and praise crafts, Loewy fully embraced technologies of his time to create new forms for modernity. He also played a central role in using *Design* to create imaginaries and to serve sales.

Toward User-Centered Design: Human Computer Interactions

Second half of the 20th century, North America and Europe

We must adopt an approach that inherently aspires to get the right design as well as get the design right.[8]

Design has always been about users. However, users as an explicit concept truly crystallized in the US from the 50s through the development of a new field of Design imbued with digital technologies : Human Computer Interaction (HCI). In 1945, in order to design new telephone systems, Bell Labs hires the first psychologist in its Research and Development (R&D) team. They are pioneers in the transition from *Design* of Products towards a *Design* of *Uses*. A few years later in the 50s and 60s, the Lincoln Lab at MIT, develops the first interactive computing and computer graphics and generalizes the use of rapid system prototyping and demonstration in R&D. In 1969, Xerox corporation funds the Palo Alto Research Center (PARC) which will be one of the most active centers in HCI research. At the end of the 70s, James J. Gibson proposes the concept of affordance[9]. A few years later, Don Norman's bestseller *The Psychology of everyday things* (renamed in re-edition as *The Design of*

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[7] Loewy, R. (2002). *Never leave well enough alone*. Johns Hopkins University Press. : French title of the book.

[8] Buxton, B. (2007). *Sketching User Experiences: Getting the Design Right and the Right Design*. Morgan Kaufman. p.78.

[9] Gibson, James J. (1977). *The Theory of Affordances*. In book, Shaw, R. and Bransford, J. (Ed.), *Perceiving, Acting, and Knowing*. Lawrence Erlbaum. pp. 67-82.

everyday things)[10] popularizes HCI concepts like *User-Centricity*, usability and affordance. *User-Centered Design* becomes a general public concept. HCI more than any other field gave a scientific legitimacy to *Design*, and created the technological fast-prototyping aesthetic.

Design Thinking and Innovation

1990s, Bay Area

> *A powerful myth has arisen upon the land, a myth that permeates business, academia, and government.*[11]

The company *IDEO* is funded in 1991 and is world famous for the *Design Thinking approach*[12][13]. The method proposes a generalization of designers' techniques within the frame of a project approach. It heavily relies on the understanding of users before the act of conception to ensure suitability to users' needs. This characteristic makes *Design Thinking* well-suited to develop large-public scalable products. Conjoint to the rise of the Tech industry in the San-Francisco area, *Design Thinking* is complementary with other *Economic Innovation* methods that develop around the same time such as *Lean startup* and *agile development*. Design « soft power » further increases in the startup ecosystem when Stanford creates the Hasso Plattner Institute of Design (D.School) in 2004. From this point on, Design Thinking becomes one of the leading innovation methodologies in the innovation eco-system. The method systematically challenges project perimeters (brief scope, addressed problem, targets users, etc). This has two impacts. First, it anchors *Design* in a strategic positioning. Second, *Design Thinking* allows the discipline to transition toward service economy.

This overview is clearly fragmented and partial. Several key components of *Design* were not presented, from the humanist and social conception of design work of Charlotte Perriand and Lecorbusier to the creative explosion of the Italian Radicals (i.e., Alessandro Mendini, Ettore Sottsass) or Japanese pure forms. much remains to be explored! It is however a large enough landscape to draw a few insights.

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[10] Norman, D. A. (2013). *The design of everyday things*. MIT Press. / First edition : Norman, D. A. (1988). *The Psychology of Everyday Things*. New York: Basic Books.

[11] Norman, D. (2010). *Design Thinking: A Useful Myth*. In Web, https://www.core77.com/posts/16790/design-thinking-a-useful-myth-16790

[12] Brown, T. (2019). *L'Esprit Design* (original : *Change by Design*). Pearson France.

[13] NB: the term is first used by researcher PG Rowe, but it is indeed IDEO that shaped it in its current definition.

2.1.1. Design and the tensions of ambivalence

Nowadays designers often find themselves on the horns of a dilemma between aesthetic motivations and the need to put this work into context in the industrial world. So they're at the heart of the political crisis, of what I call "symbolic poverty". By the same token they've got no choice but to politicise their thinking.[14]

The history of Design draws an ambivalent and somewhat fragmentary portrait of Design. The field is traversed by the controversies shown in Figure 1. From the start, Vasari describes *Design* as focusing both on Form and Concepts. It is born in fine arts and yet applied to the industry. *Design*, as all arts, aims to build, yet questioning is the founding principle of *Design-Thinking*: it is both a practice and an approach. It defines itself compared to existing systems, either criticizing of embracing, either within or outside. These tensions make it difficult to define *Design* as a coherent object of study. It is more of a flowing object, always re-shaping itself, than a concrete and stable system.

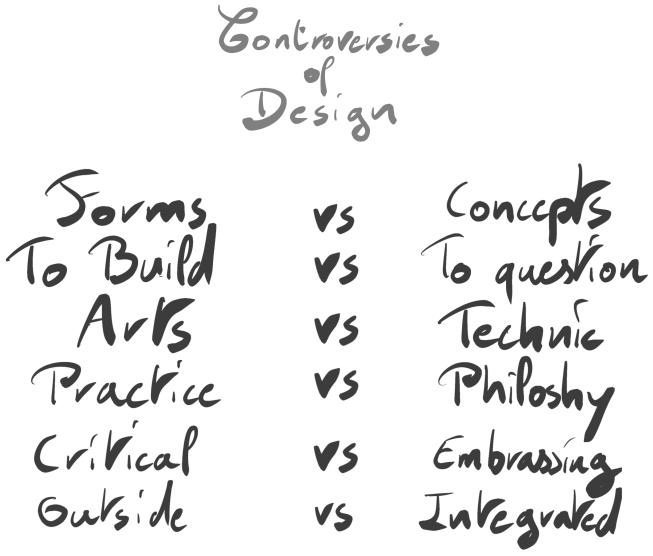

Figure 1: Controversies of *Design*

It is difficult to define *Design* through what it is. It is also a dead end to define it by what it considers. *Design* researcher Alain Findeli used the image of a Bagel to represent *Design*. A discipline can be represented by concentric circles: at the center lies the *Object* of the discipline, surrounding it are its methods, and finally its values. Findeli states that *Design* does not have a specific conceptual core as it is sharing it with parent disciplines (engineering, social sciences, etc.). As such, *Design* can be seen as a bagel, a set of methods and thoughts surrounding a hollowed core. Of course, Findeli does not let *Design* without an Object and

[14] Stiegler, B. (2004), interviewed by Geel, C.. In article, Geel, C. (2004). *Design and Uses: a Design of Responsibility?*. Azimuts no 24.

proposes that: *to make humans' daily lives better* is the *Object* of *Design*[15]. The question is nonetheless striking: if leading thinkers of the field do not have a common understanding of the *Object* they study, how is it possible to create a common ground for the discipline ? How is it possible to open the discussion on the practice ?

Unlike traditional sciences, *Design* is not so much interested in existing truths than in desirable alternatives. As such, as shown by Kees Dorst, *Design* does not typically rely on deductive or inductive reasoning but rather *Abductive* reasoning[16], i.e., *Design* does not infer effects from causes or causes from effects, it rather conceives the conditions to reach a preferred state. In this sense, *Design* is not based on replicable laws, it builds on past experience and inspiring references. This is the *Heuristic* of *Design*[17].

The ambivalences of *Design* can appear as unsettling. The ground on which we want to build is moving and refuses categories and stable systems. However, it is also the opportunity for designers to position themselves with regard to currents and open questions the discipline: to build their practices, making *Design* an ever-evolving and fertile ground for *Creation* and *Innovation*.

[15] Findeli, A. (2018). *Recherche-création et recherche-projet: même combat ?.* In book, Les Presses de l'Université Laval, *Pour une éthique partagée de la recherche-création en milieu universitaire*. pp. 41–60.

[16] Dorst, K. (2007). *The core of 'design thinking' and its application.* In, Elsevier, Design Studies Volume 32, Issue 6, November 2011, Pages 521-532.

[17] Moustakas, C. (1990). *Heuristic Research Design and Methodology.* Person-Centered Review, 5(2), 170–190.

Lui :
Mouais…
Et du coup ça sert à quoi tout ça ?

Lui :
Tu m'as demandé ce qu'était le design …

Lui :
Non mais je veux dire, c'est bien beau tout ça mais qui ça intéresse ?

Lui :
Tu te rappelles quand j'étais en incubateur deep tech ?

Lui :
Non.

Lui :
…
Bon, disons qu'on s'en sert beaucoup en innovation.
Pour trouver des applications concrètes à de nouvelles technologies par exemple.
C'est aussi un mode d'investigation en recherche.

Lui :
Ah ?

Lui :
…

Lui :
Et ça veut dire quoi ?

Lui :
…

3. Innovation, Design Sprints and Research through Design

My year of master at ENSCi-Les Ateliers was also the year I founded my company: *A.Samble*.

A.Samble is a *Design* and *Innovation* company. Its core proposition is to provide both the technical excellence of Engineering and the formal sense of *Design* to address complex challenges. One of the key activities I undertook over the past year has been to teach *Design* and *Innovation* in schools and universities. These classes mainly took the form of *Innovation Sprints* modules, spreading over one to two weeks. They are presented in detail in section 4 of the document.

In the following section, I present the concepts of *Innovation* and *Design Sprints* that are key to my professional activity. I also describes the methodological framework to the thesis, based on *Research through Design*.

3.1. On Innovation

Innovation is the process through which *Inventions* are adopted by societies (see below). As such, it consists of the conjugation of two criteria: *Invention*, which is the creation of novelty, and *Diffusion*, which consists of the adoption of novelty. Both *Invention* and *Diffusion* are driven by a set of factors that will impact the understanding and implementation of Innovation. In particular the question of causality between *Form* and *Function* define two underlying frameworks for *Innovation:* an *Economic* conception and a *Technical* approach. They are presented hereafter. These two frameworks imply very different methods for *Innovation.* They defines distinct role for *Design* as well as different forms for *Sprints*.

3.1.1. Economic Innovation, a manageable and functional approach

Economic Innovation is defined through the prism of Economy. It describes a social reorganization of production and its impacts on the economic fabric[18]. Based on the work of Joseph Schumpeter, The Oslo Manual of the OCDE proposes the following definition for innovation:

[18] Ménissier. T. (2011). *Philosophie et innovation, ou philosophie de l'innovation?*. Klesis - Revue philosophique.

An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organisation or external relations.[19]

This defines two main components for *Innovation: Invention* and *Diffusion*. The focus is put on its effective implementation in economic production. In this sense, *Economic Innovation* is defined as the *Diffusion* of new approaches within the economic sphere. The driving principle of *Economic Innovation* in this context is the possible improvement of the existing state. *Economic Innovation* focuses on its impacts: an *Invention* will be considered with regards to the benefits it can bring. In *Economic Innovation, Function* precedes its *Forms*.

There are two noteworthy consequences to this definition. First, *Innovation* can be managed, based on its results. Second, the key metric for *Innovation* success is its adoption in existing systems. This allows to design economic systems that facilitate the diffusion of Innovation within the economic field: entrepreneurs, startups, organizational innovation, funds, etc.

Economic Innovation conceives *Design* in a result-driven and management-oriented perspective. Its role is to ensure a priori the conditions for *Diffusion*. This leads to forms of *Design* that focus on *Uses* and *Users* to drive *Diffusion*, like in *Design Thinking* approaches.

This definition is the one that supports our first use-case: the *A.Samble Innovation sprints*.

3.1.2. Technical Innovation, a formal and evolutionary approach

A definition for *Technical Innovation* is proposed by Bernard Stiegler, that relies on his study of the history of *Technics:*

Innovation is what achieves a transformation of the technical system, while drawing consequences for other systems[20].

In this conception, the technical transformation precedes its adoption by the social body. André Leroi-Gouran states that, technic pressure is spontaneously generated. New forms are then absorbed, or not, by the social body. It is through this adoption that new *Uses* emerge corresponding to the new *Forms*[21]. It is through its *Diffusion* in society that *Inventions* adopt their *Uses*. There is no indication a priori on the potential utility of *Invention*, it is only possible to explain them a posteriori.In *Technical Innovation*, *Forms* pre-exist to *Functions*.

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[19] OECD and Eurostat (2005). *Oslo manual: Guidelines for collecting and interpreting innovation data.* Third edition. OECD.

[20] Stiegler, B. (1994). *La technique et le temps*, vol. 1. Fayard. p.59.

[21] Leroi-Gourhan, A. (1964). *Technique et langage.* In book, Leroi-Gourhan, A. (1964). *Le Geste et la Parole*, vol. 1. Albin Michel, coll. « Sciences d'aujourd'hui ».

Technical Innovation differentiates the act of *Invention (*which isnot constrained by the principle of utility) from the act of *Diffusion (which is*driven by social constraints). This approach, more systemic, does not allow for a proper management of *Innovation,* as innovators have little control on the processes at stake. They can at best propose new forms that will, or will not, diffuse in society. This is however liberating from the perspective of *Creation:* designers' role becomes that of proposing new enabling forms[22], i.e., to *Invent*.

This definition supports our second use-case: the *Creartathon Creation Sprint*.

3.1.3. Conclusion on Innovation

Table 1 summarizes the main characteristics of the two types of Innovation. It presents the characteristics of the frameworks, the associated roles for *Design*. In my use-cases, I successively rely on both of these definitions to describe *Design Sprints*. Which is also presented in Table 1.

	Economic Innovation	**Technical Innovation**
Main characteristics	Innovation is a manageable process that can be monitored through its results	Innovation is an organic process that can be influenced by the proposition of new forms.
Chronology Form/Function	Forms derive from Functions	Forms pre-exist to Functions
Role of Design	Diffusion of the Innovation	Invention of the Innovation
Focus of Design	Uses	Creation
Associated use-case	A.Samble Innovation Sprints	Creatathon

Table 1: The two forms of Innovation

[22] Huyghe, P.D. (2014). *À quoi tient le design.* De l'incidence édition, vol. *Poussées techniques. Conduite de découverte*.

3.2. Design Sprints

Design Sprints are a mode of work that aims to facilitate *Innovation*. During a *Design Sprint*, multi-disciplinary teams address a specific innovation challenge in a constrained time. *Design Sprints*. Design Sprints have been used in diverse fields as they can concretely address complex problems with limited time an resources.

In the industry, the term *Design Sprint* refers to the methodology developed by Jake Knapp when working at Google Venture. His work has been documented and popularized through the book *Sprint: How to solve big problems and test new ideas in just five days*[23]. The work of Jake Knapp is strongly inspired by IDEO deep-dive workshops[24]. It also builds on Agile method, and especially Eric Ries's « lean startup »[25]. The method fostered several success stories such as the creation of google hangout, whose first Minimal Viable Product (MVP) was developed during a sprint held in Stockholm.

3.2.1. The principles of Design Sprints

Based on Knapp's formulation[23], *Design Sprints* are defined by four principles are a mode of work that is characterized by four elements: time constraint, specific challenges, multi-disciplinary teamwork, and rapid prototyping.

Time constraint

A *Design Sprint* is limited in time with a defined start and a hard deadline. Over that period, participants are expected to fully dedicate to the *Design Sprint* activity. This allows for an increased intensity of work and a deep dive into the sprint theme. On the organization side, it is also a convenient way to ensure commitment of people that are present, as there is no competition with other tasks and activities.

Specific Challenges

Because they are limited in time, *Design Sprints* aim to address specific challenges. Challenges are usually presented in the *Design Sprint* brief that define the scope for work, the expected deliverable, as well as any constraint with regard to production. Briefs should be specific

[23] Knapp, J. and Zeratsky, J. and Kowitz, B. (2016). *Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days.* Simon & Schuster.

[24] Boyton, A. and Fischer, B. (2011). The Idea Hunter: How to *Find* the Best Ideas and Make Them Happen. Jossey-Bass

[25] Ries, E. (2011). *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses.* Currency.

enough to be understood, defined and tackled in a limited amount of time, while maintaining enough liberty for new unpredicted propositions to emerge. It is common for the challenges to be re-defined by the teams to give them a better grasp on the project.

Multi-disciplinary teamwork

Design Sprints rely on the work of multidisciplinary teams or at least multi-competencies teams. Each team should include profiles with a range of competencies large enough to cover all the aspects of the challenge they want to address. Indeed time constraints make it impossible to delegate part of the production, teams should thus be autonomous with regards to the tasks they carry out.

Rapid prototyping

Design Sprints rely on fast prototyping to embody the proposed solutions. This allows to efficiently present the work of multiple teams to external persons and to test solutions with potential users. Prototyping is also a way to ensure that knowledge is not lost after the event prototypes embody solutions and can be conserved.

3.2.2.A widely used mode of work

Design Sprints is a mode of work that has been widely used both in creative fields and in the industry. Two types Sprints are presented in the Thesis: three *Innovations Sprints*, in section 4, and a *Creation Sprint* in section 5.

The two types of *Design Sprints* I will present in the thesis

Design Sprints is an approach that can be applied to diverse problems in the objective to get diverse outcomes. I find useful to distinguish two types of *Design Sprint*: *Innovation Sprints* and *Creation Sprints*.

Innovation Sprints are *Design Sprints* that focus on *Economic Innovation*. They have been widely used in the startup ecosystem to lower the risks of *Innovation* projects. Examples of *Innovation Sprints* are presented in our first use-case, in section 4: the *A.Samble Innovation Sprints*.

Creation Sprints are originated in creative fields such as *Design* and Architecture. It refers to a high-intensity project that aims for creative production in a constrained period of time. An example of *Creation Sprint* is presented in our second use-case, in section 5: the *Creartathon*.

Other types of *Design Sprints* across different application fields

In the digital industry, *Development Sprints* are short periods of production during which developers implement specific features of their product. They are a fundamental part of Agile methods.In game development, *Game Jams* are events during which high numbers of participants meet and work over a weekend to create prototype games from scratch. In school startup weeks, Coding Weeks, Innovation Weeks or and Design Summer Schools use the principles of sprints to embark their students on a shared, intensive pedagogic experience[26].

Aside on Creative Charrettes

The term « Charette » used for sprints in creation, originated at les beaux arts school in Paris, during the 19th century. At that time, students often produced their pieces in studios outside of campus. When evaluations came, the school would send a cart (a *charrette* in French) to collect students pieces, some students even giving the last touches to their art inside the cart. The « charrette » was thus associated with the final rush of creative production and latter to the entire process.

3.2.3. When to do a Design Sprints?

Design Sprints are especially relevant to concretely address complex problems. They allow groups to cooperate in finding solutions, making it efficient in sharing knowledge within a group. It is efficient in term of logistic.

Open challenges without exact solutions

Design Sprints allow for teams to provide specific answer to a challenge. As such *Sprints* are most relevant for challenges that can be addressed in many ways. They are consistent with an heuristic approach and benefit from diverse teams.

Tangible solutions

Design Sprints rely on prototyping approaches. As such, it an efficient way to address problems that ask for tangible production in limited time. A good example is the use of *Design Sprints* in architecture tender competitions.

High diversity of participants:

Design Sprints provide a defined frame for work as well as shared objectives to the participating teams, allowing numerous and diverse teams to work together with no consideration of

[26] Beyer, J., & Pfister, H. (2020). *Design sprints for online and on-campus visualization courses.* In Proc. IEEE VIS Workshop Data Vis Activities Facilitate Learn., Reflecting, Discussing, Designing (pp. 1-4).

management or work organization. Doing so, *Design Sprints* provide the frame for multi-disciplinary teams to work together efficiently.

Need for a shared vision of a problem

Design Sprints are also an efficient way to create common knowledge within teams on a given challenge. Indeed participatory design creates a shared commitment within teams with regards to the considered problem. In this case, the success of the sprint lies less in solutions that are developed than in the work process that led to the solution. This is the principle of *IDEO's* deep dives sessions.

Scalable logistic

Design Sprints are limited in time and space. Organizers provide the set up but do not actively participate in production. As such *Sprints* are scalable, meaning a limited number of organizers can supervise the work of a large amount of people. This makes *Design Sprints* adapted formats for large events.

3.3. A Method: Research through Design

One last framing elements remains to be presented: the methodological framework. *Research through Design* is an approach to Research that was defined by Christopher Frayling, in opposition to *research for Design* and *Research into Design*. It was then applied by designer and researchers, especially in the HCI community. This is the methodological foundation of this Thesis.

3.3.1. Frayling's distinction between Research into, for, and through Design

Research into Art and Design approach considers Arts and Design as the object of its study, from the perspective of another discipline. For example, historians, sociologists, or economists researching into Arts or Design, practice *Research into Arts and Design*. In this case, investigating falls under the field of the Research discipline: what matters is knowledge produced through the prism of the discipline.

In *Research for Art and Design* this context, the investigation is a way for the artists or designers to gather creative material that will serve their practice. The outcome of the process is *Creation*, research only serves this purpose. The finality is the practice.

These two cases, the act of investigating is unambiguously related to a discipline: in the first case to the Research discipline, in the second to the practice of Art and Design. The last type of research is somewhat more ambiguous.

Research through Design is the act of investigating using the tools of *Design* as a mean to increase knowledge. Finality is to produce knowledge, using *Design* practices as a method of investigation. *Research through Design* belongs both to the fields of *Design* and of *Research*, as it aims to produce knowledge using *Design* tools.

Frayling's proposition is innovative as it blurs the distinctions between conceptual academic Research on one side and applied *Arts* and *Design* practices on the other. To a certain extent, it implies that knowledge is an aesthetic object as it can be pursued through *Arts and Design*.

Visualization:

I made Table 2 and Figure 2 to clarify the distinction between the three approaches that Frayling present. Table 2 explicitly defines the distinct elements of the three approaches based on their purposes, objects, discipline and methods. Figure 2 illustrates the distinction through the example of chairs: a historian doing *Research into Design* can study the different chairs in the history of arts, a designer will do *research for Design* to create a chair, when a designer doing *Research through Design* will present the discoveries he made while building a chair.

	Research into Design	***Research for Design***	***Research Through Design***
Purpose	To build knowledge by studying Design	To create by gathering knowledge	To build knowledge by Practicing Design
Object	Design	Creations' objects	Design Projects
Discipline	Research	Design	Design and Research
Methods	Methods of the Research discipline	Practice of Design	Practice of Design and Research reflexive analysis

Table 2: *Research Into, for and Through Design*

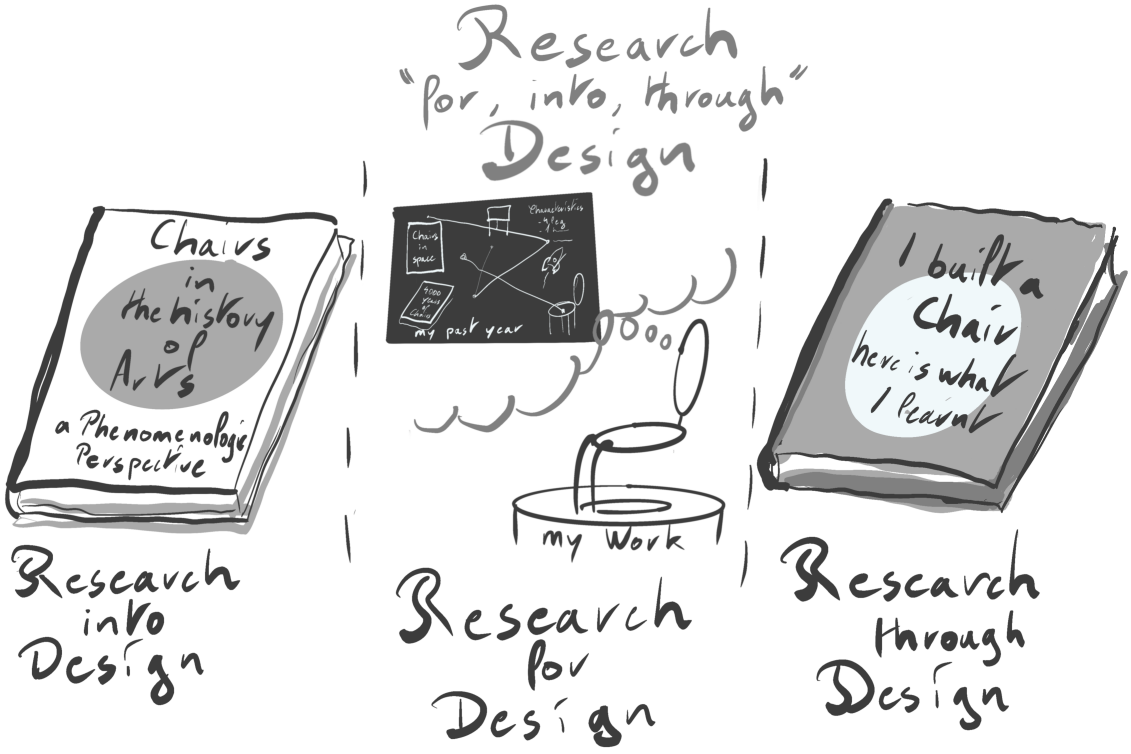

Figure 2: *Research into, for and through Design.*

3.3.2.Applications in the field of Research:

Following Frayling's formulation, *Research through Design* has been reappropriated by researchers in diverse fields. Designers investigated the field, but also the broader HCI community. In particular they proposed different ways to evaluate Research through Design, reflecting on the rigor of the process or on the success of the projects.

As *Research through design* relies on existing practices of *Design*, it is only natural that designers were amongst the first to investigate the field. For example, Dune and Rabi extensively studied design probes across their prolific practices[27] and James Auger worked on the notion of *Speculative Design*[28]. They participated in shaping the discipline.

[27] Dunne, A. and Raby, F. (2013). *Speculative everything: design, fiction, and social dreaming*. The MIT Press.

[28] Auger, J. (2013). *Speculative design: crafting the speculation*. In Digital Creativity (2013). Volume 24, Issue 1 : Design Fiction.

Research through Design has also been widely used within the HCI community. Their approach focuses on investigating through the use of artifact probes, that are designed not for themselves but for their capacity to increase knowledge when used. The study of Interactions between Users and artifacts becomes a way to produce knowledge. This challenges traditional academic Research that was based either on models of validation through experimentation (hard sciences) or on models of creation from field observation (human sciences)[29]. In *Research through Design*, the Researcher does not only observe the universe from outside of it, he acts as an integral part of it.Amongst pioneers in HCI, I cite William (« Bill ») Buxton who bridged artistic practices and product development[30], or John Zimmerman, who proposed a model for *Research through Design* from a HCI research perspective[31].

The question of the evaluation of *Design* is complex[32]. Just as each designer will propose a different solution to a given problem, artifacts cannot be directly compared. In the same fashion, the notion of results replicability cannot be applied when evaluating *Research through Design*. Still, the *Research though design* approach enables the conception of evaluation frameworks. Zimmerman proposes to base evaluation toward reproducibility of the process and rigor of the documentation[33]. Findeli, on the other hand takes another step by identifying the success of the Research to the success of the Design project and its artifact: *if the project works and the artefact produced is acceptable, then knowledge produced through the process is also valid* [34].

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[29] Beaudouin-Lafon, M., Bødker, S., Mackay, W. (2021). *Generative Theories of Interaction*. ACM Transaction on Computer-Human Interaction. Vol 28, Issue 6, pp. 1-54.

[30] Buxton, B. (2007). *Sketching User Experiences: Getting the Design Right and the Right Design*. Morgan Kaufman.

[31] Zimmerman, J., Forlizzi, J., Evenson, S. (2007). *Research through design as a method for interaction design research in HCI.* SIGCHI Conference on Human Factors in Computing Systems, CHI '07.

[32] Venable, J., Pries-Heje, J. and Baskerville, R. (2016). *FEDS: a Framework for Evaluation in Design Science.* Research. Eur J Inf Syst 25, 77–89.

[33] Zimmerman, J., Forlizzi, J., Evenson, S. (2007). *Research through design as a method for interaction design research in HCI.* SIGCHI Conference on Human Factors in Computing Systems, CHI '07.

[34] Godin, D., and Zahedi, M. (2014). *Aspects of Research through Design: A Literature Review.* In Lim, Y., Niedderer, K., Redström, J., Stolterman, E. and Valtonen, A. (eds.). *Design's Big Debates.* DRS International Conference 2014.

3.3.3.Research through Design as the method of this thesis

This work has been defined and implemented as a *Research through Design* project. It reflects on use-cases to dive into the subject of *Design Sprints*. I related the use-cases to the broader questions of their field through notional work and formulated my a *Research Objective* as well as a *Personal objective.* I answer these objective by proposing an approach for *Creation Sprints*: *Precipitated Convergence* as well as a project to go back to practice.

The underlying questions and reflections of the Thesis are initiated from my professional practice. In particular, the thesis relies on two use-cases: the *A.Samble Innovation Sprints* and the *Creartathon Creation Sprint*. These two projects encompass two different approaches for *Sprints*, and for *Innovation*. They pre-existed the conceptual ground that I present in the notional part of the thesis. They serve as two immersion fields that support my analysis. Additionally, they are adaptive experiments I have participated in.

I articulate these project with a notional work that anchors them in a conceptual ground. This work was done through the prism of *Design* and *HCI, which* includes: Literature reviews on the fields of *Design, HCI*, *Innovation* and *Creation,* interviews of experts and professionals in *HCI* and *Design* fields, and weekly meetings with Research supervisors over the course of 4 months.

The combination of use-case projects and notional research revealed unresolved tensions that are the two *Thesis objectives:* one *Personal Objective* related to my practice of *Design*, and a *Research Objective* related to the design of *Sprints*.

This thesis answers its purpose with two main contributions. First, it formalizes a large set of knowledge on the subjects of *Design*, *Innovation* and *Creation*. Second, it proposes a model for *Creation Sprints*, mixing *Arts* and *Technologies*: *Precipitated Convergence.*

These contributions are meant to support better personal and professional practices of *Design.* A last part of the thesis focuses on the construction of an *Application Project*.

Lui :
Je peux te dire un truc ?

Lui :
Vas-y…

Lui :
Tu tournes un peu autours du pot non ?

Lui :
C'est à dire ?

Lui :
Bah tout ça là…

Lui :
Oui ?

Lui :
Ca sert à quoi ?

Lui :
…

Lui :
Je veux dire, tu as une boite non ?

Lui :
Oui.
Et ?

Lui :
Tu fais du design et de l'innovation, non ?

Lui :
Certes.

Lui :
Tu as des clients, non ?

Lui :
J'essaye.

Lui :
Et ils te payent pour quoi ces gens là ?

4. A.Samble Innovation Sprints

Since I funded A.Samble in November 2021, I facilitated several *Innovation Sprints* in both Private companies and schools. In this section, I present three types of *Innovation Sprints* I implemented were *Google-Design-Sprints, Design-Thinking-Sprints, Innovation-by-Design-Sprints,* as well as their contexts of implementation and results. I conclude that they are efficient way to reduce risks in *Economic Innovation.* However they do not produce *Radical Forms* nor *Concepts,* making them un-suited for *Radical Innovation*.

4.1. Google-Design-Sprints

Google-Design-Sprints refers to the Design Sprints defined by Jake Knapp[23]. They aim to rapidly test new ideas of products. They are designed to rapidly create MVPs that can be tested with *Users*. They aim to decrease the uncertainty inherent to innovation process. It is designed to « *derisk* » the market-fit of a potential new product or service. At the end of the sprint, decision makers (VC founds or corporates executives) should be able to decide whether to invest (or not) resources in the project. As such, the teams need to rapidly tackle the stakes of a given challenge. They then prototype a preliminary solution that can be tested in context and pave the way for further implementation. *Google-Design-Sprints* are designed to probe the interest of the market for an existing concept.

Google Design Sprints aim to produce a MVP to a proposed challenge. MVP here is understood as the first version of a product that allows to gather user feedback, with less effort put on development[35]. Most sprint outcomes include presentation decks asserting concrete progress on the characterization of the challenge and a pre-prototyping of expectative solutions.

The main reference for the implementation of this method was Jake Knapp *Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days*[32].

4.1.1. Main principles of a Google-Design-Sprint

Google-Design-Sprints build upon *Sprints* principles presented in section 3.2.1. They are time-constrained, with specific objectives, multi-disciplinary teamwork, and prototyping. In particular Jake Knapp gives the following precisions:

[35] NB: some other works understand MVP as a functional product, market-proofed ; which requires higher invested time in development.

Time constraint

Google-Design-Sprints last specifically 5 days over a working week.

Specific Objective

Google-Design-Sprint aims to test already defined product ideas. The *Sprint* challenge is already defined at the beginning of the Sprint. Teams agree during the first day of the *Sprint* on the metrics of success for their project.

Multi-disciplinary teams

Teams are set to 4-7 participants with different skills. In particular, each team should include the following profiles : a facilitator and a decision maker (key profiles), as well as designers, product managers, engineers and core business representatives (Marketing, Content, Operations, etc.). This composition ensures that teams can both conceive solutions and validate their implementation in the company post-sprint.

Rapid prototyping

Google-Design-Sprints aim to create prototype solutions that can be tested with potential *Users* of the solution. This ensures the existence of a demand for the product or service that is to be developed. *Users* serve as a validation for proposed solution.

Design and User-Centrictity

A fourth characteristic is also added to basic characteristic of *Sprint*, which is *User-Centricity*. *Google-Design-Sprints* rely on *Design* to test product acceptability and appeal for *Users*.

4.1.2. Phases of Google-Design-Sprints[36]

Google-Design-Sprints propose a structured sequence of events. Each *Sprint* consists in 5 phases steps. Each step corresponds to one day of the sprint.

D1 - Understand

[36] Banfield, R. and Lombardo, C. T. and Wax, T. (2015). *Design Sprint: A Practical Guidebook for Building Great Digital Products*. O'Reilly Media, Inc.

Teams learn and discover the ecosystem of their challenge. They discover business opportunities, potential users and their needs, and existing offers. This is the moment teams define the objectives of the sprint, as well as the metrics of success.

D2 - Diverge

Teams creatively explore solutions to the problem, develop them and iterate creatively. In this phase, the feasibility of solutions should not be considered.

D3 - Converge

Teams select the best ideas for solutions based on feasibility. They can further detail up to three solutions through storyboarding.

D4 - Prototype

Teams then develop prototype(s) for the selected solution(s) that can be tested with people. Fast prototyping tools such as figma for digital projects or cardboard models for services are generally used.

D6 - Test

The last day of the sprint allows teams to conduct usability testing with potential users in order to validate the interest for the solution.

Figure 3 present these steps in in the same way that they were introduced during the implementation of the *Google-Design-Sprint* at Epitech.

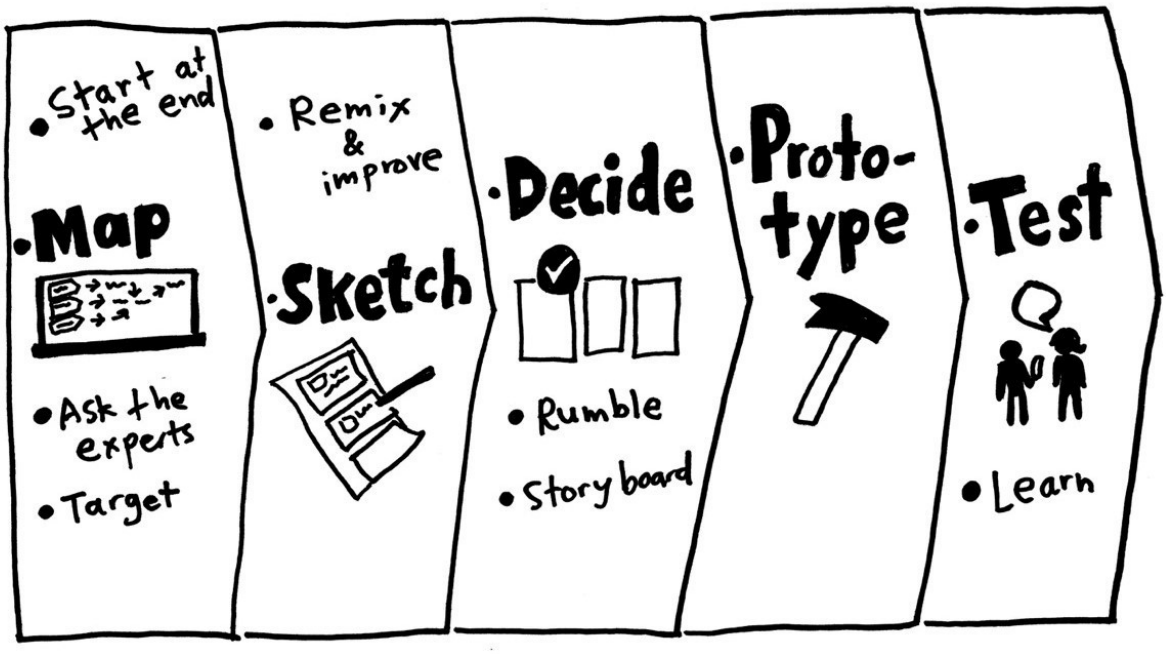

Figure 3: Phase of *Google-Design-Sprints (from Knapp, 2016)*

4.1.3. Implementation of Google-Design-Sprints at Epitech

I implemented *Google-Design-Sprints* in the frame of a mission for the Epitech School[37]. Epitech is a Parisian school specialized in digital technologies and IT development. It offers programs for undergraduate, masters as well as executive education.

One hundred and fifty (150) 3rd year students[38] participated in the sprint.

Participants were coached by 6 designers, including me.

The challenge of the sprint was for the students to define the project they would work on for the next 2 years. The school strongly supported the transformation of these projects into startup projects. Thereby, students had to demonstrate technical interest in the projects within the curriculum of a tech school, as well as in the existence of a market for transition into a business.

Teams had to produce presentation decks that included: a)an overview of the context with user pain-points, and b) a presentation of the solutions they envisioned would answer user needs, including a preliminary prototype.

At the end of the sprint, students pitched their projects to representatives of the school and to members of Paris tech ecosystem. Pitches had to last less than ten minutes and teams presented continuously on a forum stand, while juries moved freely across stands. The jury validated the projects based on these presentations, using a Pass or Fail criteria.

Outcomes:

Selection of challenges

Challenges were defined by the teams based on their expectations for the project. Most projects were technique-driven, with students defining their application field based on the specific technology they wanted to develop.

Conceptual production,

Teams showed a good understanding of the problem they wanted to address, as well as well-defined solutions.

Groups seldom deviated from their initial ideas, however in rare circumstances, several groups disbanded during the sprint. In this sense, concept production during the sprint proved to be quite linear.

Google Design Sprint proved efficient in specifying and creating knowledge on pre-existing solutions, with little divergence from initial ideas.

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[37] Web, https://www.epitech.eu/

[38] NB: equivalent to junior undergraduates.

On the form

All groups produced prototypes using figma with live demonstrations to the jury.

Presentations were all supported with power point.

No scenography or physical embodiment were witnessed. This is obviously related both to the nature of the school and to the profiles of the students, however this fact still emphasizes that physical incarnation is not inherently part of the *Google Sprint* methodology.

Google Design Sprint is not an inherently form-oriented method.

4.2. *Design-Thinking-Sprints*

Design-Thinking-Sprints are a direct application of IDEO double diamond steps in the frame of a *Design Sprint*[39]. These sprints were developed by Latitudes[40], a French startup, that have implemented these sprints for five years now and with whom I worked in the frame of *A.Samble*.

Design Thinking has two objectives: *to* m*ake the right thing* and *Make things right.* The first diamond defines the right Challenge for the *Sprint* based on implicit and explicit needs of *Users* that are gathered during a field immersion. The second diamond focuses on prototyping solutions answering *Users* needs.

Design Thinking Sprints produce two outputs: a *User-Centered* formulation of the challenge based on field immersion and a prototyped solution to the challenge.

The main reference for the definition of this method was the *Design Thinking Playbook*[41].

4.2.1. *The main principles of Design Thinking sprints :*

Design Thinking Sprints are based on *Sprint* principles. In this sense, time constraints, multi-disciplinary teams, prototyping and testing also apply to a Design thinking sprint.

Time-Constraints

Time constraints are not specific to *Design Thinking* but to the form of a *Sprint*. Thereby unfolding agenda in *Design Thinking Sprints* may vary according to needs.

Specific Challenge

In *Design Thinking Sprints,* Challenge is redefined during the Sprint based on field insights. As such, the challenge can, to a certain extent, be large or ill-defined, as it will be refined. Importantly, there should be no pre-conception on the exact nature of the solutions, as they are challenge-dependent. I propose the duration of 5 days as a basis that can be adjusted if need be.

Multi-disciplinary teams

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[39] Brown, T. (2019). *L'Esprit Design* (original : *Change by Design*). Pearson France.

[40] Latitudes Tech for Good Website. https://www.latitudes.cc/

[41] Lerwick M. and Link P. and Leifer L. (2018). *The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystem.* Wiley.

Design Thinking does not specify mandatory profiles to be included in a team. However, knowledge of the process is needed, as well as the capacity to work together efficiently. Ideo defines the T-Shaped individuals - persons with both great technical and inter-personal skills, - as perfect participants for their approach.

Rapid Prototyping

Prototyping tools in *Design Thinking Sprints* are similar tools to the ones of *Google Design Sprints*. However, stronger emphasis is put on *User* experience during prototyping, using lessons learnt from the immersion phase.

User-Centricity

The most notable contribution of *Design-Thinking-Sprints* is that the Sprint begins with the *User* through the immersion phase. As such, definition of the challenge to be addressed is *User*-driven. *Design-Thinking* thus focuses more on understanding the problem context and identifying early adopters[42].

Design and User-Centricity

Design Thinking Sprints rely on *Design* to understand *Users* needs and ensure *User-Centricity* while prototyping.

4.2.2. Phases of Design-Thinking-Sprints

Design-Thinking-Sprints follow the sequence :

D1 - Empathy

Design-Thinking-Sprint begins with an immersion in the Challenge field. They identify potential *Users* for field visits or interviews. The objective is to empathize with *Users* to understand their problems and needs. Teams can also use literature and internet reviews, social networks, on-site visits, or poles to gather information supporting User empathy.

D2 - Definition of the Challenge

Based on immersion insights, teams define their specific *User* using personas as well as the challenge they want to address. Challenges at this stage should be specific enough to be addressed during the sprint and answer to a *User* need identified during the immersion.

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42 Araújo, C. et al (2019). *Design Thinking Versus Design Sprint: A Comparative Study*. In book: *Design, User Experience, and Usability. Design Philosophy and Theory* (pp.291-306)

D3 - Ideation

Then, teams creatively ideate on the solution, first without constraints on feasibility. Once the number of propositions is satisfying, then teams can select the best solutions based on the objectives of the sprint. At this stage teams use tools like brainstorming or user journey to represent their propositions.

D4 and 5 - Prototyping and Test

Finally, teams prototype their solutions and test them with potential users. The form of the solutions as well as the displays are dependent on the selected challenge and solution. Prototypes can take different forms, such as: user journey, carton board model, lego scenography, etc.

Figure 4 presents the Double Diamond model that was presented to the student at the Digital campus.

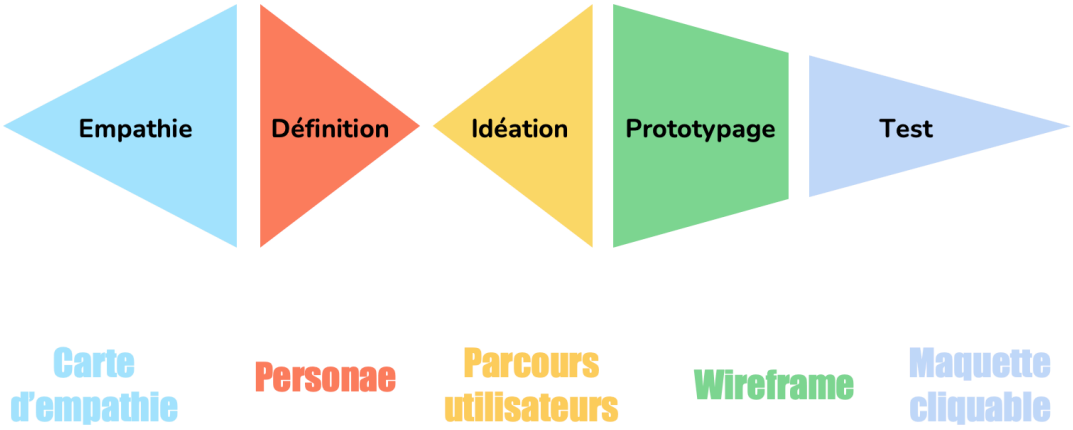

Figure 4: Double Diamond in a Sprint, adapted from Ideo's[39], property of Latitudes

4.2.3. Implementation of Design Thinking Sprints at the ENIB and Digital Campus

Design Thinking Sprints were implemented in the frame of a mission for the Ecole Nationale des ingénieurs de Brest (ENIB)[43] and in a second *Sprint* at the Digital Campus[44]. The ENIB is a generalist engineering school based in Brest. The program lasts 5 years. Digital campus is a private school specialized in digital profession, including development *User*-experience (UX) and User-interfaces (UI).

Thirty (30) students in their 4th year[45] participated in the ENIB *Design Thinking Sprint*.

Sixty (60) students in their 4th year[46] participated in the Digital Campus *Design Thinking Sprint*.

Teams followed the *Design-Thinking-Sprint*, with the sprints lasting 7 days instead of 5. They were composed of 5 to 7 students. I was the sole facilitator for the ENIB *Sprint.* For the Digital campus *Sprint,* we were three designers.

Students worked for Social and Solidarity Economy (SSE) start-ups on the design of a new digital product. For example, some teams worked on the following challenges: an Enterprise Resource Planning (ERP) for volunteering NGO, a market place for a social thrift store, or a chat bot for a Corporate Social Responsibility (CSR) NGO.

At the end of the sprint, students pitched their projects to the entrepreneurs. Each team had 30 minutes to present an elevator pitch, a methodology review and the prototype presentation. Presentations were followed by a Q&A session. They had to demonstrate the existence of user need for the product, highlighting key factors of appeal, and present a prototype for their solution.

Outcomes:

Selection of challenges

Challenges were provided by projects holders. However, several groups challenged the first ideas of their clients based on the outcomes of their immersions. For example, one client expected his group to develop a chatbot to divide work in his team. Interviews with interns from his company revealed that a project management tool better satisfied his expectations. These changes however did not radically re-orient the projects.

Conceptual production,

[43] Web, https://www.enib.fr/fr/

[44] Web, https://www.digital-campus.paris/

[45] NB: equivalent senior undergraduate

[46] NB: equivalent senior undergraduate

Teams produced well-structured and comprehensive presentations, following *Design-Thinking-Sprint* structure. The methodology steps ensured to answer the main interrogations a non-expert would have (Who is the user? What is his environment? What are his needs and problems? How do you answer to these needs? With what product?) while creating a coherent narrative for the presentations. *Design-Thinking-Sprints* allowed teams to explore a given field while ensuring coherence of knowledge. They also allowed to re-orient projects through re-formulation of the challenge.

On the form,

Students focused on the use of figma prototypes and powerpoint presentations. In most cases, productions relied on formal material gathered during immersion: visual identities of the client, eco-system best practices, etc. This is probably due to the exposition to references during the immersion phase. As a result, 2 groups in each sprint (4 in total) were hired by their project holders for further work, despite no previous experience as freelance workers. *Design-Thinking-Sprints* do not necessarily propose new forms, however they ensure consistency with regards to existing ones.

4.3. *Innovation-by-Design-Sprints*

Based on learning from the previous *Innovation Sprints*, I designed the *Innovation-by-Design-Sprints* This last form of sprint combines the general framing of *Design-Thinking-Sprints* with lessons learnt from formal and conceptual elements from the ENSCi's *Innovation by Design* Master. The idea is to blend structured *User*-driven approaches with an emphasis on formal experimentation. *Innovation-by-Design-Sprints* is parent to methods found in service design literature[47], where sensibility of the approach is a key towards buyin of the solutions. This method can also apply to product development from a uses perspective.

Innovation-by-Design-Sprints aim to formulate field-informed challenges and design solutions answering these challenge.

A more specific emphasis is put on formal implications of a *Design* process, meaning more time is spent on the form than in *Design Thinking Sprints*. The outcome of such a sprint cannot be pure knowledge: it has to be somewhat embodied.

Innovation-by-Design-Sprints provide two outputs: a challenge based on field exploration that will encompass the needs of real users, and a prototyped solution that will address these needs.

The main source document that was used for this methodology was Possible Future Playbook[48].

4.3.1. *The main principles of Innovation-by-Design-Sprints :*

Most principles of *Innovation-by-Design-Sprints* are shared with *Design-Thinking-Sprints*. As such, time constraints, multi-disciplinary teams, prototyping and testing apply to *Innovation by Design Sprints.*

Time-Constraints

Again, time constraints are Sprint dependent but one week is a good duration.

Specific Challenge

Challenges can concern a product or a service based on the context. Teams will reformulate them based on the conclusions of the immersion phase.

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[47] Penin, L. (2018). *An Introduction to Service Design Designing the Invisible*. Bloomsbury.

[48] Possible Future-French Bureau. *Playbook*. On Website, https://www.possible-future.com/wp-content/uploads/2020/08/playbook-possible-future-2020.pdf

Multi-disciplinary teams

Teams should be diverse and include designers, allowing them both to use *Design* Probes and to work on the formalization of prototypes.

Rapid Prototyping

Innovation-by-Design-Sprints put a focus on formal considerations across the process. As such, prototyping in *Innovation by Design Sprints* is more demanding with regard to forms than *Design-Thinking-Sprints*.

Design and *User*-Centricity

Innovation-by-Design-Sprints rely on immersion supported by *Design* probes (or design tools). In this sense, the immersion process can be compared to a *Research through Design* Process.

In *Innovation-by-Design-Sprints, Design* is understood as a user-centered practice that needs to be supported by designers.

4.3.2. Phases of Innovation-by-Design-Sprints :

Innovation-by-Design-Sprints rely on the main 3 distinct Phases: Explore, Invent, Prototype.

D1-D2: Explore

Teams investigate the field of their project to collect informations on both Users and practical conditions. To do so they rely on interviews, online source bibliography but most importantly on field visits. They can use *Design* probes designed for the occasion. The objective is both to collect and to embody the insights of their projects. Based on their exploration, teams re-formulate the challenge of their project, ensuring the right issues are tackled as well as proper appropriation.

D3: Invent

Based on their Challenge, teams creatively brainstorm on the best solution. This is often done in the form of collaborative creativity sessions relying on sketches. At the end of this phase, teams usually support their propositions with User-journeys.

D4-D5: Prototype

Teams design and prototype solutions using creative material. A design prototype can take many forms but should embody the proposition in a way that makes it visible to somebody who was not part of the project. It can be a video, a roleplay, an object etc.

Figure 5 presents the Phases of an innovation by Design project de fined in the Possible Future Playbook. It was turned into a Sprint format by constraining the timing of the Project and implemented at the EFAP.

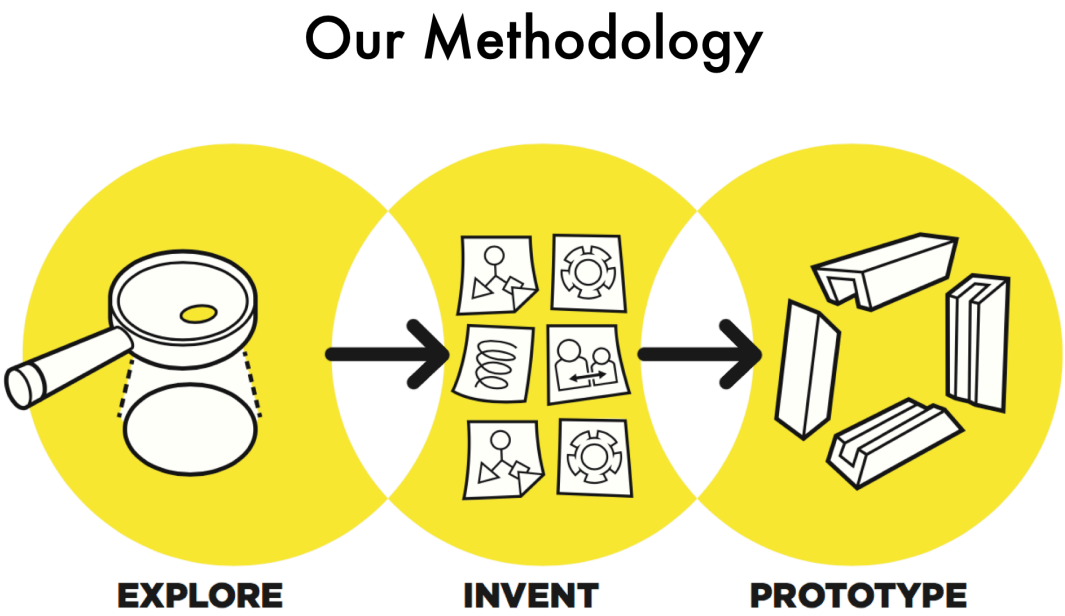

Figure 5: Innovation by Design Project Phases, property of Possible Future.

4.3.3. Implementation of Innovation-by-Design-Sprints at the EFAP

Innovation-by-Design-Sprints were implemented in the frame of a mission for the Ecole Française des Attachés de Presse (EFAP)[49]. The EFAP is a communication school based in Paris. The program lasts 5 years.

One hundred and twenty (120) students in their 4th year (equivalent senior undergraduate) participated in the sprint.

Teams followed the *Innovation-by-Design-Sprint* method, with a sprint of 8 days rather than 5. Students worked on projects of their choice, in teams of 4.

Two designers, including myself, facilitated the Sprint, supported by the school administration. The sprint lasted 8 days, with 1h30 of intervention in groups of 20 per day, the rest being autonomous teamwork.

Ten (10) Challenges were proposed to the participants. Participants could choose one of them or define their own challenge. Challenges ranged from service design to product design. For

[49] EFAP, l'école des nouveaux métiers de la communication. Website: https://www.efap.com/

example, the following projects were proposed: How to address fake news? How to design the best outdoor live event?How to increase the use of non-medicated care for long disease treatment? etc.

At the end of the sprint, students presented their work in front of their companions and the two designers, 20 minutes per group. They had to demonstrate the existence of user need for the product, highlighting key factors of appeal, and present a prototype for their solution.

During the sprint, designer tools were provided for the students to use (especially in immersion and brainstorming phases). Focus was put on the formalization of results. In particular, it was explicitly specified to students that the nature of the prototypes was left to their discretion, with examples including the figma prototype, cardboard models, videos, podcasts, etc. Each team had 30 minutes to present an elevator pitch, a methodology review and the prototype presentation, followed by a Q&A session.

Outcomes:

Selection of challenges

During the *Innovation by Design Sprint* at the EFAP, 10 already defined challenges were proposed to the students. Two subjects were directly related to the curriculum of the school : one about live events, the other about media communication. An 11th challenge allowed students to define their own challenge. Amongst the 41 groups of students, 38 chose a pre-defined subject. 25 groups chose amongst the two subjects that were directly related to the curriculum of the school. Only 3 groups chose to define their project themselves. This convergence toward well-known and more secure themes is noteworthy in a class about *Innovation*. Teams tended to limit the risks in the selection of their challenges.

Conceptual production

Groups consistently produced coherent presentations. In the Innovation by Design Sprints, students tended to make more social and event-oriented propositions. Organization of further Sprints are needed to differentiate whether this is related to the profiles of students or the nature of the *Sprint*. Another interesting fact is that communication students easily stated their first concepts and interviewed potential users, however they had more difficulties to challenge their first ideas and to develop them, while engineers and IT students struggled in the early phase of their projects. This gives a good hint of why it is interesting to mix disciplines in an innovation project that encompass all stages of a project in a constrained time-frame. *Innovation by Design Thinking Sprints* allow to explore a given field while ensuring coherence of knowledge. It did so using creative design tools.

On the form

A higher variability in the nature of the prototypes was observed, some students created videos, other games or models, supporting the creation of more defined identities for each project. However, no prototype was self-standing, they had to be explained and considered in the frame of a project presentation. *Innovation by Design Thinking Sprints* invite to a larger range of forms than the other forms of sprints, that serve the purpose of presenting the project. It does not however create self-supporting forms.

It is important to acknowledge at this point that for organization reasons, I could not include designers in teams, which may explain the limited capacity of groups to fully implement their ideas.

4.4. *Insights on the A.Samble use case*

Google-Design-Sprint, *Design-Thinking-Sprints* and *Innovation-by-Design-Sprints* differ in several ways; summarized in Table 3

	Google-Design-Sprint	Design-Thinking-Sprint	Innovation-by-Design-Sprint
Conception of Design	Test with Users to ensure acceptability and appeal	User-centered process	User-centered practice of the Designers
Composition of teams	Company executives, facilitators, developers, thematic experts.	T-shaped experts.	Designers and thematic experts.
Production	Prototype that has been tested with users.	User-centered challenge. User-Centered Prototype solutions.	Field exploration, User journey for solution concept, Tangible artifact
Phases	Five convergence steps	Double Diamond	Immersion, Challenge formulation, Prototpying

Table 3: *Innovation Sprints*

4.4.1. *Shared strengths of the Presented Innovation Sprints …*

The three types of sprints that were implemented share several important advantages.

All three methods include *Users* in the process, either ensuring acceptability of an existing project or driving the conception based on user observations. Indeed *Innovation Sprints* are designed to ensure that teams understand and meet users needs. As such, choices are made in accordance to observed or perceived needs, resulting in acceptable results. Formalized methodology also make the results more acceptable by providing a certain legitimacy to the results. In doing so, teams avoid potential critics on partiality and ensure a high acceptability of their work.

The three methods ensure consistency of results, as they rely on explicit phases defined by the methodologies, be it the 5 steps of *Google Design Sprints* or the *Design Thinking* double diamond. So, teams follow similar progression, ensuring they address all relevant questions and cover the entirety of their theme. They will not get the same results from these phases, however they address the same range of questions in a structured process, resulting in consistent results.

In addition, these methodological approaches ensure coherency in results. Structured methods not only ensure that all teams address the questions of a subject, they ensure that they do so in the same order. In that sense, narratives provided by teams do not derive from the outcomes of their work but from the structure of the method that was followed, resulting in coherent results.

Segmentation in consecutive phases allows to monitor key objectives across the sprint. Each step should answer specific interrogation and result in pre-determined deliverables. This allows to monitor the progress of each team, to ensure they do not face blockage situation, and to help them rapidly when they do. It also allows to communicate advancements, each end of phase being a milestone. This allows third parties to follow the process, be it administration or funders. As such, methodology segmentation in phases means that the process can be supervised and managed.

The three *Innovation Sprints* methods reduce uncertainty inherent to innovation problems. They ensure that an *Innovation* can *Diffuse* by including *Users* in the process. They provide a manageable process through systematic and structured approaches. As such, *Innovation Sprints* provide a rational process to an uncertain situation. They are efficient ways to address *Economic Innovation*: which explain why they are widely used in startups or in corporations.

4.4.2. Shared Limits of the presented Innovation Sprint

If they are good for risk-reduction, Innovation Sprints are not meant to propose *Radical Concepts* or *Forms*. Indeed they seek to reduce risks inherent to innovation, avoiding at the same time

Innovation Sprints are great to reduce risks and uncertainty. However this also means that they tend to avoid or reformulate highly uncertain challenges. For example, students in the *A.Samble Sprints* focused on challenges close to their domain of knowledge, challenges they knew they could tackle. They also focused on challenges with already identified *Users* to ensure the method could be applied. As a result, potentially interesting projects were never considered nor addressed. For example, the subject: *How to build trust in Science?* was not selected once in the EFAP *Sprint,* because students considered it as too « c*asse-gueule » (SIC)* to address.

The context of evaluation obviously did not encourage students to take risks in their projects. Still, this is even truer for real industry projects.

A collateral effect of the step by step methodologies was also to reduce the diversity and intensity of retained solutions concepts. At each step, teams kept solutions considered as acceptable for users. As the methods focused on risk-reduction approach, extreme solutions were screened out through the process for the benefit of more conventional and consensual ideas. In doing so, teams ended up with more acceptable but plainer concepts for solutions.

An example of that was a team that worked on How to address Fake News ? They were the only team who proposed an original experiment for their immersion: they spread false rumors in a middle school and studied the process of spreading. While it may have been ethically questionable, it was highly innovative. They however proposed the same *Verified* thumbnail as all the other groups who chose the subject. When asked why they did not build on their immersion, they answered that they thought they « *went wrong* » as the others had very different propositions.

Finally, the productions in the frame of these sprints lacked formal consideration, even if *Innovation-by-Design-Sprints* offered a higher variety of mediums than the other two methods. Indeed, teams followed the same process, with the same phases, answering the same questions in the same sequence, resulting in similarities both in structures and in the way to transmit the information. Moreover, prototypes, as they only supported an argument were considered as second to the speech. There is a rationalization of the *Form* to serve a purpose that results in its flattening. This led to high similarity in the *Forms* that were proposed.

4.4.3. Lacking Radicalness

We see that *Innovation Sprints* despite some differences share similar strengths and weaknesses. Overall, they are efficient ways to manage *Economic Innovation* processes. However, they avoid *conceptual* or *formal Radicalness,* for two reasons: projects had no artistic dimensioning and a process of Risk-reduction Convergence was applied.

The projects lacked Artistic dimension. A characteristic of Art is to question status quo and systems[50]. In this sense, its purpose is t status quo and systems, it is one of its characteristics: it avoids banal *Concepts*. At the same time, Art strives for new forms, refusing *déjà-vu.* In this sense, bringing an artistic dimension in a project allows to trump expectations and to bring Radicalness in *Concepts* and *Forms*. This artistic dimension can be brought by the presence of artists or designers in the teams, as in *Innovation-by-Design-Sprints* or by explicitly considering art as the object of the *Sprint* as shown in next part.

The methods suffer from their *Risk-Reduction Convergence*. Bill Buxton presents this tension in creative process in the following way:

> *In design, there is a trade-off between weak general and strong specific systems. Tools, like people, seem to be either a jack-of-all-trades, or specialized.*[51]

[50] Art Thinking workshops. https://www.artthinkingcollective.org/workshop

[51] Buxton, W. (2001). *Less is More (More or Less)*, in P. Denning (Ed.), *The Invisible Future: The seamless integration of technology in everyday life.* New York: McGraw Hill, 145 - 179.

The reason *Innovation Sprints* tend to similar *Concepts* and *Forms* is because they are mainly driven by the constraint of reducing Innovation risks. They follow a Process of *Risk-Reduction Convergence*. Figure 3 presents a visualization the process at stakes. Starting with a range of Possibilities, *Risk-Reduction Convergence.* Doing so, the process avoid potential bad ideas or dangers ensuring the method to reach acceptable zones. However it also contracts the range of what is done, limiting the chance to attain *Radical Forms* or *Concepts*.

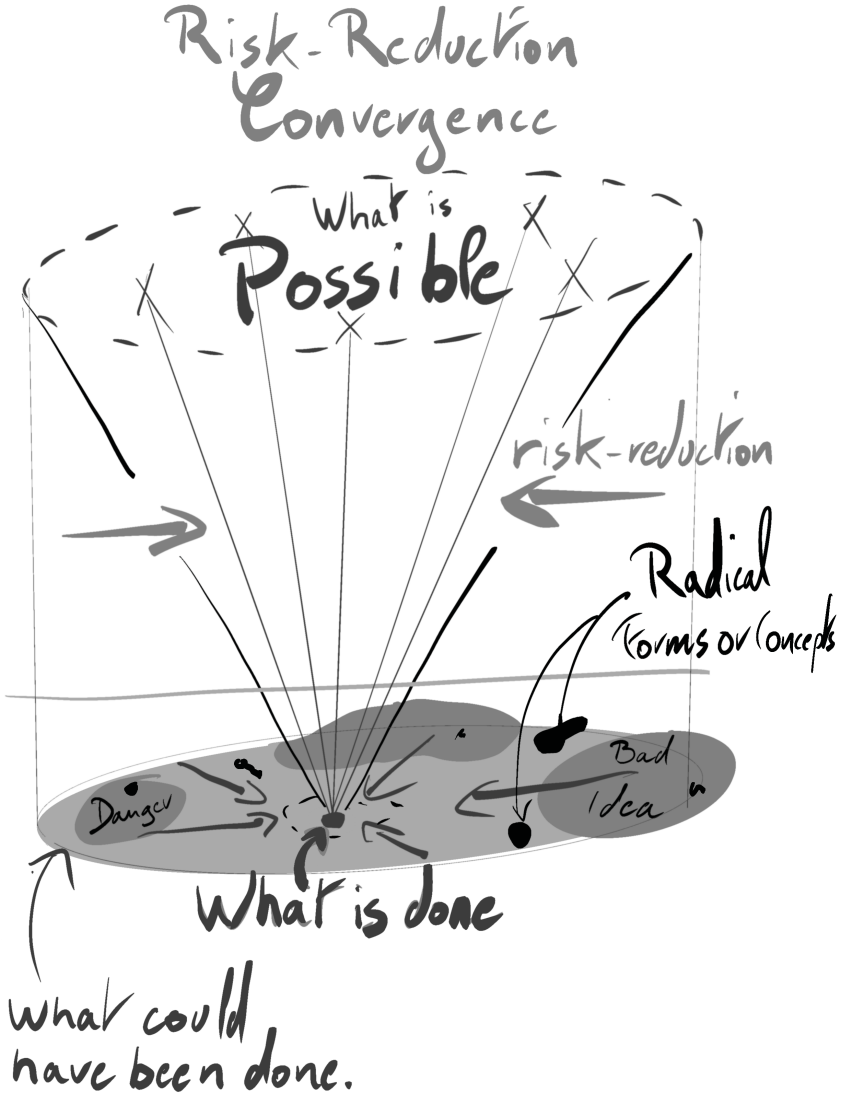

Figure 6: *Risk-Reduction Convergence*

So, we can ask ourselves: is it possible to produce *Radical Form* and *Concepts* during a *Design Sprint* ?

Lui :
Et tu me dis que tu es pas content de tes sprints ?

Lui :
Attends, ce sont d'excellentes méthodes d'entrepreneuriat…
C'est juste que la méthode qu'on suit et les questions qu'on se pose sont toujours un peu les mêmes :
Quel utilisateur je cible ? Quels sont ses pain-points ? Comment j'y réponds ?
Sketch ou Figma ?
…
A la fin, les présentations finissent par toutes se ressembler. D'un point de vue créatif ça manque d'intensité.

Lui :
…
Et tu parles des sprints que tu vends là ?
T'es pas très bon commercial, non ?

Lui :
Pas terrible…

Lui :
Et du coup ton Creartathon cet été, c'était différent ?

Lui :
Oui quand même.

5. Joining Arts and Technologies to facilitate Radical Innovations

Innovation Sprints because of their construction are not designed to produce *Radical Innovation*. However User-Center can address this challenge through the study of *Extreme-User* like artists. The Ex-Situ laboratory is specialized in these approaches. I participated with them to the Creartathon, a *Creation Sprint* mixing *Arts* and *Technologies*. I present the organization of this event, and its results. I show that it relies on implicit and explicit constraints to drive creativity, how the exhibition of the pieces participates to their artistic status. I conclude showing how Art supports a pedagogic practice.

5.1. Radical Innovation through Extreme-Uses

I show in the previous section that *Innovation Sprints* based on *Economic Innovation* proved efficient tools for risk reduction and innovation management but somewhat lack diversity and *Radicalness* both in *Concepts* and *Forms*. In the following, I present the concept of *Radical Innovation* and its relationship with *Arts* and *Technics*.

5.1.1. Radical Innovation

The most common way to define *Radical Innovation* is by opposing it to *Incremental Innovation*. Where *Incremental Innovation* improve existing frames of solution, *Radical Innovation* is the conception of new frames[52]. As such, a Radical Innovation is dissimilar from both past and current inventions: it is both novel and unique[53].

Radicalness can concern different aspects of an *Innovation*. Henderson et al. propose that an *Innovation* is *Radical* if both the architecture of the system and its components are new[54]. Norman proposes that « *Technology Epiphanies »* are attained when bringing novelty both in

[52] Norman, D. and Verganti, R. (2014). *Incremental and Radical Innovation: Design Research vs. Technology and Meaning Change.* DesignIssues: Volume 30, Number 1.

[53] Dahlin, K.B. and Behrens, D.M. (2005). *When Is an Invention Really Radical? Defining and Measuring Technological Radicalness.* Research Policy 34: 717–37.

[54] 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 (22 pages). Sage Publications, Inc.

technology and meaning of the system[55]. The common point between these definitions is that a *Radical Innovation* is novel both at the scale of the system and from the perspective of its environment, within and without the system. I will thus use the following definition for radicalness:

A system is Radically Innovative if it is new in both terms of Forms and of Concepts.

Radical Innovation has been a fruitful concept for both Academia and Industry. Indeed, *Radical Innovation* focuses on new *Concepts* and applications. In doing so, it pushes the boundaries of knowledge, which is the object of Research. Consequently, the notion has had a sustainable appeal in scientist communities. On the other hand, *Radical Innovation* is known to both destroy existing competences by making them obsolete and to create new markets in which economic development is possible[56]. In this sense, *Radical Innovation* stands at the pinnacle of « *Creative destruction* »[57]. *Radical Innovation* can focus more strongly either on *Forms* or *Concepts*.

Amongst the approaches focusing on *Forms* are technology-pushed approaches that focus on developing new technologies that will later be applied to concrete problems. This is the way deep-tech ecosystems and scientific research create *Radical Innovation*. The TRIZ method by Altshuller and Shapiro focuses on producing new designs reassembling layouts of existing systems. This architectural approach allows to create radically new systems based on existing ones[58]. Similarly, the C-K theory and C-K-P method developed at Mines-Paritech are designed to produce *Radical Innovation* by breaking given features of existing systems, with focus either on use or on design[59].

Concepts-centered approaches will mostly focus on identifying specific needs that are currently unanswered. This is a challenging objective as it implies defining a *Use* for which there is no current associated *Form*. This is a reason why *User*-centered literature have long focused on *Incremental Innovation* enabled by *Design*, as it is easier to describe *Forms* of existing systems[60]. As previously stated, in these approaches *Design* is not responsible for *Invention* but only for *Diffusion* of the *Innovation*.

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[55] Norman, D. and Verganti, R. (2014). *Incremental and Radical Innovation: Design Research vs. Technology and Meaning Change.* DesignIssues: Volume 30, Number 1.

[56] Tushman, M. L. and Anderson, A. D. (1986). *Technological Discontinuities and Organizational Environments*. *Administrative Science Quarterly*, 31: pp. 439-465.

[57] Schumpeter, J. A. (1939): *Business Cycles*. Cambridge University Press.

[58] Altshuller, G.S. and Shapiro, R.B. (1956). *The psychology of inventive creativity.* Voprosy psikhologii [Issues of Psychology], No. 6, 1956. pp. 37-49

[59] Hatchuel, A. and Weil, B. (2009). *C-K design theory: an advanced formulation.* Res Eng Design, 19:181–192

[60] Verganti, R. (2011). *Radical Design and Technology Epiphanies: A New Focus for Research on Design Management.* Product Development & Management Association, Prod Innov Manag, 28, 384-388.

However, the concept of *Radical Design* exists and proved fruitful in both concepts and applications[61]. Specifically, an original proposition by the HCI and *Design* fields will be to study *Extreme Situations* and *Extreme Users*. This field relies on 'user' whose expectation in terms of services or product strongly differentiate from general population: « *people whose daily work both inspires and stress-tests the environment »*[62]. Such users can be scientists, disabled populations or, in the case I will study, artists. They are the perfect object of study for *Uses-Centered Radical Design*.

5.1.2. Art and Innovation

From the work of Schumpeter on Artists as Entrepreneurs, *Arts* and *Innovation* have a long standing common history. The following presents some examples blurring the distinctions between the two fields .

Today, the concept of *Art* refers to creative activities, unique and beauty-oriented. Techniques, on the other hand, encompass repeatable and predictable processes of production. The distinction, however has not always been so clear. In the Antiquity, Ars in Latin and techne in Greek designated the same concept of creative activity, covering arts and craft. The words later evolved into two distinct concepts. However, these distinctions are always challenged by the existence of creative industries as well as by artists using technical mediums. These interfaces are obviously a fertile ground to interrogate existing systems and foster *Innovation*.

Artists have highly specific needs when using technologies in their practices, and are prone to twist it in unforeseen ways. As such, they are *Extreme-Users* who can challenge existing *Uses* and *Forms*. As such, working to bridge *Art* and scientific Research has been an angular stone for HCI development.

There are numerous examples in academia, from the world famous MIT Media Lab[63] to the Parisian IRCAM[64]. Private corporations also supported this rapprochement. Bill Buxton initiated in music composition before leading HCI Research at Microsoft[65]. Initiatives such as

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[61] Verganti, R. (2011). *Radical Design and Technology Epiphanies: A New Focus for Research on Design Management.* Product Development & Management Association, Prod Innov Manag, 28, 384-388.

[62] Beaudouin-Lafon, M., Chapuis, O., Eagan, J., Gjerlufsen, T., and Huot, S. et al. (2012). *Multisurface Interaction in the WILD Room*. Computer, Special Issue on Interaction Beyond the Keyboard, 45 (4), pp.48-56.

[63] MIT Media Lab website. https://www.media.mit.edu/

[64] IRCAM, Centre Pompidou. https://www.ircam.fr/

[65] Bill Buxton personal website. https://www.billbuxton.com/

Bell telephone laboratories' Experiment in Art and Technologies (EAT)[66] or Xerox's PARC Artist in Residency[67] are also worth noting.

These experiences mostly focus on the *Technic Innovation* and the associated *Invention* role of Design.

Another approach to link art and innovation is proposed by the Sylvain Bureau and the *Art-Thinking* collective[68]. To them, Art intrinsically seeks to produce new referential for Beauty, Power or Truth. Art allows to challenge systems constraints, in a way that is impregnated with the Identity of the creator. In doing so, it allows to be Radical without risk. Claiming art thinking as « *an agile methodology allowing to consistently produce improbable outcomes* »[69], they project the intersection of Art and Innovation toward the management sphere to question the systems of production.

In doing so, *Art Thinking* resolutely relies on an *Economic* conception of *Innovation* and the associated role of *Diffusion*.

5.1.3. The Ex-Situ laboratory: Extreme uses and extreme design

My first encounter with the Ex-Situ laboratory occurred in the frame of the *Creartathon*, held during July 2022, which provides a second use-case for this thesis and is presented later in the document. In this section, I present the model of Research implemented by the Ex-Situ. All the following can be referenced from their web-site[70].

The Ex-Situ laboratory is a public Research laboratory of the INRIA, located on the Saclay Plateau. The Ex-Situ specializes in Human Computer Interaction. The applications of their work include: fundamentals of interaction, human-computer partnership, collaboration and creativity. They cover thematic fields ranging from computer sciences to social sciences, engineering and design.

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[66] The Getty, Los Angeles, Getty Research Institute (1996). *« Inventory of the Experiments in Art and Technology Records, 1966-1993 ».* In website: http://www.oac.cdlib.org/findaid/ark:/13030/tf4j49n6rt/

[67] Harris, C. (1999). *Art and innovation: the Xerox PARC Artist-in-Residence program.* Mit Press.

[68] Art-Thinking: an agile method to create the improbable with certainty. In Website, https://www.artthinkingcollective.org/

[69] Bureau, S. (2022). Méthodes Agiles: Pourquoi et comments en finir avec l'hyper-focalisation sur les clients ? ESCP Business School, Executive Education.

[70] Ex-Situ Laboratory. On Website, https://ex-situ.lri.fr/

The Ex-Situ specifically address *Extreme-Situated Interaction*, which gives the name to the laboratory. *Extreme-Situated Interaction* occurs through one or several of the following criteria : *Extreme Users*, *Extreme Situations*, *Extreme Design*. This focus on Extreme Situated Interaction is an elegant way to ensure *Radicalness* in their *Innovations*, as it provides both new *Uses* and new *Forms*.

Extreme Users are users who *« make extreme demand on current technology »*. They are often artists or creatives. By their nature, they have specific expectations in terms of *Uses*. Focusing on such categories of *Users* thereby allows to identify new *Uses*.

In a same fashion, the focus on *Extreme Situations* provides a pool of specific and demanding use-cases. In a *User-Centered Design* approach, these *Users* and *Situations* provide the pool of new *Uses* needed to attain *Radical Innovation*.

These *Extreme Uses* will be addressed by the use of *Extreme Design*.

One way to do so is the *Creartathon*.

5.2. The Creartathon, a Creative Design Sprint

This section presents the *Creartathon*: a ten-day *Creation Sprint* joining artists and scientists to create interactive pieces of art. The *Creartathon* was organised by the Ex-Situ laboratory, and I joined it as a participant. The following presents its organization, outcomes and first insights.

5.2.1. General Organization

The *Creartathon* was organized by the Ex-Situ Laboratory, in partnership with Université Paris-Saclay & Graduate School Inria Saclay - Île-de-France, La Diagonale Paris-Saclay, Societies, and Humane AI net, and with the participation of ENSCI, ENSBA, École Duperré and École Boulle. It was the second edition of the event.

The workshop took place in La Fabrique, the Fab-lab of CentraleSupélec. Material for prototyping was provided in the frame of the event. Participants were lodged in on-site hotels.

The *Creartathon* gathered thirty four (34) international students, either master or PhD level. They came from fields of HCI, computer science and Artificial Intelligence, Engineering, *Design*, and *fine Arts*. Participants were selected before the event through an application process.

Two exhibitions were held to conclude the event: one at ENS Paris Saclay and the other at le Bis - ENSCI.

The *Creartathon* is a *Creation Sprint* combining *Arts* and *Sciences*. Teams' objectives were to collaboratively design and prototype intelligent interactive objects. To do so, the following creative brief was given to participants:

> *Design a creative, intelligent and interactive physical artefact that emphasizes shifting boundaries through interaction, perceivable from different perspectives.*

In an HCI trans-disciplinary approach, it was also important to encourage creative collaboration between students from various backgrounds and experience.

5.2.2. Speakers and Facilitation

Three types of speakers intervened during the sprint.

Three members of the Ex-Situ laboratory, coordinated and facilitated the event. Two HCI professors were in charge of the event unfolding as well as the transmission of information to participants. One designer was responsible for media and communication supports. They participated to the entirety of the Sprint.

During the first three days of the events, several experts presented work and references that participants could use in the frame of the *Sprint*. The speakers were two HCI teacher who presented the field and the work of the Ex-Situ, two Computer sciences research of the INRIA who presented creative applications for Artificial Intelligence and provided an Image Recognition software to participants, and four contemporary artists working on new media and technology who presented their work.

Participating teams were mentored by coaches for both technical and artistic considerations. The four aforementioned artists helped with physical incarnation of teams ideas and for pieces presentations. A fab-lab manager was also available across the hackathon phase to answer students technical demands regarding fast prototyping of both hardwares and softwares.

5.2.3. Unfolding of the event

The *Creartathon* comprised three distinct phases: Masterclasses, Hackathon, Exhibitions.

D1 to D3: Masterclasses

The first three days of the Sprint consisted of an alternation of masterclasses and application exercises. The theme of the first day of presentations was Machine learning and Artificial Intelligence applied to creative fields. Students were then given access to a model of software for imagine recognition they had to train and use in a live demonstration. The second day focused on HCI and interaction theory. As an application, teams worked on a video prototype for a fictional product. On the third day, the artistic coaches presented their work. Students then brainstormed on the concept they wanted to produce, entering the hackathon phase.

D3 to D7: Hackathon

After the masterclasses, the prototyping phases began. The Creative brief was shared with students with emphasis put on the fact that pieces had to be self-standing as they would be exhibited. From this point, teams worked in a more autonomous fashion on the prototyping of their artifact, supported by the technic and artistic coaches.

Still, teams had to produce several deliverables. At the end of D3, participants needed to present a junk prototype in the form of a video. At the end of D4, they needed to be able to pitch their concept in a technical way. At the beginning of D7, they had to submit a poster describing their artifact.

D7 to D10 : Exhibitions

Last days of the sprint were dedicated to the exhibition of the artifacts. On the evening of D7, artifacts were first exhibited at the ENS Paris Saclay to a scientific audience. Any problem with the artifacts could be addressed during D8, until the artistic exhibition opening on the evening of D8. D9 was a public exhibition of the pieces. D10 was saved for packing and cleaning.

5.3. The Crearthaton: Outcomes

5.3.1. The creations

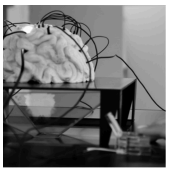
The following presents the pieces that were produced during the Creartathon.

Source material is the property of the INRIA Paris Saclay and can be found on the Ex-Situ website[71].

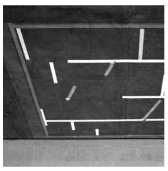
[71] Ex-Situ laboratory. *Creartathon 2022*. In website, https://ex-situ.lri.fr/workshops/creartathon22#gallery

Creartathon 2022 portfolio

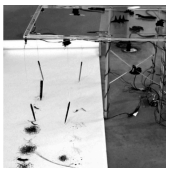
Creartathon is a creative hackathon summer school that combines art, design, human-computer interaction and artificial intelligence.
This year's challenge: Design a creative, intelligent and interactive physical artefact that emphasizes shifting boundaries through interaction, perceivable from different perspectives.
This event is organised by the Université Paris-Saclay, with the Inria Saclay Centre, and Societies, and takes place at La Fabrique, fablab of centraleSupélec.



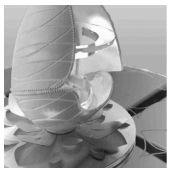
Mother Knows Best



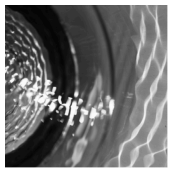
That's Life



Entanglement



Egon



Réseaunance

Materia Strata

creartathon22
DESIGN – INTERACTION – MACHINE LEARNING

université PARIS-SACLAY · SOCIETIES · Inria · HUMANE AI NET · été culturel 2022

Mother Knows Best.

Elahi Hossain - Muhammad Imran
Lola Gires - Daesok An
Mahdi Manoochertayebi

"Mother Knows Best" highlights the ways in which an individual's data is standardised into a common norm, without their knowledge or control.

creartathon22
DESIGN – INTERACTION – MACHINE LEARNING

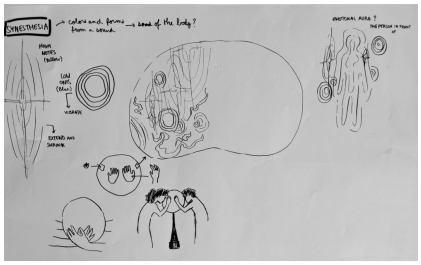
Mother Knows Best

GROUP 1: Elahi Hossain, Muhammad Imran, Lola Gires, Daeseok An, Mahdi Manoochehrtayebi

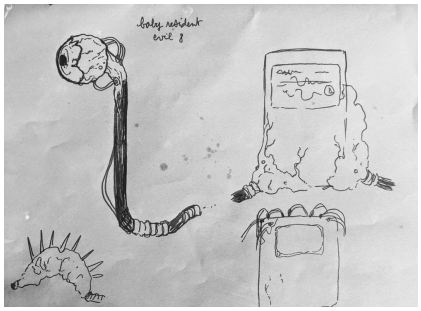
"Mother Knows Best" highlights the ways in which an individual's data is standardised into a common norm, without their knowledge or control.

CONCEPT

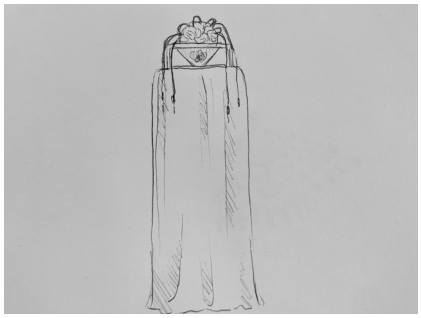
We often see a master/slave relationship between humans and machines, where the amalgamation of human data is treated as more valuable than one person's data. "Mother Knows Best" captures biological data from individual visitors and averages them to create a population norm, which each visitor can then try to manipulate by changing their own heartbeat.



This concept was developing on the idea of co-emotional synchrony through a shared visual experience.



We then developed on the concept where the artefact/machine was more insidious and would be manipulating the viewer.

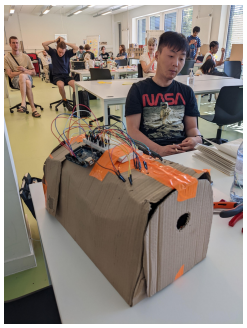


The concept evolved into a final form where the brain would be directly visible to the viewer, the interaction emphasising its beauty and horror.

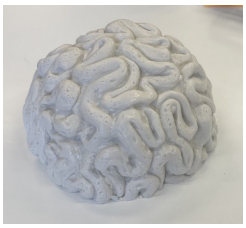
NARRATIVE

This artefact aims to manipulate the viewers biological state through captivating visuals - with its goal of bringing the users state to the desired average. Its objective of standardising the human experience was borne out of values instilled into it by technologists - and now we must face its unrelenting and devastatingly efficient methods at achieving its goal.

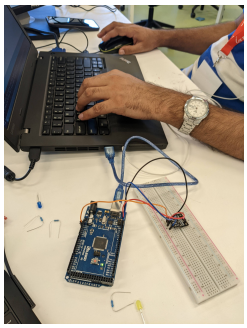
STORYBOARD



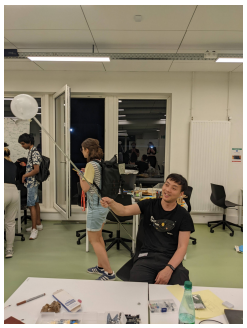
The first physical prototype of our emotional synchrony artefact.



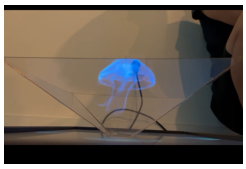
Our conceptual shift to a more insidious narrative behind the artefact led to the creation of a silicone brain.



We worked hard to develop the sensor interaction using Arduino and Processing.



We developed physical aspects that the sensor was planned to be embedded in.



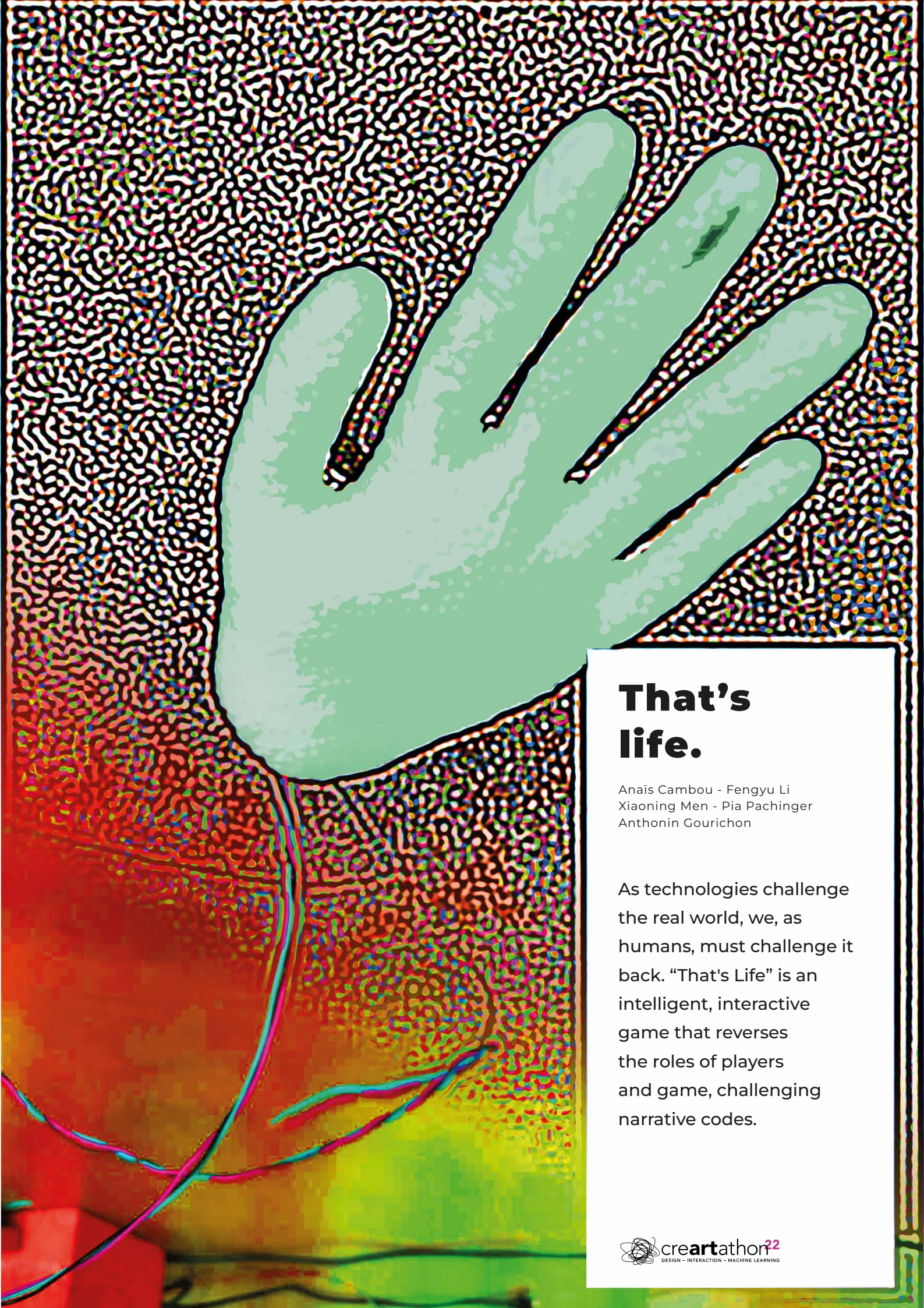
After realising the data visuals using LED's alone was not feasible technically or aesthetically, we decided to use holographic technology.

HOW IT WORKS

The artefact operates using a heart rate sensor as an input using an Arduino. The heart rate data is then transformed in Processing into a visualisation. At the same time, the viewers average data is compared to the systems defined population average and based on the quantitative difference, the system implements a particular audio (manipulation technique) to alter the users average heart rate.

MATERIALS

- Heart beat sensors
- Arduino
- LEDs
- Holographics
- Visuals
- Silicone



That’s life.

Anaïs Cambou - Fengyu Li
Xiaoning Men - Pia Pachinger
Anthonin Gourichon

As technologies challenge the real world, we, as humans, must challenge it back. “That's Life” is an intelligent, interactive game that reverses the roles of players and game, challenging narrative codes.

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DESIGN – INTERACTION – MACHINE LEARNING

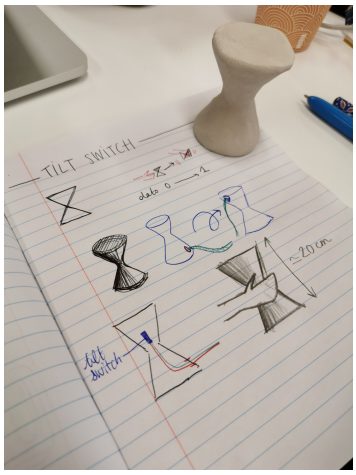
That’s Life

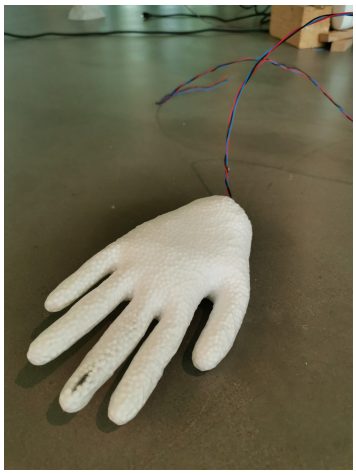
GROUP 2: Anaïs Cambou, Anthonin Gourichon, Pia Pachinger, Xiaoning MENG, FENGYU LI

As technologies challenge the real world, we, as humans, must challenge it back. “That's Life” is an intelligent, interactive game that reverses the roles of players and game, challenging narrative codes.

CONCEPT

Technologies shape how we experience our environment, offering new possibilities and perspectives about our social and physical surroundings.
“That's Life” presents an intelligent avatar looking for an exit. The visitor can transform the digital space by manipulating multiple physical artefacts. That makes it more difficult for the avatar, "Lucy", to find its way. The visitor does not control the avatar directly but instead raises and lowers the barriers that affect its life.

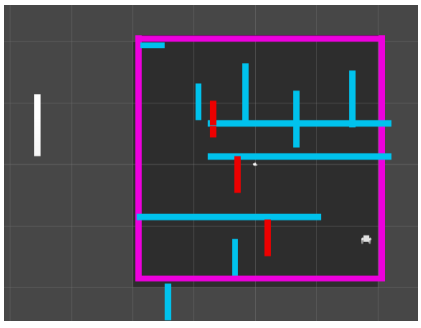




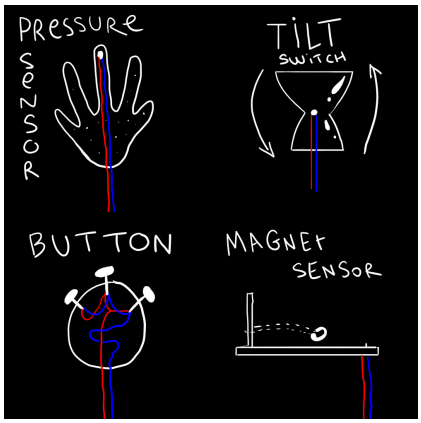
NARRATIVE

You are invited to interact with the artefacts on the ground and watch the game on the ceiling. Try to figure out either how to help or to constrain the avatar, "Lucy", on its way to the exit.

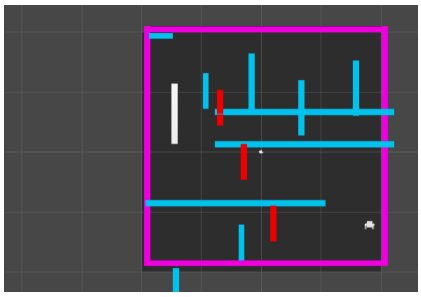
STORYBOARD



The avatar AI is trying to find its way to the exit



One of the 4 sensors is activated



By playing with the artefacts, the player is able to modify the walls and obstacles of the game

HOW IT WORKS

The multiple sensors on the artefacts are sending data to the Arduino motherboard, connected to Unity to activate some obstacles. In the meantime, the AI is trying to reach the exit as fast as possible.

MATERIALS

- Arduino
- Unity
- Clay
- Wood
- Python
- Tilt switch
- Pressure Sensor
- Magnet Sensor
- Buttons
- C#
- Plexiglass

Magalie Mobetie - Ava Scott
Lala Ray - Elena Rankova - Jiin Lim

To achieve equilibrium, diverse bodies must develop non-agressive behaviour towards each other, so they can expand without eating into each other's territories.

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DESIGN – INTERACTION – MACHINE LEARNING

GROUP 3: Magalie Mobetie, Ava Scott, Lala Ray, Elena Rankova, Jiin Lim

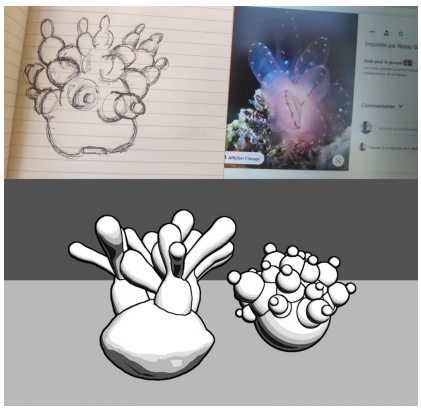
To achieve equilibrium, diverse bodies must develop non-agressive behaviour towards each other, so they can expand without eating into each other's territories.

CONCEPT

In the era after the Anthropocene, with humans gone, our trash still survives as ashes. Gifted with life through the power of wind and technology, a plastic organism modifies its frontiers through expansion, much like human cities. How can we co-habit intelligently? This installation requires us to adapt to the space of the other, by attending to dimorphic body language.

Close up of the plastic organism.

The expansion of the plastic organism.

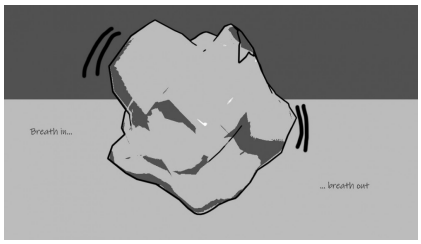


Sketches and 3d researches

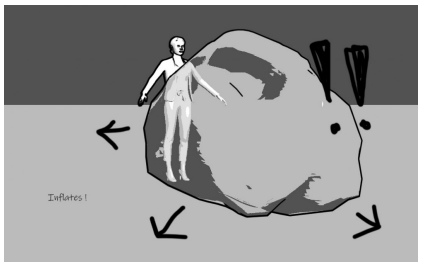
NARRATIVE

The plastic creature exists peacefully in the environment, breathing gently. Catching the viewer's eye from afar, the creature unintentionally invites the viewer into it's space. Responding aggressively, the creature expands through ventilation, demanding that the user respects it's territory. The viewers and creature enter a dynamic body language. If viewers can achieve stillness, the creature will subside it's aggression, de-escalating the situation and dissolving the opposition.

STORYBOARD



Plastic organism exists peacefully.



Opposition between viewer and creature is created as the two move close together, defending territory.

As the viewer(s) learns to reduce movement and co-exist with the creature, there is subsequent deflation and de-escalation.

HOW IT WORKS

We use a webcam to feed a video classification algorithm that detects and defines visitors in the pre-defined territory. We have used transfer learning to adapt previously trained models to our situation, trained over mobile net.
Our algorithm triggers the fan to turn on according to the visitor's presence and movement. Close visitors = more inflation. Less movement = less inflation.

MATERIALS

- Found Plastic bags
- fan
- Plexiglass
- camera

Entanglement.

Hiba Slimani - Viny Saajan-Viktor
Samuel Leberre - Frédérique Pardo

Entanglement creates constantly, systematically in different points in paper. Throughout this experience the human is invited to collaborate with the machine in order to create in tandem with it, guide it and be guided in order to develop art.

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DESIGN – INTERACTION – MACHINE LEARNING

Entanglement

GROUP 4: Hiba Slimani, Viny-Saajan Victor, Samuel Leberre, Frédérique Pardo

Title creates constantly, systematically in different points in paper. Throughout this experience the human is invited to collaborate with the machine in order to create in tandem with it, guide it and be guided in order to develop art.

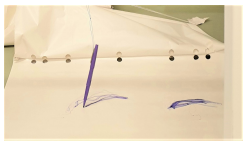
CONCEPT

With our technologies getting increasingly more advanced, the role of the artists and the edge of their creativity is constantly questioned.
Entanglement is a physical drawing machine, digitally augmented, that invites the audience to collaborate on an artwork it has already started to create on. A series of tokens the audience can move next to it influence the creative decisions taken by the AI. Nevertheless it still doesn't possess creative agency on the end result. Throughout the experience this project tries to blur the lines of authorship to create together.

NARRATIVE

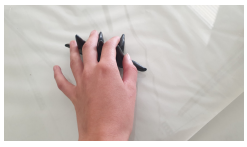
The machine does not take the role of a means to an end in order to create for a human but it rather challenges the view of creative tools and takes its own role as the artist. Therefore when it is approached and interacted with, the work becomes a co-creation between the two partners, a way for the machine to react to the person and the person to follow the ways of the machine. The result is a graphic work that is not a simple drawing but rather the trace of our dialogue with the machine.

STORYBOARD

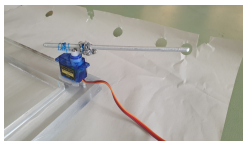


The machine is drawing.

There are 5 different tokens.



The visitor moves token around.



The motors change angles making the machine change its previous design.

The tool draws new traces on the paper.

HOW IT WORKS

There are 5 servo motors in order to achieve the movement of the pens. They all go in circular shapes and tend to act the same. A person interacts using tokens, and through a recognition system of the different colors and shapes of the tokens, the system reacts by changing the way the motors rotate, depending on the token. A projector is connected in order to reflect onto the plexiglass different patters of light that the user follows.

MATERIALS

- Arduino
- Motors
- Paper
- Pens
- Clay
- Humans

Egon.

Gustave Cortal - Corentin Loubet
Vincent Cavez - Vénissia Kay
Ignacio Pérez

An affective artefact wants to be entertained by learning your movements and sound. Will you please him enough ?

creartathon22
DESIGN – INTERACTION – MACHINE LEARNING

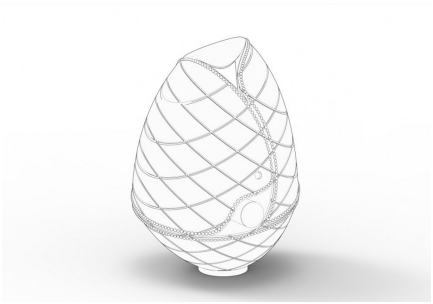
Egon

GROUP 5: Gustave Cortal, Corentin Loubet, Vincent Cavez, Vénissia Kay, Ignacio Pérez

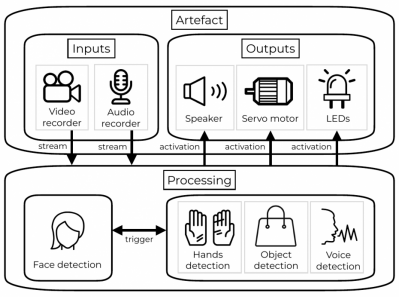
An affective artefact wants to be entertained by learning your movements and sound. Will you please him enough ?

CONCEPT

Social platforms are known to intentionally consume our attention through addictive design patterns. Starting from this premise, **Egon** is an artefact taking the shape of a smart object.
Faced with various tactics to attract its attention, this object reacts capriciously with disdain or curiosity to the audience.
This project tries to demonstrate the contemporary shift we perceive in our technological devices. In some cases, it seems to be transforming us into an addicted servant craving for attention.



3D model of the artefact



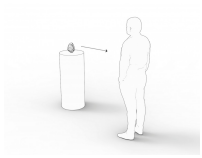
Internal processing using feedback loops

NARRATIVE

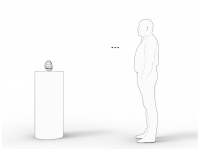
Egon is an intelligent thing combining camera, sound and movement. Using face recognition and tracking, the rotating artefact is able to select visitors by staring at them.
Able to detect the audience's behavior, it encourages them to entertain it with creative interactions. If successful, **Egon** lights up and emits a specific sound feedback. In case the interaction was not sufficient, it will express its disappointment.

STORYBOARD

Egon tracks the audience.

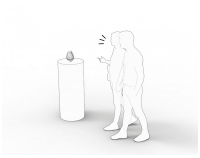


It chooses someone.



If the visitor is boring...

... Egon is disappointed.



If the visitor is interesting...

... Egon is excited.

HOW IT WORKS

Object (e.g. smartphones), face and voice (e.g. emotion and sentiment words) detection to identify the presence and behavior of the audience. Automatic generation of onomatopoeia related to different cognitive states (e.g. bored, interested, excited). Colors and frequencies of LEDs describe heartbeats and breathing using handmade mathematical functions triggered by the cognitive states.

MATERIALS

- Object detection
- Face detection
- Voice detection
- Copper
- Plexiglass
- 3D print

Ré-seau-nance.

Katherine Wang - Julián Lechuga
Guillaume Thomas - Gaelle Clavelin
Marta Shilova

Réseaunance explores the resonant vibrations of human movement through visual art.

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DESIGN – INTERACTION – MACHINE LEARNING

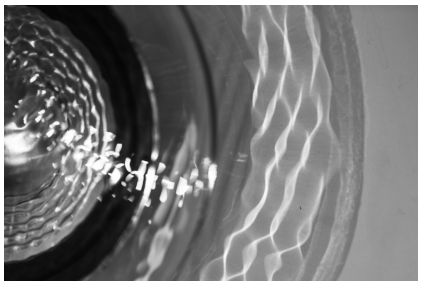
Réseaunance

GROUP 6: Katherine Wang, Julián Lechuga, Marta Shilova, Guillaume Thomas, Gaelle Clavelin

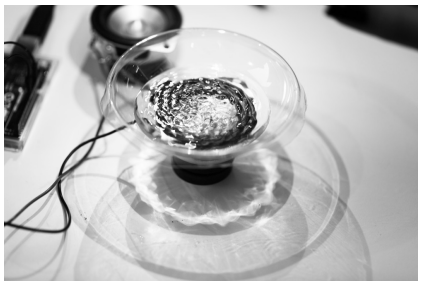
Réseaunance explores the resonant vibrations of human movement through visual art.

CONCEPT

Water is the liquid of life, a primary element connecting us all. Here, we fall down the rabbit hole through a network of glassy irises, which invites us to dive into the looking glass. Réseaunance allows individuals to play with the invisible, entering a sibylline communication through wavelengths of light and sound. Inspired by the science of cymatics, Réseaunance encourages the audience to use hand movements to communicate with cybernetic acoustic entities to display symmetrical patterns in bodies of water.



Playing with light, movement and sound,



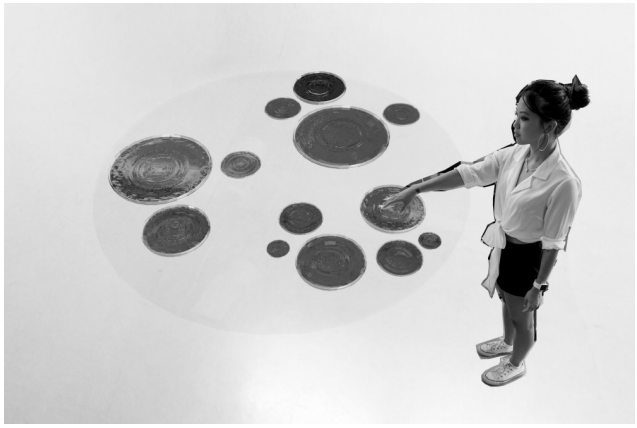
we invite you to whisper to...

water.

NARRATIVE

Réseaunance consists of a network of interconnected speakers that propagate sonic waves through water. Individuals manipulate acoustic frequencies through different hand gestures. Complex geometric patterns result from interference patterns of wave interactions.

STORYBOARD



The visitor gestures with their hands above sensors to control sound frequencies of speakers.

Speakers emit vibrations into water and visitors can play with the living shapes that form on the surface of each iris.

HOW IT WORKS

Réseaunance is a network of interconnected mediums that propagate sonic waves from different sized speakers into shallow dishes containing water. Light amplifies the patterns created by vibrations and cast dancing shadows below the irises.

MATERIALS

- Arduino
- Speaker
- Leap Motion
- Plexiglass
- LEDs
- Water

Materia Strata.

Nelly Lam - Michele De Bonis
Alexis Poignant - Anouk Daguin
Selma Noirot

A long time ago in Saclay's Plateau, nature, overwhelmed by technology, cybernitized and shift into a data mine. Scientists, tired of loosing themselves into databases, went back to the forest to cultivate the soil.

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DESIGN – INTERACTION – MACHINE LEARNING

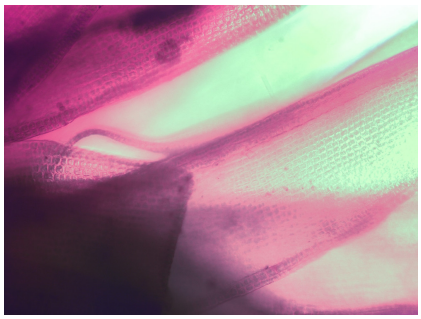
Materia Strata

GROUP 7: Michele De Bonis, Anouk Daguin, Nelly Lam, Selma Noirot, Alexis Poignant

A long time ago in Saclay's Plateau, nature, overwhelmed by technology, cybernitized and shift into a data mine. Scientists, tired of loosing themselves into databases, went back to the forest to cultivate the soil.

CONCEPT

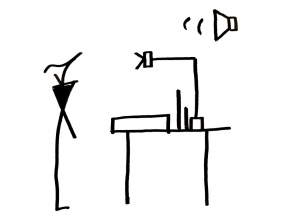
In today's technological world, the boundaries between materiality and virtuality are increasingly blurring. What would happen if the nature had formed a symbiosis with our electronics? If we shift our imagination into a near future, would technology be able to have its own intelligence to show us the layers of our past societies? What would be the way to interact with it? Would we be archaeologists, daring to discover the memory of a world that is merging the real and the virtual?



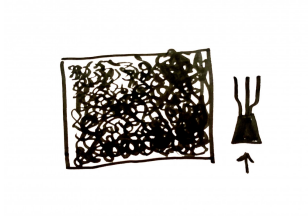
NARRATIVE

How can the world of science and technology and the world of art intertwine to make us play the role of archaeologist of the future? This is the experience we propose, containing both documentary and material finds from the Saclay site. An old box found next to a building site, a series of dismantled electrical components, a multitude of images from the archives of Saclay. The resonating voice calls us to question ourselves about the sedimentary imprint we will leave on Earth.

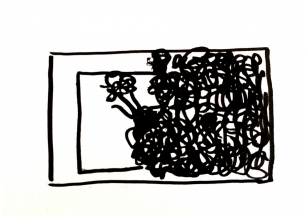
STORYBOARD



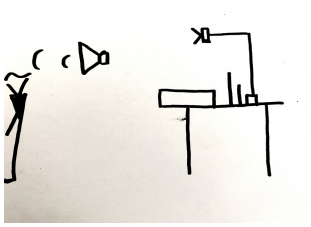
A voice coming from the installation appeals the visitors.



Visitors are invited to dig into the soil.



Data are revealed as visitors dig, encouraged by the AI.



When visitors leave, the voice begs them to come back.

HOW IT WORKS

A camera detects the user's hand through AI hand's pose estimation models. Images appear depending on its position. Texts and audio testimonies are displayed through a screen and speaker. Based on the presence of the user's hands, a state machine provides a scenario for the narrative process to invite them to keep digging. When the user stops, AI generated texts and images pop, as history taking over the unrecalled past.

MATERIALS

- PC Laptop
- USB Camera
- Screen
- Speaker
- Wood
- Soil
- Copper
- Plexiglass
- iron
- archeological objects
- Second-hand materials

5.3.2. Impact of the event

Even if it is difficult to interpret the impact of the sprint for the Ex-Situ and for the participants, some facts are worth noting.

First, it was undeniable that each team produced a highly incarnated artifact relying on both complex technology and sophisticated conceptual ground. As such, the Creartathon achieves both high diversity of *Concepts* and high level of incarnation regarding *Forms*. I propose in the following section a model for creative convergence based on the insights of the sprint.

Second, out of the eight groups of participants, four reached the Sprint Organizers to pursue their project. This shows the bonds that were created within teams as well as with regards to their projects.

The pieces were displayed in two contexts, for public to access them. The first exhibition at the ENS Paris Saclay gathered a more institutional public: researchers from the HCI community and project holder institutions (INRIA). This was the occasion to present the technical aspects of the artifacts, as well as their concepts. An award was presented to the best pieces. The second exhibition was held in a Parisian gallery open to the general public, which ranged from tourists and families to professional artists. Presentations were less formal, with technical and conceptual presentations being more didactic. In both cases, the pieces were warmly regarded.

5.4. Insights on the Creartathon

Let's push at open doors. Driving *Creation* is complex. Indeed, it requires to encourage free ideas while ensuring production. I this sense, I think I learnt a lot during the event. First about how to create a set of explicit and implicit constraint to guide Creation. Second, on the role of the exhibition in artistic creation. This experience convinced me of the pedagogic interest of *Creation Sprints*.

5.4.1. Designing implicit and explicit constraints to drive creativity

Constraints are the limits set to any process. They are essential as they define the frame of work. This is even more true when driving *Creation*. Indeed, they reduce the space of creation allowing to build on stable ground. Constraints can be explicit or implicit, internal or external

to the creator, hard or negotiable, material or not. During the *Creartathon* the following set of *Constraints* appeared as decisive to the creation process.

The explicit constraints have been presented in the presentation of the event. They were the set of rules defined by the organization of the event.

For example: Production needed to be stand-alone pieces of art that answered to the Creative Brief and could be exhibited. Team compositions were defined before the event to ensure that each team had an artist, designer and computer science member. The event took place in a defined and limited time and space. Teams followed the same agenda of deliverables that did not concern the piece itself but collateral production. They had access to the same material and supporting staff.

More interestingly, the event encompassed a large set of *Implicit Constraints*. The three days of Masterclasses were key in the construction of these constraints as they allowed teams to acclimate to the event expectations. Amongst the most decisive implicit constraints were:

The very nature of the production was probably the most important *Implicit Constraint*. Within a society, Art refers both to a common history of the members and to a deeply personal conception of fundamental *Concepts* like Beauty or Liberty. Placing the *Creation Process* in the field of Art has strong implications in term of addressed *Concepts* as well as used *Forms* making it a powerful *Implicit Constraint*.

In agreement with the *Bauhaus* tradition, the finality of the *Creation Process* is the building of the piece as it embodies both conceptual and formal work. In this sense, the stand-alone dimension of the pieces not only support the creation of pieces that could be exhibited in the frame of the event. It proposed to the participants to adopt a mindset of artists and creators. This is maybe the most important and fundamental constraint on Creation as it forced teams to make choices based on what they could do. As such, Building encouraged to focus on key features that could be included in the piece. It tended to reduce the number of ideas at stake and concentrate them, which is key to creating strong artistic *Concepts*.

Similarly, the creative brief that was provided to students was key in that it framed the expectations, not in terms of results but in the frame of disciplinary field. Indeed it directly set the sprint within the artistic field. The brief was at the same time precise in the notions at stake and free in terms of their interpretations. It evoked more than it defined. To do so, the brief relied on several *High-Level Concepts*: *« creative », « intelligent », « shifting boundaries », « perception through different perspectives »*, and combined them together in the manner of an exhibition booklet.

J.K., co-organizer of the Creartathon states :

> *The brief itself has evolved with our previous experience of the event. Last year, we only gave the theme of artist-computer partnership to teams, as a result they struggled to converge.*

Working on references is a common approach to creative disciplines. It allow to inscribe the creation in a given history as well as in a formal lineage. During the *Creartathon,* three days were dedicated to masterclasses and artists presentations. Speakers portrayed a field at the intersection of machine learning, HCI and digital art that built a common imaginary for the group. What may seem as a divergent process at the level of team individuals was in fact a convergent process at the level of the teams as it provided a common ground for them to build upon.

The space of creation itself, a Fab-lab, was an *Implicit Constraint* of the *Creation Process.* Indeed creation tools were those of fast prototyping, i.e., electrical engineering components, laser cutters, 3D printers, etc. This shaped the aesthetics of projects in a large dimension, all of them including plexiglass components and Arduino processors in the piece.

In this sense, it is meaningful to note that the project that won the first prize of the jury was *Materia Strata,* the only project that included an artistic material that was not available within the perimeter of the Fab-Lab: earth. This was obviously not the only factor but it was proof that the project went over the limits of the Fab-Lab to reach its artistic purpose.

5.4.2. Exhibition in Creation processes

Obviously, scenography is part of a piece's design. Defining the conditions in which an object is seen and interacted with allows to control and modify its reception. It allows to design the experience of the spectator with regard to the piece. It becomes possible to create either proximity or distance between the spectator and the piece, whether we want them to appropriate the piece or to create aura. These choices define both the Identity of the piece and the type of public they will speak to. For example, in the case of our production, *Entanglement*, we decided to allow spectators to draw with the machine. V., mother was enthusiastic :

> *I love that you can play with it. My husband paints so we love art but it can be pretty boring for children.*

R.B., artist, on another side commented :

> *Having people draw on the piece is too much : it makes it less interesting. The graphic proposition by the machine is good. But let's face it, most people cannot draw…*

A piece is also interpreted a posteriori through spectators, sometimes leading to unexpected results. The projection of teams into their pieces resonate with spectators own interior world. This resonance creates truth not through rationality but through the experience. During these occasions, the artifacts fully take the status of pieces of arts. S.L., *Creartathon* participant, describes:

During the show, your piece is there. It is still the same but the speech evolve every time you present it. You spent five days, full time, on it. Building. And I don't know, it is as if it kept on evolving without you. You put a lot in it and it is sending something back to you: what you put but something else too.

Art is a social construction. It is based on the recognition by the other of the status of *Art*. Exhibitions also contribute to the creation of a new status for the pieces by enabling recognition by a public. In this sense, it is interesting to note that the two exhibitions of the *Creartathon* focused on two types of public that exist for every type of creation. *Institutional Public* encompasses the recognition of a status by peers. This public can consider the work from an expert point of view. They contextualize the work within its disciplinary field. *General Public* on the other hand usually has a more naive approach to the work, based on personal aesthetic judgement and social and cultural ground. They are less interested in the technical understanding of the piece than its overall feeling. Being able to exhibit the created pieces to these two types of public allowed participants to get feedback on their creation and created a fulfilling note of recognition to end the Sprint.

5.4.3. To build as a learning process

If the *Bau* can be understood as a creative constraint driving the *Creation Process*, it is also a great learning tool.

Traditional learning process rely on a descending verticality of transmission. In this context, learners receive knowledge from somebody who knows. Where this approach is an efficient way to transmit well defined knowledge, it appears hill-adapted to *Creation*, as the latter relies on *Practices* and not on *Theories*. The *Bau* in pedagogic context turns this approach as it is the learners who will produce. As such, they are the one creating their own personal knowledge of the practice. In this sense, a decisive reason why the concept of *Bau* was formalized in the *Bauhaus* has to do with the fact that *Bauhaus* was a school: it aimed to create practitioners of *Design*.

While building, any decision is constrained by reality-check, and especially by production and execution capabilities. In this sense, rational optimization is often not achievable and decision-making will rely on what is possible more than what is best. This results in a somewhat discontinuous process of decision. Consequently, teams have to learn by constantly adapting and innovating to solve new problems and challenges. On the other hand, a discontinuous process has gaps that cannot be rationally accounted for.

Finally, it is interesting to see that the interactive dimension of the artistic pieces was also an element of transmission, to the public this time. Indeed, from an HCI perspective, all pieces could be interacted with. This led to a desacralization of both the artistic and the technological dimension of pieces, making them accessible to neophytes. Thereby, several children came to play with the machines, driven by their curiosity, like this little girl asking in front of *Entanglement*:

Mum can I draw with the machine ?

Lui :
Génial !

Lui :
Tu trouves ?

Lui :
Je sais pas mais t'as l'air content.

Lui :
Passons…

Lui :
Et tu les as rappelés ?

Lui :
Yes.

Lui :
Pourquoi ?

Lui :
J'avais envie de continuer à creuser le sujet. Je pense que je peux raconter des choses sur ce sprint.

Lui :
Ah ?

Lui :
Et ça peut faire un bon cas d'étude pour mon mémoire.

Lui :
Ton mémoire ?

Lui :
…

6. Precipitated Convergence in design sprints

Creation Processes are often represented through the prism of two complementary subprocesses (cf section 4.2). *Exploration* allow to identify new *Concepts* and Ideas, new *Forms* and References. It expands the field of possibilities and aim for *Novelty. Exploration* is a *Divergent Process. Incarnation* on the other hand focuses on producing new *Tangible Forms.* It aims for the production of forms that can be shared. It is a convergent *Process.* These two processes co-exist in *Creation*, however it is often convenient to disentangle them, making the process more manageable.

In this section, I detail the process of incarnation at stake in *Creation*. From then, I present *Precipitated Convergence:* an approach for *Creation Sprint*, joining *Arts* and *Technologies*.

6.1. Incarnation Processes

I define the process of *Incarnation* as the transition from a *Concepts Space* to a *Tangible Space*. This process is at stake in *Creation Processes* like the *Creartathon*. Figure 4 shows the process of Incarnation described below.

This model for *Creative process* representation boils down to Socrates' theory of forms. In Plato's *Phaedrus*, Socrates describes the concept of Maieutics. Ideas exist in a higher realm, beyond the grasp of human comprehension. By shaping them and giving them forms, Speeches make *Concepts* accessible to human comprehension. Through a descent from Ideas, higher realm concepts take form that make them accessible to human earthly realm[72].

Before *Incarnation*, the Invention is in the *Concept Space,* in a potential state. Ideas are in a higher conceptual form. In this sense, they are pure and diverse. However, they are also undefined and imprecise. They are not expressed but felt, individuals approach them through intimate schemes relying on individual personalities. In their interactions, Individuals reflect Concepts, shaping them. In this sense, individuals are the mirrors that give form and existence to concepts. Thereby, the *Concepts Space* is unique to any person and in this sense cannot be shared with other. It is disincarnate.

Tangible Space on the other hand is accessible through senses. Elements of the *Tangible Space* are apprehended through their observable properties in the material world. In this sense, *Tangible*

[72] Platon. *Phedre.* Les Belles Lettres, Classiques en Poche.

Productions are unique and defined. They can be shared because they possess observable features. *Tangible Space* comprises physical objects, videos, sounds, live experience, etc. Artifacts in Design are part of the *Tangible Space*.

Incarnation is the transition from the *Concepts Space* toward the *Tangible Space.* By *Incarnating*, *Concepts* become *Tangible* transforming from Ideas to physical existence. They do so using a *Medium* that is the material that supports the *Tangible Forms*. In the process, *Concepts* become more and more defined and acquire observable characteristics that are the representation in the physical world of the concepts they were born from.

More subtly, there is a reciprocal way that *Tangible Space moves* towards *Concepts Space* that is *transcendence.* As individuals project parts of themselves and create narratives in tangible objects, they endow the elements of *Tangible Space* with a conceptual dimension. This means that some objects exist in both the *Tangible* and the *Concept Spaces:* their interface is not empty. For example, art pieces and ceremonial objects will posses a high transcendental dimension, bringing them closer to the *Conceptual Space.*

Constraints on *Incarnation* are sets of forces that will impact the form of *Tangible Forms*. Constraints can be explicit, based on expressed characteristics of the Incarnation process. They can also be implicit, based on the underlying principles of the process. Different constraints will result in different forms for *Tangible Productions.*

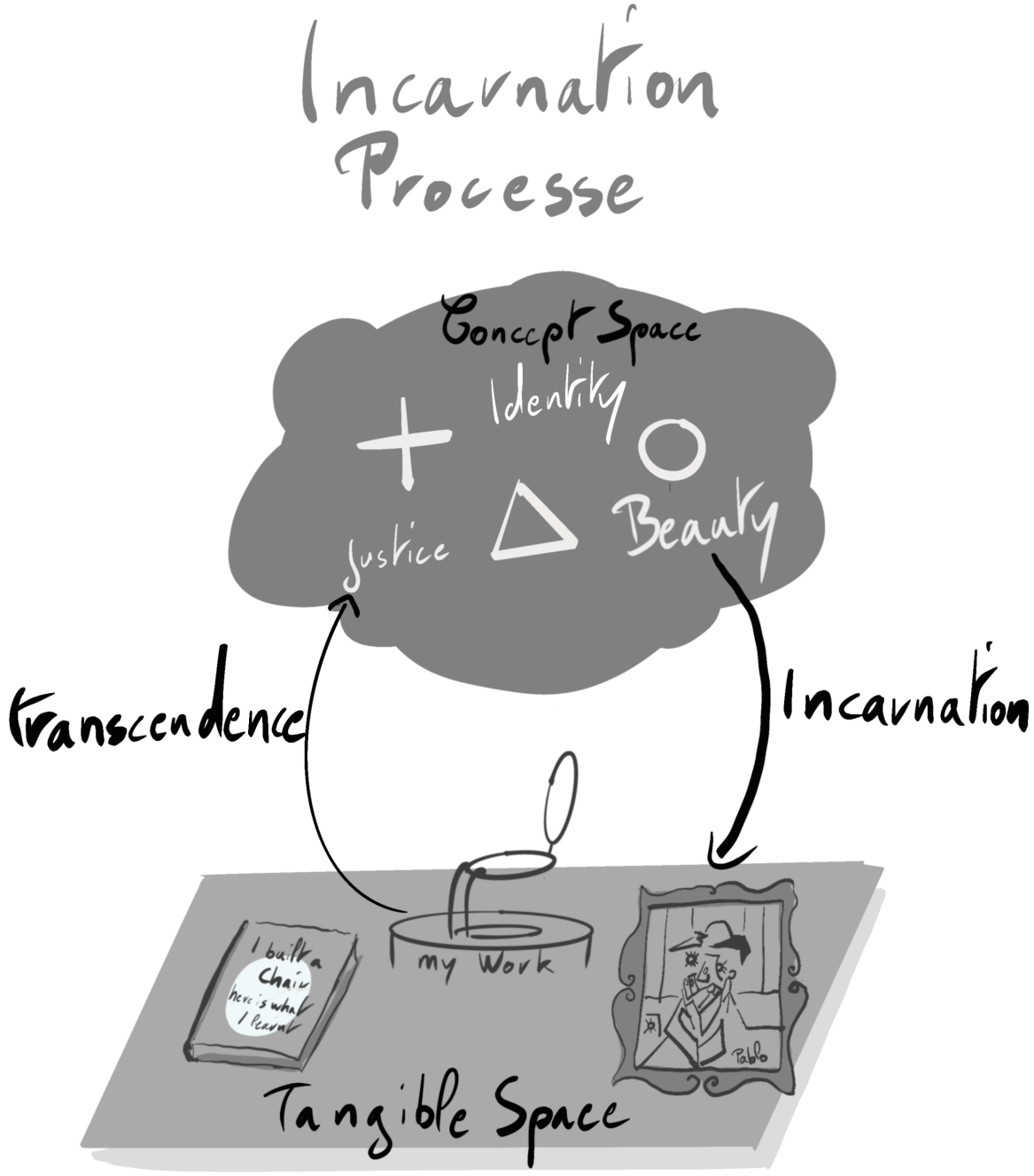


Figure 7: *Incarnation* Process

6.2. « Precipitated Convergence »

Based on the *Creartathon* insights, I define in the following section a model for *Creation Processes*: *Precipitated Convergence*.

6.2.1. Presentation of Precipitated convergence

Precipitated Convergence is a mode of *Incarnation* that aims for the production of *Radical Forms* and *Radical Concepts*. In *Precipitated Convergence*, the process of *Incarnation* focuses on *High-Level Concepts* that it seeks to rapidly crystalize into original *Forms* using technological and artistic materials as a medium.

Precipitated Convergence relies on three principles: *High level conceptual anchoring*, *Rapid Incarnation* and use of *Arts and Technics as creative tools*.

I represented *Precipitated Convergence in* Figure 5 to represent visually the process.

6.2.2. High level conceptual anchoring: expanding Concept space

Where does Creation begin ? Moholy-Nagy's, cited by Alain findeli is revealing:

> *In his artistic auto-biography, László Moholy-Nagy insists on the necessity for artistic work to start with a general problem. Every specific piece would then consist in an hypothetic solution to the problem*[73].

In this sense, the artists work does not aim to generally answer general problems but specific propositions. It seeks universality not through generalization but through specification. In this sense, the more general the starting problem, the better.

High-level Concepts refer to highly conceptual types of *General Problems*. Metaphysics questions like Identity, Being, Change, Consciousness are *High-level Concepts,* so are social constructions like Beauty, Justice or even discipline fields. Because these questions address our very conceptions of the world, they are too vast for any systematic approach to represent their infinite diversity. As such, these problems will never be completely answered, which make them fruitful grounds for artistic practices. As such, the first fundamental element of *Precipitated Convergence* is the choice of a *High-Level Concept* that will serve as a general problem: a *High-level Conceptual Anchoring*.

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High-level Conceptual Anchoring allows to ensure a high range of possible outcomes for the sprints, as well as the possibility to select the most radical ones. Indeed *High-level Concepts* cover universal questions while encompassing different realities for any individual. As such, they refer to a reality that is both universal and specific. They create at the same type common ground and diversity. As such it is a way to produce *Radical Concepts*.

This *High-Level Conceptual Anchoring* can be encouraged by several features during a sprint: teams composition, references, field of artistic creation, etc. During the *Creartathon*, the following elements were used to ensure *High-level Conceptual Anchoring:* The masterclasses anchored the *Creartathon* at the interface of HCI, Digital Technologies and Art. It did so by relying on a specific set of examples and references associated with these fields. As explained in section 5.4.2, the Creative Brief also heavily relied on *High-Level Concepts* in a form specific to Artistic Creation.

High-Level Concept Anchoring is not specific to multi-disciplinary work. However, it greatly benefits from the diversity of backgrounds. Indeed, diversity of profiles will result in diversity of interpretations of the *High-Level Concept* and consequently in high diversity of artifacts Concepts. The presence of creative profiles, such as artists and designers, are also key to the outcome *Concepts*. It is important to emphasize that at this stage we do not seek to clarify the specific understanding of the concepts within the teams, as it is the role of the *Rapid Incarnation*.

6.2.3. Rapid Incarnation

Precipitated Convergence aims to crystallize strong concepts through *Rapid Incarnation* constrained only by the capacity of teams to produce the *Incarnation*. Doing so, it keeps them as pure as possible. On the figure, rapid Incarnation is represented by the verticality of the *Incarnations*.

In *Rapid incarnation*, teams do not question their production while doing it. They only reflect on their production based on the validity and physicality of attained *Forms*. In this sense, the objective is to avoid mitigation effects brought by slow convergence process. This is a way to conserve strong *Concepts* during the *incarnation.*

Rapid Incarnation can be facilitated through several features, inspired by the *Creartathon*. First, the format of *Sprint* imposed to produce rapidly, as exhibitions were hard deadlines that cannot not be postponed. Second, teams were present full-time in the same creation space. This ensured their full dedication to produce rapidly. Third, the presence of a fab-lab

manager as well as artists who brought their experience in rapid prototyping helped participants to overcome their potential technical blockages.

In addition, several deliverables had to be produced across the *Creatathon:* a concept pitch, a video prototype, a scientific poster and an exhibition poster. These deliverables did not directly concern the physical artifacts but rather the elements supporting their presentation to the public: their Conceptual components. As a result, teams were refining their *Concepts* while working on their production.

It is important to emphasize that when working with multi-disciplinary teams, collaboration is uncertain. Diverse backgrounds mean also diverse approaches especially when it comes to production. To this regard, the masterclasses phase of the *Creartathon* was important to ensure teams' capacity to collaborate smoothly during the hackathon phase. Indeed, speeches and exercises provided teams with both conceptual common ground and experiences working together, they served to harmonize teams and allowed proper common production.

6.2.4. Arts and Technologies as creative tools to explore Radical Forms

Radical Forms means that *Precipitated Convergence* seeks challenging highly incarnated forms. On the figure, Radical forms is represented by the length of the Incarnation vectors.

As previously discussed, the proposition of *Forms* and *Concepts* are complementary dimensions of objects. Following Moholy-Nagy's heuristic of arts (sect. 6.2.2), Creation provides specific answers to a general problem. The strength of the problem lies in its universality, while the strength of the answer lies in its specificity. Consequently, the more general the underlying *Concept*, the more specific its *Tangible Form* must be. This implies that only *highly-incarnated Forms* can answer a *High-Level Concept* without loss on the way. *Radical Forms* are necessary to achieve *Precipitated Convergence*.

During the *Creartathon*, *Radical Forms* were encouraged by the conjunction of *Arts* and *Digital Sciences*. Participants had to include new technologies like machine learning in their intelligent pieces of art, knowing they would be exhibited as art pieces. This naturally led them to explore new *Forms* that resonated with AI innovative features. The practitioner artists also constantly challenged participants to avoid banal propositions.

What is perceived as a *Radical Form* obviously depends on previous exposure to comparators. As such, the presence of artists and designers in the teams was key to present new forms of embodiment. Similarly, more technical profiles tended to easily relate technologies and imaginaries, facilitating their use as creative mediums.

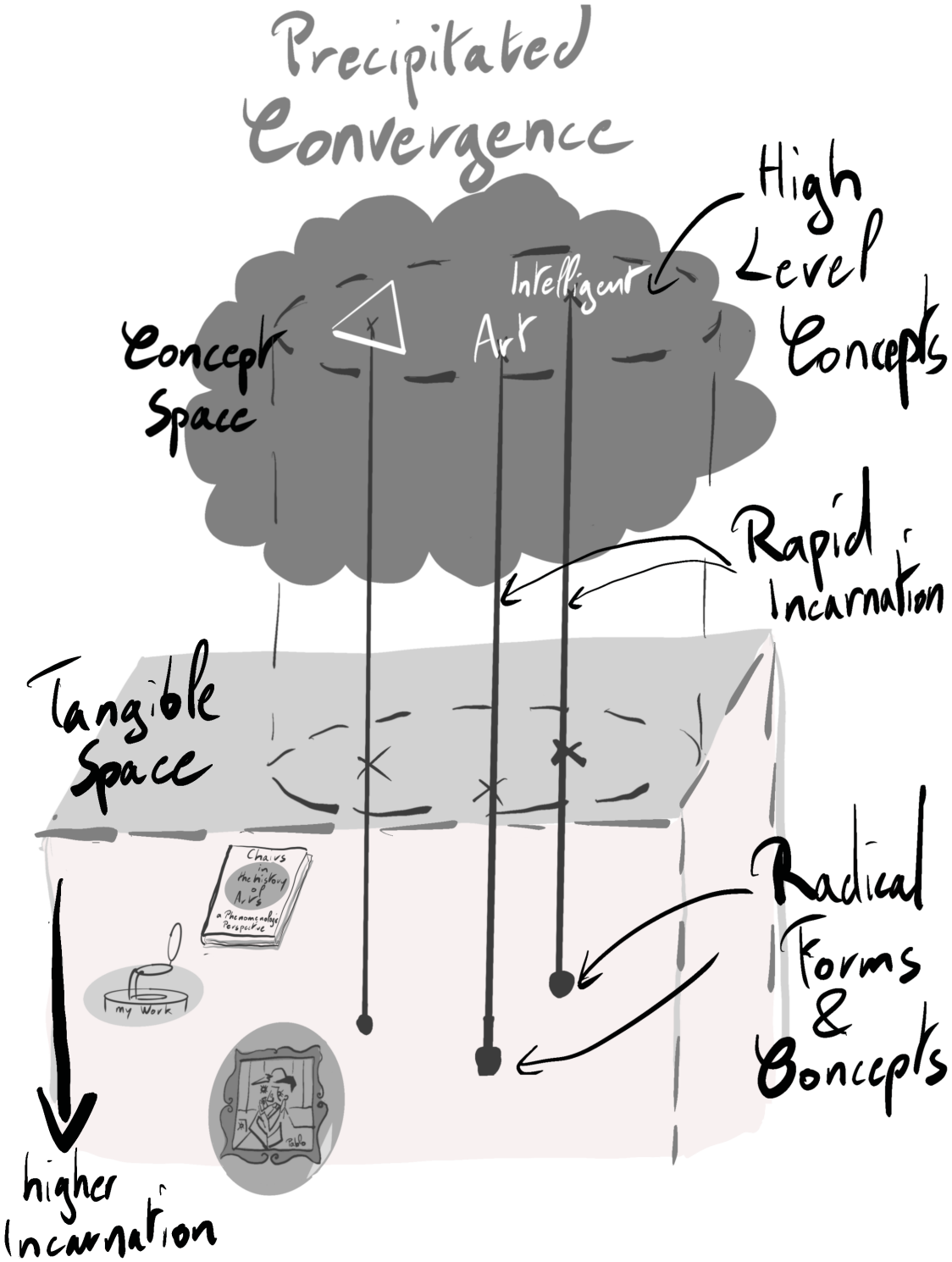

Figure 8: *Precipitated Convergence*

6.2.5. *When Precipitated convergence can be used ?*

Precipitated Convergence, is designed to be applied to a *Creation Processes* that seek *Radicalness*. As such it is relevant for example in the following cases:

Precipitated Convergence was first designed based on a HCI Creation Sprint. It produces the *Extreme-Designs* that are presented in section 5.1.3. From this point these artifacts can be integrated in the HCI *Research Through Design* process as a predecessor artifact for interaction study. As such it is designed to be the first step in a larger HCI *Radical Innovation* process.

Precipitated Convergence also provides a facilitation framework to organize workshops. These workshops could be proposed to the same type of organizations as the clients of *A.Samble*. Two format seems especially relevant: corporate workshop and residencies and pedagogic workshops. A demand for this type of event is confirmed by previous interactions through *A.Samble* activity, even though a proper market positioning would be necessary.

Precipitated Convergence provides key to understand the process of *Art Creation* as it defines the *High-Level Concepts* at stakes. It also considers the production of pieces as part of the *Process,* through the description of the *Incarnation*. Doing so it shows, and to an extent explain, the *Creation Process.* It makes it accessible. However, *High-Level Concepts* and Incarnation let room for interpretation, and even serve to transcend the materiality of pieces. In this sense they explain *Art* and transcend it at the same time. As such *Precipitated Convergence* is an efficient way to question existing systems in the frame of an event.

As such it could apply either in the frame of a workshop including company staff, in a tighter timing. It could also be fruitful when applied to artistic residencies in companies. In both case it would serve to reflect on the company purpose.

Precipitated Convergence encourage creative and conceptual thinking as well as problem solving approaches in uncertain environment. It requires to use both *High-Level Concepts* and advanced Technologies when applying it. As such it encompasses a large spectrum of theoretical and applied knowledge that are key for technical executives. This makes it a fitted tool to organize workshops, especially in technical schools like Engineering, Digital or Design.

6.2.6. *Articulation with state of the art methods*

Precipitated Convergence can be combined with methods presented in section 5.1.1.

Precipitated Convergence was modeled based on a sprint organized by the HCI extreme-user community. As such it propose an original representation for a mode of *Creative Sprints* that pre-existed within the community. It can thus easily be applied both to understand and facilitate such events.

I believe the articulation between Precipitated Convergence and Concept-Knowledge-Processing (CK-P) can produce interesting results. Indeed CK-P focuses on the extension of the space of Concepts based on the extension of knowledge and the transformation of conceptual elements. In this sense, it specializes in producing *Radical Concepts* as well as the references supporting it. This could be extremely useful to create a common conceptual ground when applying *Precipitated Convergence* with multi-disciplinary teams.

CK-P does not however address the production of new *Forms*, so Precipitated convergence can incarnate a process that begun with CK-P

The TRIZ approach relies on combining given design features to produce new ones. During *Precipitated Convergence*, it can be an interesting way to encourage students to pivot when facing a prototyping blockage. As such it can also be included in multi-disciplinary teams harmonization as a practical exercise for example, so that they can use it during the *Incarnation* process.

Precipitated Convergence possesses many similitudes with the Art-Thinking underlying principles. The main difference is their field of application: where *Precipitated Convergence* focuses more on the intersection between *Arts* and *Technologies*, *Art Thinking* focuses on the intersection between *Art* and the *Economic Ecosystem*. It would be without a doubt interesting to dig potential combinations between the two but this would require some time and experimentation to do so.

Artistic Creation often relies on individual-based practices. As such to impose a model to facilitate Artistic Creation will prove counter-productive. On the other hand, it is an already formalized tool for creation supported by the work of a practitioner artist, Moholy-Nagy. An artist who would agree with the underlying conception of artistic practice would certainly benefit from the approach. This is the sense of the Identity project: to experiment on Precipitated Convergence in an individual creation context.

6.2.7. Limitations of Precipitated Convergence

Even if facilitating elements have been proposed, *Precipitated Convergence* is not an explicit methodology of facilitation. In this sense it aims to support more than to manage the process of creation.

Since *Precipitated Convergence* seeks the production of *Radical Concepts* and *Forms* it has to be unpredictable in its outcomes. *Creations* can be polarized or biased, they can upset or anger. Like most Radical Innovation approaches it is a high-risk/high-reward type of approach. This means that to be used in concrete applications, *Precipitated Convergence* has to be coupled with a approach focalizing on making the production acceptable. As such Precipitated convergence does not address the question of *Diffusion* of *Innovation* but articulates well with methods that do.

Precipitated Convergence success relies on a large number of parameters. Composition of participants teams, quality of speakers, and material conditions are particularly key to produce radical propositions. It is not a turnkey not a frugal methodology. It requires logistics and involvement of stakeholders. As such it has to be carefully prepared knowing the expected impacts.

More conceptually, *Precipitated Convergence* relies on the concept of *Incarnation* inspired by Plato's maieutics. In this approach I present a cycle of pre-existing *Concepts* and *Forms* through the notions of *Incarnations* and *Transcendence,* as if there was necessarily a notion of causality or at least of temporality at stake. Because of time constraints I did not have time to really explore the possibility of a co-existence both *Conceptual* and *Tangible* dimension within the objects. Neither did I explore more potential dimensions of the subject. I believe a good way to address these questions would be through the prism of *Art History*. Personal research never ends.

Some limits must also be acknowledge with regard to the work on which I found my model.

Especially, for evident reasons of organization, I rely my analysis on a limited number of case-studies, that did not allow for repetition of the experiments conditions. So, several key parameters are often modified between one use-case sprint and the other: from the nature of the sprint, the type of participants or the profiles of facilitators. It has been difficult to isolate precise criteria for success from this entangled situation. However I mitigated this problem by supporting my analysis and conclusion with an important literature review as well as many discussions with experts. More sprints will eventually allow to refine the presented models to make them more and more consistent. Still in any sense, I do not pretend to present true general models, but instead specific ones that will need to be understood and adapted to any new specific situation.

Finally, a tension is left unresolved in this work, that *Precipitated Convergence* does not address: the question of *Creation* within the *Economic* context. It was convenient to disentangle these concepts to define my approach. However, the separation is not as clear. In the future it will be important to further investigate the interfaces between the two.

Lui :
Et du coup ?

Lui :
?

Lui :
Je sais pas, à quoi ça sert ? Tu vas où avec ça ? Me dis pas que tu t'étais pas posé la question ?

Lui :
Bah figure toi que si !

Lui :
Et ?

Lui :
Je crois que j'ai une super idée.

Lui :
Je crains le pire.

7. Identitie(s): a Project to Incarnate the Thesis

Precipitated Convergence has been defined. It still needs to be applied. In this following, I lay the basis for a personal project to implement it, pursuing the experimentation on *Precipitated Convergence*.

7.1.1. Adapting Precipitated Convergence to a personal Creative Practice

The principles of Precipitated Convergence can be easily applied to a personal project.

First I will apply *High-Level Concept Anchoring.* The idea is to formulate a *Project Objective* using a single *High-Level Concept*. Then investigating the Concept in a *Research for Art and Design* approach (see section 3.4.1), we relate it to other related *Concepts* as well as to diverse formal references. This ensures a plural understanding of the *Project Objective* even without a multi-disciplinary team.

Then, in an approach of *Rapid Incarnation, I* will define several *Concepts* for art pieces and mix the *Research for Art and Design* material and focusing on the use of technical and artistic references. The Concepts should be prototyped as such only considering production capabilities.

Following the principle of *Arts and Technologies as creative tools,* Prototyped Forms should rely on new technologies to provide original forms.

7.1.2. The origin of Identitie(s)

The theme of *Identity* has been recurring theme during my past year. It was even the starting point of reflexion for the redaction of this thesis. *Creation disciplines*, *Arts* and *Design* focuses on the construction of the Real. They take as an object something that is not, yet, but that could be: representations that have not yet taken forms, innovations that have not yet diffuse in society. They addresses open-ended questions[74]. This is probably the reason why fiction and the construction of narratives are central tools of the discipline. Fiction is but another way to present realities that did not, or not yet, happen. *Creation Disciplines*, works in highly uncertain environments, in constant evolution.

Identity provides stability in transforming environments. An ever evolving environment cannot be fully grasp as any understanding that is built quickly becomes obsolete, as existing

[74] Buchanan, R. (1992). *Wicked Problems in Design Thinking.* Design Issues, Vol. 8, No. 2 (Spring, 1992), pp. 5-21 (17 pages). The MIT Press.

referential and landmarks are re-shaped. As such it prevents projection and diminishes capacities of action. This is why the construction of redundant patterns in reality enable performative creation. As they create order in chaos they allow us to project and to act. These pattern can manifest through stories, concepts, actions, or forms. They can be shared by an entire society or at the level of individuals. They are what makes an *Identity*. This is why the concept of *Identity* is central to any activity of creation.

Identity is a metaphysical question that has been studied by the greatest thinkers from Plato to Locke. They confronted the tension between the undeniable existence of lasting elements and the ever changing nature of their environment. *«How can I be the same person, as I am getting older ?»*; « *What remains of the world confronted to systematic doubt ?* »[75]. These metaphysical questions are obviously undecidable, making the concept of *Identity* a *High-Level Concept*. As such it is a suited ground to apply *Precipitated Convergence*.

7.1.3. Research for Art and Design applied to Performative Identities

Identity is built through specific practices, it is defined through unique features.

In the case of artistic creation the most distinct elements are often the formal characteristic traits, ie the style. Our first entry to most pieces of art is sensible, the existence of shared formal elements between two pieces creates a coherence between them. So pieces are related to one another creating a larger ensemble that support the work of the creator. Formal Identity can be transmitted through a variety of elements: ranging from the choice of the medium and the architecture of the piece, to the most specific formal components. For example Soulage systematic use of the black color and sculpting of the painting is constitutive of his « *Outrenoir* » period.

A variation on the notion of style appears with the automatization of processes brought by new technologies. The work on patterns is not new, as it is already constitutive of the aesthetic of the *Arts and Crafts* movement. However new digital technologies and robotization brought it to a new dimension. So, artists in generative art do not create the pieces themselves but create systematic rules that will generates the pieces. As such the set of rules created by an artist will define the shared Identity of his pieces. Contemporary musician Steve Reich, for example, founded his work Identity on the use of minimalist patterns and phase shift to create complex

[75] Renée Descartes, *Méditations métaphysiques*, GF, 1992, Méditation seconde, p.71-93

pieces[7677]. In visual Design Processing provides a generative software allowing to generatively create audio-visual piece that led to a recognizable aesthetics in digital creation[78].

Identity in its general understand designates distinctive elements of an individual. From its civil status to its personality traits, it distinguishes a person from another. In his extensive work on the psychology of creativity, researcher Mihaly Csikszentmihalyi identified common trait between creative personalities. This somewhat supported the idea of a natural Identity through creative personalities[79]. This approach is appealing as it suggest a rational predicament to the artist Identity. As such the figure of the artist is part of artistic *Identity*.

It is however evident that *Identity* is not only a defined characteristic of the individuals or their work but also a social representation and recognition. On his studies on commonplace art, Arthur Danto describes how Warhol's *Brillo box* has an artistic Identity, ie is Art, because it is claimed and recognized as such[80]. Identity transcends tangibles properties entering the domain of conceptual representation. As such it is also external to individuals and their work. This means artistic Identity can be crafted, entering the domain of representation and also communication. Stefan Seigmeister, for example, frequently makes use of both his body and personal history to incarnate his projects[81]. His personal Identity, somewhat becomes a vessel for his messages in the process. Philippe Starck is also an excellent example for the crafting of public representation. On his public media, the good-nature French with an « accent to cut with a knife », navigates between never-ceasing wonder and demand for excellence[82]. This avatar incarnates better than anything a certain image of French Design. In this sense, artists Identity is accessible more through specific occurrences, creating a continuity than through explicit set rules that would encompass it. It expressed more than defined.

7.1.4. Outlook: A Project formulation as an answer to my personal Objective

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[76] Reich, S. (1968). *Music as a Gradual Process.* in *Writings on Music 1965–2000*, Oxford University Press, 2002, pp. 34–36.

[77] Epstein, P. (1986). *Pattern Structure and Process in Steve Reich's Piano Phase.* Oxford University Press, The Musical Quarterly LXXII(4):494-502.

[78] Processing website. https://processing.org

[79] Csikszentmihalyi, M. And Getzels, J. W. (1973). *The Personality of Young Artists: An Empirical and Theoretical Exploration*.The British Psychology Society.

[80] Danto, A. (1981). *Transfiguration of the common place.* Harvard University Press.

[81] Seigmeister, S. *Things I have learned in my life so far*, and other Seigmeister projects. On his personal website. https://sagmeister.com/work/things-i-have-learned-in-my-life-so-far/

[82] Philippe Starck Instagram. https://www.instagram.com/starck/?hl=fr

I like the Idea to conclude my Thesis with the Formulation of an application Project. It encompasses the back and forth movement between *Concepts* and *Forms* that I described in the document: indeed, the project is the *Tangible Incarnation* of *Concepts* revealed and explored in the *Thesis*. Going back to Practice, isn't it a *Design Manifesto* ?

Project's Objective:

How to incarnate the concept of Identity in physical artifacts ?

Lui :
Tu as l'air pensif…

Lui :
Je suis crevé surtout… il est trois heures du mat…

Lui :
C'est vrai…

Lui :
…

Lui :
…
Et sinon, tu me disais que tu t'étais remis à peindre ?

8. Conclusion

How to encourage Radical Innovation in design Sprints, by using Art and Technologies ?

To answer this question, I propose the approach of *Precipitated Convergence* that relies on three principles to create *Radical Forms* and *Concepts*: *High-Level conceptual anchoring*, *Rapid Incarnation* and use of *Arts and Technologies as creative tools*. This approach This model was shown to articulate well with existing framework and to offer interesting applications in terms of HCI *Research* and Workshop facilitation. It proposes a shift from more traditional approaches for Innovation Sprints.

Precipitated Convergence is a promising tool for creators to reflect on their practices. As such it way a model that can support the teaching of *Design* and *Innovation*. The model is also thought to allow application in the context of *Creative Sprints* and can be used as a facilitation framework. I hope it can support existing practices, probably in ways I did not foresee and benefit the ecosystem as a whole.

Finally across the thesis I hope to have contributed to show that distinctions between artistic and technical practices is more permissive than one may though. In this sense I hope I participated at my modest scale to create bridges between creative and scientific fields.

This Thesis will certainly support my professional practice, as it gathers clarifies several key notions related to the notions of *Design*, *Innovation,* and *Creation*. As such it is a useful support for expert activities, like consulting or teaching.

Finally, on a more personal level, with writing came the urge to create. I resumed painting and I conclude my work with a Project Formulation. I am still searching. I think this what it takes to

Research through Design.

Le vent se lève!…

Figures

The following figures are used in the Thesis.

Illustration for the cover was taken by me.

The portfolio presenting the outcomes of the Creartathon is the property of the Ex-Situ laboratory of the INRIA.

Tables

The following tables are used in the Thesis.

References

The following reference are used in the Thesis:

Vasari, G. (1568). *Le vite de'piu eccellentipittori, scultori, et architettori* (Lives of the Most Eminent Painters, Sculptors and Architects). 3 vols. Giunti.

Ruskin, J. (1883) *The Seven Lamps of Architecture.* George Allen. p.57.

Cumming, E. And Kaplan, W. J. (1991). *The arts and crafts movement.* Thames and Hudson - world of art.

Gropius, W. (1919). *Program of the Staatliche Bauhaus in Weimar.* Translated from German by Design Museum of Chicago, In Website, www.bauhausmanifesto.com.

Findeli, A. (1999). *La tradition du Bauhaus peut-elle nous instruire aujourd'hui?.* In book, Canadian Museum of Civilization, & The Institute for Contemporary Canadian Craft (1999). *Common Ground: Contemporary Craft, Architecture and the Decorative Arts.* University of Ottawa Press. pp. 29–44.

Loewy, R. (2002). *Never leave well enough alone*. Johns Hopkins University Press. : French title of the book.

Buxton, B. (2007). *Sketching User Experiences: Getting the Design Right and the Right Design*. Morgan Kaufman. p.78.

Gibson, James J. (1977). *The Theory of Affordances*. In book, Shaw, R. and Bransford, J. (Ed.), *Perceiving, Acting, and Knowing*. Lawrence Erlbaum. pp. 67-82

Norman, D. A. (2013). *The design of everyday things*. MIT Press. / First edition : Norman, D. A. (1988). *The Psychology of Everyday Things*. New York: Basic Books.

Norman, D. (2010). *Design Thinking: A Useful Myth*. In Web, https://www.core77.com/posts/16790/design-thinking-a-useful-myth-16790

Brown, T. (2019). *L'Esprit Design* (original : *Change by Design*). Pearson France.

Stiegler, B. (2004), interviewed by Geel, C.. In article, Geel, C. (2004). *Design and Uses: a Design of Responsibility?.* Azimuts no 24.

Findeli, A. (2018). *Recherche-création et recherche-projet: même combat ?.* In book, Les Presses de l'Université Laval, *Pour une éthique partagée de la recherche-création en milieu universitaire*. pp. 41–60.

Dorst, K. (2007). *The core of 'design thinking' and its application.* In, Elsevier, Design Studies Volume 32, Issue 6, November 2011, Pages 521-532.

Moustakas, C. (1990). *Heuristic Research Design and Methodology.* Person-Centered Review, 5(2), 170–190.

Ménissier. T. (2011). *Philosophie et innovation, ou philosophie de l'innovation?*. Klesis - Revue philosophique.

OECD and Eurostat (2005). *Oslo manual: Guidelines for collecting and interpreting innovation data.* Third edition. OECD.

Stiegler, B. (1994). *La technique et le temps*, vol. 1. Fayard. p.59.

Leroi-Gourhan, A. (1964). *Technique et langage.* In book, Leroi-Gourhan, A. (1964). *Le Geste et la Parole*, vol. 1. Albin Michel, coll. « Sciences d'aujourd'hui ».

Huyghe, P.D. (2014). *À quoi tient le design.* De l'incidence édition, vol. *Poussées techniques. Conduite de découverte*.

Beyer, J., & Pfister, H. (2020). *Design sprints for online and on-campus visualization courses.* In Proc. IEEE VIS Workshop Data Vis Activities Facilitate Learn., Reflecting, Discussing, Designing (pp. 1-4).

Frayling, C. (1993). *Research in Art and Design*. Royal College of Art Research Papers. I, 1, pp.1993-1994.

Dunne, A. and Raby, F. (2013). *Speculative everything: design, fiction, and social dreaming*. The MIT Press.

Auger, J. (2013). *Speculative design: crafting the speculation*. In Digital Creativity (2013). Volume 24, Issue 1 : Design Fiction.

Beaudouin-Lafon, M., Bødker, S., Mackay, W. (2021). *Generative Theories of Interaction*. ACM Transaction on Computer-Human Interaction. Vol 28, Issue 6, pp. 1-54.

Buxton, B. (2007). *Sketching User Experiences: Getting the Design Right and the Right Design*. Morgan Kaufman.

Zimmerman, J., Forlizzi, J., Evenson, S. (2007). *Research through design as a method for interaction design research in HCI.* SIGCHI Conference on Human Factors in Computing Systems, CHI '07.

Venable, J., Pries-Heje, J. and Baskerville, R. (2016). *FEDS: a Framework for Evaluation in Design Science.* Research. Eur J Inf Syst 25, 77–89.

Knapp, J. and Zeratsky, J. and Kowitz, B. (2016). *Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days*. Simon & Schuster.

Boyton, A. and Fischer, B. (2011). The Idea Hunter: How to *Find* the Best Ideas and Make Them Happen. Jossey-Bass

Ries, E. (2011). *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses.* Currency.

Banfield, R. and Lombardo, C. T. and Wax, T. (2015). *Design Sprint: A Prac- tical Guidebook for Building Great Digital Products*. O'Reilly Media, Inc.

Web, https://www.epitech.eu/

Brown, T. (2019). *L'Esprit Design* (original : *Change by Design*). Pearson France.

Lerwick M. and Link P. and Leifer L. (2018). *The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystem.* Wiley.

Web, https://www.enib.fr/fr/

Web, https://www.digital-campus.paris/

Araújo, C. et al (2019). *Design Thinking Versus Design Sprint: A Comparative Study*. In book: *Design, User Experience, and Usability. Design Philosophy and Theory* (pp.291-306)

Penin, L. (2018). *An Introduction to Service Design Designing the Invisible*. Bloomsbury.

Possible Future-French Bureau. *Playbook*. On Website, https://www.possible-future.com/wp-content/uploads/2020/08/playbook-possible-future-2020.pdf

EFAP, l'école des nouveaux métiers de la communication. Website: https://www.efap.com/

Art Thinking workshops. https://www.artthinkingcollective.org/workshop

Buxton, W. (2001). *Less is More (More or Less)*, in P. Denning (Ed.), *The Invisible Future: The seamless integration of technology in everyday life.* New York: McGraw Hill, 145 - 179.

Norman, D. and Verganti, R. (2014). *Incremental and Radical Innovation: Design Research vs. Technology and Meaning Change.* DesignIssues: Volume 30, Number 1.

Dahlin, K.B. and Behrens, D.M. (2005). *When Is an Invention Really Radical? Defining and Measuring Technological Radicalness.* Research Policy 34: 717–37.

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 (22 pages). Sage Publications, Inc.

Tushman, M. L. and Anderson, A. D. (1986). *Technological Discontinuities and Organizational Environments*. *Administrative Science Quarterly*, 31: pp. 439-465.

Schumpeter, J. A. (1939): *Business Cycles*. Cambridge University Press.

Altshuller, G.S. and Shapiro, R.B. (1956). *The psychology of inventive creativity.* Voprosy psikhologii [Issues of Psychology], No. 6, 1956. pp. 37-49

Hatchuel, A. and Weil, B. (2009). *C-K design theory: an advanced formulation.* Res Eng Design, 19:181–192

Verganti, R. (2011). *Radical Design and Technology Epiphanies: A New Focus for Research on Design Management.* Product Development & Management Association, Prod Innov Manag, 28, 384-388.

Beaudouin-Lafon, M., Chapuis, O., Eagan, J., Gjerlufsen, T., and Huot, S. et al. (2012). *Multisurface Interaction in the WILD Room*. Computer, Special Issue on Interaction Beyond the Keyboard, 45 (4), pp.48-56.

Oakley, K. and Sperry, B. and Pratt,A (2008). *The art of innovation: How fine arts graduates contribute to innovation.* Hasan Bakhshi.

MIT Media Lab website. https://www.media.mit.edu/

IRCAM, Centre Pompidou. https://www.ircam.fr/

Bill Buxton personal website. https://www.billbuxton.com/

The Getty, Los Angeles, Getty Research Institute (1996). *« Inventory of the Experiments in Art and Technology Records, 1966-1993 ».* In website: http://www.oac.cdlib.org/findaid/ark:/13030/tf4j49n6rt/

Harris, C. (1999). *Art and innovation: the Xerox PARC Artist-in-Residence program.* Mit Press.

Art-Thinking: an agile method to create the improbable with certainty. In Website, https://www.artthinkingcollective.org/

Bureau, S. (2022). Méthodes Agiles: Pourquoi et comments en finir avec l'hyper-focalisation sur les clients ? ESCP Business School, Executive Education.

Ex-Situ Laboratory. On Website, https://ex-situ.lri.fr/

Ex-Situ laboratory. *Creartathon 2022*. In website, https://ex-situ.lri.fr/workshops/creartathon22#gallery

Platon. *Phedre.* Les Belles Lettres, Classiques en Poche.

Buchanan, R. (1992). *Wicked Problems in Design Thinking.* Design Issues, Vol. 8, No. 2 (Spring, 1992), pp. 5-21 (17 pages). The MIT Press.

Renée Descartes, *Méditations métaphysiques*, GF, 1992, Méditation seconde, p.71-93

Reich, S. (1968). *Music as a Gradual Process.* in *Writings on Music 1965–2000*, Oxford University Press, 2002, pp. 34–36.

Epstein, P. (1986). *Pattern Structure and Process in Steve Reich's Piano Phase.* Oxford University Press, The Musical Quarterly LXXII(4):494-502.

Processing website. https://processing.org

Csikszentmihalyi, M. And Getzels, J. W. (1973). *The Personality of Young Artists: An Empirical and Theoretical Exploration*.The British Psychology Society.

Danto, A. (1981). *Transfiguration of the common place.* Harvard University Press.

Seigmeister, S. *Things I have learned in my life so far*, and other Seigmeister projects. On his personal website. https://sagmeister.com/work/things-i-have-learned-in-my-life-so-far/

Philippe Starck Instagram. https://www.instagram.com/starck/?hl=fr