

#### HIGH CULTURAL DENSITY MANUFACTURING

A model for the integration of technological innovation and craftsmanship to synergize cultural value and economic sustainability

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#### **1** THE EVOLVING WORLD OF MANUFACTURING

#### 16 The fourth industrial revolution

The world of manufacturing is undergoing a time of radical transformation. Design is required both to adapt to the changes and requirements of production and, more importantly, to apply its methodology to direct the efforts of innovation to a positive outcome for users, environment and economy.

#### 22 Technological innovations, production scenarios, enterprise solutions

Industry 4.0 is an approach to the organization of a smart, flexible and connected factory which opens new opportunities of business inside companies as well as horizontally and vertically in the markets. This model has deeper consequences than a greater level of automation and efficiency on the production line, potentially disrupting many economical aspects of our society outside of the factory as well.

#### 34 An objective look at the current state of development

The impact of a fourth industrial revolution has gradually captured the attention of a wide public in the last few years. While the great benefits and potential threats are being strongly debated in most industrial-intensive countries around the world, it is relevant to look at what are the promises of this revolution, where we are on this path today, and what could be the different destinations of this journey.

#### 40 From Industry 4.0 to Company 4.0

Connectedness is one of the core elements of the 4.0 approach. While there is a strong emphasis on the industrial Internet technologies that empower communication between machines and people, it is also important to give relevance to the connections, new and existing, established between the factory and other sectors of economy and society. An open-minded approach makes evident that the discussed transformation is interest of a broader variety of enterprises even outside of the production sector.

#### 48 A value map of the fourth industrial revolution

With a systemic approach we can draft a map of the actors and bonds involved in this complex net of relations. The connections between the parts highlight some of the many different value chains affected by the fourth industrial revolution. It is evident how the vast diversity of solutions part of this approach do not hold a single inherent purpose, thus they need to be declined specifically for different use cases.

#### 62 The relevance of the territory

In order to give a specific intent to the application of an Industry 4.0 approach it is possible to look at the local context of the territory as a framework, with the influence of its own manufacturing sector as well as the characteristic cultural heritage as the common thread to achieve a specific and effective solution.

### 2 LOOKING FROM THE TERRITORY

#### 68 Made in Italy

Using Italian manufacturing as a case study for the application of the fourth industrial revolutions' paradigms, we identify the characteristic relationship between craftsmanship and industry that is at the essence of Made in Italy as a crucial factor to shape a localization of the Industry 4.0 strategy, in particular addressing the balance between hand work and an excessive automation that could be detrimental to the actual or perceived value of the goods.

#### 76 The value of efficiency

The technologies and solutions proposed by the Industry 4.0 strategy are still bound to a perception of increasing efficiency to bring more value inside the factory. From the scope of the local use case, a different viewpoint is explored where the added value of greater efficiency in some parts of the process is invested in a greater flexibility and economical sustainability of the high-quality work of the craftsman that cannot be automated or substituted by machines.

#### 82 The scope economy

The application of technologies that allow for a more scale-insensitive production along with those that bring efficiency all around the process create favourable conditions for the development of businesses that take strong advantage of scope economy, as opposed of scale economy, in order to deliver a variety of goods that satisfy increasingly individualised needs from the customer.

#### 88 The augmented craftsman

Empowered with tools that enhance its production speed and flexibility while maintaining the peculiar experience, knowhow and skills that distinguish him, the craftsman can work in a contemporary context which is not just restricted to small niches and extreme luxury. From the public, a newer conception of hand-work that does not shy away from the capabilities offered by digital technology is needed to appreciate completely the value of this evolution of artisanship.

#### **THE CULTURAL VALUE**

#### 94 Cultural and commercial value

A scenario of different mixes of value proposal, ranging from a pure cultural offer to a completely commercial one, analysed in relation to the business proposition, the key features and the contrasting approaches. This map is then explored in order to develop a more specific path for the use case of Industry 4.0 paradigm in a craftmanship enterprise.

#### 98 Art: Pure cultural value work

The art sector has been considered particularly relevant for its sensitive need of balancing a cultural intensive activity with the economic needs of any sustainable business practice. The integration of digital technology in the process of creation and the apparent conflict between cultural and commercial objectives are two key issues of this particular context that apply to the researched use case.

#### 108 Craftsmanship: Being through with the stereotype

Abandoning the nostalgic picture of the lone hand worker in its workshop, a contemporary vision of the craftsman is identified that integrates effectively with industry and is not afraid of technology in its work. The emerging figure is not outdone by the factory, instead it is the key for providing quality goods and leveraging on the competition in many manufacturing segments.

#### 120 Industry: Best practices from the factory

The industrial segment is focused on delivering goods with a prominent commercial value. The main driving force in this sector is competition, which can be mainly achieved through efficiency of costs and better positioning on the market. Even if this kind of enterprise has usually low interest in delivering cultural value it is cardinal in the application of organization, technology and process practices.

#### 128 Made in Italy: Quality, research, innovation

The Italian industrial model is characterized by a system of values which treasures a design and innovation driven manufacturing. In this context the cultural value becomes more relevant for the industry has it is a distinguishing factor that differentiates these enterprises from their competition through an attention to quality and specialization which other manufacturers cannot provide.

#### 138 A high cultural density manufacture

In order to combine the high cultural value provided by the skilled work of the craftsman with the organizational and technologic innovations that come from the industrial segment, a manufacturing segment which relies on intensive use of cultural elements to compete in the market is identified. The product of this process is an artefact as cultural product which holds a value that is not merely commercial to the user and its social environment.

#### ▲ ESTABLISHING A METHODOLOGY

#### 150 On the contribution of industry and university

In the process of balancing the cultural proposition with the business needs of a manufacturing enterprise, it is significant to establish relationships with both the academic institutions and the industrial sector to integrate the best practises of cultural innovation and market competitiveness.

#### 164 Guidelines for experimentation

From the awareness of the different segments of the explored scenario with their relevant features, guidelines have been established to be able to conduct a practical application of the discussed use case. Six main significant areas of the approach have been identified to deliver the mix of cultural and commercial value of the process.

#### 168 Diffusion of culture

Before establishing a manufacturing process, it is significant to note the relevance of craftsmanship in the diffusion of cultural elements, from material culture to production skills, which can be important both in research and industrial environments to deliver specialized results and top quality. Thus, a first touch point of the process becomes the competence of the craftsman as an experienced worker in its specific segment.

#### 194 Analogic and digital

A sensitive part of the proposition of cultural value resides in the means of design and actual production. Especially, there is a conflict between the perception of traditional hand-work as more valuable than digital fabrication techniques from the public as well as a struggle from the traditional craftsman to accept and integrate these digital opportunities in their work without devaluating their production or expertise.

#### 212 Technology and innovation

While an increasingly efficient and adaptable factory could supposedly be detrimental to the craftsmanship enterprise, it is possible to envision how the small and medium scale manufacturer can benefit from many of the technologies and solutions proposed in the Industry 4.0 model while also make use of the flexibility of its smaller size to give even more relevant usage to this approach.

#### 230 Design and artefacts

The label of hand-made is not enough to incorporate and transmit the value of neither the goods or the process. To bring together these different needs, solutions and strategies in a coherent proposal, design is necessary not only on the single product level but as a strategic approach to both integrate innovation in the enterprise and communicate it effectively to the user.

#### 248 The Cultural Value

The core of the proposition is the added value that comes from the integration of cultural elements that gives a sense of authenticity to the products and elevates them from the standardization of mass production. The cultural content is sensitive to the user thus it must be effectively communicated to be appreciated in its entireness and resonate with its own cultural background and social environment.

#### 274 Economic sustainability

The will behind this approach is empowering the craftsmanship enterprise to compete in a real production environment. For this to be possible it is necessary to be realistic when evaluating the current manufacturing market which poses both significant cost issues and great opportunities of competition through added value. The globalized market itself is increasing the demand of local products, which is a constructive condition for the development of a cultural intensive business approach.

#### DIRECTIONS FOR PRACTICAL APPLICATION

#### 302 Choosing an operational framework

In order to verify the guidelines developed in the methodology stage, a field test has been devised to get an initial feedback on the innovation model. Even though the process is suitable for the renovation of existing business models both in the craftsmanship and small industrial sector, in order to assess the potential of the methodology in all the stages of research and production an operational framework has been chosen to shape a new business concept from scratch.

#### 310 The Precious Plastic project

The open source project Precious Plastic, started by the Dutch designer Dave Hakkens, is a platform for raising awareness of the true value of plastic materials through the diffusion of a plastic waste recycling toolset which can be assembled and operated in an accessible way for people all around the world. The open source nature of the project stimulated the creation of a worldwide community made of people collecting plastic waste, workspaces for recycling and manufacturing and businesses selling recycled plastic goods.

#### 328 Cultural Value drivers

The cultural value of any work is subject to a complex system of interactions between individual, society, territory and experience. In this case study, the cultural scenario of recycled plastic has been analysed to identify some core drivers which can help integrate and communicate the cultural value characteristic of this specific process and framework, assessing both the nature of the input and final output of the system.

#### 340 **Design concept**

From the designed scenario, a concept has been selected to create a connection between the cultural value generated from the plastic recycling process and a cultural segment who is able to understand it and appreciate it. The choice identified "sports celebrating the environment" as the direction to craft a business strategy which successfully bridges the cultural and commercial aspects of the methodology.

#### 346 **Research survey**

To conduct a preliminary testing of the design concept, a research survey has been structured to assess the potential of the approach and gather feedback from potential customers about their evaluation of the offered cultural value. The questions have been devised to focus core elements both on the cultural and commercial level of the potential value proposition. The data collected opens the way for the implementation of the methodology into a practical business model.

#### 358 Guidelines implementation

Once the preparations for the testing stage have been conducted, the methodological part of the thesis has been applied practically to design the business model of the high cultural density manufacturing concept case study. The entire process has been applied, following the six main fields, implementing the most relevant guidelines in a practical and distinct way to be coherent and successful for the concept enterprise.

#### 372 Business strategy

The business concept has been developed further by applying the methodology in a realistic scenario. The guidelines have been implemented into a business model which takes in consideration the requirements and settings of a real-world scenario. The outcome of this stage is the structure of the experimental enterprise which can then be practically implemented and tested in an actual economic environment.

#### 380 Definition of an experimental phase

After preparing the business model for a real-world application, the last step is introducing the business concept for the high cultural density manufacture on the market. In order to conduct a preliminary test of the business model, a pre-sale prototyping has been planned to assess the interest of the public through a crowd-funding platform. This final stage of the experimentation is designed to check the response of the market and gather crucial feedback with a minimum viable product minimizing the investment risk.

#### 400 Further development

The launch of the crowdfunding campaign marks the first real step into the market. This stage is crucial to gather the response of the public, whether it is a success which propels the growth of the business or a failure which provides invaluable insights for the development of the model at a minimized cost. The application of the concept through all the stages of the methodology designed in the thesis establishes a case study for the real-world application, where actual businesses and startups might choose to adopt the high cultural density manufacturing model to foster innovation and generate new value both on the cultural and commercial level.

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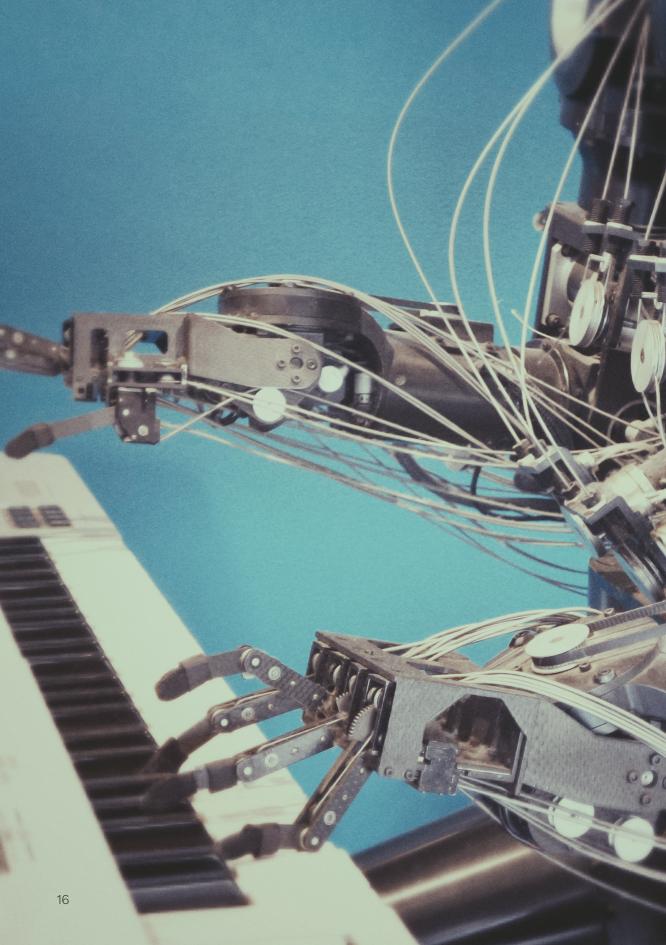
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Appendix

THE EVOLVING WORLD OF MANUFACTURING PART 01





## The fourth industrial revolution

The global scenario of production technologies and enterprises, including all the more or less directly related processes and activities along the supply chain, is undergoing a profound transformation process which is expected to revolutionize the world of manufacturing. The pervasive adoption of digital technologies and their exponential performance increase has established the premises for an innovative scenario, shaping the next great step in the way we make things: the fourth industrial revolution. The term Industrie 4.0 has been first introduced in a German policy for high-tech manufacturing in 2011<sup>1</sup> and has gained popularity in the next years as major industrial production intensive nations, both in the EU and in the rest of the world, developed their own adaptations of this strategy. The indication of "4.0" refers numerically to the previous industrial revolutions and makes use of the software notation to emphasize the scale of this change, which ideally gives start to a new era of production. The definition itself, despite already being widely adopted as the standard to define the next evolution of industrial practices, has been debated for the supposed lack of the introduction of a completely new system or technology, differently from all the previous historic industrial revolutions. Moreover, it is notable how this is the first time an industrial revolution is analysed and

1. Source: www.bmbf.de/de/zukunftsprojekt-industrie-4-0-848.html

modelled before it takes place rather than ex-post, as has actually been the case for all the historical precedents. Nonetheless, from a scientific standpoint the technologies and solutions proposed in the Industry 4.0 manufacturing model are capable of delivering a major shift in the actual industrial production processes, potentially holding a remarkable influence outside of the factory as well. The disruptive impact which could be delivered on economy, society, infrastructures, enterprises and education is an indicator of the advent of a new industrial revolution.

All the previous historical transformations of industry have been centred on the development and introduction of a new technological or infrastructural breakthrough which disruptively innovated the established ways of producing, distributing and consuming in the respective societies. From our retrospective point of view, the introduction of steam engines, electricity or microelectronics in the past three industrial revolutions were an obvious advantage, the potential of which would be absurd to not appreciate or even turn away. However, following the historical evolution of these transformations it is more evident how none of these revolutions happened overnight. Actually, the introduction of new technologies could initially cause reactions ranging from underappreciation to ridiculing or even fear, as happened for example for the introduction of electricity in homes. Such radical changes held a considerable influence, not just on the factory and the fabrication processes happening inside of it but indirectly affecting society as a whole. Several decades have been necessary each time to move from the initial recognition

the introduction of new technologies could initially cause reactions ranging from underappreciation to ridiculing or even fear

> of the new technologies into a mature adoption which fully recognizes and employs their potential both in commercial and social environments. While industry might have been the quickest in the recognition of some business potential in these technologies, introducing such change is impossible for any actor alone, however big, as it needs a joint effort and cooperation on an infrastructural level to be effective. The industrial revolutions spread on every stage of the supply chain, even requiring the creation of supportive infrastructures which are necessary for the distribution and logistics. This need of the factory has a direct influence on society, as the innovations introduced in this context often spread to the benefit of businesses and people outside of the manufacturing environment as well. These transformations of industry also have a relevant impact on employment and working conditions as well as the geographical and societal distribution of wealth, contributing considerably to the steady evolution of civilization. The newfound progress becomes the foundation for further technologic and scientific innovation, in a positive loop which is essential for the growth of society as a whole.

The third industrial revolution, which ranged from the second half of the twentieth century to approximately the first decade of the twenty-first one, has witnessed the rise of electronics and information technology, with an unprecedentedly fast performance increase and scale reduction. In this period of time, the introduction of microcontrollers, computers, telecommunications and robotics into the factory accomplished a disruptive innovation of the industrial processes, leading to an unprecedented level of automation, precision and efficiency and therefore opening many new directions for the further development of the manufacturing scenario. The mature conditions of this digital era of fabrication have made the product design and engineering as well as tooling and manufacturing stages almost completely digitalized, making delocalization of production increasingly easier and promoting mass production as the best route to achieve greater efficiency thanks to the cost optimization possible through scale economy.

In the last decade, a new generation of digital technologies saw the rise in the industrial environment. Thanks to the development of reliable and accessible infrastructures like pervasive diffusion of high-speed internet access, cloudcomputing and big data analysis, innovative technologies and solutions have been defined to empower a further step in the evolution of manufacturing processes. Through the application of potentially disruptive technologies like artificial intelligence the fourth industrial revolution has the possibility to deliver a much greater impact than an increased level of efficiency and automation inside the factory. While, in the immediate, optimization could be the first experimental stage for the introduction of these technologies from existing industrial firms, once maturely employed the Industry 4.0 model could disrupt the current concept of factory itself, consequently changing the way products and services are consumed, desired or perceived in society itself.



## Technological innovations, production scenarios, enterprise solutions

The former industrial revolutions were mostly dependant on the emergence of a core new technology, infrastructure or energy source which was taken advantage of with the support of favourable economic, politic and cultural conditions, resulting in a massive transformation of the previous industrial processes and practices. In the case of Industry 4.0 it is difficult to highlight a specific enabling technology which is going to spark the process of transformation. More realistically, this paradigm essentially brings together many already existing or recently developed technologies and tools into a single comprehensive strategical approach to accomplish a new generation of industrial processes through smart, flexible and connected factories and machinery.

From this collection of technologies and solutions there are some which are relatively new entries to the industrial sector, as their performance or reliability was not yet mature enough to be introduced successfully in the factory, and others which were already developed but found a new purpose or application in the manufacturing environment thanks to the cohesive use of industrial internet, connecting every element of the fabrication and logistics processes from machinery to goods and even workers themselves. It is important to underline how, as the fourth industrial revolution is being planned and designed in advance, on top of technological advancement it is necessary to establish the propitious circumstances for this innovation process to mature and spread, in the same way the previous evolutions of manufacturing were supported by infrastructural and economic conditions. Therefore, the supportive intervention of governments and regulators and to some extent the cultural acceptance and predisposition of the whole society are fundamental to foster this change and accomplish the full potential of this innovating force.

The concept of connectedness is a key theme in this advanced approach to production in several levels. Inside the factory itself, the implementation of industrial internet-based solutions will provide connection to the machinery, which will employ edge-computing and will be able to recognize individual products and people, the people, who can be tracked and directed through customized directions, and the goods, which will be univocally identifiable and trackable from the start of their production through delivery. As the model progressively finds its most effective applications, this networked condition of the factory will transform deeply the interactions happening inside the production plant, where machines will increasingly shift from automated to autonomous and the whole process is gradually virtualized and simulated. From the worker's standpoint, this evolution of the manufacturing processes and methods will establish novel interactions and working procedures when relating with the tools, facilities and goods which characterize the different industrial processes. Outside of the factory as well, this trend of pervasive and constant connection and interaction between parts will bring a wide transformation of commercial relations both between businesses and consumers. The diffusion of data collection and analysis along with the increasing digitalization of processes will open the space for innovative business solutions which employ this lighter and agile connected approach as an asset to be flexible and competitive on the market, potentially achieving disruptive solutions which revolutionize the services sector as well. These effects of the evolution of the factory will have direct consequences on the innovation of the supply chain, both vertically and horizontally, and will involve even the indirect actors of these processes because of the economic flows resulting from this restructuring of manufacturing. Individual customers, even without being exposed directly to the changes happening inside the factory, will be affected by the connecting flows of the fourth industrial revolution in their consumer experience, expecting an increased interaction with companies, actual goods and other customers through a pervasive integration of internet connection and invisible data collection and communication. From a wider and inclusive perspective, this connecting tendency will establish many new relations and interactions between existing or newly introduced parts while giving a more tangible and direct form to current logic or practical connections between actors of the larger economic system.





#### Additive Manufacturing Technologies

Tools of manufacturing based on additive techniques give the advantage of significantly smaller initial investment and no cost in the variation of products, but without the scale economy benefits

#### **Industrial Internet**

The internet enabled network of sensors and actuators and the identification of all the goods, machines and workers allows for smart interactions and organization inside the factory



#### Augmented / Virtual / Mixed Reality

Reality based technologies will generate opportunities for simulation of tasks, advanced learning, data communication and smart interaction with machines and devices



#### **Edge-computing**

On top of generating data continuosly, machines will be enabled with edge computing for an immediate elaboration and analysis even before transmitting to a cloud storage of information

Some of the main technologies powering the Industry 4.0 model



#### Cyber Physical Production Systems

The tools of the production line become autonomous and connected, communicating with each other and making decisions in real time, also generating a virtual digital twin of the factory



#### **Artificial Intelligence**

There is a significant potential for the use of AI in the factory, especially in conjuction with CCPSs which open potential like predictive maintainance and increased autonomous flexibility of production lines



#### **Autonomous Vehicles**

The presence of autonomous vehicles for both human and resources transportation will have a significant impact in the organization of supply, warehousing and assembly line activities



#### **Big Data**

The connected network of actors inside and outside the factory generates a vast amount of data which is stored and analysed to improve performance and strategy

# $\bigcup_{i=1}^{n}$

#### **Cloud-based Strategies**

The connected nature of machines, goods, people and buildings will make solutions based on cloud services more impactful, from data analysis to cloud manufacturing



The digitalization of all steps of production as well as the tracking of goods and supply chain will generate vast amounts of data which can be analysed and exploited in real-time



#### **Cyber Security**

Beside being an opportunity for growth and innovation, the vast amount of data and the digitalization of every process means the necessity of far superior means of security from informatic threats



#### **Mass Customization**

The employment of tools and manufacturing techniques which are less determined by scale economy offers the opportunity to individualize the offer while keeping the serial speed and precision

Some of the main solutions and challenges part of the Industry 4.0 model



#### **Smart Logistics**

The innovation will involve the whole supply chain, needing logistics and warehousing as well to update to new means of smart organization and communication to stay competitive



#### **New Business Models**

Many new opportunities for business structures arise, from the trend to relocate production to domestic areas to cloud-manufacturing with close range suppliers and less transportation



#### Formation and Growth of the Workforce

With the automation of an even larger part of production tasks, workers will need to be facilitated in the transition to new higher skill level jobs of supervision and control in the future production line



#### Quick-response Strategies

By combining the approach of mass customization with the analysis of big data in almost real time, it will be possible to make changes to production cheap and fast Inside the factory, the actual industrial processes affected by the introduction of the technologies and strategies of the 4.0 model can achieve innovative workflows which break from the current sedimented methods of organizing production of the established industrial sector. The usually most optimized industrial structure of the assembly line could potentially be revolutionized in the Industry 4.0 model. The introduction of these new technologies and infrastructures, which conveniently allow for flexibility of production in a costly effective way, opens novel opportunities for industrial process which do not follow the usual sequential development stages of design, engineering, manufacture and distribution. Whereas the established model of manufacturing invests consistently in time and resources to achieve a single and most effective fabrication process which cannot be changed without extremely large expenses, the paradigm of Industry 4.0 should allow factories to employ an iterative research, design and manufacture model where every stage is repeatable and the process is in constant evolution. This approach allows for quick and cost-effective changes to the characteristics of production even after the start of the distribution phase, potentially integrating feedback from the pervasive data-collection happening inside the factory and within the product as well, allowing for a fast response to emerging market requirements or potential production improvements. This is made possible not only from the collection and analysis of data, which to some extent is already done and is achievable in usual industrial processes, but from the introduction of increasingly scale-insensitive production technologies which are less bound to the traditional mass manufacturing restrictions.



"Pendolino", born in the Alstom factory of Savigliano. The process of design and manufacturing in the plant has been heavily digitalized in the past decade, producing a workflow which relies on interactive informational media to aid the workers in the many complex operations of the production line (Magone Mazali 2016). image source: https://www.alstom.com/media.

On a theoretical level, the Industry 4.0 model aims to achieve a factory which can effectively adapt to constantly different external requirements, ideally repurposing continuously tools and machinery or autonomously reorganizing workspaces. Some currently existing fabrication technologies are inherently less sensitive to scale of production, comparing for example injection moulding to fused deposition modelling, and the fourth industrial revolution aims to increase consistently the effectiveness of this tools in larger scale manufacturing environments. Clearly, to introduce a continuous and iterative process of production and design will not be possible by straightforwardly introducing new technologies inside the factory. The entire model of the company, its objectives, the professionals and even the hierarchy would have to be restructured to fit a completely different concept of production. Nonetheless, enterprises successful in achieving this disruptive approach to the industrial process could have the opportunity to introduce an unexpectedly competitive offer on the market.

One of the most promising achievements of an ideal implementation of Industry 4.0 is the capability to attain a fabrication process which can sustain, in an economically efficient way, the benefits of a mass manufacturing model with the flexibility of on-demand individualized production. This "mass customization" model would make possible to manufacture goods with the precision, quality and cost-effectiveness of mass scale production but with the potential to make every single unit of the product customized and traced for a specific customer. Such strategy would ideally break the common conceptions about serial production and foster completely new approaches to manufacturing and distribution, overcoming the most limiting drawbacks of the current mass production model which relies mostly on an economy of scale to achieve the efficiency of the industrial process. In practice, this process would require a vast technological renovation inside the factory, integrating intelligent responsive machinery with a CCPS model to make production mostly autonomous and reliable tracking systems for goods to be identified from generation to final delivery.

The flows generating and interacting in this complex system of increasingly connected parts lay the foundation for many disruptive innovations which are impossible to predict in the current stage of formalization of the Industry 4.0 model as a proposal for the development of a fourth industrial revolution. Outside of the elements strictly related to the initial 4.0 paradigm, a deep network of relations will spread the effects of this change to every sector of economy to adapt and respond to this innovation with progress in infrastructures, services, finance, education and distribution. Whereas the currently established manufacturers would need remarkable investments of time and resources to completely restructure their current processes to employ this model, the smaller enterprises and the new players on the economic scenario might make use of their agile structure to adopt the paradigm of the fourth industrial revolution right from the start, boosting their competitiveness by anticipating other enterprises in the race to innovation. Making a clever use of strategies like cloud-manufacturing, the current notions of production and distribution could be completely re-established, while more solutions for production and logistics in the 4.0 model also aim at restoring domestic and close-range production in spite of the strong trend for relocation of the manufacturing facilities to cheap-labour countries.



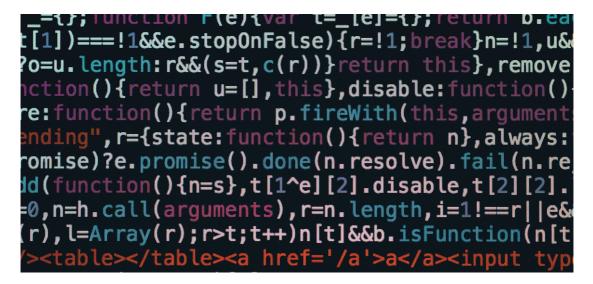
### An objective look at the current state of development

The last few years have seen a quick rise in popularity of Industry 4.0, which became a widely debated topic and gained the interest of increasing numbers of people outside of the inner circle of the industry insiders. The quick pace of events and debates around this issue, fostered by the workin-progress nature of the model itself, generated both a vast amount of interest around the fourth industrial revolutions as much as confusion about the actual content or practical implementation of this solutions. The service providers of Industry 4.0 solutions, which have already begun to develop and implement the first packages for the innovation of factories, have been especially prolific in the diffusion of the benefits coming from this innovation, not only inside the manufacturing lines in terms of efficiency and profits but outside of the production plant for customers and workers.

This positive atmosphere of progress and innovation promotes a general optimistic inclination of the public towards the advancements of economy and society. However, when dealing with a topic which is still in an explorative and mostly theoretic stage, it is fundamental to avoid getting lost in utopian visions of the future and focus the attention on the reality of what is actually possible to achieve in the present or near future as well as what is most important and overall favourable to aim for and accomplish in the long term. From this perspective, looking critically at the technologies and solutions of the Industry 4.0 paradigm is essential to evaluate where we currently are on this path and which exactly is the destination we are moving forward to.

An interesting point of view on this subject has been provided by the Senior Vice President of General Electric, one of the main providers of Industry 4.0 solutions, Deborah Sherry. She offers an insider look on these technologies and opportunities and their state of development and implementation in her article about "Debunking the Myths of Industry 4.0"<sup>2</sup>. Four major features have been taken in consideration on this topic: AI in the Box, Magic Big Data, Digital Skills and Human Factor. The common thread is that the advertised factory of the future is indeed a reachable reality, but that right now we are still far from an intelligent, flexible, autonomous productive plant and that what is actually doable today is still not of immediate implementation. We are not yet able to make use of plug-and-play intelligent technologies that can act reliably on their own. For example, AI "still takes a great deal of human intelligence to be effective", big data needs "knowing which data is valuable enough to be collected" as well as a methodology to study, interpret and implement the gathered information. The issue of talent and job skills is also relevant, as people not only are not going to disappear from the factory but will need increasingly specialized education to switch from repetitive assembly line duties to a dynamic information-centric process that involves cooperation with

<sup>2.</sup> Deborah Sherry, 2017, https://www.linkedin.com/pulse/we-want-build-factory-future-need-go-beyond-industry-40-sherry/



Coding becomes an increasingly relevant skill as digital competencies start to be requested increasingly in once analogic workflows

intelligent machines. Another relevant point concerns the role of people in this more autonomous robotic factory. While the technologies of production become more digital and intelligent there is an apprehension for the current workforce, who on one hand may see its experience on the field get outdated or depreciated while on the other may not be given the opportunity to stay up-to-date with the skill request of these new job requirements. The digitalization process that once reformed and in great part automated the lower steps of the work hierarchy is seemingly proceeding in the direction of higher job positions which formerly appeared impossible to systematize.

EU technology and innovation roadmaps such as Factories of the Future from the European Factory of the

Future Research Association (EFFRA) and the Strategic Research Agenda from the European Technology Platform on Smart Systems Integration (EPoSS) are useful parameters to understand the path to the future season of manufacturing and industry. While it would be short-sighted to dismiss the technological advancements promoted as fourth industrial revolution as nothing more than a marketing trend, even with an open mind to change and the will to push forward a vision of the future, it is explicit that there is still a long way to go before getting to the idealized scenario of a widespread, mature and established Industry 4.0.

An objective look at the current state of development



### From Industry 4.0 to Company 4.0

Previous industrial revolutions had a considerable impact on many aspects of society and lifestyle for the communities involved more or less directly from the development of considerably different means of production, mobility and labour distribution. The ways changes of this scale can affect the whole society is problematic to model and predict realistically, as unforeseen causal connections or disruptive approaches to the initial proposal are inevitably part of this restructuring process. The accessibility of products, services and jobs, both on an economic and distance scale, as well as the different shapes these could take thanks to the renovation of production processes, are all conditions which can greatly affect lifestyles and economic environments on a large scale and in ways which are difficult to forecast. This considerations have been true for the historical precedents, which generated vast indirect consequences on living conditions and mass behaviours which were not strictly related to what was happening inside the factories at first. For the fourth industrial revolution this may prove to be even more significant and evident as, in the current stage of conceptualization and early development of the new industrial model, it is already strongly oriented to the disruption of many commonly established customs of the current industrial society.

The European Factories of the Future Research Association, which has been actively contributing to the research and development of the Industry 4.0 model, has defined some long-term objectives for this innovation flow in its Factories of the Future report which is part of the Horizon 2020 roadmap. In the document, the European commission delineates future scenarios for industry which place the factory in direct relation with surrounding environment to understand how will the role of manufacturers evolve in the future. In this document there have been defined four main scenarios for the interaction of industry with society and the environment in the future. The first is "factory and nature" which underlines the necessity of industry to adopt sustainable processes under every aspect, from material employment to energy consumption and waste disposal, to be a positive influence in the future of production. The second is "factory as a good neighbour" which draws the attention to the usually unpleasant presence of the industrial facilities in current city planning and on the consequent need to make factories a favourable and accepted presence in urban contexts. The third is "factory in the value chain" which focuses on the positive impact of collaborative practices from manufacturers in the wider economy and the influence of new strategies on the development of smarter and more efficient supply chains. The last is "factory and humans" which targets the importance of people in an increasingly automated environment to understand new needs of workers in the smart factory as well as improvement and evolution of current job conditions, wages and formation. This vision of the factory interacting with and influencing its surroundings underlines how important it is to consider the implications of the fourth industrial revolution from a wider perspective, including how this innovations will change sectors like energy, transport, well-being and infrastructures which are key to the whole society and economy as a system. For this reason, it is fundamental that all businesses, despite their grade of relatedness to industrial manufacturing, understand the progress advised by the Industry 4.0 program. Every enterprise which wishes to stay competitive in this dynamic environment, regardless of its economic segment of operation, is required to be knowledgeable with this programmed change in order to be prepared to new policies and requirements coming from other collaborating businesses as well as innovative demand from their customers. The history of industry, even in very recent times, is full of remarkably successful companies which failed to adapt to emerging conditions and requests, ultimately being disrupted by competitors which were quicker to adopt new strategies or even delivered completely new solutions on the market. This concern is significant as well in the case of the fourth industrial revolution and, despite the recurring theme of the factory, this innovation affects every big or small economic actor, including consumers themselves as individuals.

In fact, in the diffused Industry 4.0 development scenario there has already been a progressive shift of concept from an overtly factory related paradigm to a broader notion of Company 4.0, which encompasses in a more inclusive way every economic actor outside of the strictly industrial scenario. This change of perspective highlights in a more direct way the influence of Looking at the Italian program, the official policy regarding the fourth industrial revolution has in fact be renamed to Impresa 4.0, reflecting this commitment to engage every different layer of economy

> the introduction of technological advancement on business innovation in general, rather than reducing this interaction to a passive causal connection where non-manufacturing actors are only indirectly invested by the new paradigm of production. The involvement of businesses coming from not strictly industrial sectors in the development of the 4.0 model is essential for every party to benefit the most from this transition, as we have underlined how this model is inherently systemic in its network of interactions. Moreover, enterprises in every sector can be protagonist of this change by making use of many of these technological and business innovations which are not necessarily bounded to the employment inside the factory. Looking at the Italian program, the official policy regarding the fourth industrial revolution has in fact be renamed to "Impresa 4.0", reflecting this commitment to engage every different layer of economy rather than limiting this progress to the manufacturing environment.

> This tendency is even more understandable when focusing the attention on the single technologies which empower

the Industry 4.0 model. Aside from some improvements which relate strictly to the actual serial manufacturing stages and the respective tools and machinery, the array of solutions in the smart factory model are actually not only beneficial to a diverse range of enterprises but, in some cases, they have been already experimented with successfully. Service-oriented companies for example have been already testing on the field the use of AI and Deep Learning to provide effective solutions, managing customers relations and delivering innovative offers. It is evident that, in a near future where the fourth industrial revolution reaches a mature stage of practical implementation, businesses in every economic segment will be adopting these technological advancements effectively in their own way to keep the pace of competition. The actualization of the ideal Industry 4.0 paradigm by itself, even if it were specifically limited at the revolution of industrial manufacturing, would still require a great deal of disruption and innovation in a large range of external infrastructures to accomplish its logistic and business objectives, making the renovation of the whole economy a necessary step by definition.

It is manifest that, compared to the initial Industry 4.0 program, the transformation of the entire economic system is an even larger and more challenging task. As it has been described how the industrial revolution is realistically a fairly slower process than the name implies, it is necessary to always keep the big picture present and be aware of how this change will involve all other aspects of society in order to make this change

a real opportunity for better working and living conditions. The practical implementation of this model does not only require the technology, material resources and investments. The human presence is essential for a successful result therefore, when discussing the transformation of businesses, it is significant to keep in mind also how jobs will evolve, the nature of the work of the future and how existing and newer employees will fit in the organization of the smart enterprises. The workforce must be ready to adopt new methods and organizational models to provide effective results in an evolving work environment. To achieve this, the companies must act preventively by establishing a framework for formation and knowledge diffusion which accompanies the current workforce during the transformation process. From this perspective, parallelly to the investments in actual production assets and infrastructures, companies will be required to dedicate resources and time proactively to update the competences of their workers to this technological evolution, both inside the factory nd in other businesses. The academic institutions can provide in invaluable help on this matter by providing innovative education while new talent is still in the higher education cycle as well as activating channels for collaboration with the enterprises to provide formation to the current workforce, facilitating the reception and success of the innovations introduced in the company. The introduction of fresh younger talent among the experienced workers can stimulate a positive contamination where the two sides can help each other integrating digital skills of the contemporary education programmes with specific knowhow gathered with years of experience on site.

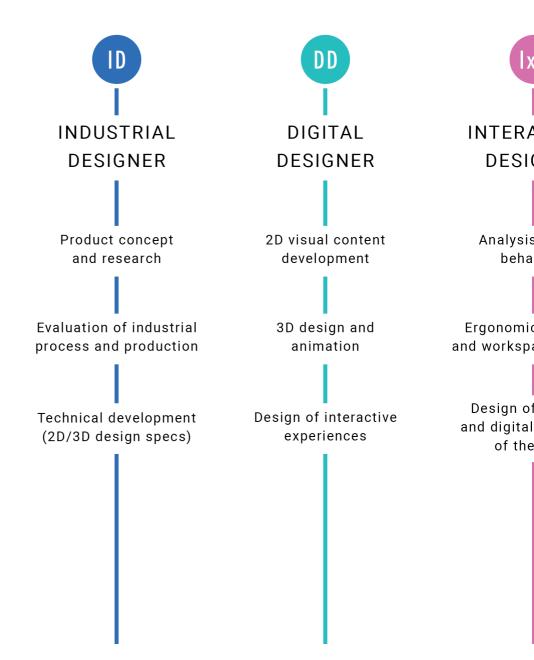
A comprehensive observation of this process from a systemic point of view highlights how the surfacing schemes of the next industrial revolutions hold complex and deeply networked interactions between appearing or current parts. When actively making an effort to program this evolution of economy and consequently of society, the attention to the interests, relations and connections within the existing and emerging actors of the system is essential to design an approach which seizes the opportunity for the global improvement of current conditions of life and work under every aspect.



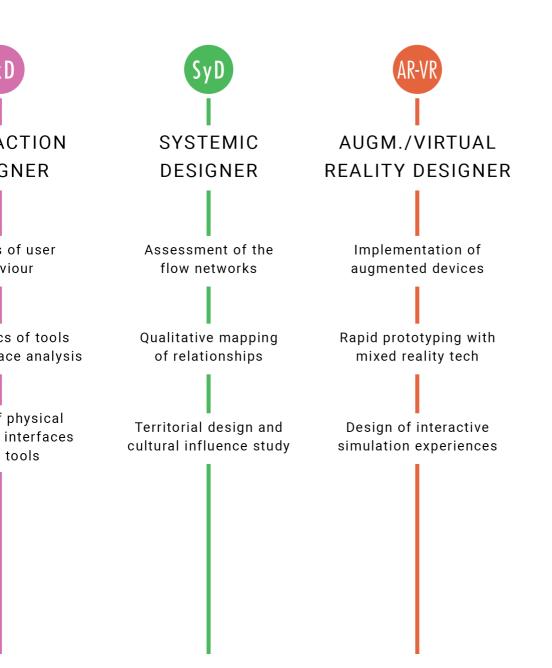
# A value map of the fourth industrial revolution

It has been underlined how the Industry 4.0 program attempts at redefining completely many existing processes of manufacturing and distribution, establishing new relations as well as introducing new elements and activities. Such a radical transformation of industry cannot be overlooked by designers as the two domains are strictly related and have always depended closely on one another. Therefore, to understand the influence of designers in the scenario of the fourth industrial revolution, a conceptual mapping activity has been employed to understand the structure of the factory of the future and identify any potential opportunities for the development of a design-oriented approach.

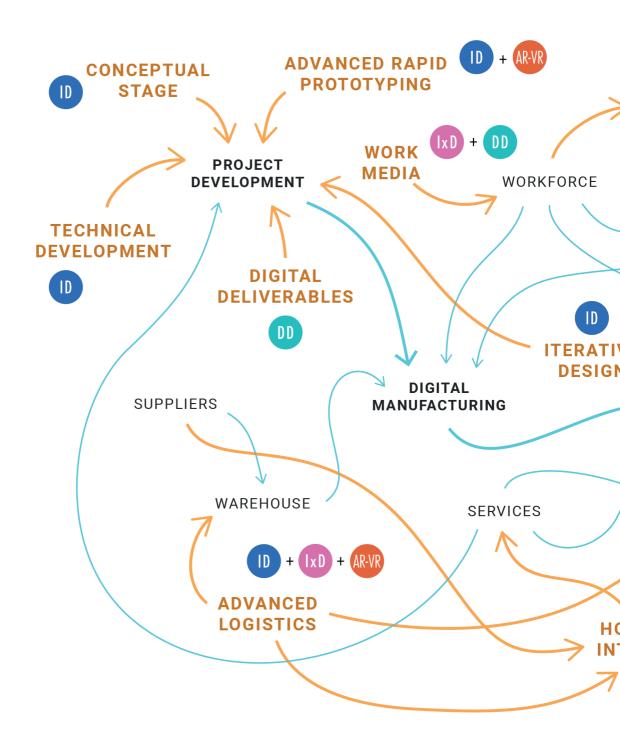
By structuring an initial model of the different stages of an industrial activity following the 4.0 paradigm, the key areas of technological and business innovation have been defined. The diagram has then been analysed from the perspective of the designer, with a wide definition that embraces a diverse set of specializations, to target the potential areas of action. Along the supply chain, many opportunities for the intervention of design have been identified.



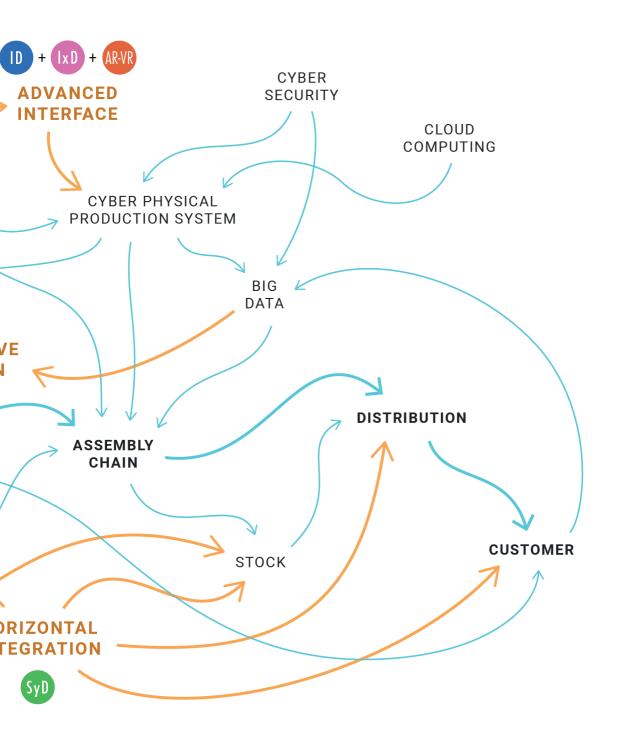
Glossary of the several design specializations which can take part in the different parts of the future factory



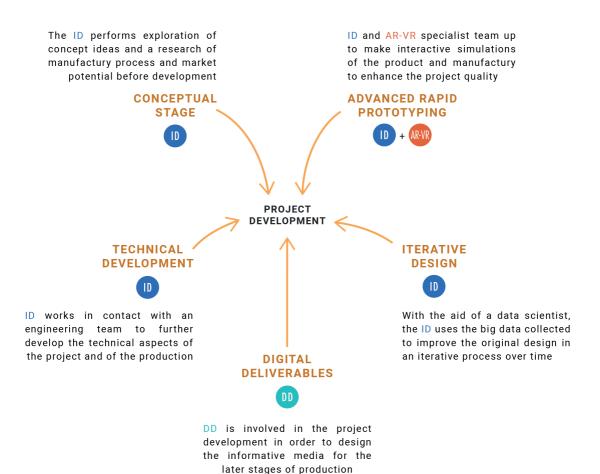
A value map of the fourth industrial revolution



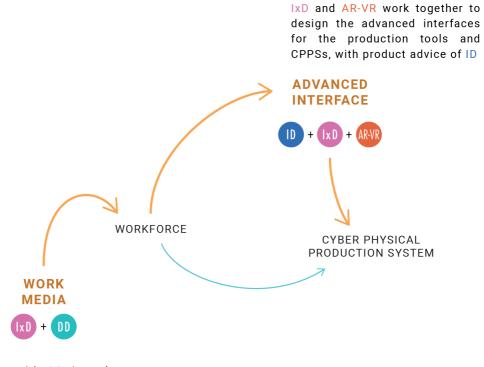
**KEY DESIGN OPPORTUNITIES** for the intervention of different designers in the future factory process



The initial phase of project development holds a vast potential for design driven innovation as the evolution of the means of production introduces many opportunities to not just fabricate things with a different process but to employ these technological advancements cleverly to manufacture goods in ways which were not possible to offer before. One of the main targets of the fourth industrial revolution is restructuring the production process to increase efficiently the flexibility of fabrication. To make use of this potential it is essential to attentively make use of design, aiming at the formulation of solutions of production which effectively employ the unique possibilities introduced by this new production paradigm. The project development phase also changes its role compared to the traditional production process as the possibility for iterative design will require recursive efforts to improve products and processes, making the development a parallel activity which follows the whole cycle rather than an isolated first block which closes when the effective manufacturing phase starts.

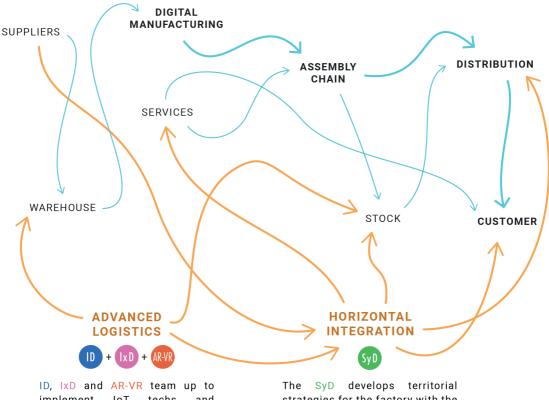


Once the project development stage flows into the practical execution of the manufacturing processes, the centre of the attention shifts to the workers and the machinery, especially focusing on the way these two realms interact within themselves and with each other. In the ideal execution of an Industry 4.0 fabrication pipeline, the machinery involved in the actual production should be autonomous in the execution of flexible manufacturing processes. However, the same should not be assumed of the workers who operate these tools, interact with them or supervise the fabrication process. The workforce is expected to be increasingly adaptable as well, shifting from a specialization in specific steps of the process to a wider understanding of the entire workflow. For this adaptability to be executed correctly it is fundamental that the workers are provided with relevant instructions in every situation, aided by support media and material which helps always maintaining the control of the situation both in a task or process perspective. To make this relation between people and machines more synergic it is also necessary to design the interfaces of these tools and devices in the most effective way. By making use of the technological opportunities of the smart factory, the interaction should be designed to efficiently blend virtual and real, introducing smart and unobtrusive interfaces while complementing the formation and testing with simulation tools.



IxD works with DD in order to develop interactive informational media that will aid the workforce during the manufactury process

While the manufacturing process employs a flexible approach to offer innovative products and services, the supportive logistic stages both at the input and output of the factory must be designed to make the industrial processes efficient and economically successful. The Industry 4.0 model offers many insights on the development of smart and innovative logistics model, implementing the same strategies for adaptability to technologically enhance these stages of the supply chain. The designer can organize and improve these activities by introducing technological innovation into the process. From a wider perspective, the fourth industrial revolution aims at a reconfiguration of networks between enterprises, communities and environments. For this scope, the systemic designer's intervention is fundamental in defining the objectives and solutions for this cooperation between different actors, generating benefits on an economic, environmental and social level. Horizontal integration among companies on the territory through technological innovation through a systemic approach is a valuable opportunity for the fourth industrial revolution.



ID, IxD and AR-VR team up to implement IoT techs and modified reality devices to enhance the logistic process The SyD develops territorial strategies for the factory with the implementation of new business models and network cooperation

To identify the potential opportunities for the development of a design-driven innovation strategy for the Industry 4.0 approach, a value map has been traced to attempt a better understanding of the overall structure of the fourth industrial revolution scenario. It has been underlined how this transformation of the manufacturing sector multiplies and reshapes the flows of matter and information between the factory of the future and its environment. Staying true to the core feature of connectedness of the Industry 4.0 model, the resulting network of interactions is a complex system which is shaped by the numerous relationships forming between people, goods, companies, societies and the environment. The resulting scheme highlights the profoundly systemic nature of this issue, connecting economic, social and environmental requirements from an array of different actors which need to cooperate in order to achieve the best possible results from the actual implementation of this paradigm.

Employing the systemic vision to approach this complex scenario of interacting parts with their own distinctive values and objectives, it appears evident how the Industry 4.0 model must be approached with an increased attention to its deeply networked nature not only inside the factory but on a considerably wider perspective. This awareness of the bigger picture, identifying the opportunities for models of cooperation between enterprises to generate new value in the chain, highlights how the Industry 4.0 cannot be employed successfully at its potential if it is conceived as an abstract model which makes no difference in its implementation anywhere in the world. This issue brings into attention the need for a more concrete and practical vision of the fourth industrial revolution which relates more strictly with specific territories with their individual qualities and requirements, aiming to achieve innovative solutions both inside the territory and from the cooperation of different communities.



# The relevance of the territory

The Industry 4.0 model is composed of an extensive set of synergic technologies and strategies which target the renovation of the current manufacturing standards to reshape the possibilities of production. From this wide collection of solutions, each firm is expected to strategically define which tools and advancements to implement in order to grow and progress while staying competitive on an evolving market. However, the 4.0 paradigm does not explicitly imply a distinct specific goal, nor do the technologies by themselves inherently manifest a purpose for their application which goes beyond cheaper production costs or faster and more organized processes. The full potential of the ideal fourth industrial revolution though, which goes far beyond the pursuit of constantly increasing efficiency of manufacturing, requires to act specifically in every different context by defining innovation strategies which make use of the technological introductions to accomplish remarkable achievements which are consistent with an actual revolution of the manufacturing scenario. Every industrial sector or individual enterprise with its distinctive processes and requirements would therefore have to adapt the Industry 4.0 model to the specific situation, aiming to employ these technologies farther than the optimization level in a disruptive way, aspiring to unlock a market potential which was

previously unreachable or even unconceivable.

This attention to the different needs of distinct industrial sectors, economic segments and territories has already been addressed to some extent since the original release of the Industrie 4.0 program from the German commission. In the recent years, most manufacturing intensive countries of the world have proposed their own policies and regulations around the theme of the fourth industrial revolution. However, these territory-specific programmes have usually directed the attention to one or the other aspect of the whole paradigm without going too far in the adaptation of the abstract model to the distinctive needs of the countries, mostly to avoid investing excessive time and therefore falling back in the global competition to the achievement of the new manufacturing evolution. Making use of the systemic approach, the territory actually appears to provide a solid structure for the development of innovative production strategies which take in account the distinctive gualities of defined territories and communities to concretely realise meaningful applications of Industry 4.0. The manufacturing sector is not to be considered a purely commercial entity which is disconnected by the cultural heritage of a territory. The production of goods is often one of the most representative economic activities to convey the traditions, values and specializations of a community. Therefore, to accomplish a purposeful implementation of the strategies coming from the fourth industrial revolution into a realistic setting, it is proposed that the territorial identity and industrial vocation is employed as a starting point to approach



the successful implementation of Industry 4.0 with a systemic approach. In this research, the Made in Italy has been chosen as a manufacturing and cultural context to explore as the foundation of a local adaptation of this innovation program, assessing the distinctive benefits and the potential issues of adopting this approach.

# PART 02 LOOKING FROM THE TERRITORY





### Made in Italy

The Italian manufacturing scenario offers a series of unique characteristics, developed through time thanks to the local and external cultural and commercial influences, which with the passage of time established this production environment as unique and renowned worldwide. This production scenario involves a great variety of economic segments, which are commonly united through the employment of the iconic country of origin label of Made in Italy, which evolved in time from a simple definition of the manufacturing country to an actual brand with its own qualities and consumer perception.

To understand the distinctive features and the successful traits of this entrepreneurial excellence of the Italian production scenario, it is worthwhile to evaluate the process of the gradual configuration and codifying of this industrial system in time. The first steps of the industrial scenario currently defined as Made in Italy can be retraced to the years following the Second World War. In this period, the industrial sector consolidated a distinctive approach to manufacture which was characterized by a significant networked organization. This system featured a synergized and collaborative approach to production and supply chain on a territorially defined scale, where different enterprises specialized in single stages of the whole process unified by the "industrial atmosphere" of a local community (P. Bertola, 2014). The resulting industrial districts, with their local and systemic action, held a remarkable relevance in the development of the distinctive features of the Made in Italy production and the corresponding system of values which is now associated to this label. The nature of the Industrial District can be defined through four main characteristics: the district is a system, made of relationships between different agents aggregated by a set of rules, usually informal; the firms in the district are independent, they maximize their profits through the specialization on few steps of the overall cycles and the established bonds with other actors of the system; institutions endorse the development of the district, encouraging the interaction between its parts and the growth of the community; the districts have a local dimension, the interaction among the actors happens in its geographical boundaries (C. Pietrobelli, 1998). Across the country, different local communities consolidated their knowledge and heritage coming from the territory and cultural identity into excellence production networks specialized in different manufacturing segments. A wider ecosystem of industrial districts has gradually surfaced, which featured every community of practice contributing to the foundation and definition of an overall industrial approach which in time came to identify the distinctive production of Made in Italy. An essential feature of this manufacturing approach is the unique blend of industrial vocation and high-quality craftsmanship, which made the products of this segment renowned worldwide and still appreciated to this day. The Made in Italy label, far from being



On top of the values of quality and design, the Made in Italy products are often sought-after for the underlying image of a conceptualized Italian style, especially abroad.

a simple indication of the place where the product is fabricated, inherently conveys a system of values, which is expressed naturally by the products through the attention to detail, the outstanding quality, the innovation of form and function and the authenticity coming from the lineage of a craftsmanshiporiented enterprise. Aside from the specific quality which every district is able to deliver in its own manufacturing segment, at the foundation of this system is a renowned and recognized culture of quality, which has been achieved progressively in time through the cumulative contribution of a legacy of Italian products and enterprises which have distinguished themselves for the superior standards for design, research and communication (P. Bertola, 2014).

The distinctive qualitative offer of Made in Italy is mainly associated with four sectors of manufacturing which are commonly known in Italian as the "Four As": food (alimentare), clothing and fashion (abbigliamento-moda), home furnishing (arredo-casa) and mechanics (automazione-meccanica) (S. Micelli, V. Sacchetti, 2014). The success of the companies operating in this sector was founded consistently on the distinctive organization of the territory in specialized industrial districts. The enterprises benefited strongly in their growth of the presence of this local production networks and of their corresponding communities of practice, which provided a specific and sedimented knowhow along with an excellent workforce featuring the mastery of the respective tools, materials and processes. The organization of production in industrial districts, with its unique networked structure, has been successfully leveraged to generate a more agile economic and industrial system. Thanks to this flexibility, small and medium companies of the Italian manufacturing scenario have often been able to successfully withstand the significant economic pressure coming from the international production environment. Even though global firms had the possibility to compete fiercely through their large scale and financial availability, the companies of Made in Italy have been able to take advantage of the flexibility of its production system to quickly employ small and fast incremental changes to their processes and offer, reacting better to changing market demands and outperforming the competitors on quality and specialization (S. Micelli, V. Sacchetti, 2014). However, the same system which offered this advantage of quick and effective adaptation has also

Thanks to this flexibility, small and medium companies of the Italian manufacturing scenario have often been able to successfully withstand the significant economic pressure

held back Made in Italy in the renovation of its strategies over time. The structure of the industrial districts, while efficient for the introduction of fast and incremental innovations, did not prove effective for wider-scale and deeper transformation, becoming a slowing factor in the long-term restructuring of production to stay competitive on evolving markets. Therefore, the original industrial district system started losing its effectiveness in the international economic scenario in the last decades. The external intervention of a super partes institution could have provided the necessary strategic and coordination input to plan and execute shared efforts for the achievement of common future goals (C. Pietrobelli, 1998).

More recently however, this apparent crisis of the industrial district model has returned different results. The global competition in the digital transformation, promoted by the advent of the mature phase of the third industrial revolution, coexisted with a period of strong economic crisis which questioned the performance and competitivity of many small companies of the Italian manufacturing scenario. Nonetheless, while a superficial look at the economic tendencies could lead to the conclusion of the decline of the joint model of excellent craftsmanship and industrial vocation, which favoured the initial rise of Made in Italy but also seemingly anchored it to the past in a contemporary period of evolution of demand, the figures actually highlight a different scenario where Italian companies fared fairly well in this diffused economic crisis time . An interesting interpretation of this phenomenon could be that of a model which was not approaching its end but rather investing a considerable effort on a restructuring of its old declination. The companies which endured this demanding stage of reorganization and successfully overcame the economic crisis have been able to convey the technological demands of a contemporary industrial model with the high standards for management and design that always characterized the production of Made in Italy, maintaining the cultural soul of this unique manufacturing approach. The advance of globalization has not always been threatening for this model, as the same tendency to delocalize production to other countries which has often been detrimental to the quality of the produced goods has conversely attracted to Italy the manufacturing requests of respected international firms, seeking to distinguish their offer on the market through the specialized knowhow and excellent quality that only the Italian industrial districts have often been able to provide.

The specific conditions which have distinguished the Made in Italy from competition over time are therefore fundamental in

the exploration of the opportunities coming from the innovation brought by the fourth industrial revolution, contextualizing the general paradigm of the Industry 4.0 on a local application through the distinctive qualities of this specialized manufacturing scenario. The key to the successful accomplishment of this ambitious objective is to employ an approach which is both sensitive to the richness of the cultural environment, a determining factor in the development of the superior design and quality of production of this manufacturing sector, while righteously taking advantage of the heritage and sedimented knowhow of Made in Italy to enhance the competitiveness on the global market through an exclusive added value. Rather than letting the transition to the Industry 4.0 model be the occasion to cut with the past, favouring an international model which is globally competitive but not distinctively better or different in any specific country, the peculiar blend of craftsmanship, industrial atmosphere, design-driven innovation and managerial practices which have distinguished and supported Made in Italy in its initial rise should once again act as the foundation on which to build the next step of the industrial transformation, positioning Italy in a contemporary, innovative and competitive position while employing the same values which made the manufacturing sector unique in the first place.



# The value of efficiency

From the long-term objectives and strategies of the Industry 4.0 model, it is clear that the mature age of the fourth industrial revolution holds a potential for innovation which are on a completely different level from the improvement and optimization of current processes. The actuation of these strategies will require to restructure completely both the factory itself and the way goods are produced which, by the means of the connectedness of this paradigm previously underlined, will have a decisive economic and social impact on many other spheres of society which are not immediately related to manufacturing. While only being theoretic, the prospective future scenarios identified in the 4.0 model vary greatly in features and scope with considerably ambitious directions. These ideal scenarios range from the total substitution of human workers in the production lines, leaving only space for the supervision of the autonomous and intelligent machines, to completely flexible factories, which can autonomously adapt to different production lines and requirements with almost no human input, to the establishment of globally distributed networks of autonomous production and distribution. These conceptual scenarios depict significantly radical transformations of what is actually established as the factory, prefiguring important indirect consequences outside of the industrial environment. However, it

has also been highlighted how the current state of development of practical solution and implementations of the Industry 4.0 model is still very close to the usual production model, usually only investing in the direction of a "smarter" factory. The main short-term application still continues to be a greater level of automation in the existing factory and production line, with the consequent increasing of efficiency in the operations. One of the main barriers is the economic investment in this transformation, as the employment of the new solutions currently requires large capitals for the purchase and implementation of the technological advancements. However, the only actors which can afford such an investment are huge industrial firms with sedimented processes and production workflows which are significantly difficult to transform in such a radical way. Moreover, such costly improvements require a clear definition of the return on investment for the company, which is easier to achieve or even just measure with a straightforward implementation of efficiency improvements. Conversely smaller industries or startups, which enjoy a much more flexible organization and a totally different innovation freedom, cannot easily employ disruptive models based on Industry 4.0 because of the very limited resources that they can invest on the transformation.

The current situation is then imposing serious limits to the short-term application of the more disruptive innovations coming from the fourth industrial revolution, if not in strictly experimental contexts where the economic competitiveness can be momentarily set aside in favour of research and development the improvements coming from this model would be adopted in the existing value chain to enhance what makes the process unique while optimizing significantly all the accessory activities

> activities. Nevertheless, searching for the opportunity of a more meaningful application of these advancements while continuing to refer to the framework established from the features and benefits of the Made in Italy manufacturing scenario, an opening to experiment a different application has been defined. Staying true to the system of values which characterized the Italian manufacturing environment, a shift of attention is proposed from the pursuit of greater efficiency and automation to reduce costs to the increase of the quality of production. As it has been previously described, the distinctive approach of Made in Italy emerges from a purposeful interaction between the outstanding quality of craftsmanship and the organizational capabilities of industry, successfully mixing the added value of cultural heritage with the research and innovation promoted by a design-led management (P. Bertola, 2014). Staying faithful to this commitment, the technological advancements coming from the fourth industrial revolution in the Italian manufacturing context could therefore be directed to the empowerment of this unique blend making through the adoption of these innovations. Rather than making

the current system competitively obsolete, the improvements coming from this model would be adopted in the existing value chain to enhance what makes the process unique while optimizing significantly all the accessory activities. Although far from the heavily industrialized factory protagonist of the Industry 4.0 model, in the perspective of the Company 4.0 the craftsmanshiporiented enterprise has a large deal of benefits to introduce in its own manufacturing sector. Employing an attentive approach to the preservation of all the stages of production where the direct input of the craftsman generates the outstanding quality and cultural added value which make characterize the product, the technological and organizational advancements proposed in the model offer many opportunities to deliver innovation along all the stages of the supply chain. By increasing considerably the efficiency of logistics and distribution, the customer relationship and marketing and the business model itself, the craftsmanshiporiented enterprise could invest more on the activities which make its offer really competitive. The superior quality of the product, the opportunity for customization and the direct relationship between producer and customer which define the approach of the craftsman can therefore be offered to a larger audience, in spite of the current limitation of the luxury segment imposed by the excessive costs of this process.

The value of efficiency



### The scope economy

As it is typical in manufacturing businesses, in order to increase the turnover of a creation process the volume of production tends to be amplified, capitalizing on the fixed costs to increase the profits. This strategy is defined as scale economics. The necessary condition for it to work is the concentration of a considerable demand in a market on the offer of few goods and services. This kind of environment has usually thrived on the production of "hits", products that attract enormous attention and demand outstanding the competition. The polarization of culture was extremely important in this process, as the channels for diffusion of information as well had more restrictive volume limitations, thus they needed to invest on content which was more probable to attract interest. This situation has almost been the rule in the last decades and still is to a big extent in many sectors of economy. In this perspective, those productions which only attracted a niche of interest where mostly dismissed as "misses" and failed to be economically sustainable as they were outplayed by competition. This way the scarcity of available choices on the market has been both a premise and a by-product of the globalized production system in a looping fashion. The trend, though, has been changing in the last decades with the democratization of broadband internet availability. The access to an unprecedented cultural abundance has offered the opportunity to spark demand outside of the mainstream selection while the rise of web commerce created the link between demand and offer in these niche segments. Chris Anderson popularized this concept as "The Long Tail" in the homonymous 2009 book. The infinite availability of different cultural stimuli empowers the demand for increasing choice where it used to be scarcity of options. While the markets have been strongly reshaped by this increasing demand for less mainstream goods, in recent years this trend has started to acquire further relevance because of the request of products that are not just part of very specific segments but become progressively more customized to the needs of the individual consumer.

Rather than capitalizing on the scale of batches, this strategy would give relevance to recurring assets and knowhow to deliver efficiently a wider offer of goods and services

> The Industry 4.0 program takes into account these requests from the market, trying to build a bridge between the economic sustainability of manufacturing processes and the increasingly individualized needs of the customers. The production strategy of mass-customization ideally aims to offer the benefits of mass production on quality, reliability and cost efficiency joint to the

flexibility of on-demand customized goods. Although being one of the most promising offers of the fourth industrial revolution, the implementation in a real-world context is still lacking the necessary technology and infrastructure. While the potential for factories to address tailored requests from customers with specific individualized needs appears enticing, there is still a long way from the currently available 4.0 technologic solutions to an idealized adaptable production plant which can shift flexibly, efficiently and almost autonomously between different production lines to address single-unit batches of goods to be delivered to individual customers around the world. However, in the current industrial applications pushing toward this goal we can already observe a promising shift to an adaptable process which, tough being far from a single-unit batch, is still much more efficient in delivering a broader choice of products with different characteristics. In many sectors, diversification of production is becoming more valuable for businesses and 4.0 manufacturing technologies increase this shift to an economy of scope. Rather than capitalizing on the scale of batches, this strategy would give relevance to recurring assets and knowhow to deliver efficiently a wider offer of goods and services, empowered especially by digital technologies which become progressively less sensitive to scale both in production and logistics.

The market demand for more qualitative and individualized solutions resonates strongly with the distinctive features of the Made in Italy production. This perspective looks at masscustomization from the opposite side and would require for tailored productions to achieve greater efficiency and scale in order to address increasing request from customers. The technological and strategic offer of the Industry 4.0 paradigm could be key in achieving this change. A thoughtful implementation of digital solutions, which respects the value of craftsmanship from one hand while empowering business volume from the other, will be one of the greatest challenges for a transition of Made in Italy into the fourth industrial revolution.

The scope economy



## The augmented craftsman

In a common industrial intensive factory, Industry 4.0 asserts a strong push towards a reality of production where the "hard" work is increasingly automated in favour of a knowledge worker acting as coordinator thanks to its experience of the overall process. The assembly line approach, with blue collar workers specialised in their small area of influence inside a bigger and complex scenario outside of their knowledge and responsibility, becomes less effective in a 4.0 environment because of the dynamic processes of the smart factory. While the increasing level of precision and dependability of robotic instruments becomes able to substitute a growing percentage of the manual skillset held by the traditional industrial worker it also escalates the need for human competences and experience in this flexible production environment.

When evaluating the possible future evolution of work in a craftsmanship intensive enterprise, it is fundamental to assess this relation between the worker, its knowhow and the technologic tools and assets. In the collective consciousness, artisanship and industry are perceived as opposite realms. One is a slow, tailored and traditional process while the other is a fast, serial and contemporary one. The reality of manufacturing is much more nuanced than this black and white antagonism. In the case of the four main sectors of Made in Italy we can see how there coexist situations where craftsmanship and automation are mixed in different ratios to deliver goods with an outstanding quality at a sustainable scale. Excellence businesses in the food and wine segment, for instance, have been able to stay true to their bond with territory and tradition, often connected to small and very specific geographic areas certified by specific regulations, while scaling their business volume and exporting these goods to other countries around the world. The qualitative component of these products is not just a matter of the local sourcing of raw materials but of culture and heritage integrated through the process.

The peculiar mix of industrial business practices and management, attention to design and innovation and distinctive quality provided by expert craftsmanship are crucial in the development of the next scenario of production. While industrial advancements are perceived as a continuous and unavoidable flow towards the future through cycles of technological breakthroughs and consequent fine tunings, the work capabilities of people tend to be perceived statically and nostalgically, like the skills of the craftsman are unable to grow with time and are ultimately going to go extinct in favour of pervasive automated work someday. This misconception fails to appreciate how craftsmanship is not a closed pool of knowledge, bound to the past, which pulls in a different direction from innovation. By addressing craftsmanship as a dynamic mindset, coming from both heritage of the past and personal experience of the present, different tools and challenges coming from a digital environment must not be addressed as an attempt to automatize traditional artisan work but as proper new forms of contemporary craftsmanship, with the same amount of knowledge and dedication

> it is possible to understand how different tools and challenges coming from a digital environment must not be addressed as an attempt to automatize traditional artisan work but as proper new forms of contemporary craftsmanship, with the same amount of knowledge and dedication needed from the more traditional ones. The melancholic look at tradition of handwork is instead detrimental to the full appreciation of the distinctive cultural value provided by contemporary craftsmanship which is an especially competitive factor in Made in Italy both as an independent production and in synergy with the dynamic industrial reality of the fourth industrial revolution. Coding a craftsmanship of the tools of the next industrial age as well as empowering activities and knowhow from tradition with new production instruments is the crucial way for a competitive manufacture environment connecting the pull of technology and innovation with the immense cultural heritage of artisanship.



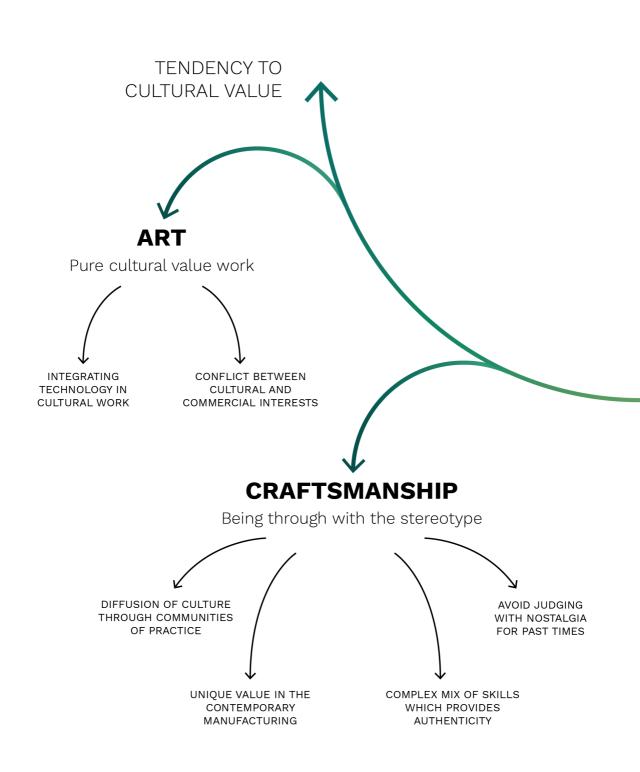




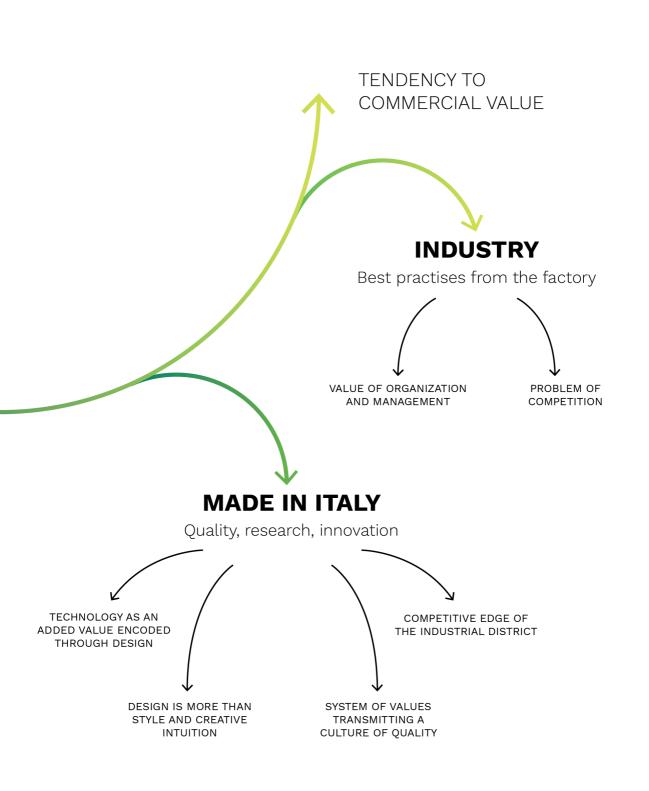
# Cultural and commercial value

In order to develop a more specific path for the use case of Industry 4.0 paradigm in a craftmanship oriented enterprise, a scenario of different blends of cultural and commercial value propositions has been explored. Where the commercial value is objectively and quantitatively defined mostly by forces like market demand and financial transactions localized in global economic networks, the cultural value is a subjective variable which is mediated by a large range of factors both on the side of the producer, like encoded simbolic content, quality and originality of concept, relation and interaction with other existing cultural products, reputation of the author and aestethic of the result, and on the side of each individual interacting with the offer, mediating and interpeting the content through previous cultural experiences and foundations, belonging to different cultural and social groups, interest in the symbolic content and understanding of the background of the proposal.

To understand how these two realms interact, the map as been explored for challenges and opportunities coming from each mix of value, trying to assess the characteristics of a cultural intensive and economically sustainable direction.



Scenario of different propositions in the spectrum of cultural and commercial value offer





# Art: Pure cultural value work

Out of the range of elements in the field of the research, the art sector has been considered the one most centred on the offer of cultural value. Notably, art organizations are here regarded as businesses as well because, beside the conceptual or individual motives behind the artistic activities themselves, they rely on public or private funding and investments, with corresponding expectations, and offer services or goods to their own market characterized by specific demands. This field of the analysis has proved particularly interesting because it highlights some underlying needs and requirements which are distinctive of cultural-intensive activities and which can be contextualized to the scope of the research.

A first perspective on the nature of a cultural intensive production comes from the relationship between commercial and cultural value. While the value of goods and services in the commercial world is defined by economic and financial factors like demand variations and conditions of the market, the cultural value of an artefact is also the result of a complex interaction of different factors like aesthetic conceptual quality, audience reach, reputation and peer recognition. The correct perception of this added worth has a strong subjective component which is influenced by the socio-cultural context of the observer. While less educated and informed audiences could often fail to appreciate the cultural value integrated in the production, especially where it is less related to the employed techniques or materials and more dependent on the conceptual richness, there are some misconceptions which can devaluate cultural work even to the eyes of a more knowledgeable observer. One of the biggest challenges to the perception of the value of goods and services in the artistic sector is the diffused misconception that commercial success is an opposing force to cultural practice and detrimental to the final worth of the production. The popularity and profitability of an artistic production often influence negatively the perception of the cultural value, as the commercial success would compromise the integrity of the concept and its quality. The widespread of this phenomenon is so relevant that artistic organizations often struggle to benefit from their intellectual capital without damaging the relationship with their audience and its development.

The delicate balance between providing powerful and authentic cultural content and the growth of a user base with personal expectations projected on the production of an artist are at the base of this struggle between commercial and cultural success. This issue proves relevant to the research topic when seeking to translate a cultural value coming from local heritage, traditional craftsmanship and rich intellectual content into a scalable business activity with a contemporary market appeal and competitiveness.

In the essay "Capitalising Creativity", Sarah Thelwall proposes a solution for art organizations to profit from their intellectual assets without suffering of this cultural devaluation by investing in parallel services or goods which enhance their economic sustainability. The author makes a distinction between first order and second order activities. The first ones are at the core of concept, design and development as well as actual execution or production depending on the media. This kind of effort is greatly dependant on the expertise of the individuals who participate in the process, requires an initial knowhow and predisposition. The quality of the results is completely dependent of the labour of experienced people thus these tasks are not suited for scaling by definition. On the other hand, as the first order activities integrate the main part of the cultural content, investing on the second order ones can at the same time avoid losing the added value and help profiting from the cultural work in a sustainable and scalable way. Second order activities take advantage of the applied knowledge and perceived cultural value of what has been produced by offering products or services which are suitable of scaling regardless of the initial input of the expert.

An effective and significative implementation of digital tools and skills is also an undergoing challenge of the art sector. This issue has been addressed exhaustively in the 2017 report "The adoption of digital technology in the arts" by the UK foundation Nesta. In the document is presented a snapshot of the relationship between art and digital means, especially with the aim of introducing innovation to the practice. In the introduction

#### In creative processes



The horizontal integration of technology in art organizations. Source: "The adoption of digital technology in the arts", p.14, NESTA UK, 2017

is highlighted how "The arts tend to be ahead of society when it comes to envisioning the future of technology [...] however, arts organizations often face challenges in adopting digital technologies [...] in a way that results in innovation".

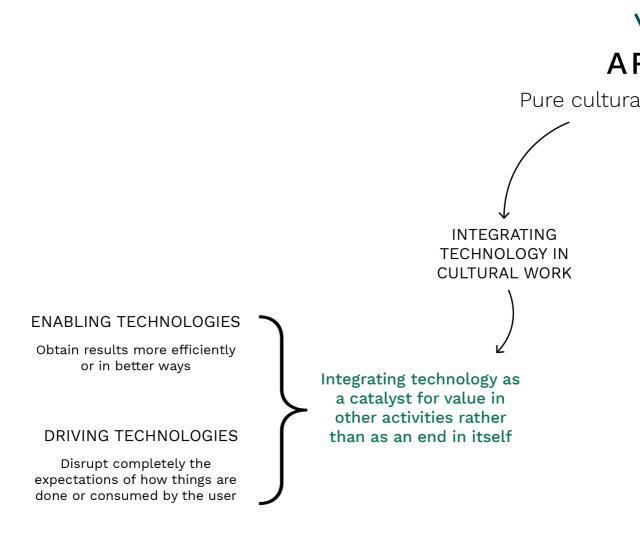
Those environments which have been traditionally relying on mostly traditional means often experience hardship implementing these new tools in a way that is truly meaningful rather than just self-purposed. To avoid a trivial compliance to the strong external push to the digital transformation, the new technologies need to be treated as a catalyst for existing activities instead of a different category of investment per se. In this context, digital tools can either function as an enabling or driving technology. While enablers make different results possible, either in a way that is more efficient or one which is completely radical and transformative, drivers are those pervasive technologies which gain enough diffusion to establish new and original expectations for the users and their means of interaction (Nesta UK, 2017). Any business willing to innovate its processes and services should then be aware that the digital factor, in order to be meaningful and effectively useful to the aims of the firm, must be implemented as a horizontal element that intersects every other activity, also on financial and organizational level.

Contextualizing with the research topic, the work of the craftsman very often suffers from this same struggle to scale activities sustainably without affecting the actual or perceived value of the final product. The integration of second order tasks in the business model could prove remarkably efficient to achieve a more profitable process without compromising the richness of the cultural content of first order activities. Depending on the specific craft, the process of production itself could be the main touch point of the cultural value chain thus making the value of the goods anchored to the input of the expert. In this case, an example of second order activity could involve offering the knowledge and expertise regarding the process or design activity as a service, which could be made into an increasingly efficient occupation to expand thanks to the opportunities of digital means of communication and online networks. The purposeful inclusion of digital technologies in the processes of the craftsmanship enterprise is also a significant issue to address. The manufacturing processes which involve experienced human labour are very difficult to completely automate and digitalize,

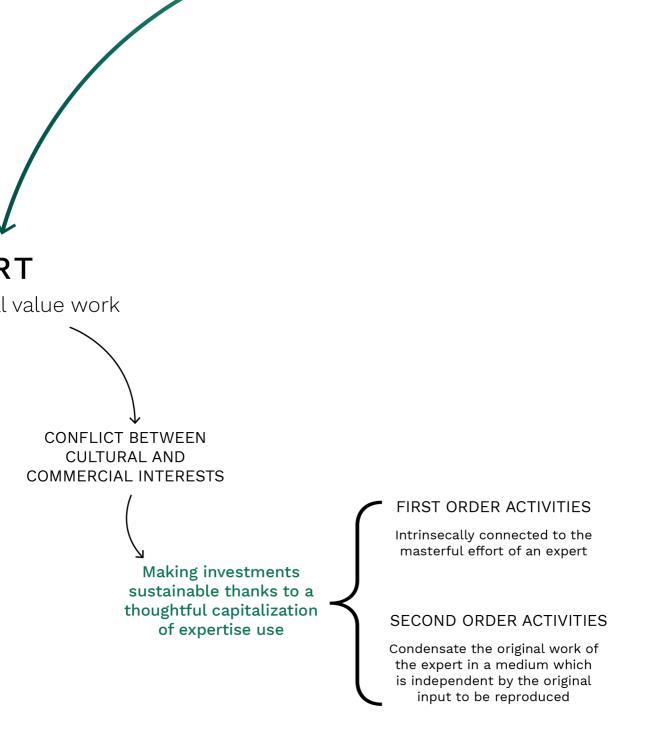
especially in such a way that the final output retains the same value as the original process would.

In order to achieve a digital implementation which complements and synergizes with the existing process, it is crucial to assess realistic objectives for the new technologies starting from actual issues and challenges, thus giving purpose to this transformation. The digital portfolio should be regarded in its entirety, evaluating benefits which could appeal all the different phases of the process rather than just the production or design. This horizontal aperture to innovation is especially relevant where a slower approach to digitalization in manufacturing is necessary to sustain the quality results and the cultural value. From the opposite perspective, an open mind to the implementation of digital tools and hybridization with existing knowledge and experience is an imperative condition for the development of novel cultural value related to instruments which are apparently lacking their own material culture, partly due to their relative newness. These technologies can offer their specific essence of cultural value when they are embraced with the mindset, experience and knowhow of an innovative craftsman.

This horizontal aperture to innovation is especially relevant where a slower approach to digitalization in manufacturing is necessary to sustain the quality results and the cultural value



Opportunities and challenges in the Art scenario





### Craftsmanship: Being through with the stereotype

In the range of analysis between pure cultural or commercial value, the work of the craftsman classifies as a mix of a business practice, because of the merchantable nature of its trade and of the final products, and a distinctively cultural activity, as the original contribution of craftsmanship to production is characterized by the integration of cultural elements which add to that sense of authenticity that serial production struggles to imitate. In many local communities, craftsmanship still has strong roots where the renowned heritage and excellence of the techniques or goods is so keen that establishes a sense of belonging and pride. The overall common feeling in the occidental capitalistic society, though, is that the craftsman as a figure is anachronistic, failing to correlate with a quickly growing production environment which simply made this work obsolete and unable to cope with the needs of the contemporary age. While there was an age where craftsmen where the only producers in society, the different industrial revolutions have transformed not just the means of production but the rhythms and the expectations of consumption. From this point of view, the traditional artisan and the current consumer find very little common ground.

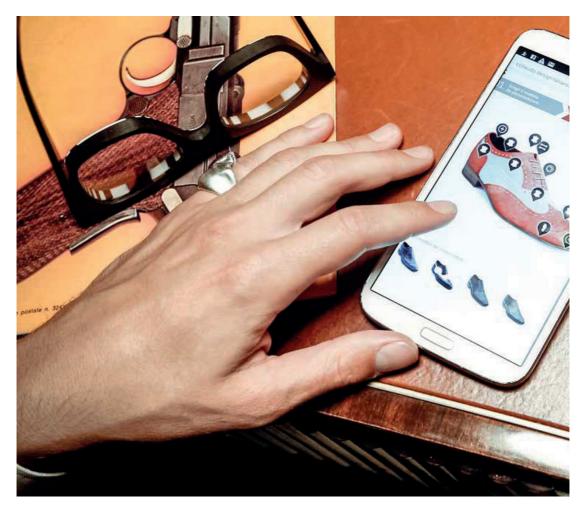
Despite the inconveniency of craftsmanship as an efficient

and staple mean of production for fast and large-scale demands, the perception of quality and the system of cultural values around these activities have not lost their worth. In many cases, the most traditional branches of artisanship, due to the high-quality output but increasingly low offer, has shifted towards a niche luxury market where the demand has both a desire for tailor made products of outstanding level and the economic means to afford such a performance. In the more common segments of society the craftsman is still valued for the heritage and skill involved in his work but, as the industrial commodities are usually the only efficient way to consume in the daily life, he is mostly regarded as a traditional figure which must be respected and "preserved", by the likes of an endangered species, for his historical relevance and connection to territory rather than for his usefulness in the contemporary life expectations of society.

An attentive and less limited look to the reality of craftsmanship in manufacture, especially in the context of Made in Italy, provides a slightly different picture from the stereotype. In fact, if we consider it as the interaction of an outstanding knowledge of materials and processes and a matured experience which is partly coming from heritage and partly developed first-hand, the craftsman does not look at all like a superseded reality of the past, with no useful place in the modern age. As a matter of fact, there are many realities in which not only this figure is relevant to the modern production but holds a strong competitive power for the businesses which invest in this added value. Very far from the small workshop of the past, one of the richest applications of the craftsman's outstanding skills are those industrial manufacturing environments where the production processes are partly or completely impossible to automate, as well as where the automation would be possible but would lead to a great loss of the quality and consequently of the value of the goods (G. Campana, et al. 2016). An example of excellence of craftsmanship in the manufacturing process is that of the leather goods district in the Florence area, in Italy. Here many domestic and international fashion brands, specialized in the production of top level leather accessories, have entrusted the production of their goods to companies of this renowned industrial district. While these firms have a global market and a relatively largescale production, the manufacturing process is strongly relying to the skills and expertise of the local craftsmen which not only found the organizational means to provide larger quantities of products but embraced new technologies to innovate their trade and keep it competitive in a fast-paced industrialized world. The heritage of this district has been accepted and respected while also empowered by advanced tools and an attention to business which let the tradition survive the wave of cost competition by mass manufacture and the tendency to relocate production to low wage countries.

The reality of global competition highlights how it is often possible to achieve very cheap mass-produced goods which are also of relatively acceptable quality, with little to none expert human labour involved in the process of manufacturing (G. Campana, et al. 2016). While it may seem counter intuitive to introduce craftsmanship in this heavily serialized industrial production context, this scenario offers a remarkable opportunity to make use of the distinctive characteristics of the craftsman to compete on those added values which these factories cannot provide to the customer. While the demand for good quality products at the most affordable price is a main force shaping the market, recent years have witnessed a consistent increase of the customers necessity for less standardized products and experiences which address their individual needs, tastes and ambitions (M. Martinez Toran, et al. 2017). Business realities ranging from the individual craftsman to small scale enterprises could take advantage of the market request for personalized goods by leveraging from one side their predisposition to flexible manufacturing processes and small-scale commissions while on the other side providing an outstanding and authentic experience and end product through the added cultural value and direct relationship with the customer. This model of customized production is increasingly requested by those knowledgeable users who are able to discern and appreciate the great value integrated by the craftsmanship approach, therefore being positive in regard to the obviously more expensive price range compared to serial manufactured goods.

There also exist different production contexts where the effort of the craftsmen is deeply appreciated outside of the manufacturing process itself. Made in Italy has a long history of collaboration with the craftsmen that exceeds the handwork on the final goods by itself and reaches the stage of design and development of the products alongside the designers and



The Italian company DIS (Design Italian Shoes) promotes the excellence of craftsmanship and tailor made products in an innovative way through a smart 3D digital system of online configuration. Users can customize their specific requests online to receive an high-quality and unique product, offering a total of 45 million of combinations.

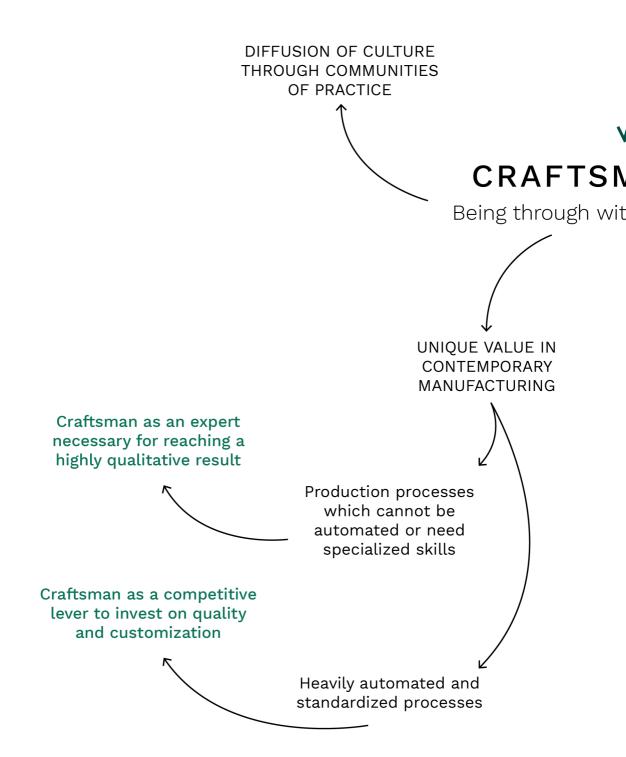
Source: https://www.designitalianshoes.com/

entrepreneurs. This concept is what M. Bettiol and S. Micelli refer to as "The hidden side of design". Many excellence firms of Made in Italy have reached the renowned quality of their offer thanks to the contribution of experienced craftsmen which related with designers on the same level and in an iterative fashion, developing ideas into tangible prototypes which reshaped the original concept into something new until the process concluded with the final design. (M. Bettiol, S. Micelli, 2013). The material culture blended in the product through the distinguishable effort of craftsmanship is capable of delivering an addition to the original concept which explicitly returns a feeling of authenticity typical of the passionate hand work of the artisan. Many Italian firms from fashion to furniture design have strongly employed this knowhow in their production to achieve outstanding qualitative results. The deeper understanding of materials, tools and processes of this experienced worker along with its personal heritage of the craft and attention to quality are valuable assets in the design stage in many enterprises even where the actual manufacturing process is more heavily automated.

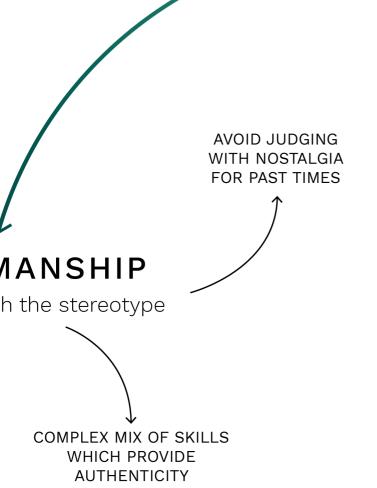
An important point must be made about the relationship between craftsmanship and experience related to the past. While the relevance of legacy and tradition, the transfer of knowledge from master to apprentice, the influence of the local communities of practice and the slow honing of the peculiar skills of the trade are all undeniably at the essence of craftsmanship, it is very easy to fall in the misconception of looking at these activities in a nostalgic way. As has been pointed out, there are many meaningful places for the traditional craftsman in the contemporary economy, both as a catalyst of quality in the productive activities and as a valuable complement to the design and development of products in more serial manufacturing processes. In this sense, we can see how this figure has in part transformed and adapted from the more stereotypical artisan in his small old-fashioned workshop to stay relevant with the requirements of another age (M. Bettiol, S. Micelli, 2013). However, it is also fundamental to notice that there is a concurrent growing transition to new and hybrid forms of craftsmanship which blend the mindset, passion, culture and knowhow of legacy with the practice of innovative design and production instruments to express new forms and ideas. Democratized technologies of digital fabrication and interaction, ranging from the popular FDM 3D printing, laser-cut and CNC to integrated controller boards and sensors, sparked the intuition of a new generation of tinkerers and makers to create something original. While there might seem to be a lot of difference with the image of the craftsman creating his product by hand with analogic tools and the output of the digital production of a 3D printer, an attentive look at these tools and their peculiarities can return a more accurate perception of how much skill and knowledge is required to design, model, create and polish such items. While these technologies allow for sure to share online, download and try schematics easily almost without any knowhow of the tool, a meaningful employment of digital tools requires the research, attention, expertise and approach of a craftsman to return authentic and novel results. The hybridization between the mindset of an artisan and innovative tools of production, especially with a design approach, could lead to new and exciting forms of expression and functionality which are representative of the contemporary spirit. On this perspective, the public must be able to take a step towards this path to appreciate how much learning of tools and materials, precision of design and passion for the craft are required to achieve these result, like craftsmanship from legacy would do.

Contrary to the popular belief that technological advancements of the factory would definitively outdate the figure of the craftsman, the increasing demand from the market for increasingly customized and individually relevant products and experiences, while is to some extent addressed by some future plans of Industry 4.0, needs more than ever the intervention of the experienced master of the craft with is material culture and natural predisposition to flexibility of production to deliver authentic results to specific customer segments, providing an experience which the serial intensive factory cannot replicate even in the context of the fourth industrial revolution.

Craftsmanship: Being through with the stereotype



Opportunities and challenges in the Craftsmanship scenario



Craftsmanship: Being through with the stereotype



# Industry: Best practises from the factory

In the evaluation of the value proposition, on the most prominently commercial pole we find the factory. In this sense, we refer to the industrial sector which employs an intensive automation in its manufacturing activity, produces serially for either consumers or other businesses and most importantly has a limited interest in the offer of cultural value because its proposal is strongly regulated by financial and commercial interests. This is the scenario of that sector of industry which is profoundly structured around the concept of efficiency and optimization. For this reason, even if unrelated to the proposal of cultural content, it is still significant to consider for the way it structures and executes managemental, logistics and sale choices.

innovation, offering something new to the market or addressing demand needs which were not yet satisfied.

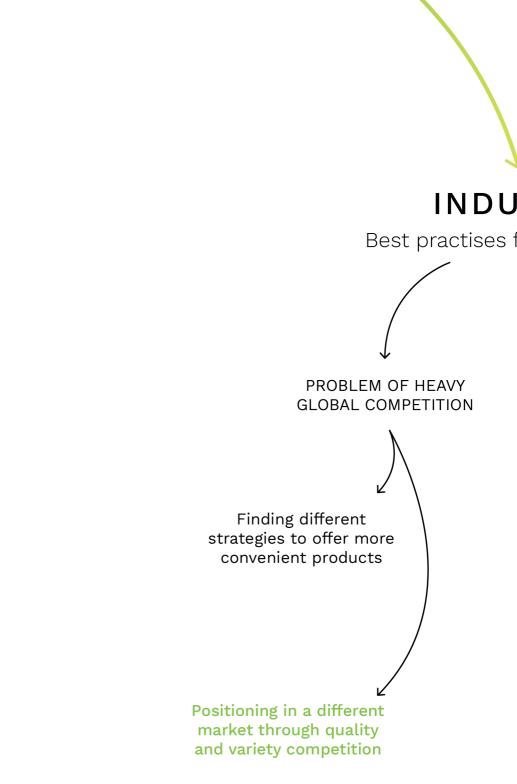
On this range of the market spectrum, the main interest factor driving the behaviours of the different actors is competition. The commercial interest at the foundation of these companies requires them to strive for the acquisition of the largest possible share of business and consequently of profit. The limited nature of demand sparks an immediate confrontation between firms in order to achieve the largest portion of the market possible. This condition usually leads to the emergence of top performing leaders and in a process lasting many years the diffusion of the products reaches its natural consumption level, making the market for that product become saturated. In this condition, new sales can virtually be made only to the expense of other competitors. One of the main strategies for acquiring a bigger audience is cost competition, where a company employs investments on the internal processes of the factory and on the relations to external actors to achieve a lower cost of production, thus increasing the demand for the specific good. This kind of strategy is best effective when the size of the industry allows for an extreme economy of scale. However, smaller or emerging actors on the same segment may be prevented from competing on cost because they cannot reach an equal level of efficiency as the leaders. In this case, a more efficient solution could be based on the employment of a specialization of production, thus aiming to offer more specific products to a narrower but consistent audience whose needs cannot be addressed completely by the biggest players on the market because of their lack of flexibility. This strategy of segmentation allows to avoid cost competition to an extent by competing on a diversification of the offer. Depending on the grade of development of the sector of interest though, there might be little space left for further segmentation as any differentiation in the offer would still need a coherent and quantifiable corresponding demand in order to be effective. When the explicit needs of the consumers on the current segment are widely addressed, firms can attempt to generate new demand by deploying on the market new products which satisfy needs which were not yet considered or expressed, for example investing on research and development to deliver original products with a technology push approach, or respond with a solution to a request or problem of the consumers which does not find a satisfying solution on the existing market, with a market pull line.

Staying competitive on the market is of significant relevance for industries, which requires a continuous effort to achieve greater efficiency. This strong underlying necessity has been addressed in many ways during different phases of industrialization with the development of organizational models. These management strategies could account for every aspect from the overarching aspects of the factory and of its relationship with external actors down to the configuration of the smallest patterns of operation for machines and workers in the assembly line. This scientific approach to the organization of every aspect of the factory and its continuous refinement are essential to deliver the expected level of results while incurring in the smallest possible expenses and maximizing the profits. The ever-present force of competition requires all actors to stay dynamic, adapt and transform at all times to avoid being outplayed by other companies. Failure to identify change and react accordingly can strongly affect the business of an industry and recent history offers plenty of cases where leaders of the market failed to stay relevant to their demand resulting in their disruption by novel and innovative competitors. In this perspective, Industry 4.0 itself is an important step in the direction of unprecedented levels of optimization and flexibility of production and logistics for the

future factory, thus will be essential for current firms to stay up to date in this transformation.

Competition on costs and efficiency are not, of course, the only factors playing a role in the dialogue between offer and demand. While factories must actively operate to maintain their internal activities as well-organized as possible, firms must also commit to stay relevant to their demand. The development of a connection with the customer, may it be in a business-to-consumer or business-to-business market, is of remarkable importance to increase the demand and maintain lasting relationships with the existing one. In this field, the elaboration of a strategical marketing plan is crucial to lay the common foundation of all the efforts, from brand identity and equity to the actual product and service offer, which establish the bridge between producer and consumer. A positive and effective management of the external relationships of the industry, both upstream with suppliers and downstream with customers, cements its image and reputation on the market and is essential to position effectively in relation to other competitors in the same segment. An underestimation of this factor can lead to a decrease of demand over time because of the shift towards firms with a stronger external perception of delivered quality, affordability and dependability.

In the current scenario of manufacture, most sectors of production with a pre-eminently commercial value offer feature industries with such an efficiency level to be capable of delivering goods of acceptably high-quality standards at a relatively inexpensive price. In such a situation, it is definitely unmanageable for smaller or start-up companies to establish a competition on cost in the same segment. In order for new firms to achieve their share of the market, it is more effective to aim at delivering an added value which the bigger competitors in the segment cannot offer because of their massive scale, which makes quick turns and innovations difficult to achieve or take advantage of effectively without great investments. The smaller scale of this organizations, although inefficient for scale economy strategies, can provide an upper edge through flexibility. In this situation, offering a higher quality product, establishing a closer and more individual relation with the customer, achieving a greater variety of offer are all core features which a smaller but qualitative and well-organized enterprise can implement to integrate an added value which can make their product, service and brand sustainable economically in the competitive manufacturing scenario.



Opportunities and challenges in the Industry scenario

STRY from the factory

VALUE OF ORGANIZATION AND MANAGEMENT

Industry: Best practises from the factory



## Made in Italy: Quality, research, innovation

Differently from the most fundamental form of industry featuring serialized goods, heavy automation and assembly chain manufacturing and aiming at an almost completely commercial proposition of value, the enterprises of Made in Italy, though often reaching an industrial scale, offer a different interpretation of production which encourages the human factor and cultural content to strengthen their offer and position on the market. Made in Italy as a label refers to a very wide variety of economic divisions. These areas range from ones which are more deeply rooted in tradition and heritage like the most recognized fashion, furniture and food segments, to ones which are on an almost opposite field of high-technology and innovation like sport and luxury automotive, aerospace, cruise ships and biomedical (Cappelli L., et al., 2017). Beside these macro-areas of manufacturing, there is another notable sector of internationally recognized Italian offer which is the tourist and hospitality segment. The art, architecture, history and culture of the peninsula are also part of an acclaimed perception of quality and cultural value and heritage which is well acknowledged both inside and outside the country (Fortis M., 2005). Notably, there is also a recognized design and manufacture of advanced machinery and industrial tools which are globally appreciated for their innovation and dependability which are,

in many occasions, the instruments that have been engineered to produce the Made in Italy goods in the first place (Micelli S. 2015). Thus, the complete scenario is characterized by a diverse arrangement of commercial segments which mostly share little in technological and production elements. Therefore, the feature which associates the different products, brands and firms in this spectrum is their transmission of a common perception of lifestyle, excellence, reliability and quality which is strongly codified in the Made in Italy COO (Country of Origin) definition.

the Made in Italy definition evokes a status of quality, research, innovation, cultural content and manufacturing value which is appreciated quantifiably by the customer

> Behind the achievement of this renowned status, which is commonly perceived as a guarantee of quality for the consumer, there is the heritage of many successful enterprises which have been able to rise in the international competition and codify these positive traits in the evocative image of this COO classification. In this firms, the management line synergized with a creative approach to foster and integrate innovation extensively during the whole process of production, from initial development and manufacture

to distribution and communication (Bertola P., Colombi C., 2010). This design-centric approach to entrepreneurship has promoted the growth of the unique bond between the local material culture,  $heritage \,and \,craftsmanship \,with \,a \,developing \,industrial \,ecosystem$ of production. The innovation of production processes, which is still today recognized as one of the most advanced and competitive for its qualitative degree, has also benefited from the use of design as a strategic decisional element. On an organizational level, these outstanding companies have been able to synthesize their initial success, contextualized in a particular socioeconomic historical condition, into a dynamic strategy which could be replicated flexibly in changing economic environments (Bertola P., Colombi C., 2014). Through this mixed approach between administration and design as a strategic and leading function, the firms of Made in Italy which are still today relevant and known have managed to keep being effective during the decades, making their nature of excellence and originality into a common recognized cultural structure of values which became associated with this "Made In" label.

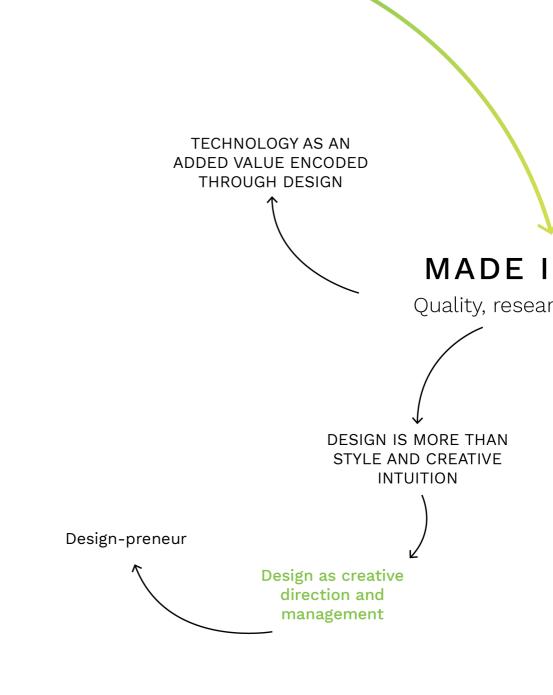
From a commercial perspective, the diffused success of this offer in the many different sectors which compose the distinctive Italian production is recognized both inside the country and on the global market. As a meta brand associating a wide selection of firms and respective economic segments, the Made in Italy definition evokes a status of quality, research, innovation, cultural content and manufacturing value which is appreciated quantifiably by the customer in its purchasing decisions. Buyers perceive the added value of these goods both in product characteristics, like quality and reliability, and in aesthetic traits, like originality and elegance, thus justifying the increased expensiveness and feeling satisfied by their choice of a higher quality product. Moreover, the purchasing pattern has been proved to be more cognitive and rational rather than based on intuition or emotion, resulting from an informed and reasoned selection and comparing of different product choices on various price levels, consciously favouring the Made in Italy product over other available choices (Cappelli L., et al., 2017). Nevertheless, it should be noted that this perceived qualitative excellence, while keeping the same high standards of design and communication, has sometimes lost part of its bond with the manufacturing heritage and, especially abroad, has shifted towards a more persuasive conception of "Italian Style" rather than actually Italian provenience and production of the goods (Micelli S., et al., 2015).

In the perspective of more recently established companies in the Made in Italy productive ecosystem, the conditions for economic development are very different from the fertile ground which allowed the original wave to grow and take roots. New realities which wish to surface in the current productive scenario are likely to encounter a seeming contradiction of concept between the lineage of a rooted material culture from the heritage of their craft or their territorial vocation and the need to innovate and be contemporary to an audience demanding a novel offer. Despite the inherited weight of a tradition of excellence and the expectancy of outstanding results, recent entries in the Italian manufacturing scenario have lived to their expectations, testing the performance of the Made in Italy system and proving its adaptability to the transforming circumstances of different conditions of society (Bertola P., Colombi C., 2014). New brands interfacing with the existing environment have found in the established industrial network of manufacturers and suppliers, with their local specialization and proven organization, a dependable structure upon which to rely for their own growth. While being able to make use of existing resources for production, new companies have made a concrete effort to integrate innovation both in technology and concept.

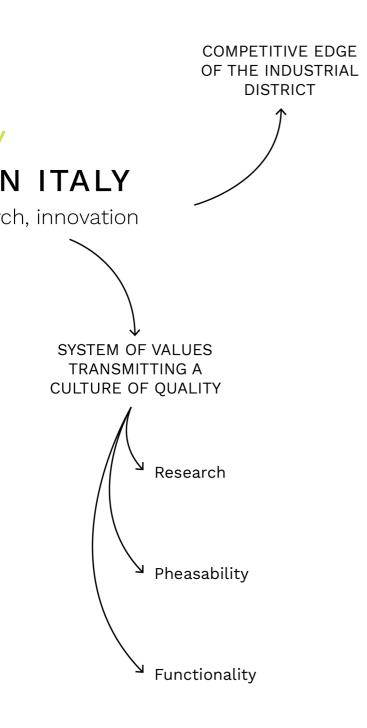
This new generation of enterprises is proving able to cleverly take advantage of the abundance of cultural material, balancing the tie with tradition with a contemporary appeal through a meaningful approach to innovation. Integrating symbolic and cultural elements in their production from local heritage and craftsmanship, these small companies are synthesizing an original interpretation of their legacy and empowering it with the

[...] while keeping the same high standards of design and communication, (it) has sometimes lost part of its bond with the manufacturing heritage and, especially abroad, has shifted towards a more persuasive conception of "Italian Style" tools, strategies and technologies of the current era, giving rise to a novel production without betraying their origin and context, achieving that complex to replicate sense of authenticity and belonging which is fervently sought after by their demanding customers. Contrarily to their predecessors, the recent actors of Made in Italy are advantaged by a strong digital essence which allows them to interact effectively with their audiences even without the major investments which more traditional ways of communication would require. Through a prominent and well accomplished narrative proposition, these companies communicate in a direct and selective way with those specific market segments which are able to comprehend and appreciate their offer of cultural content, thus avoiding a difficult to sustain competition on mass markets (Bertola P., Colombi C., 2014).

The commercial environment of the Made in Italy system has proved its competitive value in time by empowering its creative soul with a committed approach to research and innovation, thus being capable of wedding the widely recognized and appreciated predisposition to style and elegance with a sound foundation of functional advancement and evolution of manufacturing processes, also thanks to the employment of design strategically on a leadership position rather than merely an input to production. From the analysis of the successful factors which influenced the evolution of Made in Italy as well as from the research of its state of development in the current cultural and economic scenario, we can acknowledge several useful insights on those organizational best practices which are crucial to effectively bridge an industrial and commercial vocation with the integration of an authentic and relatable cultural essence in the production traits. In the highly competitive market of industrial manufacture, the companies which took advantage of their heritage of craftsmanship and local vocation, without a nostalgic look to tradition but rather with a prospective approach to innovation and purposeful technological advancement, while also making extensive use of design as a strategic factor to guide the efforts of management and entrepreneurship have accomplished outstanding performance on the market, attracting consensus from an informed and demanding base of customers which has rewarded the added value of quality and research with their continued trust as buyers.



Opportunities and challenges in the Made in Italy scenario





# A high cultural density manufacture

The research of the commercial and cultural value proposition in different economic sectors has established a scenario of various possible blends between the two ends of the spectrum. From these key areas of analysis, it has been possible to determine a selection of crucial issues and challenges to assess as well as best practices to implement in order to pursue successfully a business which draws on both spheres of value in a purposeful and economically viable way. The initial objective of meaningfully integrating technological advancements of production, organization and design in a manufacturing segment which leverages craftsmanship to introduce cultural content and authenticity in the production of goods. To achieve this delicate balance between different economic levers with their own benefits and downsides, an organizational model which is capable of bridging this two seemingly distant realities is proposed: the high cultural density manufacture.

The process of generating novel results by mixing advanced technologies in existing production environments is not of immediate execution. In order to actually accomplish innovation in this scenario, it is not sufficient to straightforwardly assimilate technological advancements in the existing production processes and product offer. Scientific progress by itself is not enough to introduce innovative results if the integration of modern technologies in processes and products is not led by a conception or intuition of how these additions might purposefully find a place in the overall experience of the consumer (Bertola et al. 2016). As it has been previously observed about the integration of digital technologies in art organizations, these integrations cannot be self-purposed but should be treated as a solution to an existing problem or a catalyst to reach previously impossible results (Nesta UK 2017). To achieve this condition of significant hybridization, the technologic content must interact meaningfully with the cultural context of the recipient.

For this purpose, design must be leveraged as a hermeneutic activity to understand the sociocultural environment of the consumer. The cultural scenario of the user should be initially researched and analysed through a human-centred design approach to understand the heritage, ideas, experiences and needs which concern him most deeply. This content can be very diverse in nature and derive as much from local material culture as being shaped by global influences, while being more or less implicitly constructed upon characteristics like ethnicity, social class, interests and lifestyle. The designer has access to both the instruments to interpret culture, decoding stimuli and phenomena which may often be faintly perceivable or implicit, and to synthesize this information into relatable and transmittable communication forms. The result of this action is a comprehensible snapshot of the underlying meanings which

#### a human-centred design approach to understand the heritage, ideas, experiences and needs

lead cultural interactions in a specific context. For the purpose of this analysis, it should be emphasized how cultural capital is here intended in a broader conception which involves all the possible means of conveying sociocultural contents, both immaterial and physical ones. Therefore, in addition to the most recognized, lasting and shared forms of culture like literature, mythology, philosophy, science and high art, also the material cultural capital coming from narrower or more localized subcultures, each featuring their specific customs as well as distinctive everyday interactions of their daily life, should be given major attention. The artefacts we interact with everyday are not excluded from being cultural elements, actually being a relevant meaning vector in both an individual and social dimension of life. The objects, spaces and services we come in contact and respond to are important drivers of cultural content as they embody the emotions and ambitions of the people who interact with them while also being related to a physical place with its own sociocultural context and legacy. In particular, we can distinguish those artefacts which are explicitly conceived and treated as cultural products. According to the definition proposed in Bertola et al. 2016 they are defined by three main features: "The first one is to be mature and historicized, recognized by individuals as bearers of a thick layering of



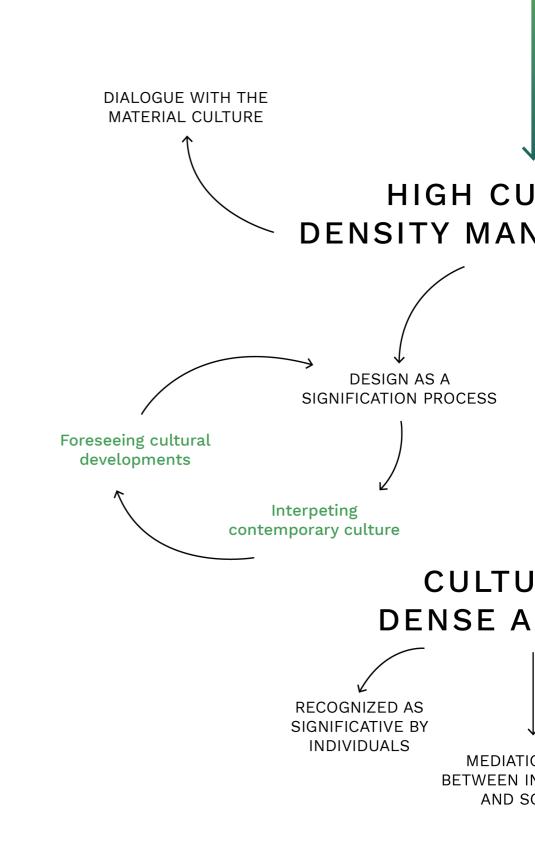
Clothing as a culturally-dense artefact is an essential part of the social interaction between individuals, carrying a large amount of institutionalized information.

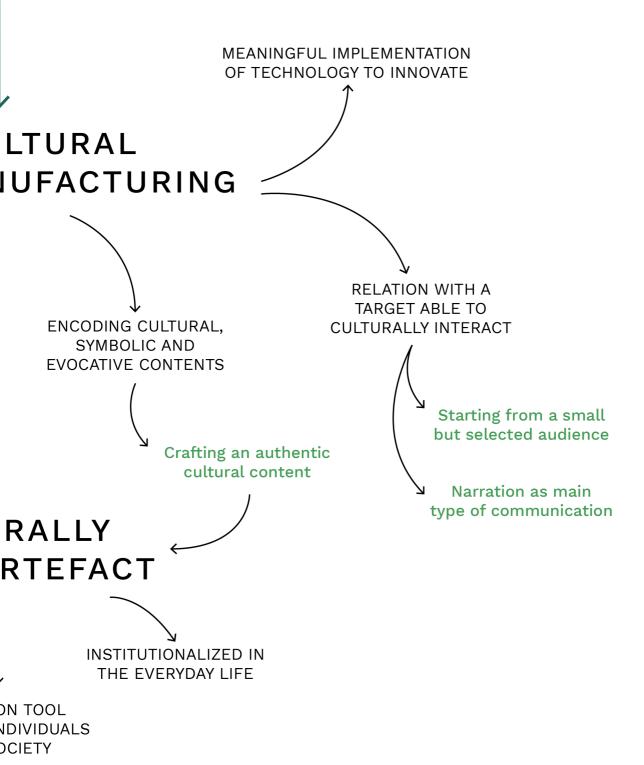
meanings and narratives: the evolution of their forms and their use, the processes by which they are produced, the stories and the identities of the associated brands. The second is to be institutionalized in everyday life, to have a character of familiarity and to be partakers of the definition of people's lifestyles. The third is to become tools of mediation between the individual and his social environment, becoming 'identity prostheses', that is definition tools of subjective and collective identities". These cultural artefacts are an important component of the social reality of the users in a way that transcends the original need they were meant to satisfy. An immediately understandable example is how clothing has expanded its influence from the original primitive need to cover and protect our body to a medium of expression which is capable of communicating a great quantity of messages about the person who wears it, both on an individual level as a mean of self-recognition and actualization and on a social level to implicitly relate or differentiate from other individuals and subcultures.

With this interpretative approach to design is possible to intentionally embed symbolic and evocative content in artefacts, posing the attention on the cultural implications of the way goods are conceived, shaped and used. With an attentive intervention on these factors it is possible to introduce radical social innovation making use of subtle dynamics which may be unexpressed in the material world. Continuing the parallel with fashion, an example of this meaning-driven innovation, as posed by Norman and Verganti 2012, is the invention of the mini-skirt in the 60s which, while introducing little to no innovation in technology of manufacture, had a great symbolic representation of the change of women's perception in society and of their acquired freedom. As the two authors outline in their analysis, through an activity of designdriven research it is possible to identify connections or shifts in cultural dynamics which can lead to new meanings for existing products categories or technologies, resulting in the introduction of a radical innovation which would otherwise be impossible with a human-centred design approach, which is remarkably more effective when incrementally innovating in contexts of known issues which need refined and improved solutions.

The cultural artefact is deeply connected with its context, whether in a sense of similarity and evolution or separation and counter-culture, and this relation is mediated on an individual layer by the subjective filter of the user and on the social level by common and shared conceptions and ideas. The resonance of the cultural content embedded in these goods with the heritage and cultural values of the audience evokes an inherent sensation of authenticity which is transmitted and highlighted by the instruments of narration. This communication layer must be part of the design since the start of the process of research and interpretation in order to convey effortlessly and genuinely the message and be intuitively relatable for the user. The choice of a cultural-intensive approach to manufacture is thus capable of narrating and transmitting effectively the added value of craftsmanship and legacy of products in a contemporarily relatable way, therefore successfully creating products which find in their distinctive and authentic cultural content the competitive lever to find viability on the market. On the technological level, this meaning-driven strategy aims to contextualize meaningfully innovative instruments and techniques of production with both the research and development of products, on the design side, and with the expectations and desires of customers, on the consumer one.

A high cultural density manufacture







The

Optimizer

The Planner

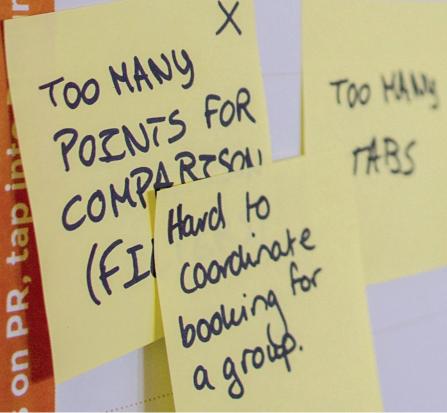
## 2. PROBLEMS / PAINS

Which problems do you solve for your customer There could be more than one contract and the eg. existing solar solutions for private house a good investment (1).

120

mends

travelling travelling







## On the contribution of industry and university

The qualitative analysis of the value proposition scenario highlighted different shades of the mix between cultural and commercial inclination for businesses, individuals and organizations. Each of these variations has proved a valuable source of strategic information since, through a deeper understanding of their more distinctive features and operational framework, it is possible to extrapolate fundamental insights on the common challenges they struggle with and on the competitive advantages each of them benefits of. In order to follow through with the initial research intention, leading effectively the craftsmanship enterprise into the next industrial revolution, the experiences of other sectors are priceless to investigate and transpose into the current scenario. The delicate objective is to strike the right balance between innovation, taking advantage of the new technological opportunities and organizational paradigms of Industry 4.0, and legacy, staying true to the heritage of craftsmanship and to the cultural capital at the core of the more renowned Italian manufacturing. This challenge might seem unbearable for new or smaller players in the market, which might be lacking in experience and resources to successfully achieve this transition, as well as more established realities which are currently polarized excessively either in the direction of cultural This production environment is often afflicted by the contradictive need to competitively make use of its invaluable cultural capital, which might come from local heritage, generations of direct experience and a masterful attention to quality, even though having to stay relevant to a contemporary and dynamic demand

> or commercial value, thus making the rearrangement of existing processes problematic to accomplish. Enterprises longing to stay competitive in this evolving scenario should not be left alone in the demanding process of transformation. Beside the incentivising efforts of respective governments through investment easing policies and regulations, these actors should look both at the Higher Education and Industrial domains for guidance in this adaptation process. Activating connections with universities is decisive to introduce talent and innovation practices in the enterprises, while stimulating new and outstanding results through research and experimentation. Although the high cultural density manufacture inevitably outdistances itself from the more typical large-scale production enterprises for different strategic and production choices, the connection with the world of industry should not be neglected as well. Even though in the common imaginary the automated factory tends to be antagonized when confronted with craftsmanship, as they seemingly embody the conflict between capitalist alienation and the nostalgia for a

happier past of traditions, the craftsmanship enterprise should be smart enough to overlook this stereotype, trying to make use purposefully of the several advancements of industrial practice in its own activity. Especially contextualizing in the production environment of Made in Italy, new actors should take advantage of existing industrial districts to benefit of the systemic network of production and logistics when proposing their own contribution to the market with a preeminent cultural proposition.

On the relationship with the academic institutions, the craftsmanship enterprise should address the field of research to set in motion innovation practices in a well-conceived, meaningful and strategically effective way. This production environment is often afflicted by the contradictive need to competitively make use of its invaluable cultural capital, which might come from local heritage, generations of direct experience and a masterful attention to quality, even though having to stay relevant to a contemporary and dynamic demand. Today's demands from society exhibit their own original requirements and motivations which, while not in direct contrast per se with the offer of the craftsmanship enterprise, need the producers to be attentive to novel drivers if they wish for their goods to be relevant to present audiences, while prospectively even more to future ones. Achieving an effective solution to this challenge is a task that must be taken seriously to avoid being outcompeted and eventually disrupted from a market which is transforming with a steady pace. The systemic design approach is in this regard exceptionally valuable for the purpose of supporting the existing local material culture

and production networks in a purposeful way. The strategic advantage of this methodology should be employed to understand the deeper connections between local material culture, resources, producers and consumers and advantageously make us of this information to reshape and direct the manufacturing efforts of these businesses. Establishing the link between the enterprises and the network of universities, especially if it is possible to make use of a local system of education and talent, is therefore crucial to sustain the excellence of the present manufacturing knowhow with the innovation push of newer generations of specialized workers with a natural closeness to the dynamic and digital dimension of current society.

In conjunction with the strategic direction in the effective employment of the existing cultural capital, the contribution of the research and experimentation of academic entities in the manufacturing field is also essential to foster the growth of new cultural value on top of the existing elements coming from heritage or legacy. The integration of both design thinking and practice to the knowhow of the craftsman are crucial to achieve genuine innovation in a field with delicate connections with tradition. The integration of advanced technologies with the distinctive mindset and workflow of the experienced traditional craftsman can lead to the promotion of new and updated forms of manufacturing, transposing the peculiar sense of authenticity to original means of production and expression. The designdriven approach is also important to generate new meaning from current knowhow and practices, leading to radically innovative results in technologically consistent production environments. This approach leads to artefacts which resonate profoundly with the sociocultural contexts of the users, which is an essential requirement for a manufacturing process which leverages the cultural dimension of production to be competitive.

Lastly, the collaboration among the small enterprises of the industrial districts and the big scientific and technological actors of the academic and research domains are crucial for the transferral of the distinctive knowhow of the territory. The investment in formation is crucial to foster the generation renewal of the capital of competences between the experienced craftsmen and the younger workers approaching the trade. The active channel with university should be a catalyser for the successful activation of this process of revitalisation of the enterprises with a strong and sedimented cultural vocation, with a mutually beneficial exchange of competences between the two fields. The promotion of education, experimentation and knowledge exchange networks, both inside the industrial district and systemically between distinct ones, is a crucial operation to achieve the innovation that the existing heritage producers strongly need to stay relevant and competitive in the current market.

Correspondingly to the dialogue with education and research institutions, the high cultural density manufacture should not avoid confrontation with the more typical industrialized factory, therefore superseding the instinctive predisposition to antagonize the industrial sector when trying to promote the craftsmanship enterprise. In order to realistically drive forward and actualize the vision of an autonomous and economically sustainable high cultural density manufacture, the contextualization in the diversity of the industrial environment is unavoidable as well as indispensable. In the previous section regarding the transformation of craftsmanship, it has been already illustrated how the "endangered species preservation" approach is not beneficial to the cultivation of the existing cultural capital, since it stagnates the valuable knowhow in a situation of unsustainable commercial practices which are anchored to tradition instead of relying on it. Treating this manufacturing approach as a serious business proposition in the broader economic scenario, it is necessary to analyse thoroughly the commercial drives and undercurrents of the whole market. In the economic setting there will inevitably subsist competition on both the offer, where larger and more automated companies can provide greater cost-efficiency and standardization, and on the demand, which features quick and dynamic need changes while not compromising easily either in price and satisfaction of specific requirements.

In order to respond actively and effectively to the peculiarities of different consumer segments, the craftsmanship enterprise must undergo a significant effort of updating and revision. In this perspective, it would be decisive to resort to the same design-driven entrepreneurship which guided the most outstanding companies of Made in Italy in the growth from their initial formation to their current position of leadership. These enterprises displayed a distinctive aptitude in the establishment of a prosperous connection between an outstanding qualitative level of manufacturing, coming from the experience and heritage of the knowledge workers of local tradition, with the innovating force of creative direction. This approach combining design and management on the same level has been essential to strategically bring into play the vast cultural capital while introducing innovation in products and processes in a meaningful, thoughtful and commercially effective way (P. Bertola 2014). From the analysis of the industrial districts, it is also evident how the active collaboration between leading players of larger scale (capofiliera) and smaller producers and enterprises with exceptionally specialized talents has proved mutually beneficial for all actors on the territory, leading to resilient economic networks and supply chains benefitting of the mix of both industrial and craftsmanship competencies (Osservatorio Distretti 2013).

Within the boundaries of the enterprise, the understanding of the best practices and organizational strategies of the industrial sector can lead to significant improvements of the internal activities. Although regulated by different economic forces, the parallel between the large-scale factory and the smaller manufacturer is crucial to highlight the potential for improvement in the current workflow. The dynamics of the large-scale manufacturing sector encouraged the various firms to develop consistent and dependable strategies directed at optimization of inner processes and effectiveness of the approach to market. The aggressive rivalry of this economic environment forces all actors to stay constantly updated with their competition to avoid being outperformed. This constant drive for improvement of the industrial scenario, while sometimes leading to ethically controversial decisions in fields like environmental sustainability and work conditions, has cultivated in time constructive procedures on the organizational level from which the smaller producers can draw to achieve an increased operational performance themselves. In the specific context of Made in Italy, the industrial atmosphere by itself has decreased its effectiveness in the last years hence emphasizing the necessity of an investment on the renewal of the entrepreneurial culture (Osservatorio distretti 2013). The managerial dimension is often overlooked by many smaller enterprises which, without an effective strategical scheme, fail or struggle to be effective commercially. Especially because of the limited resources which they can afford to invest, the smaller actors cannot neglect devising organizational strategies and enhancements to strategically increase their market effectiveness.

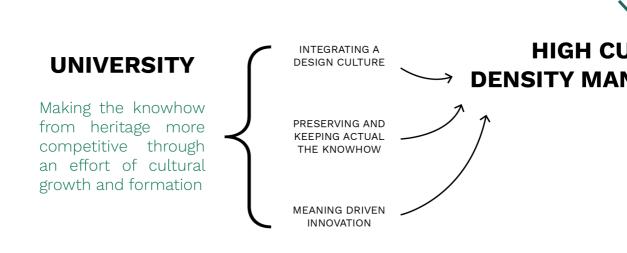
As it has been previously pointed out, the Industry 4.0 paradigm offers many of these valuable insights on supply chain, production means, work organization, logistics and technological advancement. While many of the proposed systems are not directly or efficiently applicable to the craftsmanship enterprise, there still persists a variety of insights which might be deducted from the fourth industrial revolution model and arranged more specifically for the high cultural density manufacturing. In some cases, the smaller producer is even at an advantage compared to the massive global industry. An exemplary concept from Industry

4.0 which the cultural intensive enterprise should successfully adopt is the direction of the serialized factory towards flexible automation. While the mass-customization path is theoretically enticing for the global manufacturer but still a very long way from being achieved, the small enterprises should meanwhile take advantage of this unanswered demand of the market making use of their natural predisposition to flexible production, customization and attention to the more individual needs of customers. In this perspective, the thoughtful implementation of digital design and production technologies in the craftsmanship process would be crucial to empower the smaller producers to achieve a bigger volume of manufacturing without compromising the cultural value of their authentic methodology and knowhow.

This stance on contemporary technological production and communication means is especially relevant in the relationship between the enterprise and its external scenario. One of the most threatening shortages of the smaller craftsmanship enterprises in the current Made in Italy environment is the lack of updated means of communication and relation with the customer (Osservatorio distretti 2013). While the success factors of these economic scenario are still valid, in order to stay competitive in the wider environment of international production an investment on brand identity and reputation, marketing strategies and customer relationship management systems. In this segment, many enterprises relying on cultural value coming from heritage face the challenge of narrating their lineage and authenticity while being relevant and meaningful to contemporary audiences. Transmitting in a novel way values that are deeply connected with tradition is a complex as much as an essential task, which points back to the necessity of employing meaningful narration activities to interact effectively with these audiences. Striking this delicate balance of values between the concepts of tradition and innovation requires to strategically design and execute a communication and branding strategy, which involves every step of the process inside the enterprise and all the levels of interaction with the social and economic context. Failing to embed coherently the same values in the artefacts themselves, in the process of production and in the communication with the final users would seriously undermine the market effectiveness of a high cultural density manufacture as the interpretation and appreciation of the cultural value is subjective, affected strongly by the perception of the individual and the projection of its social context.

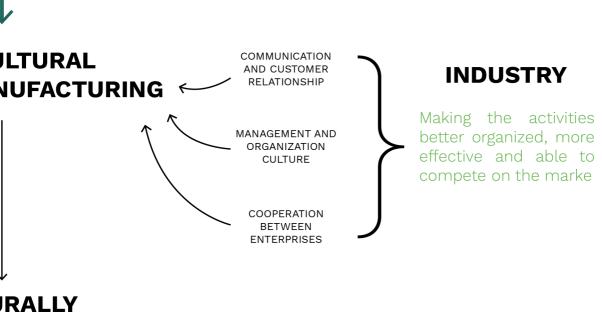
In addition to the effectiveness of the commercial interactions happening subsequently to the manufacturing activities, a cultural enterprise entrenched in the economic context of Made in Italy must also interface productively with the existing networks of production. As it has been illustrated previously in regard to Made in Italy, the base foundation of the local industrial districts gives an advantage position to the newer enterprises as they can take advantage both of existing proven supply chains along with their own innate predisposition to innovation. Conversely, the existing firms should improve the competitiveness of the established relations by looking beyond their own local context and experience. The whole structure of industrial districts could benefit from its networked system nature by activating cross-disciplinary competence contaminations, enriching the potential of each actor across the supply chain along with stimulating the emergence of original and innovative cultural capital (Osservatorio distretti 2013). By opening itself to the existing industrial ecosystem, the high cultural density manufacture can access a systemic territorial network, leveraging the local material culture and sedimented processes of supply and production, and make us of a wide source of cultural value to appreciate, reinterpret and transmit.

The objective of establishing a high cultural density manufacturing enterprise might rightly seem like an intimidating task. In order to achieve the expected results of commercial sustainability along with the promotion of cultural value, it is necessary to make use of a strategical planning and an effective practical execution of the all the activities from research to production and communication. To overcome these difficulties, the small enterprise should actively take part in the existing academic and economic networks by establishing connections with these innovation attractors. The dialogue with other fields is therefore to be sought after as it is essential for the small enterprise and mutually beneficial to the other involved actors. By establishing new valuable connections within the existing nodes of the system and incentivising the development of new realities it is then possible to achieve a greater level of innovation and added competitivity for all the parties involved.



CULTU DENSE A

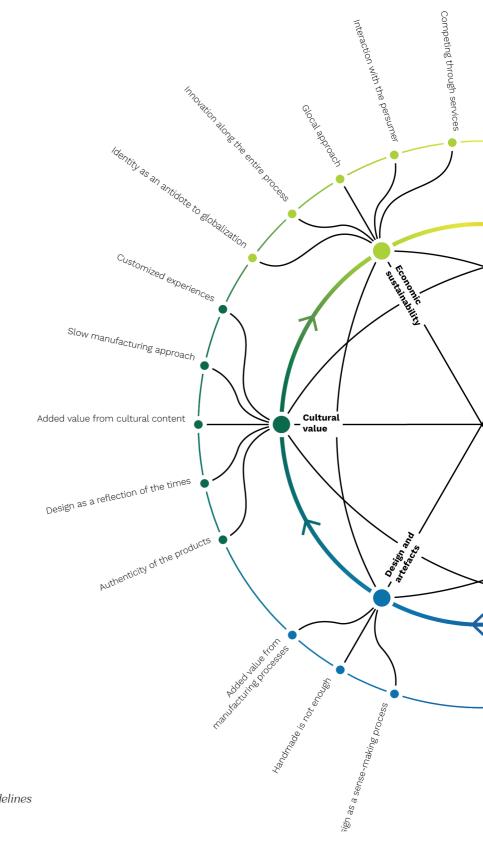
Scenario of collaboration between academic institutions, enterprises from the industrial sector and HCDM



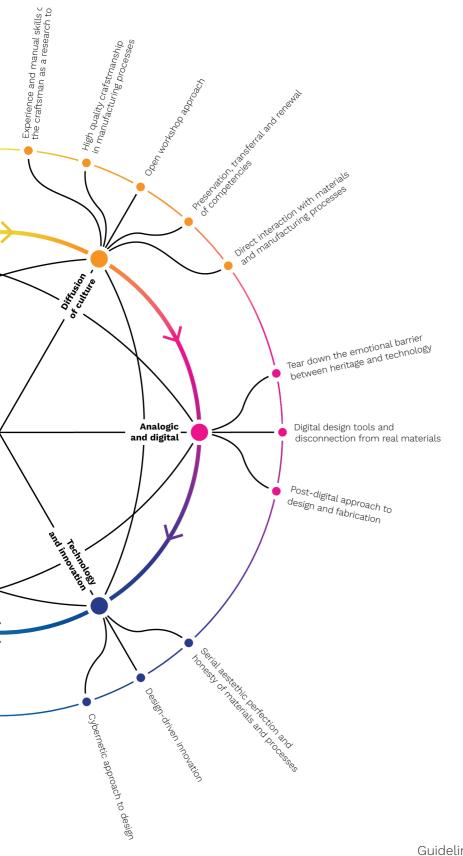
RTEFACT

## Guidelines for experimentation

Starting from the innovating push of the fourth industrial revolution, with its own technological advancements and organizational strategies, and following with the contextualization in the Italian manufacturing scenario, the previous section of the research has analysed the characterizing driving forces, evident and underlying, of the scenario for the development of a cultural intensive manufacturing activity. From the knowledge collected in the research it has been possible to identify six core areas of intervention which are fundamental for the success of the high cultural density manufacturing. For each field, guidelines for experimentation have been devised in order to establish a map of the most important features to implement in a cultural enterprise to achieve a successful blend of cultural and commercial value. The different fields are structured within a rational flow. associating the various guidelines in logically connected steps, and every area is essential in its own respect to the final objective of establishing a sustainable and autonomous cultural intensive production strategy. However, any existing enterprise might select and adapt to the single use case the most relevant and effective of every single one of the proposed guidelines from each field, thus designing their original strategy in conjunction with any of their own existing cultural capital and manufacturing assets. Some of the existing companies might already be proficient in one or more of these areas but still requiring the implementation of more principles from other less developed ones. Other enterprises might as well be currently putting an adequate effort in almost all the fields while not obtaining satisfactory results nonetheless because of the lack of a coherent and effective strategy designed to channel the values from the initial stages throughout all the process. For these reasons it is remarkably important to contextualize meaningfully every guideline in the wider picture of a real business, both if already existing or in a start-up phase, interacting with both its sociocultural and commercial environment. Employing this knowledge as a solid foundation, it is possible to proceed to carefully establish thoughtful connections between the guidelines and the actual cultural and economic scenario in an effective way.



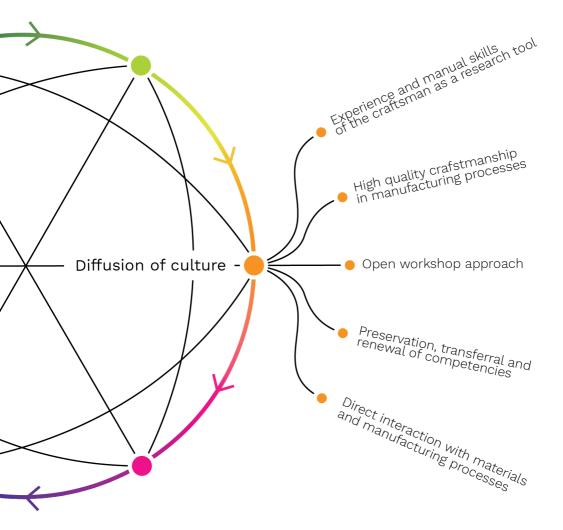
Model of the HCDM guidelines



Guidelines for experimentation

## **Diffusion of culture**

Diffusion of culture



The manufacturing system of the most distinctive production of Made in Italy is characterized by the sedimented territorial knowledge of materials, processes and products coming from a lineage of excellent craftsmanship empowered with entrepreneurial innovation, with a diverse range of original variations in the many different industrial districts of the national territory. This knowledge, which is deeply embedded in the communities of practice and local material cultures, is tough to replicate elsewhere and therefore fundamental for the competitivity of these enterprises (Osservatorio distretti 2013). As previously mentioned about the contemporary relevance of craftsmanship, the different skillsets of the trades, the specialized knowhow, the codified experience coming from direct practice with the masters are all extremely valuable and soughtafter competencies in many fields of production, including the industrial manufacturing sector itself. In the establishment of a business practice which revolves around cultural value, it is therefore essential for the first touch point to be all those activities centred around the diffusion of knowledge, making use of the original cultural capital of the enterprise even before the start of the actual manufacturing process.

Experience and manual skills of the craftsman as a research tool While the craftsmanship enterprise effectively makes use of the specialized and qualitatively excellent results of the expert workers in a manufacturing process characterized by high quality goods produced as single artefacts or very limited series, the more automated industrial production environments can still gain vast benefits from the collaboration with the craftsman. In fact, even before the actual fabrication process, the collaboration between craftsman and designer can be especially valuable for the development of complex or innovative products. Since design as a discipline is in many ways traditionally related to that of the craftsman, the research and development stages of industrial production are an especially fruitful environment for the interaction between these two characteristic figures to take place. The potential and the methods for this collaboration have been explored by Handan Temeltaş in his 2017 research "Collaboration and exchange between 'Craftsman' and 'Designer': Symbiosis towards Product Innovation". In his exploration, the distinctive characteristics of the manufacturing process of the craftsmanship enterprise have been coded in three main features. First is the risk taking and responsibility for the handmade unique object, which sees the craftsman personally acting in the handling of the raw materials, fabrication and assembly of the components and final polishing of the final goods. Whereas the designer contributes mostly to the research and development stage of the new product with little to no role in the manufacturing processes, the craftsman has a direct influence over all the stages of design and fabrication. The second characteristic is the peculiar process where the prototype is being continuously elaborated into becoming the final artefact. Differently from an industrial process which is structured distinctly into stages of research, design, prototyping and fabrication, the craftsman operates on the same artefact since the initial steps of the manufacturing workflow, continuously refining and making adjustments as needed on the piece which will become the final product itself. The final level of distinction is the holistic approach to manufacturing. This distinctive approach to the fabrication process of the craftsman is founded on the knowledge of both what to do and how to do it which influence each other simultaneously, leading to a qualitatively outstanding result which would be difficult to achieve when mastering only one sphere of this knowhow. Making use of these distinctive qualities the craftsman can introduce innovation in the process of a more industrial producer by incorporating the "tacit knowledge" embedded in its own working methods, relating directly with the designer which acts as a connecting node to the serialization of the factory. This original knowhow is beneficial in various different stages, from knowledge production, to application and finally diffusion (Temeltaş 2017). For the success of the high cultural density manufacturing, the enterprise should also consider how the contribution of its distinguishing specialized knowhow could be beneficial to analogous processes across different economic sectors, therefore establishing a parallel business activity to make use of its cultural capital in addition to the actual internal manufacturing processes more strictly related to the fabrication of artefacts.

Diffusion of culture

High quality craftsmanship in manufacturing processes The contribution of the experienced craftsman in more industrialized production realities is not limited to the research and design stages. In all those segments of manufacturing where the production processes feature critical specialized activities, the contribution of craftsmanship is crucial in the delivery of qualitatively outstanding results. In this environment which competes through excellence of both design and fabrication of the products, the expert worker intervenes in all those stages of manufacturing where processes are extremely difficult to serialize with satisfactory results or cannot even be automated at all. This is often true regardless of the specific materials of production, as the specific technique of the craftsman on raw matter can specialize in very diverse areas, ranging from more traditional forms like wood polishing to more recent specializations like carbon fibre handling (Temeltas 2017), and of the product category or economic segment as well, as craftsmanship can be expressed in complex mechanical products as much as traditional ceramic artefacts. In their 2016 research G. Campana et al. have studied the employment of craftsmanship in the luxury leather district of Tuscany with the aim of identifying parameters for the evaluation of the strategic contribution of the experienced craft workers to the process of manufacturing. The authors identified various distinctive features of the craftsmen compared to common workers, such as specific knowhow of the craft, heritage, creativity and territorial vocation. The research evaluated the impact of craftsmanship intensive activities on the various stages of the design and fabrication processes, highlighting the significant influence of this approach to manufacturing in the aggregation

of value to the final product and consequent competition on quality and specialization of offer. In addition to all those existing high quality and luxury niches where excellent craftsmanship is consistently employed to generate value in manufacturing, led by the significative example of Made in Italy, the high cultural density manufacturing should take into account the possibility of making an additional use of its available knowhow and experience through the collaboration with small industrial actors, preferably in the same territory, which might desire to employ strategies of competition on quality rather than on cost, thus employing craftsmanship as a mean of adding cultural value into their commercial offer. Through the establishment of new flows of commercial and cultural value exchange the enterprise can both be a vector of renovation and diffusion of the local heritage and become a central point of the production fluxes inside the industrial district.

Diffusion of culture

Open workshop approach The business advantage coming from the diffusion of culture is not limited in the direction of the craftsmanship enterprise taking a step towards the factory, in either research or production stages. As the retainer of a competitive and renowned cultural capital, the high cultural density manufacturer might as well employ its own production spaces as an experimentation ground to stimulate innovation and diffuse knowledge. Through the approach of an "open workshop", the cultural intensive enterprise can become first hand a place for formation and transmission of expertise. Through an elimination of physical and psychological barriers, the aperture of the workshop towards the outside environment can encourage a beneficial diffusion and mutual exchange of knowledge between realms which are usually disconnected. Bringing forward a sedimented tradition of transferring the heritage of the craft from master to apprentice, in a contemporary cultural environment where openness and sharing are valuable economic forces, the manufacturing spaces of the enterprise can become a connection spot for the promotion of activities which encourage both the preservation of heritage through generation renewal of knowhow and the positive contamination of legacy with fresh inputs from different areas of expertise. Establishing an open workshop activity can be beneficial to the cultural enterprise on many different levels. As the connection point between peers, it could become the catalyser for a process of cross-pollination among different fields of expertise and material cultures, encouraging the aforementioned process of systemic action between different districts and supply chains which is fundamental for the growth and innovation of the entire

manufacturing environment. This approach can also have a strong impact on the communication with the commercial audience of the producer, establishing a sense of community and direct interaction which becomes a preferential mean for an effective transmission of the proposed cultural value. By being introduced personally to the activities of the craftsmanship enterprise, the customers can appreciate more profoundly the deal of knowledge, skill mastery, time and rhythm of manufacturing which distinguish this cultural approach to production from the automation of the massive industrial counterparts. A high cultural density manufacturing activity should invest in the open workshop approach as a powerful mean of market recognition and networking on the peer level, establishing valuable production district synergies, while also engaging their market audience, with sharing activities which stimulate the involvement with the process and the brand, creating a personal connection which acts as a preferential mean for the successful and coherent narration of the consistent effort made by the enterprise to integrate cultural value in its offer.

Diffusion of culture

Preservation, transferral and renewal of competencies The craftsmanship enterprise inherits a large amount of its cultural capital from the prolonged tradition of direct transmission of the characterising expertise and knowhow through the relationship between master and apprentice. The lack of generation renewal, worsened by the economic crisis, has been one of the most alarming threats to the whole sector of craftsmanship in the last decades, with the average age of the workers increasing continuously in the sector (Regione Piemonte 2012). Since the specialized knowhow and expertise of the craftsmen is usually the result of a direct experience of materials, tools and techniques accumulated in time, the pass of the baton to a new generation of workers is essential for the preservation of that specific knowledge and heritage before the senior members of this lineage abandon the working environment (D'agostino Ferritti 2016). The high cultural density manufacturing has the potential for developing into a privileged attractor of this knowledge, employing a structured and continued approach to the captivation of new talent into the processes of legacy and transmitting this specialized knowledge to a novel generation of experts. Taking advantage of its contemporary organization and communication approach, these cultural intensive enterprises can prove to be remarkably more attractive to the younger workforce than the traditional workshop, ensuring the continuation of the cultural lineage while benefiting from the innovation potential of the more technologically accustomed young talents. In addition to the traditional custom of apprenticeship in the workshop, the cultural intensive enterprise should make use of its digital and innovative nature to adopt new channels for the diffusion

of culture. Exploring the potential of newer means of formation, from on-site workshops and hackathons to the massive open online courses (MOOC), the high cultural density manufacture can make use of this opportunity not only to promote the connection with new talent and preserve its cultural capital but as a mean to establish itself on the market as a leader of its trade, institutionalizing its cultural authority in the field.

Diffusion of culture

Direct interaction with materials and manufacturing processes One of the most distinctive features of the quality outstanding manufacture in the craftsmanship enterprise is the natural integration of authenticity in the artefacts, coming from an original and sedimented way of ideating and realizing products. This characteristic quality is especially cherished in the manufacturing environment. While this quality is often also related to specialized processes in which the approach of the craftsman cannot be replicated in large-scale with other instruments or techniques of production, the peculiar relationship between the experienced worker and his instruments or preferred raw materials can prove remarkably beneficial for designers and other product developers. The unauthentic feeling typically associated to most of the industrial production is often neither a direct by-product of the serial nature of the manufacturing process nor an unavoidable consequence of the employment of materials with an artificial aesthetic. This unnatural feeling is usually related to the disconnection between the materials, regardless of their natural provenience, and the way they are shaped, assembled and polished into the final artefact. On the design side, the increasingly digital nature of the process increases the abstraction between the project as a digital instance and its counterpart in the real world, often actually materializing the results only in the last stages of prototyping. Understanding the methods and techniques of the craftsman, its experience in the manual manipulation of materials and the natural properties and characteristics of them leads to an improved mastery of the entire process which allows for the achievement of more authentic results even in industrialized processes. In an interview for the online design magazine Core77, Apple's design head Jonathan Ive has underlined how the disconnection of the material from the form, in a digital computer-assisted drawing (CAD) workflow which leads to abstract shapes being labelled and rendered in a particular material only out of a stylistic choice, is a serious problem in the design practice and how the remedy for this unauthentic approach is a first-hand experimentation and experience with materials and tools, to understand how they inherently behave and react to solicitations before imagining their final shape in an artefact. The high cultural density manufacture is located in an advantageous position in this scenario as it naturally bridges the qualities of the craftmanship manufacturing process with the needs and objectives of larger enterprises. In this perspective, it can be the perfect environment for designers or product engineers to learn personally and experiment the diverse qualities of materials and processes, with the leading help of experienced masters of the craft which can guide them to a greater level of accomplishment and authenticity in their work. When evaluating the possibilities for the cultural intensive enterprise for integrating new activities centred around the diffusion of knowledge, this particular relation with industry and design education should also be considered as its knowhow reveals to be particularly competitive for these firms and institutions.

Diffusion of culture

Lastly a business organization which is centred on the appreciation and promotion of cultural value in manufacturing, the diffusion of knowledge is a valuable asset to encourage new activities which are complementary to the main production of artefacts. These activities hold a great potential for innovation because of their natural inclination to encourage a constructive contamination with different fields of expertise. The qualitatively outstanding work of these companies is attractive for firms coming from different economic sectors, especially industry, making formation and experimenting activities a valid integration to the offer of services. Meanwhile, the knowledge diffusion activities constitute an interesting opportunity for those cultural enterprises which, because of the first order nature of craftsmanship intensive processes of manufacturing, struggle to scale their business towards a more economically sustainable balance. Employing contemporary means of communication through digital platforms, the knowledge transmission process can be shaped into a second order scalable activity, widening the reach and the appeal of this practice without requiring additional costs or the personal intervention of the expert craftsman, like would have been traditionally necessary in the more typical process of direct experience of the craft. Many craftsmanship enterprises fail to realize how central the knowledge flows are to their trade and how much potential for business might come from a thoughtful management and transmission of the invaluable cultural capital in their hands. The high cultural density manufacture should consider thoroughly the opportunities for taking advantage of their specialized expertise and knowhow through complementary activities of knowledge diffusion to increase the effectiveness of the business proposition.

## } Diffusion of culture

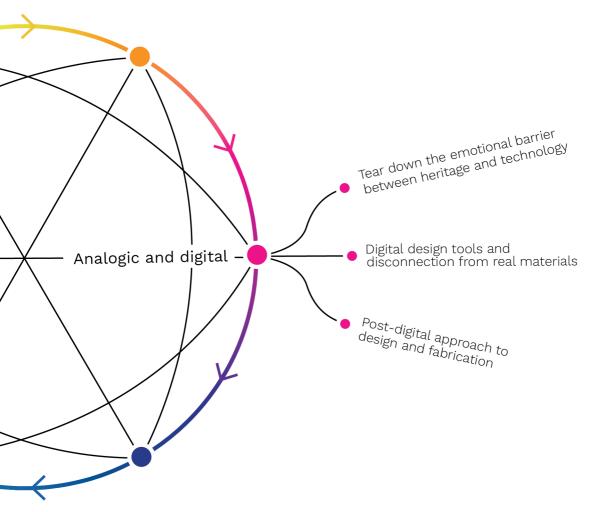
Diffusion of culture

## Analogic and digital

Analogic and digital

1-22

4.5



As it has been illustrated, the high cultural density manufacturing strategy is employed from the beginning with the purpose of giving a more contemporary and updated direction to valuable practices of the past which inevitably lost their relevance with the transformation of the economic scenario during years. This objective gives rise to some delicate issues which must be addressed with great attention to elaborate coherent and convincing results. One of these challenges comes from the necessity to integrate updated technologic tools and strategies in a field where a consistent part of value is related to the heritage of a manual expertise from legacy. This apparent conflict between analogic and digital world, while undoubtedly a sensitive matter to address, can also lead to promising outcomes, resulting in increased and renewed cultural assets for the enterprise. The construction of an in-depth awareness of this subtle equilibrium is essential to integrate strategically new elements in the existing material culture in a synergic way, promoting the growth of original cultural value while expanding the range of possibilities for business organization and manufacturing, all in a respectful way of the traditions which make craftsmanship treasured in the first place.

Tear down the emotional barrier between heritage and technology

In the section about the cultural and commercial proposition of the craftsman, it has previously stated how in the common imaginary, and to some extent in the real scenario as well, the advancement of industrial technologies and means of production have framed craftsmanship as an outdated presence from the past, with little place in the current economic scenario besides the melancholic and longing symbol of a cherished past. The reality of facts is much more nuanced and, while traditional craftsmanship might be incompatible as a manufacturing process with the consumption needs of the whole modern society, the methodologies, the experience, the distinctive approach to a qualitatively outstanding production are all features which are relevant, uncommon and sought-after in the contemporary economic environment. For the vision of an economically sustainable, competitive and successful cultural intensive manufacturing to become realistically achievable, it is crucial to address this connection with heritage which should be the foundation of the cultural advantage rather than the weight which makes this economic segment often stuck in the past. The nostalgic vision of craftsmanship identifies the added value of this approach in the handmade nature of the artefacts and of the manufacturing process. This misconception has established an emotional barrier in the adoption of new technologies of production as they would apparently discredit the valuable intervention of the craftsman. This thought position fails to recognize how the distinctive approach of this skilled worker is deeper and wider in scope than the simple handmade interaction with materials and tools. Therefore, when evaluating the introduction of digital technologies in the manufacturing workflow of the craftsmanship enterprise, it often happens that the digital fabrication tools are dismissed as they seemingly do not rely on "handmade" techniques. In the first place, these tools require both a great understanding of the behaviour of different materials and instruments in the input and a fair deal of direct human intervention to make the output of the machines into the final product. While it is true that some of this tools can support a workflow which moves directly from the digital schematics to the construction of the end product in an almost automated way, as much as this opens an interesting dimension in regard to the logistics of manufacturing, this specific kind of approach yields the less interesting results on the quality of production level. A meaningful integration of these technologies in the workflow of the craftsmanship enterprise would employ the distinctive mindset, attention to details, direct interaction with materials which characterize the excellence of its traditional approach to these digital fabrication technologies to achieve an authentic result regardless of the digital nature of the manufacturing process. With an objective consideration of the analogic techniques production, it is straightforward how the handmade definition is not by itself a warranty of either quality of concept or of aesthetic result. The discerning element integrating authenticity in this process is the distinctive approach of the craftsman which lies on a higher level than the specific tool or material, making it adaptable to new technologies and production contexts. For the high cultural density manufacturing to be effective it is necessary to employ an open mind to innovative means of production and digital technology, experimenting new forms of craftsmanship and new workflows to cultivate original cultural value and achieve authenticity in novel processes and techniques.

Digital design tools and disconnection from real materials The last two decades have exhibited an increasing evolution of digital tools of design and engineering, increasing critically the precision of technical drawing and the possibilities of modelling and rendering tools. The resort to increasingly digitalized workflows from the design and research stages, into development and finally manufacturing has opened great opportunities for product innovation, optimization of processes and quality of manufacturing. However, this increasing abstraction between the software-based design progression and the actual processes of manufacturing leading to the final artefact has simultaneously detached the product developed digitally from its material counterpart in the world of atoms. When the activity of designing, starting from education to the professional practice, becomes completely separated from the physical interaction with raw materials, instruments of production, and manufacturing techniques, the unavoidable result is that of an artefact which does not embody honestly the uniqueness of its materials. The profound comprehension of resources and techniques coming from direct experience is crucial to lead design choices in a way that, merging authentically and accomplishedly the appearance and the functional dimension of the artefact, employs materials in a meaningful and honest way, providing a resonantly genuine feeling to the perception of the user. In order for the design research to restore its initial relationship with the direct mastery of materials and production techniques, leading consequently to the development and production of artefacts with an intrinsic authentic feeling, it is essential for designers to experience the physical dimension of product construction techniques, assembling, polishing and treatment of raw materials. The collaboration between craftsman and designer has its own lineage of successes and, especially in the Made in Italy economy, often lead to outstanding results which would have been difficultly achieved by any of the two parties alone (Bettiol, Micelli, 2014). In this scope, the craftsmanship enterprise is in the ideal position to offer an experimentation and formation environment where students or more experienced designers can apply their methodology while increasing their knowledge of processes and materials. In a high cultural density manufacture, the bond between physical interaction and digital design workflow is essential to be addressed constructively to encourage a process which integrates effectively the cultural value from the authenticity of production and the contemporary appeal and innovation of a design-driven enterprise.

Analogic and digital

Post-digital approach to design and fabrication As it has been illustrated previously, one necessary condition for the success of a contemporary engaging cultural intensive enterprise lies in the balance between traditional tools and digital means of design and production to foster the innovation of methods of heritage, encouraging the growth of new cultural capital through innovation. On the manufacturing side, the digital fabrication instruments have to find a place in a workflow which encourages a meaningful integration with the traditional mindset of the craftsman. Contextually, in the design environment, digital instruments must be employed for their efficiency and versatility but with a constant attention to the corresponding counterpart in the real production environment. While these two flows should be balanced carefully with the knowhow coming from heritage and local material culture, it is also attainable to implement them in a synergic way, establishing a completely new method for research, design and manufacturing. The most common definition of digital design is often limited to the aggregation of digital means of project development and digital instruments of fabrication in a one-directional manner, while some authors propose a different interpretation which revolves around an iterative process which employs digital tools for exploration and experimentation purposes (Kourteva, Mc Meel 2017). In their research, the authors have proposed a novel approach to design and production which builds on this recursive and enquiring variety of digital design while integrating traditional means of prototyping and production, trying through an experimental work to "recover the human driven aspect of being an intuitive creator (Picon, 2010, p. 60) without neglecting the technological

advantages of the available digital tools. The digital craft and the real material tactile interaction are the two logical threads explored in this project. The focus is set on how they support or prevent the designer in taking design decisions". In their experimentation, despite the initial intention of utilizing a digital workflow to generate and then fabricate the final artefact, various challenges have surfaced which have been finally overcome through manual analogic means of interaction with the materials, revealing empirically benefits and issues of the two spheres in various stages of the design development. Through their case study and research, a post-digital methodology has been defined which is centred around the iterative resort to both analogic and digital means in all the stages of product development, from the early concept to prototyping and manufacturing, in order to complement the pros and cons of the single workflows. In a high cultural density manufacture, the employment of such a postdigital design and production strategy could prove fundamental to find the most effective equilibrium between analogic and digital realm, cultivating and effectively conveying the united cultural value belonging to each field in an innovative and constructive fashion.

Analogic and digital

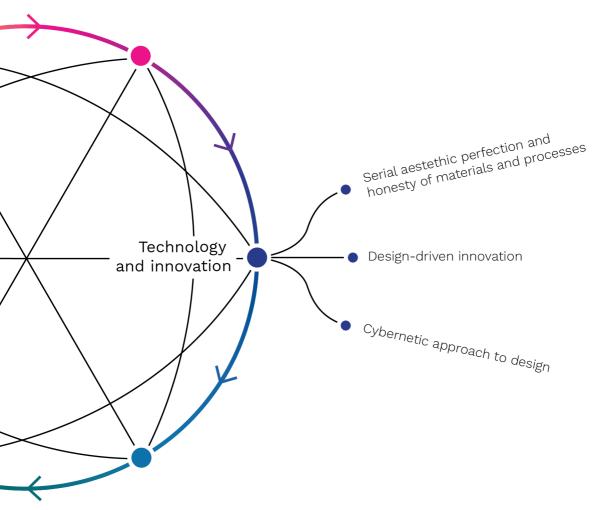
The dualism between digital and analogic realms is intrinsic of the transition to an organizational model of manufacturing which relies on the integration of technological advancements with the excellence of traditional methodologies of production from heritage. Accomplishing this transition successfully is a delicate task which requires a strategical approach to both heritage and innovation. However, this hybridization can result in a valuable renewal of the cultural capital from legacy and is thus essential to bring competitiveness to the craftsmanship enterprise in a contemporary economic environment without renouncing to the cultural soul distinctive of this sector.

## } Analogic and digital

Analogic and digital







The initial analysis of the manufacturing state-of-the-art, conceptualized in the Industry 4.0 development model, has contextualized the technological evolution of industry and, in a wider way, of all the economic scenario. It was stressed how the fourth industrial revolution is not a phenomenon restricted specifically to the heavily industrialized and automated factory, therefore opening the discussion on the way this paradigm can be translated for the transformation of the system of SMEs which characterize Made in Italy. Although these cultural oriented businesses rely heavily on a production structure which consistently draws value from heritage and tradition, the renovation of the craftsmanship enterprise to reach the standards of the contemporary technological expectations is a mandatory step for the entire segment to survive the next wave of industrialization. Learning from the exploration of the cultural and commercial value scenario, a high cultural density manufacturing model has been proposed, with the central purpose of connecting successfully the cultural capital coming from heritage with the fierce pull for technological and business innovation demanded from contemporary markets. The objective of this approach is employing technology in a meaningful endeavour, therefore positioning economically in a more effective position compared to both the obstinately traditional workshops and the activities which, though employing new technologies in their process, are not making the effort of giving them an actual meaning in the process of innovation.

Serial aesthetic perfection and honesty of materials and processes The distinctive predisposition of the craftsman to elaborate the authentic feeling of artefacts through an excellent mastery of materials and techniques is a core characteristic which must be preserved in the transition from craftsmanship enterprise to high cultural density manufacture. The comparison between the attention to detail and quality of processing of an artefact manufactured by a specialized craftsman and the closest industrial-made counterpart highlights an immediate divergence of appearance. The organizational choices of the industry, starting from the economy of scale model, have inherently influenced the form and features of serial-made products. Excepting those product categories where industrial precision and automated processes are necessary to obtain secure and qualitative goods, which are by definition excluded from a potential comparison as they lack a craftsmanship equivalent, the investment on further serialization of manufacture and standardization of product characteristics has lead over time to the development of an aesthetic of serialization. The continuous effort of industrial design has shaped the restrictions of a large-scale manufacturing process into its own appealing style which, dismissing the fluctuations of shorter term trends, leads to appealing and expressive results through the masterful manipulation of geometry, shapes, detail, texture and finishes. While this established aesthetic of perfection has been since cherished in many economic sectors, especially technology and electronics, it manifests an underlying sense of artificialness. This issue has recently surfaced more vividly as it is being addressed by designers trying to convey a more homely and natural appearance to industrial products. However, the authentic nature of the artefacts coming from a craftsmanship-oriented process of design and manufacture is extremely problematic for the industry to replicate as it is strictly connected to that distinctive process of production which is incompatible with massive scale production. This same conflict of perceived and embedded values of the artefact are also relevant when moving in the opposite direction, from a more artisanal to an industrial model. The attempt to imitate the industrial aesthetic would be pointless for the high cultural density manufacturer as it is conflicting with the intention of competing in different markets than the typical industrial one. Therefore, as the fabrication process scales upwards and new technologies and business strategies are implemented in the traditional model of the craftsmanship enterprise, the recognition and respect of the core essence of activities and techniques is essential to preserve the merit of authenticity which makes this business strategy viable in the contemporary economic environment.

Technology and innovation

### Design-driven innovation

From the analysis of the distinctive strengths of the renowned Made in Italy production, it has been highlighted how the most successful firms of this economic segment have proved competitive in international markets through the employment of an original business organization strategy which deployed a creative direction of the companies. Thanks to the deployment of the lead designer on the same level of the management, these enterprises were able to craft disruptive and competitive products which made the production of these brands stand out from the crowd of the market. The introduction of a design-driven entrepreneurship in the company gave the economic actors of a congested market, which also suffered from the international cost-reduction competition, the extra edge through the offer of products with an added cultural, research and innovation content. Over time, this strategy led these outstanding firms to sum holistically their influence into the common COO brand of Made in Italy, with its perceived excellence in the consumer base. While the contribution of this enterprises is clearly related to the characteristics of the single products, it is significant to take into account how an underlying approach to design-driven leadership has conducted these companies to success. Thus, when evaluating the intervention of the designer into the high cultural density manufacture, it is essential to consider how, on top of the research efforts in the product design and communication fields, the innovation pull of strategic design is fundamental to devise an effective plan for cultural and commercial growth of the business. For this purpose, it is of critical importance to introduce the systemic approach to design in the management of the cultural intensive enterprise. Through its innate inclination for the appreciation of local material culture, the understanding of complex system interactions on both environmental and economical levels and the capability of connecting actors to generate new value, the systemic designer is therefore the appropriate figure to introduce a meaningful and respectful innovation in the processes, methodologies and supply chains of the craftsmanship intensive sector of Made in Italy.

Technology and innovation

Cybernetic approach to design The characterizing activity of the designer has changed in scope over time from its initial emergence to the present time. According to Richard Buchanan's theory (2001) of the four orders of design, the first effort of designers has interested the field of symbolic representation and communication, mainly expressed through text and images, which corresponds to the basic figure of the graphic designer. The second level has concerned the conceptualization and development of material artefacts in the tangible realm, which matches the work of the industrial designer, and has expanded over time to include the physical, psychological and social relation between objects and human beings. While the first two orders have distinguished most of the production of the twentieth century, the attention of the designers started to shift from the delimited challenges of single and independent design problems, which characterized the graphic and industrial fields, to wider and more articulate challenges, posing an additional attention to human activities and their organization. This larger perspective was distinctive of the third order of design, which saw the rise of new specialized professions dealing more specifically with services, experiences, interactions. As the different orders of design include to some extent the characteristics of the lower ones, the fourth order of design is the one with the largest field of action. On this level, involving complex systems and environments, the design challenges are represented by complex, multi-disciplinary problems which involve numerous actors from different fields and potentially with conflicting views and personal interests. According to the author "This area is more and more concerned with exploring the role of design in sustaining, developing, and integrating human beings into broader ecological and cultural environments, shaping these environments when desirable and possible or adapting to them when necessary". Tackling these issues requires the employment of design on a systemic level in order to be capable of understanding complex causal fluxes, like the relationship between people, cultures, enterprises and their territories, and identifying in this networks the opportunities for a positive and sustainable growth. The fourth industrial revolution is by itself one of the aforementioned complex systemic challenges, therefore is crucial to employ a second-order cybernetic approach, where the designer does not just lead the enterprise towards a goal but is capable of defining in the first place which goals are best to pursue from a vast and still disordered body of information (Ferrari 2017). For the transition of the craftsmanship enterprise into a high cultural density manufacture, it is necessary to employ this strategy for the achievement of meaningful innovation while respecting culture and existing balances in the complex territorial system. This need is manifested even more vividly for those enterprises which are not already established, thus requiring a greater deal of objective-scouting and consequent design leading to accomplish effectively the transition to this cultural-intensive model.

Technology and innovation

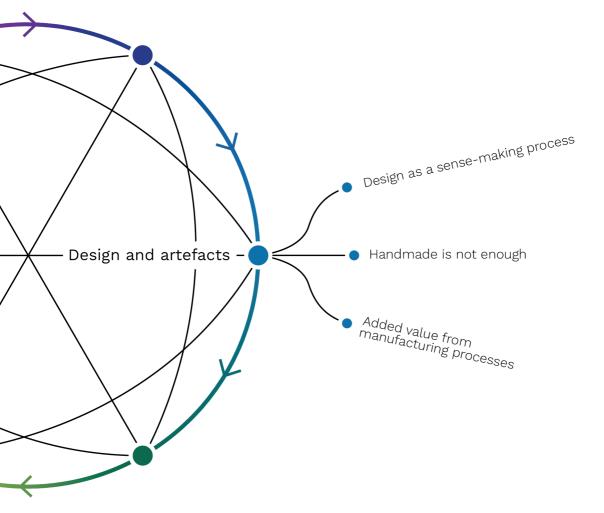
The response to the diffusion of the Industry 4.0 paradigm requires all enterprises to be attentive of the way, subsequently to the adoption of new technologies and strategies pervasively inside the factory, the whole economic system is going to transform. The wider adoption of innovative driving technologies is going to renovate the requirements of the users especially, establishing new standards for interaction and consumption in society. As the craftsmanship enterprise often suffers from an already outdated business model, it is remarkably significant to embrace these technological advancement, although with the constant direction of a design-driven leadership capable of decoding, understanding and interacting with these articulated systemic challenges and overcoming them with successful and thoughtful solutions, taking account of all the distinctive characteristics of this peculiar segment of production.

#### echnology and innovation

Technology and innovation

#### **Design and artefacts**





We have seen how the design-driven entrepreneurship, led by the analysis and planning activity of the systemic designer, is essential for establishing the correct course in each individual application of the high cultural density manufacturing. Building on the strategical insights coming from the application of a systemic approach to the management of innovation in the enterprise, the more typical product design activity is clearly essential in a process which, although integrating a vivid cultural content, is still commercially built around manufacturing. Concerning this relation between the product and systemic levels of design, it is noteworthy that the aforementioned four orders of design are not a restrictive classification. On the contrary, designers which relate to one order of this structure should confidently approach the mindset of different orders to create deeper and more resonant results in their activity (Buchanan 2001). In this case, the synergy between the efforts on all the four orders is essential to ensure that the cultural value at the core of the enterprise is chosen, embedded and narrated in the most effective and coherent way, ensuring the final authenticity of the artefacts.

# Design as a sense-making process

The design of a culturally dense artefact is an intricate challenge as the nature of cultural value makes its perception especially subjective to different audiences, depending on a complex network of influences coming from the individual and the different social environments with which he interacts in his life. The user is integrated in a continuous flow of social negotiation with its peers and diffused social contexts, while also affected by a persistent flow of information coming from a wide array of sources in its environment (Bertola et al 2016). Immersed in this unending flux of influences, people employ, sometimes unknowingly, the artefacts they use and interact with daily as a tool of social relation, making use of the cultural content of these goods to define their own identity in a larger cultural setting. The products offered by a high cultural density manufacturer need to be an operating part in this dialogue by embodying vividly their explicit and authentic cultural content. Determining effectively this symbolic and evocative cultural essence into the artefact cannot be obtained by the means of design as a "shape forming" activity. While the effort of a style-oriented designer can be very effective at employing trends in an aesthetically pleasing way, thus generating a greater commercial value, the encoding of cultural content is a process which needs a deeper activity of meaning interpretation and synthesis. Therefore, this activity requires the employment of design as a sense-making activity. By interpreting contemporary cultures, researching both the material and immaterial channels of cultural interaction, the designer must be able to read underlying stimuli in different fields of knowledge and information. Through this hermeneutic approach, the designer is then capable of highlighting previously unseen cultural connections and structure them in a way which is relatable and understandable by others. For the high cultural density manufacturing, the cultural mapping resulting from this process is an essential instrument to define and predict cultural developments, while also embedding original cultural content in the design and production of the artefacts. Employing a methodology of re-signification (Bertola et al 2016) gives design the possibility to connect with the audience on a deeper and more appealing dimension, sparking new cultural connections which resonate with the existing individual and social environment while introducing a meaning-driven innovation to the artefacts and the interaction people engage with them (Norman Verganti 2014).

Design and artefacts

## Handmade is not enough

Analysing the craftsmanship enterprise economic sector, it is manifest that a considerable share of the businesses of this scenario seek to find their marketability univocally into the offer of handmade products. It has already been illustrated previously how there subsist many different ways in which the distinctive methodology of the craftsman and its approach to manufacturing techniques is a key factor for achieving outstanding artefacts which compete on their excellent quality. However, it would be superficial to limit the added value of this distinctive process to the mere handmade nature of the final product. While the craftsmanship approach to fabrication is inherently more expensive than the industrial one because of its widely narrower scale of manufacture, the handmade nature of an artefact is by no means a warranty neither of its higher quality nor of its cultural relevance. On the contrary, it has previously been explained how industrial production employs a considerable investment to be commercially relevant for its consumers, while the craftsmanship enterprise often lacks this attention to marketing and communication or to the development of trends in demand. A traditional craftsman employing an outdated mindset and business organization is therefore in an adverse situation competition-wise. To fulfil their market potential, craftsmanshiporiented enterprises must recognize the real advantages of their own distinctive methods of research, prototyping and manufacture and embrace this commercial advantage consciously and confidently. Therefore, regardless of the handmade origin of the artefacts, the positioning of this business on the market must emphasize all the added value of this process compared to the more common factory. Learning from the lesson of Made in Italy, to reach this status of excellence in the high cultural density manufacture is essential to invest confidently on research and innovation, embracing the conceptual potential of the artefacts and thus competing with an original offer, in addition to the added quality of the manufacturing process itself.

Design and artefacts

Added value from manufacturing processes In the contemporary globalized market, the competition between the craftsmanship enterprise and the industrial sector cannot take place effectively either on cost or capillarity of distribution. Moreover, it has been mentioned how the handmade nature of the products is no warranty of their quality or market potential either. To achieve an effective appeal for the end customer, which will inevitably evaluate its consume choice by comparing every product with its industrial counterpart, the cultural intensive process of design and fabrication must be capable of integrating an added value in the artefact, in order to justify its inherent expensiveness with the offer of features and benefits which the large-scale industrial model cannot replicate efficiently or at all. Conveniently, a craftsmanship-oriented approach to manufacturing has a wide range of opportunities to integrate this added values in the artefacts, although the process is not immediate and requires an attentive effort on the design side to be actuated effectively. In the first place, the craftsman is typically inserted in a wider context of local material culture which may involve the availability of specific materials on the territory, of an original heritage of fabrication techniques and the existence of peculiar products, finishes or iconic elements which hold a special relation with the local environment and the corresponding community. When designing the artefacts in a high cultural density manufacturing model, it is vital to communicate with the local material culture, transferring to the final product all the added value coming from the time spent by the specialized expert working on the fabrication process, as well as conveying the authenticity of the product, incorporating the cultural and symbolic content coming both from heritage and the distinctive attention to manufacturing. The culturally dense artefact, as an outcome of this specific design approach, carries implicit symbolic information which communicates an original sense of belonging, communicating deeply with the existing cultural capital while employing a meaning-driven innovation to denote novel and engaging interpretations (Norman Verganti 2015).

Design and artefacts

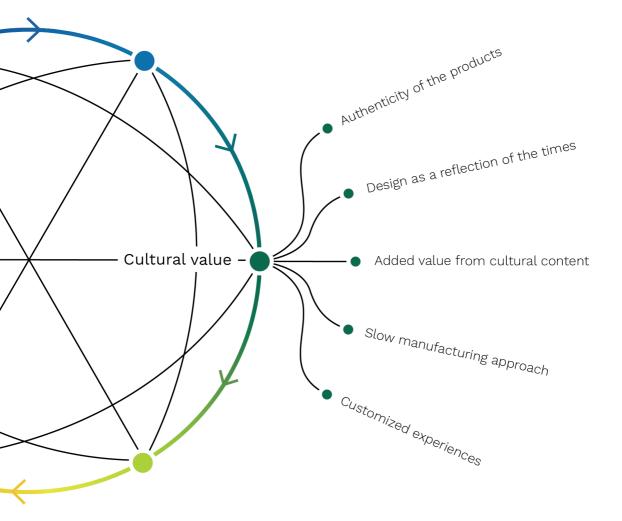
To pursue successfully a renovation of the craftsmanship enterprise economic sector, transitioning to the model of a high cultural density manufacture, it is immediately manifest how the introduction of new technologies of production and business organization is not enough on its own to encourage innovation in this segment which struggles to be contemporary commercially. As previously illustrated, technological advancements are not an end in themselves thus they need to be integrated in a significative way, meaningfully finding their place in a wider process with its specific objectives and characteristics. To avoid the risk of this irresolute investment on the modernization of existing instruments and methods, it is essential to work constructively on the current cultural capital, making use of technology as a mean of empowerment for those activities which generate the added value in the manufacturing process. In order to create culturally dense artefacts, employing design as a signification process is a strategic lever to understand and decode cultural contents which must be taken advantage of in the reinterpretation and innovation of meanings, leading to final products which successfully integrate and manifest their cultural value. Expecting the consumer to just appreciate the products for their handmade origin is an unproductive approach, therefore the use of design thinking as an instrument of sense-making and meaning innovation is necessary to encourage the competitiveness on scope and quality of this segment, while respectfully preserving and renovating the existing tradition which makes the manufacturing original and connected to people and their territory.

### } Design and artefacts

Design and artefacts

### **Cultural value**

Cultural value



At the essence of the entire structure of strategizing a high cultural density manufacture is the cultural soul which characterizes every stage of the activity from initial establishment, to design and actual fabrication. Since the evaluation of cultural and commercial value illustrated in the third part of this research, it has been inspected and illustrated how the typical activities of a manufacturing organization can assume a cultural dimension to generate an added value. The resulting cultural intensive enterprise relies on this content to generate a competitive advantage, offering an added benefit for those consumers who relate to the symbolic dimension and appreciate it. In this section will be addressed more specifically how to manage the cultural capital and which could be the sources of cultural content to make use of.

Authenticity of the products Thanks to the strong entrenchment in a territory with its own specific customs, material culture, folklore and symbolic tradition or even COO recognition in the case of the district nature of Made in Italy, the craftsmanship enterprise holds a valuable potential as a catalyst of cultural value in the manufacturing field. The natural predisposition to encode all this characteristics into its production process makes the skilled craftsman inherently proficient in the fabrication of artefacts with a deeply authentic expression. In fact, the experienced craftsman is embedding in the artefact, through his specialized process of fabrication, on one level its distinctive knowhow and mastery of the raw materials and techniques while on another one a tacit knowledge coming from a long sedimented heritage of the craft. The synergy between these two spheres of explicit and implicit knowledge is at the core of the intimately authentic cultural dimension of the final artefact, embodied in its material, shape and finish which honestly communicate the nature of the product and its history. This is a decisive factor in the competition with industrial manufacturers as the factory is by definition incapable of delivering these qualities, despite more recently attempting to imitate the appearance of such authentic products. Regardless of the actual raw material or commercial segment, the heavily serialized production suffers inevitably from limitations which betray the automated and impersonal nature of the final products. However, because of the already mentioned elevated attention of the industrial sector to the trends and requests of the consumer, the high consideration of the value of authenticity by the large firms of manufacturing is a significantly encouraging signal of the chance for competitiveness of the high cultural density manufacture, which holds the advantage of moving confidently in its own territory.

Cultural value

Design as a reflection of the times The cultural environment could be represented as a continuous system of fluxes which influence one another, with stronger elements that are more sedimented or widely recognized, smaller ones which burn out without leaving their mark and others as well which grow in time becoming increasingly relevant and influent. This complex network is constantly filtered by the subjective perception of the observer, which is influenced by all the experiences, knowledge, thoughts, ideas, past and ambitions of the individual. Due to the mercurial nature of this scenario. which is both constantly transforming objectively and being interpreted and decoded subjectively, conveying cultural value requires a specific consideration of the continuous fluctuations of cultural content and of the interpretations users give to this phenomena. From the perspective of the designer, the strategy for the conceptualization of cultural content into the artefact must consider the frequent transformations of sociocultural environments, therefore requiring the design of these products to be consistent with their message in the specific time and space in which they exist and are utilized. While the evocative content can turn out to be timeless, as in manifesting a lasting appeal which is above fleeting trends, it cannot be purposely abstract from the dimension of time, as it would then struggle to be relevant for any cultural community with its own specific time-constrained ideals and thought positions. For the cultural content of the artefact to own a consequent cultural value for the customer, it must hold an understandable and relatable meaning to the user on a subjective and individual level as well as being recognizable and interpretable by the social context with whom the user is interacting and negotiating its own social identity. The culturally dense artefact is in all regards a communication medium. A product with a detached appeal, which does not transmit explicitly and confidently the semantic of its design, or worst is lacking any meaningful content to express, will not achieve a significant place in the perception of the user, therefore wasting the opportunity of acquiring the critical cultural value necessary for it to be commercially successful. In the design process of the high cultural density manufacture, the distinctive characteristics of a cultural artefact must be attentively considered and implemented from the research and concept stages to the fabrication methods. Once a significative cultural content has been established, it is essential to employ communication strategies with a coherent narration to transmit the cultural contents to the users in an engaging and effective manner.

Cultural value

Added value from cultural content It has been previously explored how the craftsmanship enterprise must behave in respect to the conscious integration of cultural value in its production, taking advantage of a predisposition to a certain method of manufacturing which is capable of achieving authenticity and relatable cultural content connected to heritage and local material culture. However, the manufacturing techniques are not the only mean of integrating cultural value, which is found convenient as the only characteristic of being handmade is not always sufficient to stimulate an actual added value in the artefact. While the research has assumed a territorial standpoint, that of the excellence of Made in Italy production, which leads to a close relation with the craftsmanship enterprise, the high cultural density manufacturing model is not limited in application to this economic segment as there subsists a wide range of opportunities to integrate cultural value in addition to the craftsman intervention in the fabrication process. Therefore, starting from the local material culture, the honest of manufacturing and the authenticity of the products, there are many other opportunities to achieve a culturally dense production. Through the employment of a sense-making design process, the interpretation of cultural developments is the foundation for the research of valuable symbolic content. A significant source of cultural value is found in the ethical features of products, manufacturing processes and business choices. The integration of ethic qualities in the artefact or the enterprise itself is a compelling way to achieve an added value to the final products. A large, diffused and growing community of customers is increasingly attentive to the moral issues related to their consume choices and are willingly to accept the added expensiveness of goods if they perceive their same ethic position in them. An example of these fields is environmental sustainability. Although the huge industrial firms are slowly attempting to implement more sustainable practices, the typical large-scale logic of production often contains an innate incompatibility with environmental preservation, even when it is sought-after by the companies, strongly limiting the potential for better solutions without a complete restructuring of the logistics and manufacturing processes. The consistently smaller companies employing a high cultural density manufacture model however are in an inherently advantageous position for the achievement of environmental sustainability in their processes. Thanks to their small scale and flexibility, as well as their deep relationship with their territory and its resources, the cultural enterprise can employ a systemic approach to production which respects the environment while also generating an added cultural and commercial value, establishing a positive feedback loop which encourages sustainable local growth and makes environmental sustainability a commercially convenient practice rather than a troublesome external imposition. This approach promotes a sense of community and belonging around the artefacts and the company itself, incentivizing a deeper cultural connection which is essential for this entrepreneurial strategy. A related example regards the "fair" branch of resource harvesting and manufacturing. In addition to the attention to environmental sustainability, this ethical position is concerned profoundly with the job conditions and the respect of the communities of all the people involved in the business process of the enterprise, from the initial phase of purchase or collection of raw materials, to the logistics, the actual manufacturing and the distribution of the final goods. Globalized economy has fostered many industrial practices which are in divergence to this attention, especially when gathering resources from developing countries or relocating production to low-wage ones. Industry 4.0 could be a first step in the direction of more domestic production and employment while also optimizing logistics and distribution in more sustainable ways. However, the fourth industrial revolution will take a long span of time to find its concretization in a pervasive way, thus it is difficult to currently predict to what extent it will be possible to make large industrial firms compatible with a fair and sustainable process of production. Yet, in the current economic scenario, the high cultural density manufacture is in the perfect position for embracing an ethical process as it does not just respect people, territories and communities but effectively drives its value from the resonance with their peculiar resources, material culture and production heritage. This systemic attention to territories and people, which is an essential requirement for this cultural intensive enterprise model, is an advantage point in the qualitative competition and differentiation from industrial manufacturers, thus making the narration of this cultural content essential to communicate the added value to the final user base.

Slow manufacturing approach The intimate relationship between the cultural intensive enterprise and its territory, driving on local material culture and traditions, make this production approach particularly near to what could be defined a slow manufacturing. The slowness approach, typically recognized in the original and most renowned Slow Food movement founded by Carlo Petrini in Turin in 1986, is founded on the ambition of rationally directing the consume of people towards typical, qualitative, ethical and traditional products belonging to the local production and heritage instead of the fast, cheap, unethical and alienated goods offered by a globalized industrial automated process of production and distribution. The slow manufacturing concept has been analysed by G. Campana and B. Cimatti in their research "The slow factory: a new paradigm for manufacturing" of 2013. The authors analysed enterprises both internationally and in the Made in Italy economic sector documenting how some companies have found in a slow manufacturing approach the key factor for being competitive on the market through added cultural value while rediscovering tradition of manufacturing and their bond with the territory and its heritage. A classification of slow manufacturing has been proposed which relates the age of the production technologies and the speed of the process. This categorization highlights how any mix of the two variables can lead to effective results depending on the economic segment and particular use case. The high cultural density manufacturing should seriously consider making use of this slow factory approach to design and produce goods which clearly manifest their deep connection with territory, their ethical standpoint both inside the enterprise and towards the environment and communities, the respect and appreciation of legacy and an overall inclination for qualitative excellence.

Cultural value

## Customized experiences

In addition to the increased bond with the territory and local heritage, the slow approach to production opens new interesting possibilities for the high cultural density manufacture to take advantage of. As cultural value is the product of a negotiation between the user and its social context, the cultural influences and demands of the individual can be very specialized depending on its personal experience and all the subcultures or smaller communities with which he interacts. The natural developments of these cultural niches in society, as well as actual countercultures which oppose mainstream values, are the expression of a deeper need for identity and diversification between the individuals belonging to larger cultural groups. This ambition to be oneself is of course reflected in the consume habits of the users, with the individuals belonging to both the wide mainstream communities or the smaller specific niches exhibiting the conscious or implicit need for cultural artefacts which act as tools of identification in this social fluxes. While the definition of mainstream selfexplanatory underlines how it involves the majority of a cultural group, therefore giving space to the industrial efficiency of the large-scale serial production, there has been a rising tendency in the last years, especially encouraged by the diffusion of knowledge and commerce on the internet, to develop more specific and individualized needs in opposition to the mass culture. The availability of virtually infinite choice, represented economically by the long tail (Anderson 2010), sparked the desire of more self-expression, which is reflected by the desire of increasingly customized experiences and products. It has been illustrated before how the industrial sector tends to be responsive respect to the commercial shifts in the needs of consumers and the Industry 4.0 model, with the proposal of a mass customization manufacturing strategy, confirms this increased attention to the individualized needs of every consumer. While the automation intensive factory is surely interested in the opportunity for greater flexibility in order to take advantage of this diversified demand, the high cultural density manufacture is inherently predisposed to address these requests as the slow approach opens room for a more direct relationship with the customer. The "slowness" of the manufacturing process offers an easier adaptability of design and fabrication to more specialized demands while, economically, addressing niches of the market has the advantage of a better engagement of the customer on both the commercial and cultural level. The satisfaction of on-demand requests by individual customers is therefore an important driver for value in this manufacturing model as this is an increasing market trend, with a remarkable commercial worth, which a cultural intensive enterprise is predisposed to satisfy successfully.

Cultural value

Establishing from zero a high cultural intensive manufacture presents a significant opportunity to adopt an original and distinctive approach, as the cultural value around which the enterprise is centred can be as diversified as there exist cultural niches in society. As the digital means of interaction and communication make the relation with specific customers vastly easier than in a pre-internet economy era, the possibilities to create an interface with a smaller or more specialized cultural community are still economically viable, especially as this business model is based around a small and therefore more agile manufacturing and distribution process. The integration of digital technology in the process also encourages innovative models of fabrication and sale which can address efficiently the individualized needs of single customers, in a way the factory is very far from replicating despite the effort of the fourth industrial revolution.

## } Cultural value

Cultural value













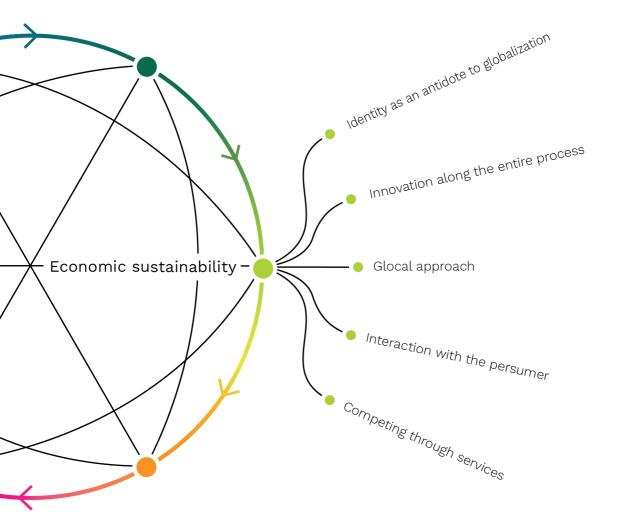












At the foundation of the high cultural density manufacturing strategy is the mission of making a cultural approach to production autonomously sustainable as a business organization and commercially successful. This approach moves countertrend to the typical policy of "preservation" of heritage, which commonly attempts to protect those crafts endangered of disappearing because of the economic difficulties and ageing of the workforce but does not effectively give to these businesses the tools to be commercially autonomous. The proposed model, instead, has the purpose of promoting a competitive and innovative enterprise able to make effective commercial use of its cultural capital without external help, thanks to the employment of updated technologies of production and renewed means of interaction with the customer, while led by a strategic use of design on all levels from communication, to product development and systemic planning. This approach to manufacturing avoids completely the attempt at an impossible opposition with the heavily industrialized sector, which is definitely more competitive on logistics, costs, standardized quality and distribution means, which would inevitably lead to the cultural enterprise sacrificing its core of heritage in favour of a factory-like approach in the pursuit of fiercer optimization. Instead, the high cultural density manufacturing strategy positions the business in a smaller but more specialized market segment which the industry desires to reach but is unable to because of its massive scale logic. This way, the cultural enterprise makes competitive use of its own distinctive assets in a niche where these qualities are cherished and appreciated for their added value, offering something more appealing and relevant than the industrial counterpart to make for the inherent increased costs of manufacture.

Identity as an antidote to globalization The globalized nature of the contemporary economic environment, with massive scale industrial firms capable of producing standard quality products at relatively inexpensive costs, cannot be overlooked or underestimated when devising a strategy for the high cultural density manufacturing to be successful commercially. It would clearly be ineffective to convince the consumer to trade the established benefits of industrial goods, which are competitive in cost and distribution while holding a suitable commercial value to the user, for a more expensive product coming from local manufacturers without offering something more than the competition. As previously stated, competing on the same level of the factory is a weak strategy, therefore it can be challenging to identify an optimal spot in this crowded economic environment. However, a deeper analysis of the nature of the actual globalized market surfaces some implicit but nonetheless significant flaws of the economic model, which can be taken advantage of when elaborating the proposal of something novel. The economy of scale nature of the typical industrial firm, based on automation-intensive factories and global supply chains, draws its market effectiveness by the largest possible consumer base. Addressing a wide economic sector with its offer grants these industries the possibility to reduce costs to the minimum by employing the manufacturing of massive batches of the same product. The downside to this model of production is its embedded incompatibleness with flexibility of production, leading to the development and manufacture of universally appealing goods, which are conveniently designed to be commercially effective on a wide range of consumers. As the consume choice and the interaction with artefacts is essential for the user to define its social identity, this inherent standardization of the offer from industrial sources brings the side-effect of a consequent standardization of ideas into a mass culture. It has already been illustrated how the model of mass culture has been quickly weakened by the information opportunities of virtually infinite choice through the long-tail distribution of knowledge distinctive of the internet era (Anderson 2010). Conversely, the consumer has developed an increasing need for products which address its individual needs in a more personal and tangible way, compared to the more abstract one-size-fits-all offer of the massive industrial sector. With the exception of the aforementioned high technology industry segments which do not possess a legacy of traditional production, manufacturing processes inside the factory tend to be a merely functional step which does not convey an added value to the customer, which usually does not even know the way this kind of goods are actually manufactured. This is especially true of those supply chains where the fabrication and assembly phases are relocated to low wage or developing countries, in which case the company might even employ active efforts to make this negatively recognized manufacturing approach disconnected from the user perception of the product and the brand. To counterbalance the disconnection from territories and communities typical of the production of the large-scale industrial sector, the high cultural density manufacture can aim at offering products which exhibit strong identity features, manifesting confidently the bond with territories and communities, and designing culturally dense artefacts which engage the user personally. This direct interaction and more human dialogue between the enterprise and the consumer is a sought quality by the users, which appreciate significantly the relatable way in which they are taken in consideration of by the manufacturer, while establishing an appealing connection through a meaningful narration of the personally resonant cultural value proposed by the company. The smaller producer can make competitive use of the adaptability to smaller niches, addressing requests and lifestyles of specialized cultural segments with thoughtful and specific solutions, which gain a relevant added value for the customer thanks to the customization of the offer.

Innovation along the entire process The current economic scenario, featuring globalized supply chains and distribution networks with strong international cost competition, forces the cultural intensive enterprise as well to be conscious of the production environment and position strategically in the market. While it has been illustrated how the high cultural density manufacture can be competitive on the production side through quality and added value of its offer, it is also essential to leverage the other functional stages of the process to establish a position of advantage on the market. Especially in this manufacturing model where the intervention of the expert worker is crucial for the quality of production, which inherently makes the fabrication process more expensive and difficult to optimize, it is essential to have an efficient and organized business structure which is supportive of the manufacturing process. While the gradual outdating, from a competition standpoint, of the manufacturing process in craftsmanship enterprises is partly justifiable with the deep relation between heritage and cultural content of production, the general incapability of the small enterprises of this segment to adapt to contemporary economic conditions on a business organization and logistics level is one of the main reasons for their market ineffectiveness. It has been shown already how the industrial sector is an ideal source for the research of organizational best practices and an attentive adaptation of its strategies can be beneficial in the updating of economically ineffective production enterprises. In the range of opportunities offered by the Industry 4.0 model, there are many strategical insights and technological advancements which could be valuable to bring innovation in the whole supply chain of the craftsmanship enterprise. As the value of the output is strongly dependant on the actual stage of fabrication, it is essential to introduce any possible optimization in all the other phases of the whole process where efficiency and automation are not detrimental to the authenticity of the artefact. In the activities preceding fabrication, it is important to focus the attention on new models of smart logistics and warehousing coming from the fourth industrial revolution. Even on a smaller scale which might not make investments on robotics or assembly chains efficient, there are many solutions which could prove useful in different use cases, from the digitalization of logistics, device empowered smart workers and coordination with suppliers through data analysis. The Industry 4.0 model also suggests the establishment of completely new business models, with a strong digital core, which could be easier to adopt for a smallmedium enterprise because of its added agility in respect to the massive industrial firms. Craftsmanship enterprises are naturally predisposed to on-demand production and the business models and technologies of the fourth industrial revolution could make this inclination even more competitive on the market. After the manufacturing of the artefacts, there is still room for innovation of distribution, marketing, sale and interaction with customer. With its contemporary and digital approach to communication, the high cultural density manufacturing model aims at an updated proposition of the business on the market which is relevant and relatable to its audience. In addition to the design of an authentic brand which synergizes deeply with the cultural proposition of the enterprise, the employment of digital tools and channels of communication is essential for engaging successfully a demanding customer base with its high expectations. As the user is increasingly searching for added experiences rather than the goods on their own, establishing both a meaningful narration and a direct relationship with the customer are essential for the commercial success of this production model in the contemporary conditions of the market.

## Glocal approach

The globalized nature of the current manufacturing market, which distributes supply chains along continents far away from either the company itself or the consumer, is characterized by an economy of scale approach to production which endorses the continuous pursuit of greater efficiency and standardization. As cultural fluxes are also reflected by the artefacts people interact with in their life, the narrowing of choices in product variation contributed to a gradual flattening of the cultural variation into a mainstream, abstract, market-trend oriented industrial proposition. The lack of specialization in the offer of the standardized market has encouraged the customers to search for artefacts and relative brands which reflect more personally their cultural nuances and characteristics. This desire has amplified the demand for products with compelling cultural content, an explicit connection to a territory or community and a recognizable identity. The nature of this request, which contrasts the abstraction of industrial serialization with the authenticity of culturally dense artefacts, poses the high cultural density manufacturing in a favourable position to satisfy this increasing demand for genuine and culturally meaningful products as it is an innate quality of its distinctive economic position. Although the fabrication of artefacts with an authentic feeling is the natural economic field for the craftsmanship enterprise, the demand for genuine products with an explicit and relatable identity, which developed in response to the aseptic industrial offer of globalized economy, requires an additional effort to the traditional craftsman. While local consumers are increasingly looking for products, services and experiences which reflect more personally their distinctive cultural characteristics, this tendency does not point in the direction of a return to traditional means of consumption of a pre-globalized economy. To take advantage of this opportunity the enterprise is required to establish a glocal approach, contextualizing meaningfully the original qualities of its cultural capital in a business proposition which takes advantage of its local identity to be competitive on a global scale . With this approach to a meaningful design-driven innovation of the existing heritage, it is possible to give the cultural richness of materials, products and techniques from the legacy of the territory a valuable position in a contemporary scenario of production. The adoption of this contemporary approach to tradition, which makes the respective products and experiences relevant and relatable to a public significantly wider than the cultural community of origin, encourages both the market growth of local manufacturers, which find a larger audience and engage it more effectively, and a positive process of cultural exchange, as the products of a local community become appealing for new consumers around the world because of their authenticity and relation to territory. The definition of local territory can refer to various scales of magnification, in the Italian example ranging from the small community of practice, to the industrial district, the whole Made in Italy or even the European level, each sporting its own features and qualities in the cultural sphere. In order to be effective on the market, the high cultural density manufacture should engage confidently the demand for authenticity and cultural content which the industrial firms cannot satisfy because of the limitations of their economy of scale approach.

However, it is fundamental to understand how the users who are manifesting these needs are also culturally rooted in the global economy, therefore requiring the enterprise to employ its cultural capital coming from tradition in a renovated and contemporarily significative fashion, engaging effectively with an audience which will not renounce to the established high expectations about the interaction with the products they consume and the respective brands who offer them.

Interaction with the persumer In the wide economic scenario of the contemporary globalized manufacturing environment, while on the offer side the market is characterized by the strong position of industrial firms which compete fiercely on cost and engage the consumers through intensive use of marketing, the demand represented by people as consumers has increasingly become more active in respect to the dominance of brands in the market relationship. The mature internet era, through the offer of virtually unlimited information and media access, has encouraged users to access a wide range of knowledge and cultural contents which, because of the limited means of offline diffusion of information, were previously difficult to find and interact with. Internet, both as a communication mean and through the rise of online commerce, made possible for niche producers and corresponding consumers to interact with each other. The accessibility to more specialized products to satisfy the needs of users outside of the mainstream market parallelly developed the faceting of the demand into more specific segments, establishing a previously economically unsustainable long tail market (Anderson 2010). This suddenly extensive availability of goods has also increased the effects of global competition, establishing a system where the diligence of the consumer in the search of online purchase alternatives was rewarded with better deals and cost-quality ratio. The recent economic crisis amplified this tendency as a wider range of users were incentivized to pursuit the best value for their money, even at the cost of more time spent informing about goods and alternatives as well as thoroughly searching for the most convenient retailer. The increasing selectiveness of consumption by a user which gathers extensive knowledge about its purchase choices has developed in a new definition of demand. Named through the portmanteau of person and consumer, the persumer is an individual with a rational and informed approach to commerce who knows its potential in the demand-offer relationship and employs it to strip the producer of its dominance in the interaction. Taking advantage of the competition of the global market environment, this type of consumer has understood the economic power of its buying choices. Rather than passively accepting the market offer, the persumer has the ability of requesting an added effort from the producers who wish to gain its commercial approval, posing the attention not just on the availability of specific products but on the positioning of the brand and the entire process of manufacturing and distribution. In the research "Scenarios for Design and Craft" by Morez et al. 2017, the characteristics of the persumer demand are defined as "quality of communication (discarding the superfluous), originality (solutions not brands are what is sought after), simplicity (communicating only what is essential in contrast with current excesses), flexibility (knowing how to continually adapt to the customer), transparency (clear and well-defined communication), courage (risking being different), sustainability (market balance), unpretentiousness (brands must show their human side), credibility (brands must be consistent in what they sell, say and do) and a clear commitment to society and the environment". The high cultural density manufacture must prove attentive to the relationship with this segment of demand as it holds the potential to satisfy the high expectations of this customers and establish a successful connection with them better than how a massive industrial firm might do, while from their side these users are in the best position to appreciate all the added values of the artefacts, the processes and the entrepreneurial vision of this innovative cultural intensive business. Distancing itself from the abstract, aseptic and intensively marketed offer of the industrial counterpart, which is directed to a wider but mainstream public of consumers, this strategy of manufacturing which values traditional influences, local material culture and community building can engage this narrower but more informed and attentive segment of demand with an offer which, even though more expensive, integrates a valuable and authentic added experience to the mere commercial component of the product.

Competing through services In the last years, the development of the globalized economy has emphasized the relevance of the new segments of specialized and demanding customers which developed in response to the standardization of the massive industrial production. The flattening of subcultures, territorial differences, niches of consumption and individual lifestyles into the manufacturing logic of an economy of scale production, fuelled the demand of more individualized solutions to the needs of consumers as single people with personal preferences and needs. The alienating unification force of the mainstream serialized production encouraged the customers to look for alternative sources of offer which integrated in the artefacts added values of authenticity, craftsmanship, legacy or identity. However, this tendency is not limited to the production and purchase of artefacts with a more distinct cultural component. The common denominator to this emerging demand points in the direction of a more individual and personal interaction with brands, which must be perceived as more representative of the cultural values of the customer and sensitive to their distinctive traits. The result is an overall pursuit of authentic and engaging experiences which are not limited to the interaction with the artefact but also involve the interaction with the producer through services and communication. The predisposition of the craftsmanship enterprise to offer an enhanced experience around the product itself through its distinctive process and approach establishes favourable conditions for a successful satisfaction of this demand. This segment of more demanding consumers significantly values the additional qualities of the personal interaction with the enterprise, giving room to the high cultural density manufacture to approach the market with innovative business models, taking advantage of all the services and secondary interactions which the massive industry cannot sustainably engage. Making use of the rational integration between a smaller-scale flexible organization and the novel opportunities offered by the purposeful integration of digital technologies in the manufacturing, logistics and communication activities, the cultural enterprise can engage the customer through a more direct relation, offering innovative services and experiences in a field which is outside of the competition with the large-scale industry. The optimization of processes and supportive activities empowers the enterprise to engage efficiently and at a more competitive cost the users with customized services and tailored offers. In addition to the realization of on-demand or personalized artefacts, high cultural density manufacturers coming from different fields of production might find, through the employment of a design-driven innovation strategy, many additional services through which to engage the customer. Raising the attention on the movements of the innovative and more disruptive actors of economy, it is possible to identify common flows, for example the sharing economy development, which could prove notable and inspiring for this original approach to a cultural intensive production. Another range of opportunities to offer additional services has been discussed in the previous sections about "Diffusion of Culture" and "Relationship between Analogic and Digital", which suggest various prospects for the broadening of business activities taking advantage of the unique cultural capital of the enterprise. The strategic employment of design-driven entrepreneurship is crucial for the high cultural density manufacture to identify unforeseen opportunities for the development of new activities and services, engaging effectively the range of customers looking for a more individual experience, and establishing a more economically sustainable and successful business structure.

The entire high cultural density manufacture model originates from the initial challenge of bridging effectively the distinctive cultural qualities of the craftsmanship enterprise with the commercial success and rigorous business organization of a more industrialized producer. The devised strategy makes use of the characteristic cultural capital coming from the territory, heritage and expertise of the enterprise and contextualizes it in a contemporary economic scenario, aiming to establish an economically autonomous and innovative manufacturing model centred on the competition through high quality, specialization and added value. Rather than avoiding taking in consideration the industrial and globalized nature of the manufacturing market, this approach positions the business in an advantage position where it can address specific needs which cannot be satisfied efficiently by the larger industrial counterparts because of the limits of an economy of scale. By establishing a direct and meaningful relationship with an attentive, informed and appreciative demand, the high cultural density manufacturing can approach its own segment of the market in a successful and sustainable way, while respectfully making use of and renovating its own distinctive cultural capital. Making a real effort at understanding the characteristics of this user base and its expectations, the enterprise can offer authentic experiences, artefacts and services making use of the knowhow and excellence of work coming from heritage. The contemporary language and proposition make the genuine proposition of the high cultural density manufacturing also engaging to wider communities and cultures, promoting a positive exchange between local material cultures and people from different places. By accepting that competition with the main sector of industrial manufacturing is ineffective and meaningless, the craftsmanship enterprise can find its own place making use of its distinctive qualities in innovative ways, anticipating the factory on a market where it is not able to effectively intervene. From the perspective of a smaller or local industrial producer, the high cultural density manufacturing model can be the strategic element which makes possible to avoid the cost-competition with the global actors, achieving a competition of quality and specialization of production by aggregating the added cultural value which makes the artefacts more appealing than the cheaper but standardized counterparts.

## } Economic sustainability

# ONS FOR PRACTICAL APPLICATION PART 05

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## Choosing an operational framework

The previous sections of the research have examined the push of the innovating forces of the current manufacturing scenario on a global scale, namely the fourth industrial revolution, and made use of the systemic approach to contextualize this evolution in the distinctive scenario of Made in Italy. From this systemic analysis of the technologic, economic and social implications of the Industry 4.0 development, it emerged the strong need to develop a localized approach to this manufacturing revolution which establishes strategies and objectives coherent with the distinctive qualities of the Italian production and its rich cultural heritage. From the development of a value distribution scenario, ranging from cultural to commercial in different blends, it has been identified a route to generate a business potential from the introduction of the innovating forces of Industry 4.0 into a cultural intensive enterprise which draws its value from human and local sources, counterposing the immense economic strength of industrial giants which completely outperform businesses competing on cost efficiency and production scale. This high cultural density manufacturing model has then been synthesized in a programmatic series of guidelines which serve both as a guide for staying competitive, for the existing businesses which will be inevitably invested by the disruption of the fourth industrial revolution, and an advantaged starting point, for all the new enterprises which will make use of this innovation force to offer new value on the market from a startup level.

The development of the methodology for the high cultural density manufacturing model has been based mostly on scientific and academic sources, designing a coherent and fluid strategy to guide businesses in the innovation process. This research and strategy development effort, although based on a sound theoretical foundation, requires a practical validation to test and demonstrate its effectiveness. Thus, a consequent experimentation phase has been deemed essential to test and consolidate the previous research stage and the guidelines developed in the methodology within an actual application in real economic settings. This phase of field testing is essential for many reasons. In the first place, transposing the structure from theory to practice will highlight the real potential of the model as well as the areas which can still be expanded and improved, transforming the initial proposition in a more effective and practical strategy for the adoption in actual market contexts. By exposing the model to the interaction with the public, it will be possible to gather valuable feedback from consumers, businesses and institutions, establishing a direct interaction with the overall economic and cultural environment, fundamental for the success of this approach. On top of the benefits of experimenting the methodology and receiving a response from the market, the field testing of the model is crucial to create a first case study of the practical implementation of the designed guidelines, offering a direct example of how to apply this process to a real scenario, adapting the abstract guidelines to real market conditions, territories and people. The correct execution of the strategy is crucial for the future success of the model, thus for those businesses or entrepreneurs wishing to experiment the methodology it will be essential to make use not only of the guidelines but of a complete case study which highlights the different stages and practically explains how to carry out the entire process in the most effective way.

The premises of a model aiming to meaningfully implement innovation on technologic, design and managemental levels of manufacturing enterprises required to maintain a wide perspective on the diverse qualities and characteristic features which different production environments exhibit. In order to achieve a structure which can prove effective in very different fields, there has been designed a broad set of guidelines which cover diverse thematic areas and key activities. While on a more abstract theorical level the identified guidelines are all coherently designed as a system, with specialized parts interacting meaningfully with each other, in an actual use case with its own tangible economic scenario it is manifest that not all the guidelines might be useful or efficient to apply. Therefore, different business might employ their own unique mix of the proposed strategies, adapting the methodology to the specific requirements of their market scenario. The adoption could come either from the position of an existing business, seeking competitiveness and innovation in its field, or that of a new value proposition, which can employ this strategy to enter the economic scenario in a novel and successful way.

In the case of existing enterprises, which have already been operating in the manufacturing segment for a certain amount of time, they might already be effective in some of the six main areas of the methodologic process but missing on the opportunity of innovating their business through an expansion toward other currently less developed areas, which would enrich their value proposition and increase their competitiveness and economic sustainability. Another issue preventing the enterprises from reaching their full potential, even when approaching a wider range of fields in this spectrum, might as well be the lack of a coherent and effective strategies which synergizes all the efforts toward a clear and meaningful business objective. The managemental sphere of the methodology, making use of strategic design, is thought to address this issue by joining together in a systemic fashion all the different guidelines towards a defined and achievable goal.

The case of newcomers which adopt the strategy from a startup level poses different concerns and opportunities. The most valuable asset for these companies is the initial lack of constraints, responsibilities and already defined variables while they are still in a research and business design stage. By employing this approach from the very beginning, new enterprises possess the advantage of structuring their business model around this innovative vision of manufacturing right from the start rather than adapting to this conditions some existing assets which might prove not valuable or inefficient. The digital soul of contemporary businesses positions startups in a beneficial spot when interacting and connecting with their customers and narrating their value proposal. However, as the approach revolves around the cultural component of the business offer, newcomers are required to define and build their own cultural capital which will serve as the foundation of the high cultural density manufacturing approach. As the complex and subjective nature of cultural value makes it more difficult to identify and employ successfully than the commercial counterpart, the new enterprises can be at a disadvantage compared for example to a craftsmanship enterprise which can already count on heritage, territorial vocation and expertise of the workers.

For the purpose of establishing the foundation for a successive experimental phase, it has been considered the opportunity to develop a new business concept from the start, rather than partnering with an existing enterprise thus starting the testing phase immediately from the implementation of the guidelines. While the chance to explore the potential for renovation of a concrete cultural capital would have been definitely interesting, working with an established manufacturer would mean to skip a crucial part of the proposed approach which is the generation of new cultural value. For example, manufacturers which already employ master craftsmen from a traditional production segment already possess a great cultural potential and would mainly need a strategic design approach to fulfil this capacity more successfully, while introducing parallelly innovations adopted from the guidelines to grow their business and reach a more effective contemporary appeal. However, a new

actor on the market would have to start from the development of its own distinctive cultural capital on which to establish the high cultural density manufacturing model. This preliminary stage is crucial as it will lay the foundation for the generation and transmission of all cultural value in the business. By working on this type of startup enterprise, it will be possible to practically experiment and validate the potential for the production of new cultural value from existing cultural scenarios, which is essential for the consequent application of the methodology developed in the previous section. Otherwise, the approach would be definitely more limited as it would apply only to existing businesses with an established cultural capital available upon which to build.

To conduct a future experimentation phase with the aim of developing an original business concept from zero, it is fundamental to establish an operational framework which will direct the further implementation of the high cultural density manufacturing approach. For the application of the methodology, it is necessary to identify a distinctive cultural proposition which serves as the foundation of the relationship with the group of people who will be able to appreciate this added value. In a specific real economic context, even an enterprise on the startup level which has not yet developed a personal mileage in its segment could accomplish a novel business proposition based on pre-existing cultural capital, for example thanks to the geographic connection of territorial vocation and industrial district. By adopting a fresh and original interpretation of an already recognized heritage, it is possible to generate an appealing cultural proposition while making use of a recognizable content which is easier to relate to. However, in order to design an objective and effective field test, as well as gathering results that are also interesting for businesses which cannot make use of such an existing cultural capital from local sources, the operational framework and cultural propositions defined for the experimenting phase will focus on the generation of an original cultural value on which to apply the designed guidelines.

These considerations lead to the choice of an innovative manufacturing module as the starting element on which to build the structure of the experimental high cultural density manufacturing business concept. This technological standpoint for the generation of cultural value gives the opportunity to conduct a globally relatable but locally adjustable case study, as geographic boundaries do not limit the viability of the approach, with every different territory actually encouraging a distinctive adaptation of the cultural proposition. This perspective is also beneficial on an operational level as it makes possible for the startup to avoid developing new proprietary production technologies for the cultural value creation process, which could pose a consistent barrier to the accessibility of the high cultural density manufacturing model for newly established businesses. This process gives the opportunity to embed a consistent part of the generated cultural capital in the manufacturing tools themselves, offering an easier path for the introduction of the new business on the real market at the time of practical implementation.



## The Precious Plastic project

The chosen technologic foundation for the conceptual development of an experimentation stage is the open source project Precious Plastic, started in 2013 by the Dutch designer Dave Hakkens, focused on the global concern of excessive plastic waste production which threatens ecosystems, people and economies around the world. The project offers for free an extensive knowledge base for the realization, with minimized skills and investments, of a complete plastic recycling workshop which can fit into a single shipping container. After only a few years from its start, thanks to its open source and collaborative nature, the Precious Plastic project has already established a dedicated community of adopters all around the world. Depending on their individual assets or goals, people have created a commercial benefit around this project in different ways, establishing commercial interactions with each other by offering their own products and services. For example, businesses with the right knowledge and technology started manufacturing the tools for plastic recycling and selling them to those who want to start a Precious Plastic workshop. Communities who face the plastic waste disposal problem directly can also collect and sell the plastic waste to the workshops, which not only can create and sell their own recycled plastic products but even just turn the waste



Precious Plastic exposition at Bijenkorf, Amsterdam

into a sorted, washed and grinded plastic which can be sold as a raw material ready to be moulded into something completely new. In practice, those who are interested to get involved with the recycling process can find a comprehensive manual of the Precious Plastic project which contains both an introductory explanation on how to manufacture plastic materials and the actual description of how to run your own plastic recycling workshop. The users who have the opportunity of building the tools themselves can access the schematics and guidelines for the production of all the plastic recycling technologies which comprise the process. The tools fall in two distinct categories, the transformation of collected waste into a reusable material and the manufacturing of new recycled plastic products. Workshops can either focus on one of the two processes or establish a complete pipeline from waste collection to selling finished goods.

Beside the democratization of the access to the plastic recycling workflow, the Precious Plastic project is characterized by a distinctive philosophy on the common issue of plastic waste endangering the environment, which is suggested by the name itself. The mission of this project is not just to offer the instruments for a better disposal of existing plastic waste or to raise awareness on the potential of recycling but to focus the attention of the public on how much underrated plastic is as a raw material in the first place. Plastic is unique for its remarkably versatile industrial properties, it is one of the most durable resources available and also one of the materials with the most possible applications. On top of being worthy for its wide collection of uses and qualities, plastic is a finite and scarce resource as it is oil-based and therefore inherently not renewable, which the manifesto synthesizes as "Plastic is made to last forever but designed to be used for minutes". Instead of recycling massive amounts of single use plastic goods, the approach wants to actually direct the attention to clever and informed design choices and production strategies that avoid the material ending in the bin altogether. Even small design interventions which can inspire affection to a usually impersonal product can delay considerably this embedded semantic obsolescence of plastic products, which are perceived as inherently cheaper and more disposable than goods made in almost every other material.

Thanks to the decision of offering all this knowledge as open source, people can gain a commercial benefit from the project while also having the opportunity to contribute to the development and growth of the platform and global community. This freedom to personally employ and nurture the project has multiplied its potential of expansion around the world, attracting the interest of a great number of dedicated individuals with different backgrounds of expertise. Different local communities from each country can approach this project with specific expectations and objectives, leading to a more diverse application of the tools and processes as well as sparking innovative solutions or additions to the existing knowledge base, which can be then integrated into the main Precious Plastic development. These iterations of the knowledge base, coming from the internal advancements made from the official team as well as from the community of supporters and enthusiasts, are periodically officialised into new releases of the project. Every release features improvements like the introduction of innovative tools, more efficient technologies of building and manufacturing and new services for the community. The fourth Precious Plastic release will feature a remarkable evolution of the project. The team has defined key goals to achieve and diffused a call to arms to recruit designers, engineers, web developers and more to tackle the issue of plastic waste and expand the potential of recycling processes. Between the main objectives there are the efficiency and safety of the machines, the development of more semi-industrialized technologies and a more effective and solid online platform to stimulate an even greater interaction of the community. Thanks to the collaboration of dozens of people who will join in the new headquarter in Eindhoven, the Precious Plastic team will develop its most ambitious step into the contrast to plastic pollution.

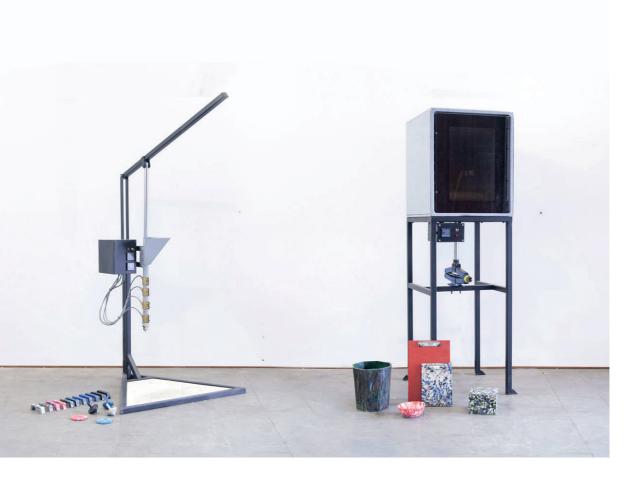
The Precious Plastic project has been deemed ideal as a foundation for the generation of cultural value as, on top of the benefit coming from technological innovation, its distinctive approach to environmental sustainability already offers an original cultural proposition, thus constituting an optimal base for the implementation and testing of the methodology in the experimental stage. Once this initial operational framework has been defined, the Precious Plastic workflow has been analysed in all its steps to determine its practical potential for the implementation of the high cultural density manufacturing model.

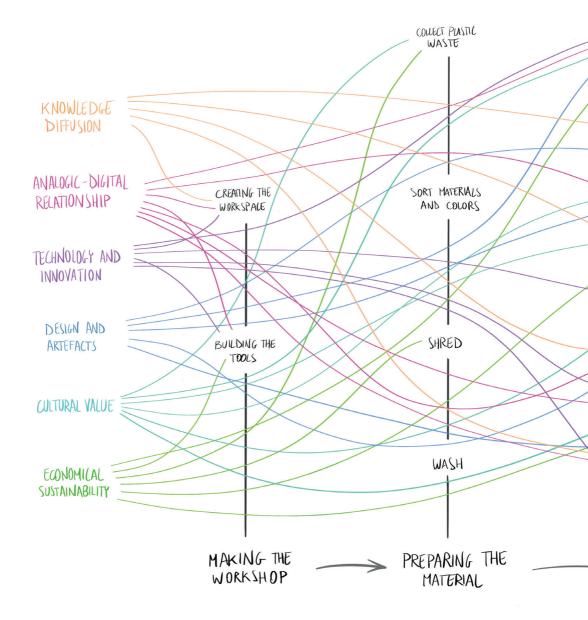


Functional Precious Plastic workspace fitting in a shipping container

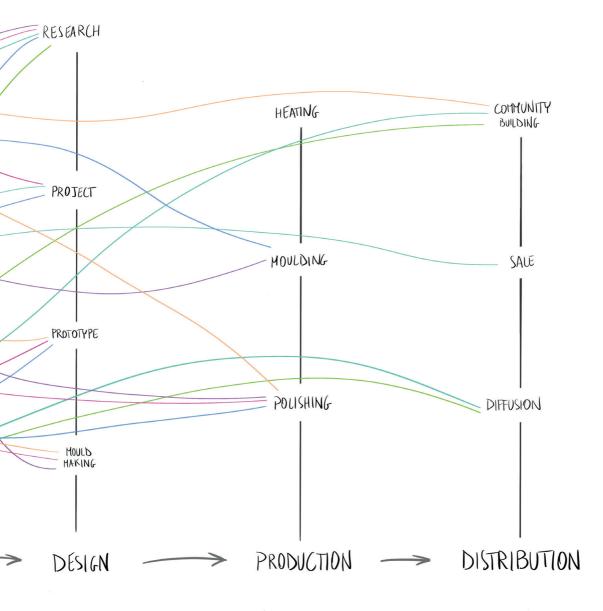


The family of machines which constitutes the Precious Plastic tools for fabrication. First machine is the shredder, second is the extrusion, third is the injection and fourth is the compression.





Mapping of the different stages of the Precious Plastic process and evaluation of the potential for interaction with the methodology guidelines



The process has been examined from a wide perspective, including also the activities that are not immediately related to the recycling activity itself but are still necessary overall for the launch and successful operation of a business based on this framework. Once the main activities of this process have been identified, a preliminary exploration of the potential for the application of the approach has been conducted by evaluating the parts of the process which can collect the most benefits from the implementation of the methodology. This initial assessment featured a brainstorming approach which appraised the areas of application in the Precious Plastic workflow for each of the guidelines. From the visualization of this qualitative data, it is possible to identify the activities which may hold a larger potential for the business strategy. By connecting these key points, a series of possible strategies have been designed.

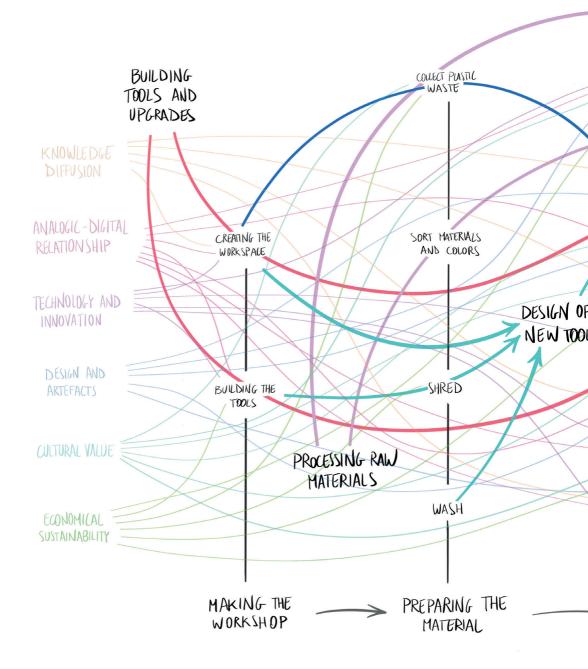
The second layer of this analysis is a collection of opportunities for the application of the high cultural density manufacturing model in the characteristic operational framework of the Precious Plastic project. In order to avoid discarding any business potential too early, an open-minded approach has been employed to identify even the routes of value proposition which are not immediately connected to selling finished products made with recycled plastic. This mindset is essential as it allowed to collect a series of additional business opportunities which, even if not immediately implemented in the strategy of the enterprise, can still be later integrated to generate new value in a later stage of growth, as none of this opportunities exclude each other mutually. Specifically, six distinct paths have been defined (see figure in the next spread).

## **BUILDING TOOLS AND UPGRADES**

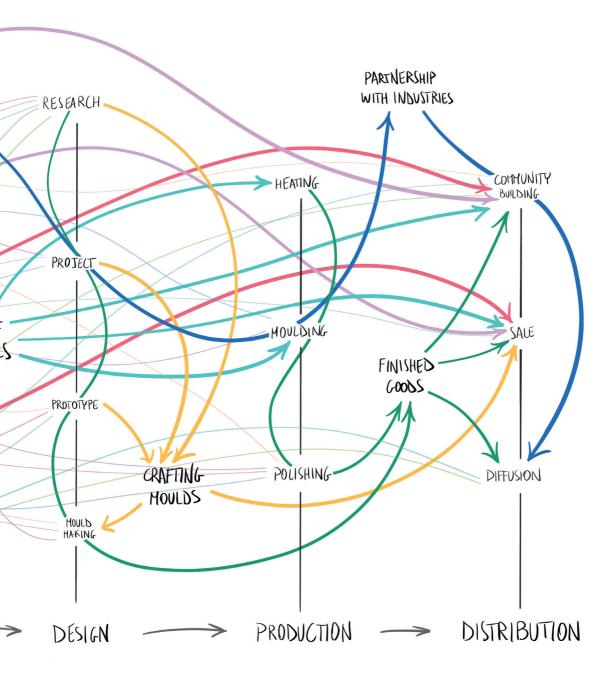
The first option would define a supportive activity which does not directly practice any part of the recycling process. This proposal would essentially employ the Precious Plastic knowledge base and schematics to manufacture and sell the tools for the development of the workshop, additionally integrating improvements and addons to the original designs as well as offering direct services like setting up the workspace and the maintenance of the machines. This option would be very valuable for example for experienced welders who can employ their craftsmanship and knowhow while integrating an additional cultural value through the improvement and adaptation of the existing solutions, even on-demand for the requirements of individual customers.

## **DESIGN OF NEW TOOLS**

The second option would approach the same area but with a design-centric perspective. The design of new tools is an opportunity for engineers, designers and craftsmen to work together in the development of innovative solutions related to the recycled plastic workflow. As previously mentioned, the Precious Plastic project is made of consecutive iterations which integrate new knowledge and practical improvements in every release. The rich online community is a valuable source of insight on the



Identification of potential opportunities for the development of a high cultural density manufacturing experimental concept based on the Precious Plastic project



needs of the adopters which still stay unsatisfied. While the basic project is open source and available to everyone, the design and manufacturing of original technologies gives the opportunity to sell the finished machines, directly assembling them or in collaboration with a producer, at a premium price because of their additional value.

### **PROCESSING RAW MATERIAL**

The third option focuses on the initial part of the Precious Plastic project, which is the prepping phase of the material that turns the collected waste into a reusable resource. This process begins with the gathering of the plastic waste, which can be done directly as an activity internal to the business or by making use of suppliers, also establishing the opportunity for people from the local community to turn domestic waste differentiation as well as the collection of abandoned waste from the environment into a rewarded activity or even a full-time job. After the collection phase, the plastic enters the preparation process which involves washing, sorting and shredding the waste. The output of this process is a raw plastic material in a powdered form, which will serve as the input for the manufacturing stage of the Precious Plastic workflow. Acquiring this shredded plastic already prepared for production is a huge benefits for every workshop which only focuses on the second phase of the process or which needs more resources than what it can directly collect and prepare on its own. A business centred on this proposition can easily generate cultural value from the collection of waste and sum it with the

commercial value of the output material which is directed towards the actual recycling process.

### **CRAFTING MOULDS**

The fourth option is directed at a specific activity of the process which is mould design and manufacturing. The Precious Plastic process has a peculiar approach to the process of producing plastic goods from a technological standpoint compared to an industrial one. The direct interaction with the tools and materials allows for unusual plastic craftwork in ways which can resemble other artisanal processes like the glass production. Either manufacturing with the extrusion or injection workflow, the tools for plastic recycling need support elements or actual moulds to shape the new plastic products from the recycling process. The ideation, optimization and production of these moulds is by itself an independent activity which requires its own share of expertise and work. A business could focus on this activity only, designing, fabricating and selling the moulds to the workshop who use the Precious Plastic tools. On top of this, thanks to the diffusion of digital manufacturing processes, it would be possible as well to establish an online commerce in product schematics, selling the fabrication blueprints to workshops around the world.

### **FINISHED GOODS**

The fifth option is the more balanced and well-rounded approach to the Precious Plastic project, which makes use of the plastic recycling workflow to design and fabricate finished goods for distribution. In this scenario, the business can operate on the whole recycling process from waste collection to fabrication and sale or focus only on the manufacturing of the products by purchasing the raw material from a supplier. This is the most versatile approach to the adoption of Precious Plastic as the project is introduced as a technological foundation but does not limit the scope or economic sector of the business, opening its proposition to many different potential markets. A manufacturer employing this workflow can generate a consistent cultural value from the characteristic recycled material and fabrication process, but still retain a considerable conceptual freedom in deciding what to create with this resources and technology and who to offer this proposition to.

### **PARTNERSHIP WITH INDUSTRIES**

The sixth option makes use of the Precious Plastic framework to create an activity more directly oriented to the recycling and waste reduction awareness cause. By making use of one or more of the previously described processes, this approach aims at the cooperation with other partners and industries to create campaigns and collaborations. Although being based on temporary productions, this strategy makes use of the established recognition of larger brands and firms to diffuse the project in a wider and more effective way while providing these companies the opportunity to invest in social corporate responsibility activities as well as gaining an image benefit. To make use of this business opportunity, on top of assembling a well-equipped workshop it is crucial to establish an appealing brand which embodies this cultural value. This effort is fundamental to interact successfully with other companies and communicate attractively with the public.

For the consecutive progression of the design of a conceptual scenario, it has been decided to continue forward with the development of the business concept by following the path of the fabrication and sale of finished goods. While every route held its own qualities and characteristic benefits for the application of the high cultural density manufacturing model, this path has been recognized as the most versatile for the implementation of the methodology. Moreover, most of the other development opportunities are limited to the interaction with other Precious Plastic based businesses, which even for a successful application of the thesis approach could still result in a not very relatable case study for adopters coming from market niches too different from the one of this process. Thus, the business design and structuring of a cultural value-oriented manufacturing enterprise which makes use of the tools and workflow from Precious Plastic to generate additional value in the fabrication process has been chosen as the most remarkable application for the purpose of this research.



## **Cultural value drivers**

Consequently to the definition of the operational framework and the outline of the opportunities for business development and application of the methodology, this concept of technological and commercial structure needs to be evaluated for its potential of cultural value generation. The input of this assessment is the core definition of the value proposition of this experimentation: a high cultural density manufacturing business concept relying on the production of final goods fabricated with locally sourced, handcrafted and recycled plastic material. Since the start of this testing stage, there has been an attention to the production of a case study which would be relevant for the widest possible public, thus trying to introduce the territorial factor, which is key to the application of the methodology, as a less directly restricting element until the practical implementation of the guidelines. Therefore, the local component will mainly impact the scale of the business rather than being identified as a specific community with a corresponding cultural heritage yet. With this frame of mind, to explore the opportunities for the generation of cultural value of our proposal we can start by identifying the main factors of influence offered by the defined framework. The more confined scale of the process, which gives back an added value to the community and territory, is a relevant quality of the proposal and contributes to its distinctiveness while facilitating the involvement of local users. The craftsmanship-oriented manufacturing process, which is an unusual feature for plastic goods, is significant both in the integration of added value directly in the fabrication stage and in the establishment of a more direct and human relationship with the final users, contrasting the alienating position of the large industrial producers which are usually operating in the plastic sector. The process of collecting and recycling plastic waste embeds inherently a potential for cultural value strictly connected to the environmental sustainability field, investing on the characteristics of both the initial waste and the transformed final product. From the analysis of the opportunities for value generation in the process of handcrafted, locally sourced recycled plastic a scenario has been shaped which outlines the cultural drivers related to the specific features of the inputs and outputs of this distinctive activity. Most of these characteristics can be achieved simultaneously as they are not mutually exclusive, therefore giving space for a wider and richer cultural proposition.

### **CONCORDANCE OF PURPOSE**



Process of recycling, from Precious Plastic kit

The cultural value is generated by the relationship between the original use of the input material of the process and the function of the new product obtained as output from it. The waste is recycled to become a new product functionally inserted in the same process which generated it in the first place. This driver stresses the embedded unsustainability of the products or packagings employed in some activities and generates the opportunity to repay this shortcoming with a positive action in the same system. While this quality of the input alone is not directly affecting the generation of new waste from the process, it states an effort in the correct disposal of this material and the reduction of the environmental impact of this activity.

### **CONCORDANCE OF CONTEXT**



Abandoned waste, from Precious Plastic kit

The cultural value is generated by the relationship between the original context from which the input material is obtained and the one in which the output product will be employed. The waste is collected from a specific context, which might be distinguished for example by social, geographical or natural characteristics, and then recycled to fabricate a product which will be used in a context similar or related to the original one. This driver makes use of the positive action of collecting waste from a specific community or environment and amplifies the cultural value by using this material to manufacture a product which is reused in the same context. This relation establishes a cultural interaction between the same matter being present in an analogous context but in a different and more meaningful form.

### WASTE REDUCTION SUPPORT



Plastic landfill, from Precious Plastic kit

The cultural value is generated by the action itself of recovering the input material from its current context where it is disposed or dispersed. In this case, the waste might be collected from natural environments and other places where it is a damaging presence or the action of waste collecting might become the mean for further social or ethical benefits. This driver makes use of the dedication to sustainability or additional positive causes to embed an added cultural value in the fabricated goods, regardless of the shape or function that the final product might actually possess. This relation gives the opportunity to the final user to support a cause he is keen to but upon which is difficult or impossible to intervene individually, potentially making use of the product as a mean to diffuse the connected ideal and cultural value to its social group.

### **UPGRADE OF PURPOSE**



"111 Navy Chair" made of 111 recycled PET bottles, Emeco

The cultural value is generated by the repurposing of the input material to fabricate a product with a higher perception of worth or usefulness. The raw material is considered disposed waste in the moment it is collected but the process of recycling and fabrication transforms the same matter into a new good with a more engaging and valuable use. This driver changes the destination of use of the artefact to make the output of the process significantly more meaningful than the input, even if it consists of the same material. The evolution of the disposed plastic into a useful and appealing product, with a considerably higher worth perception and a consequently longer life cycle, embeds in the goods an engaging added value.

### **POSITIVE FEEDBACK LOOP**



Recycled plastic tote bag, from Precious Plastic kit

The cultural value is generated by the repurposing of the input material to fabricate a product which contrasts waste generation by design. In this case, the raw material was originally employed in a disposable product or even a packaging for other goods. Through the recycling process, this matter is reshaped into an artefact sharing the same function of the original but designed to be durable and reusable, contrasting its initial disposable and single use nature. This driver incorporates added value into the product by both collecting and reemploying the disposed plastic waste while generating products which avoid this waste is created again in the first place, establishing an engaging cultural proposition through this interaction between the properties of both input and output of the process.

### HANDMADE PLASTIC



Hand crafting of plastic, from Precious Plastic kit

The cultural value is generated by the shift from an industrial plastic manufacturing process to handcraft plastic fabrication and polish. The properties of the plastic material have made it widely preferred and employed in heavily serialized productions, conducting to a sedimented cultural connection between the factory scenario and the product itself. This driver overturns this implicit cultural relation by handling the same material in an unusual manner, usually related to the manufacturing of wooden, glass, leather or other more traditional materials. Applying the craftsmanship mindset to the plastic fabrication, an unexpected cultural value is incorporated into this material the perception of which is commonly cheap only because of the way it is fabricated and presented. The attention to detail and expertise of the craftsman increase considerably the worth of the final product, generating an added cultural value from the contrast with the most common perception of the same material.

### **SERIAL UNIQUENESS**



Recycled plastic vases, from Precious Plastic kit

The cultural value is generated by the specific features of the fabrication which make every single unit of the serial process aesthetically unique. Whereas the plastic products coming from industrial sources use a raw material, therefore consistently maintaining a serial production where all the units share identical characteristics, the recycled plastic workflow introduces unpredictability in the final appearance of the product. Due to the mix of plastic with slightly different colours, or even through a deliberate choice of blends, the output of the process is each time unique even when employing the same moulds and tools. While in an industrial context this uncertainty would be regarded as imperfection, in this context the unique nature of each unit increases its worth by giving the plastic product, which is implicitly perceived as cheap because of its serial and replicable nature, an added value embedded in its distinctive identity and qualities.

The analysis of the potential for cultural value generation in the defined operational framework has led to the identification of some key opportunities for the application of the high cultural density manufacturing model on a newformed cultural capital. In this specific case, the Precious Plastic project has been employed as a cultural catalyser through which to incorporate added values of sustainability, handcraft and territorial benefits on social and economic level. Once this scenario has been established, because of the subjective nature of cultural value it is necessary to find a relevant connection between the identified opportunities for value generation and a consistent cultural group, which must be able to understand and appreciate the increased worth of this proposition and willing to support it commercially. This step towards the creation of a sustainable economic structure requires the definition of a design concept, which has to materialize the cultural and technological innovation into an actual business direction. The definition of a strong concept is fundamental to the success of the design-centric approach of high cultural density manufacturing as it will be the main connection to the customer base and the key to its appreciation of the value proposition.

Cultural value drivers



## **Design concept**

The scenario for the generation of cultural value has explored the potential for the starting framework to deliver a rich and appealing value proposition, which is essential for the consecutive development of an effective business model making use of the experimental approach of the thesis. This scenario defined the main opportunities for developing a cultural capital through the handcrafted, locally sourced and recycled plastic manufacturing. However, as cultural value is subjectively mediated by the observer and his interaction with different cultural influences and social groups, the mean of transmitting this value proposition to the final users is essential for the success of the whole business development process. The design exploration approach has been employed to conceptualize different directions to strategically define the features of this interaction. As the main cultural drivers offer a large potential from the application of environmentally sustainable practices, one key direction for the concept is the cultural engagement and dedication to nature and its preservation. The proposed design concept for the hypothetical business is "Sports Celebrating the Environment". This direction has been estimated strategically effective as it offers an appealing bridge to the group of users both on the level of cultural value proposition, as this is a segment which already engages personally natural environments and should therefore be more inclined to its preservation, and on the level of actual product and experience offer, as the sport segment holds a wide range of opportunities for the development of goods and services. The key business design assumption is that the increased sensitivity to environmental sustainability of this group of people, which passionately practices activities in direct contact with nature in its free time or even professionally, will make them relate to the cultural offer on a deeper and more engaging level. As the entire structure is designed to work through the Precious Plastic open source project, the dedication to environmental sustainability is not a marketing effort but a fundamental part of the model. Therefore, this cultural group is expected to relate to the common cause and reward this dedication with its cultural and commercial support.

The practical implementation of this business concept will take place on a local scale, engaging with existing groups of sportsmen and attempting to establish a new sense of community through the shared appreciation of natural environments. By approaching a defined territory with its own characteristic qualities, it is possible to interact with its heritage and unique identity to embed an added sense of authenticity in the whole process, from the business to the actual products. The activity will raise awareness about the issue of abandoned plastic waste, the opportunities of plastic recycling and generally the preservation of landscape and ecosystems, engaging this cultural group in a compelling way which also eventually supports them in the diffusion of the



cause, which they might already be dedicated to on an individual level. The plastic waste itself will become the input of the manufacturing process which, being designed to convey value through the identified cultural drivers, will transform it into the mean for the appreciation of the special worth of products fabricated from the activity. The ideal positive cycle established by this proposal would promote activities beneficial to the environment will rewarding culturally and commercially all the actors involved in the process, who share the dedication to the same issue. The products themselves would thus be culturally dense artefacts which become both a symbol of this dedication and the mean for supporters to personally promote better behaviours and consumption choices in their own cultural and social circles. The definition of a strategic direction is essential to effectively convey the efforts of the business into developing a successful and economically sustainable activity. However, this content is still conceptual and relies mainly on assumptions about the customer segment and its behaviour. This initial proposition must then be validated through a mean of field testing in order to gather valuable feedback before moving into a more concrete stage of the business development. Through this testing stage it will be possible to rapidly evaluate the effectiveness of the concept with a minimal investment of time and resources, gaining the opportunity to develop and improve the initial proposal before actually launching into the market. In this stage of development of the business concept, the main area of interest is the validity of the cultural value proposition. As this field is subjectively perceived by the users, it is necessary to design the testing stage to gather the opinion and feedback of this cultural group, therefore making the research survey a valuable tool for this testing phase.





## **Research survey**

The definition of directions for development of the methodology started from the identification of an operational framework and followed consecutive rational steps to structure a successful implementation of the business strategy in a realistic economic scenario. With the definition of a design concept, the testing model is ready for an interaction with the public, in order to receive valuable feedback on the value proposition when it is still possible to implement changes easily. This early testing strategy is essential to minimize the commercial risks and to assess the soundness of the cultural proposition. By approaching the market early, even a negative response from the potential customer base is a fundamental tool for the definition of the best market proposal. To achieve this deeper understanding of the users, the testing tool of the research survey has been chosen. The survey is usually not sufficient by itself as a prototyping tool to realistically and quantitatively test commercial interest. However, as the cultural dimension is the main level on which to gather knowledge in this phase, conducting this qualitative testing stage will provide useful insights on the way the cultural proposition is perceived, gathering crucial feedback on what are the most important values for the final user and his social circle. From the collection and analysis of this directly sourced knowledge, it will be possible to design a business structure which more successfully engages the user, with its own values and needs.

The worth of the cultural proposition is profoundly subjective, as it is constantly mediated by the observer, its belief system, its interaction with other people and the external influences coming from present events and past experiences. This feature makes the cultural value more difficult to predict than the commercial counterpart, thus making the direct relationship with the final user fundamental to understand more clearly its perception of such value. In this stage, gathering information directly from the users is ideal to give a solid foundation to the structure of the business strategy before it is already too defined to be changed effectively. Understanding better the assumptions, preconceptions, external pressures and internal struggles of the user around the cultural proposition is necessary to offer the best solutions to him and make its experience the most compelling possible. As it has been previously explained in the development of the methodology, the narration component is an essential part of the process of a cultural enterprise and cannot be disregarded merely as an advertising effort, as possessing a cultural capital is useless if it is not appreciated thoroughly by the user.

To ensure the effectiveness of this testing stage, it is necessary to evaluate the most important information we want to gather from the users. While there could ideally be a very wide range of knowledge which would be valuable to receive from the respondents, it is necessary to keep the survey as synthetic as possible to avoid losing its effectiveness as a testing tool. The accessibility of the survey, and consequently the quantity and quality of the answers, is a direct function of the clarity, conciseness and flow of the questions asked to the user and the overall structure of the questionnaire. In order to strike the ideal balance between quantity and quality of the collected information, it is then essential to design the survey in a clever way. With this objectives in mind, an initial exploration of the topics to investigate through the survey has been conducted. Starting from the design concept and value proposition, it has been evaluated what could be beneficial to understand about the customer, without posing any particular restriction yet. After defining a group of potential questions, a semantic map has been developed to visualise the main areas of interest and organise the information in a logical flow. This qualitative map establishes a relation between the cultural value (on the X axis), which ranges from environmental sustainability to local and territorial benefits, and the commercial value (on the Y axis), which ranges from the offer of physical products to the interaction through services and experiences. The resulting scheme therefore assesses every potential question through its relation to product or service and sustainability or territory in each of the four quadrants. At the centre of the scheme is the user, thus all questions closer to the origin regard more closely the values, opinions and feelings of the respondent or of its social group. Moving away from the centre, the questions become more strictly related to the value proposition, therefore assessing the perception of the commercial offer and the ideal interaction between the user and the business concept.

Once an initial composition of the questionnaire has been identified, the questions have been synthesised, joined or discarded to ensure the survey is most effective and maintains an ideal length. The selected ones have been organised in distinct areas of interest which will compose the main blocks of the survey structure. While this structure is essential and consequently all information is relevant for the scopes of the test, to ensure that the respondents can answer in the easiest and best possible way these core modules have been organised following a logical flow of question themes, starting from an initial step of demographic framing of the sample. There have been defined five main areas of the survey which have been ordered as following:

### **CULTURAL MODEL OF THE USER**

The first block is aligned with the origin on the Y axis as it is completely focused on the user, not investigating yet his interaction with the business concept. In particular, the first group of questions will introduce the respondents to the theme of environmental sustainability, assessing their individual perception and opinion, the cultural assumptions and the external peer recognition of this topic and its associated activities. This initial step is not only important as an introduction to the survey but establishes the foundation of the consequent assumptions about the cultural value of environmental sustainability and its appreciation from the final users. Understanding both the personal inclination to the cause and the social recognition of this issue is necessary to communicate effectively with the user and facilitating him in his social interactions with his peers. This preliminary understanding will be the foundation for the consecutive assumptions regarding the value proposition of the concept business.

### PERSONAL CONNECTION WITH NATURE AND ENVIRONMENT

In the second stage of the survey, the user will be asked his opinion and preference regarding the theme of the design concept, in order to evaluate the opportunities for business development of this design direction. This block of questions will test the viability of the cultural relationship between environmental sustainability and people who practice outdoor sports, providing an initial feedback on the market potential of this business model and possible improvements which can be made to the value proposition. The data collected from this questions will be essential to become more knowledgeable with the specific customer segment, understanding its expectations, customs and beliefs to design a successful business strategy which satisfies the users with rich and relatable cultural content. A negative response from the users will require an adaptation of the design concept to a more effective proposition, it is therefore essential to conduct this testing stage early in the development process.

### **COMMERCIAL VALUE ASSOCIATED TO SUSTAINABILITY**

The next areas of investigation are more oriented to the business concept and the actual proposal to the final users. In this set of questions, the survey will focus on the commercial appreciation of the cultural value proposed to the user through the dedication to environmental sustainability. The entire operational framework has been built around the adoption of sustainable practices and the diffusion of awareness around this issue, therefore the recognition of this added value is the most relevant to the success of this business proposal. The cultural artefacts manufactured in this process will be the mean for the customer to diffuse and promote more environmentally practices, while the services will engage users and other businesses directly in these activities. To shape consistently this cultural proposition it is fundamental to understand both the individual predisposition of the user and the interaction with its social circles regarding this issue, identifying eventually a peer pressure to hide or exhibit certain tendencies or values. The narration part will be tailored to be beneficial to these identified needs and concerns of the users.

### **COMMERCIAL VALUE ASSOCIATED TO LOCAL PRODUCTION**

In this area, the main objective of the survey is to understand the respondent's appreciation of the cultural value generated from the territory and local scale of production and distribution. The high cultural density manufacturing model is designed to generate economic and social benefits on local scale, interacting with the local community and generating value from heritage and local skills. The business will be deeply connected to the territory, generating identity qualities and authenticity from this interaction with local heritage and communities. For the strategy to be effective, the user base must be interested in the territorial vocation of the activity and understand the benefits of the local scale of this model. The questions of this block will assess the recognition of this added value from the customers in their usual purchase choices when choosing products and services. The local scale of manufacturing and the direct relationship with a community are a strong cultural lever to establish a connection with the users, therefore this knowledge is essential to interact in the best way with the customer base.

### **COMMERCIAL VALUE ASSOCIATED TO CRAFTSMANSHIP**

The last part of the survey covers the cultural perception of the value generated by the employment of craftsmanship in the fabrication process. In the high cultural density manufacturing approach, the adoption of human expertise supported by innovative technology is core to the creation of value. With this last set of questions, the respondents are asked to describe their appreciation of the distinctive qualities of a craftsmanshipintensive model which include the high quality of the products, the specialized knowhow of the craftsman, the direct relationship between customer and producer as well as the customization of the products and services thanks to the limited series of fabrication. While this approach to the structure of the business proposition is inherently costlier as a production process, it offers a considerable cultural addition to the products which differentiates this activity from competitors in the industrial sector, despite their increased scale-efficiency and optimization. However, for this added value to be commercially beneficial it is necessary to understand how much the users appreciate it in their own cultural model.

The overall scope of the survey has been to establish a preliminary assessment of the perception of the cultural value from real users on the market, getting more knowledgeable with the real demand in an actual economic scenario. Rather than presenting the potential customers the prototype of a product and asking for feedback, which would mean to imply already a large part of the development process, this testing instrument adopted in an early stage gives the opportunity to establish a more solid knowledge base on which to build al the consequent steps which will eventually lead to the actual goods that will reach the market. From this early assessment the users have been presented with questions targeting their cultural model built around the value proposition, allowing to estimate the worth of the added cultural value from the appreciation of the distinctive approach of this design concept and approach. This understanding of the demand is essential for the high cultural density manufacturing model as its market potential is only realized at its fullest when there is a deep connection and interaction with the users. Building on the gathered information and feedback of the public, it will be possible to improve the business proposal adapting more

effectively to the expectations and desires of the customers. This knowledge base will also be an important contribution for the evaluation and selection of the most beneficial guidelines from the diverse offer of the methodology, establishing a strong and successful link with the users right from the launch of the enterprise. Conversely, this knowledge will help in the reduction of the initial investment, acting selectively in the choice of the most useful activities to perform and services to offer, while also aiding in the minimization of the entrepreneurial risks in the already demanding phase of the startup launch. The next step in the development of the hypotethic case study will be the actual application of the guidelines designed in the theoretic phase of the thesis, implementing practically the methodology on the design concept to develop a solid structure upon which to build a successful business strategy.

# "respondents generally felt to be more culturally involved in sustainability and recycling than their social groups"

	-		
A positive action, to be proud of	80.8 %	44.7 % !	
A positive action, to keep private	15.9 %	16.5 %	
An hassle I'd rather avoid	0.7 %	20.9 % !	
No particular interest	2.6 %	16.9 % !	
	own	peers	
Perception of "waste differentiation":			

Perception of "dedication to sustainability":

A positive action, to be proud of	65.6 % -	$\rightarrow$	36.4 % !
A positive action, to keep private	20.5 % -	$\rightarrow$	19.9 %
An hassle I'd rather avoid	2 % -	$\rightarrow$	34.4 % !
No particular interest	3.3 % -	$\rightarrow$	5.3 %
	own		peers

# "there is an elevated interest in the destiny of recycled products and materials"

Interest in having control of the way differentiated waste will be reused:

I would be interested in it	53 %
Seems interesting but I would not use it personally	28.5 % ∫
No, pnly the recycling matters	17.9 %
I do not differentiate	0.7 %

Some of the insights which could be reconstructed from the analysis of the survey response. The full questionnaire and the responses in anonymous format are available in the appendix at the end of the thesis.

### "a large group of respondents would like to show their support to sustainability through the products they use in order to spread awareness to others"

Interest in displaying support to sustainability through used products:



### "elevated awareness of the abandoned waste issue and high likeness to personally intervene to avoid it"

Perception of abandoned waste as a relevant issue:

5 out of 5 (very high)	96 % !	<b>85%</b> personally collected abandoned waste from other people <b>at least sometimes</b>
4 out of 5 (high)	3.3 %	<b>45%</b> personally collected abandoned waste
3 out of 5 (neutral)	0.7 %	from other people <b>frequently</b>

### "people who practice outdoor sports resulted two times more likely to invest more for a sustainable product"

How much would you pay a sustainable product compared to an alternative:

Considerably more (up to 50%+)	7%	6 %	
Quite more (up to 30%+)	19 % 💛	49 %	ight angle 26 % $ ightarrow$ 55 %
A little more (up to 15%+)	62 %	32 %	
I would not pay more	12 %	13 %	
	does not practice	practices outdoor sports	

#### POST-DIGITAL DESIGN APPR.

NSTRUMENTS OF DIGITAL DESIGN AND FABRICATION ARE MIXED WITH PROTOTYPING AND MANUFACTURING TECHNIBUES OF CRAFTSMANSHIP TO REACH ORIGINAL AND ANTIENTIC REWITS -DESIGN AS A STRATEGIC LEVER TO INTEGRATE INNOVATION IN ALL THE STACES OF THE PROCESS

DESIGN - DRIVEN INNOVAT.

SYSTEMIC VISION OF THE ENTERPRISE IN ITS TERRITORY

### Design as a Sense Making Activity

DESIGN MUST BE EMPLOYED WITH THE FOCUS ON THE SYMBOLIC AND EVOCATIVE CONTENT SURPDUNSING THE ARJEFACT AND ITS USAGE

### DESIGN AS A REFLECTION OF ITS TIMES

- EMPLOYING THE DIGITAL CORE AND INNOVATIVE OFFER TO CREATE ORIGINAL AND ENGAGING WUTURAL CONTRA FOR A CONTEMPORARY AUDIENCE

### SLOW MANUFACTURING APPR.

- SMALL SCALE PROCESS WITH HIGH QUALITY AND ADDED VALUE TO ENIGAGE A DEMANDING AND INFORTED MARKET

### rksho p

PLE IN THE ASTIC RECYCLING EDUCATING)

ROCESS OF AND DESIGN ID PROSUMERS

#### TEAR DOWN THE ENDTIONAL BARRIER BETWEEN NEW TELH AND QUALITY OF CRAFTSMANIHIP

- THE ENTERPRISE IS BORN WITH A DIGITAL CORE AND REFERS TO AN INDUSTRIAL MAL CUTURE (ASSOCIATION OF PLASTIC) - CRAFTSMANSHIP ACHIEVES QUALITY AND MITHENTICITY IN NEW FIRMS

#### GENUINE MATERIALS & PROCESSES OF FABRICATION

- THE ORIGIN OF THE PLASTIC WASTE IS A KEY DRIVER OF VALUE - THE PROCESSES REFLECT DRECTLY THE HISTORY OF MATERIALS AND PRODUCTS TO CONVEY ANTHENTION

### HANDMADE IS NOT ENOUGH

THE OFFER OF GOODS CANNOT BE UNITED TO HANDCRAFTED COUNTERPARTS OF BETTER AND COMPETITIVE INDUSTRIAL PRODUCTS

- Taking Advantage of the PeculiaRity of the Process to Be cottPetitive on quality and fuel.

### ADDED VALUE OF THE PROCESS

-THE SMALLER-SCALE AND CRAFTMANGHIP-INTENSIVE PROCESS MUST BE EMPLOYED MEANINGROLD TO GENERATE AN ENGAGING ADDED VALUE TO THE GOODS

### OFFER OF CUSTOMIZATION

- MAKING USE OF THE AGILITY OF A SMALL-SCALE DIGITAL EMPOWERED PROCESS TO OFFER MORE INDIVIDUALIZED PRODUCTS AND SERVICES

### AUTHENTILITY OF PRODUCTS

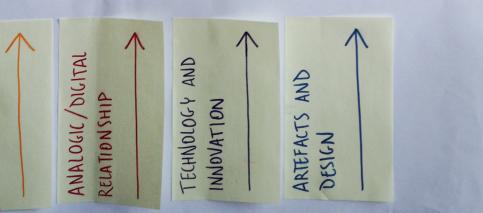
THE LOCAL CONTEXT AND RELATION SHIP WITH TERRITORY CHE THE FOUNDATION FOR THE AUTHENTICITY OF THE OFFRE - THE CONTENTION FOR AND ARPEALING TREATMENT OF SUSTAINAS. OFFRE ORIGINAL VALUE

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# **Guidelines implementation**

The diffusion of the surveys and the consequent data gathered from the answers have been a preliminary step in the assessment of the market response to the value proposition. The analysis of the knowledge gathered from this first public testing stage will act as the foundation for the development of a realistic framework of operation for the business concept. By involving the final users directly, this concrete basis of knowledge will be essential to direct the consequent steps in an informed way, moving with rational and solid consequent steps to reach an effective final market proposition. The feedback and insights gathered from the analysis of the collected data are also required to position the business concept of this case study in a similar position for the implementation of the methodology to an existing enterprise, which might have already collected information on its customers and segment of operation both through direct experience and similar market research over the course of its commercial activity. Nonetheless, existing businesses can still employ similar testing instruments to gather feedback before implementing innovation in their own enterprise, therefore assuring that there is a clear understanding of the cultural predisposition of the users and consequently that the change introduced in the processes is effective and beneficial. Once this concrete framework is

established, it is possible to proceed in the evaluation of the guidelines to understand the best approach of strategic design to introduce meaningful innovation while investing effectively the resources and time needed for this transformation.

Making use of the knowledge base gathered through this testing stage, it is the ideal instance for the practical introduction of the experimental approach in the development of the value generation process and business structure. The methodology that has been researched and designed in the theoretic part of the thesis is structured as a continuous flow of key guidelines which are organized into six thematic areas. The approach is designed to be adopted as a modular strategy, actively selecting the elements which are more effective to be integrated in the existing offer of the enterprise and introducing them purposefully to establish an innovative and more inclusive business structure. An existing business should therefore analyse the whole methodology to understand how its own current offer compares to the strategy, assessing the areas to address which are actually overlooked, the ones which are addressed only partially or not effectively and those where the business already has a strong grasp. After gaining this understanding of the starting structure, it is possible to proceed in the evaluation of the best route for the development of the innovation strategy. In the example of the hypothetical case study of this stage, as there is not a starting activity on which to introduce improvements, the whole methodology will be evaluated to find the best implementation for this operational framework and move the design concept to an actual business structure for a high cultural density manufacturing activity.

In the previous parts of the definition of development directions, it has been gradually developed the concept for the design of an enterprise focused on the cultural value generated by the employment of locally sourced plastic waste and craftsmanship to create new recycled-plastic goods for sport enthusiasts who are passionate about nature and environmental sustainability. To organize the implementation of the guidelines into this business concept, the process of work for this ideal activity has been divided in key phases which have been then assessed for their potential for the application of the methodology. In this case, four main steps have been defined, moving from initial design of products and services to their final sale and distribution with a central manufacturing and service execution phase and a supportive supply and logistics stage. It is important that these stages are kept general as they would otherwise influence and restrict too much the evaluation of the opportunities offered from the approach.

# **RESEARCH, STRATEGY AND DESIGN**

The first part of the process is the research, strategy and design stage. This phase is directed at the development of the value proposal through a design-driven approach. This fundamental stage employs design from two perspectives. The first is a focused approach aimed at the development of the product and service offer for the business, the second a higher-level strategic design which defines the organization and objectives for the activity. In the first scenario, the guidelines which have been selected involve the need for authentic content and meaningfulness in the design of cultural artefacts, employing an attentive use of design both from an industrial and systemic standpoint to deliver results which deeply embed the value proposal. The second one reflects the need for strategic design to direct the innovation process and economic efforts of the business model, making use of the cultural proposition as the key lever in the development of a meaningful, high-quality and distinct offer on the market. The first phase of the process alone covers most of the six fields of interest of the methodology.

post-digital design approach	Instruments of digital design and fabrication are mixed with prototyping and manufacturing techniques of craftsmanship to reach authentic and original results
design-driven innovation	Use of design as a strategic lever to introduce innovation in all the stages of the process Systemic vision of the enterprise in its territory
design as a sense- making activity	Design must be employed with the focus on the symbolic and evocative content surrounding the artefact and its usage, understanding and interacting with the cultural model of the user
design as a reflection of its times	Employ the digital core and innovative offer of the enterprise to craft original and engaging cultural content for a contemporary audience
glocal approach	Rooting the activity and the offer deeply into the territory and its identity
	Communicating in a contemporary and globally engaging way to be appealing in a competitive environment

# **RESOURCES, SUPPLIERS, LOGISTICS AND TERRITORY**

The second part is the resources and logistics stage. This phase might not at first seem essential to the implementation of the guidelines, but is actually an important step in the definition of a business approach which is attentive to both technological innovation and a rich cultural proposition. The most beneficial guidelines come especially for the last field of Economic Sustainability, which has the effective organization of the business at its core. The logistics define the scale of the business operation, which holds a key role in the development of meaningful relations with the territory and the local communities. While from one side this stage establishes the opportunity for the development of a close interaction with the users through services and specific activities, this is also the best part of the process to introduce more explicit technological innovation as it holds almost no influence on the cultural value of the final goods. Therefore, it is important to explore the possibilities for smart and digital models of innovation in this stage.

slow manufacturing approach	Engage a demanding and informed market with the added value coming from a small scale and high quality process
innovation along the entire process	Business and management of production stages with a Company 4.0 oriented approach
	Smart methods of logistics and warehousing
	Optimization through on-demand production and distribution
competing through added services	Engaging users through direct and individualized interactions and experiences
	Inolve users in the process of recycling by offering an infrastructure service which guides and helps them in their contribution

# MANUFACTURING PROCESSES AND ACTIVITIES

The third phase is the manufacturing process itself. We have defined how the selected design concept will be especially focused on the production on final goods through the selected operational framework. The fabrication and product handling stage are consequently essential to the implementation of the guidelines to this case study, which is reflected by the coverage of the full spectrum of the six thematic fields of the approach. Since the structuring of the workshop itself, which offers the opportunity to diffuse knowledge and attract interest through community building activities, all the steps of technological integration, operation of tools, choice of manufacturing techniques and added services which deal directly with the customers hold a considerable potential for the generation of both cultural and commercial value and are therefore essential for the design of a successful economic model. This stage also interests directly the craftsman or expert worker and its role in the business, identifying the fundamental aspects which make the ideation, fabrication and polish activities unique and highly valued by the customer base. Conversely, this stage has to be strictly intertwined to the design one in order to incorporate and narrate successfully an authentic cultural content.

open workshop approach	Directly involve people in the process of plastic recycling (information/education activities) Hands-on processes of fabrication and co-design with users and
	prosumers
tear down the emotional barrier	The concept is designed from the start with a digital souls and relates with an industrial material culture (plastic production)
between heritage and technology	Opportunity for the development of authentic craftsmanship in new fields
honesty of	The humble origin of the plastic waste is a key driver of value
materials and processes	The processes reflect directly the history of materials and products to convey authenticity
handmade is not enough	The offer of goods cannot be limited to handcrafted counterparts of better and competitive industrial products
	Taking advantage of the peculiarity of the process to be competitivy on quality and flexibility
added value of the process	The smaller-scale and craftsmanship-intensive process must be employed meaningfully to generate an engaging added value
offer of customization	Make use of the agility coming from the small scale and digitally empowered process to offer individualized services and products
interaction with the persumer	Engage and interact directly with the most active and dedicated customers to develop better solutions and spread the activity

# COMMUNICATION OF CULTURAL CONTENT AND DISTRIBUTION

The distribution phase is the last step of the process. This stage is still important to the application of the methodology as it becomes the predominant touch point with the user base, defining the key outcome of the strategy as a successful business model or not as the approach employs the cultural value as an essential part of an actual market value proposition. This phase is thus important to deliver the efforts made in the previous stage to design a culturally-dense structure to the respective cultural segment which will ultimately define the worth of the proposed value with its interest and support of the activity. The narration of this added value is therefore a fundamental activity to ensure the success of the entire process. This stage is also defining of the scale of operation of the enterprise, which is local at its essence but should be open to a glocal approach to export the identity content to other communities which appreciate the authentic value proposition from this activity.

authenticity of products	The local context and relationship with the territory give the foundation for the authenticity of the offer
	The dedication to sustainability in a compelling way, instead of a mere green-washing, generates an authentic cultural value
added value from cultural content	The recycling process of plastic offers many directions for the effective integration of cultural value in the final products
	The local dimension and relation with the territory give identity to the enterprise and its products
identity as an	Satisfy the demand for goods with a strong identity
antidote to globalization	Emplooy an approach that counters standardization by design, offerign original and genuine cultural products on the market

From the overall perspective on the implementation of the guidelines, a solid approach has been defined which will be the foundation for the design of a consistent and effective business model for the practical implementation of the hypothetical case study. The input of this process of strategy development has been a design concept, with its own established operational framework, which focuses on the production of final goods through a defined culturally meaningful process. The outcome of the application of the guidelines confirms the expectations of this initial proposition, as the design and manufacturing stages are actually the steps of the process which gather extensive benefits from the implementation of the methodology, covering the whole range of thematic areas offered by the approach. Conversely, the fields which span their influence over the whole process of the concept case study are the Cultural Value and Economic Sustainability, which reflects explicitly the main objective of the approach of bridging these two factors into a successful strategy for manufacturing, embodying it in every stage of the business process from start to finish.

Guidelines implementation



# **Business strategy**

The initial design concept has been first tested by gathering feedback from the potential users, providing useful insights on the worth and appreciation of the cultural value proposition. Building on this knowledge base, the methodology has been implemented practically to the conceptual case study by evaluating the most beneficial guidelines to design a coherent and effective strategy for the concept of high cultural density manufacturing. The selection of the guidelines provided the cultural and commercial flows which will back the economic sustainability of the activity, the development can thus move forward from the design exploration and strategy definition to the actual configuration and planning of a realistic business model, which will be prepared for the launch on a real market segment.

In the previous stages of the definition of the directions for experimentation, the mission of the business concept has been proposed and then implemented through a cultural value proposition. The strategy that has been designed through the adoption of the methodology into an actual business plan to interface with the real market, it is necessary to move from the more abstract level of design-driven innovation to a specific and concrete economic environment. In this stage it is essential to identify all the assets necessary for the execution of the value proposition, understand clearly the target which will interact commercially with this activity and assess all the economic relations fundamental for the establishment of an effective and successful process, from suppliers and logistics to the identification of competitors.

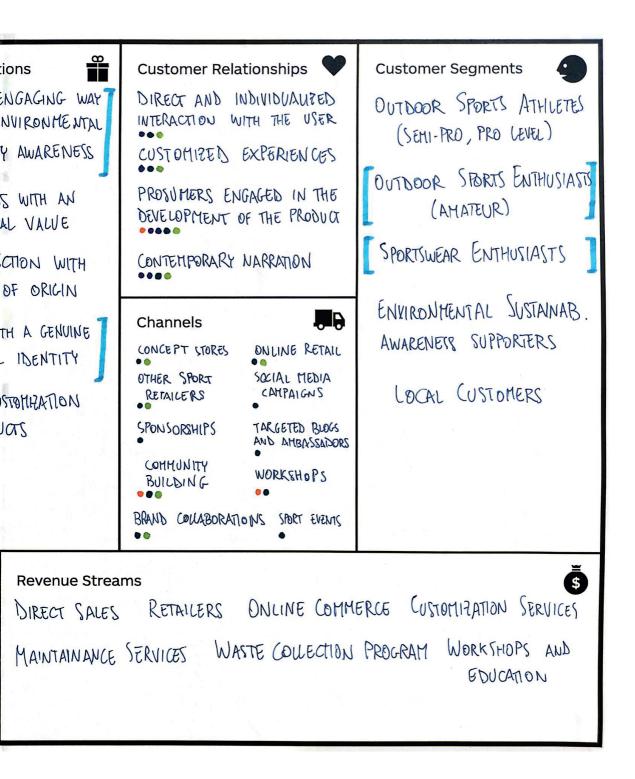
For the definition of a future practical execution of this phase it has been made use of the Business Model Canvas as an initial foundation for the economic and working structure of the enterprise. This tool is functional to help in the visualization of a coherent and solid structure for the economic proposal, synthesizing in a single scheme all the fundamental parts of the business in a way that makes it possible to evidently evaluate the interactions between different modules. More than for the final representation of a complete and working business structure, the Business Model Canvas is especially convenient to quickly explore and test different strategies and directions, aiding in the identification of the most beneficial one while often leading to unexpected or disruptive business models which were not included in the original proposal used as input. The process of completing the canvas supposes multiple iterations of drafting the whole structure field by field, analysing the current effectiveness of the model and the potential opportunities for development, prototyping and testing to gather feedback on the proposition and eventually implement these insights by starting the development of a new business model from scratch. Every stage of this revision process assesses the validity of the economic assumptions,

highlighting potential for improvement and any threats which would have been difficult to identify beforehand. After some repetitions of the process, the initial business model gradually shifts to a more solid, effective and potentially innovative proposition which is ready to be tested practically on the market.

In the case of the successive experimentation process, the starting point for the design of the business model would already be structured in a solid way because of the many steps of strategic development which are employed in the previous phases. Therefore, the Business Model Canvas has been used initially for the main objective of offering a visual synthesis of the current status of the business structure design, integrating every step from the development of a cultural value proposition to the analysis of the customer segment through the surveying activity, and to introduce the supportive economic elements which are necessary for the actuation of the business model on a real market. Starting from the already developed points, the canvas has been filled starting from the value proposition, which is the core of the entire culturally-intensive approach of the concept activity. The next step has been defining the customer segments, which were proposed originally in the design concept and refined through the public testing stage of the survey. Moving from these two fields to the adjacent modules, the whole canvas has been filled with the necessary assets and activities which are required to sustain and execute the activities, successfully implementing the value proposition and then delivering it to the users, always keeping strictly in mind the guidelines from the strategy that has been

Key PartnersPLASSTIC WASTE SUPPLIERS (CAL FACTORIES, URBAN WASTE)ATHLETIC GEAR ENGINEERING CONSULTANCYSALES AND MARKETING CONSULTANCYLOGISTICS	Key ActivitiesDESIGN AND RESEARCHPLASTIC RECYCLINGPRODUCT HANUFACTURINGCUSTOHHATION SERVICEMAINTAINANCE SERVICECOMMUNITY ENGAGEMENTKey ResourcesPLASTIC WASTEPLASTIC RECYCLING TOOLSWORKSPACE FOR FABRICATIONDESIGN AND COMMUNICATION SPACEUTILITIES	Value Proposi A WITURALLY TO SUPPORT E SUSTAINABILIT QUALITY GOOD ADDED WITUF DIRECT CONNE THE TERRITORY ARTEFACTS W AND ORIGINA ACCESSIBLE CU OF PROD
CONSULTING DISTRIBU	S SUPPLIES EVENTS	RKETING ACCOUNTING

The employed Business Model Canvas template was downloaded from "strategyzer.com" (CC-BY-SA 3.0)



previously designed through the application of the methodology. Once the Business Model Canvas has been completely filled, it has been analysed and revised to obtain a more refined structure which generates and conveys coherently and effectively the value proposition throughout the whole process. This resulting structure has than been integrated with the guidelines of the previous step to obtain another level of visual information, identifying in the business model which activities are the most strategically relevant for the application of the approach in the market proposal.

Once this business model canvas has been revised into an effective economic structure, it is possible to plan the introduction of the experimental case study into a real market environment, which would complete the process of practical application of the methodology of the thesis. In the specific case of this hypothetical case study, the business concept has been configured without an initial company as a starting point, therefore designing a new enterprise from zero which will enter the market on a startup level. Thus, it is essential that the first step in the economic environment is designed to provide the most possible feedback from the market while minimizing the investment of time and resources for the business. For these conditions to be configured ideally, a last field-testing stage has been defined to assess the effectiveness of the approach on the market with a minimum viable product (MVP). Whereas the initial field-test conducted through the diffusion of the survey has mainly targeted the response of the public to the cultural

proposition and its appreciation of the initial design concept, the next testing stage will have the objective of directly assessing how the value proposition and the whole business structure perform on an actual economic environment, assessing the commercial interest raised in the customers.



# Definition of an experimental phase

For the execution of an actual experimental stage of the high cultural density manufacturing case study, the business strategy developed through the previous steps should be finally concretized into a realistic prototyping framework, located in a tangible and defined environment of people, territories and enterprises. From the definition of this concrete scenario it would be possible to identify the cultural and commercial flows which connect the business concept to the existing framework and to design more specifically the interactions with this individual environment. For the sake of this hypothetical development, the chosen scenario has been the Piedmont region, of which Turin is the capital city. Evaluating this area from the perspective of the design concept, it is geographically very rich in the offer of opportunities for outdoor activities thanks to the presence of the Alps on three sides of the region and of a vast variety of natural settings across the whole territory. Here, outdoor sports enthusiasts have the chance to practice a diverse selection of sports in environments ranging from mountains, with climbing activities and snow sports, lakes and rivers, with canyoning and rowing, forests and woods, with camping and adventure routes, to air sports like gliding and ballooning. From this vast range of opportunities, the focus for the practical application of the "Sports Celebrating the

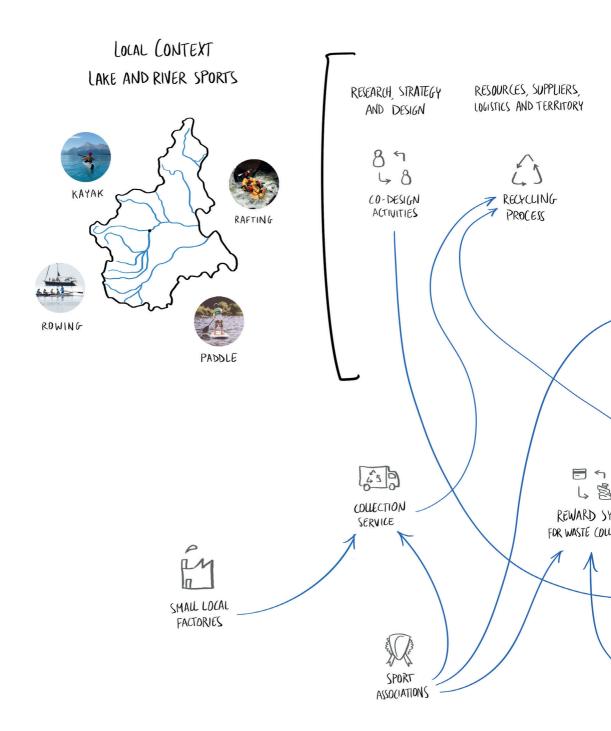
Environment" design concept has been on the outdoor activities practiced in the vast net of rivers and in the many lakes of the Piedmont region, including the largest Italian river Po and its many tributaries.

These natural locations will not just be the setting for the practice of outdoor sports by the potential users of the business. The core of the cultural value generation for this business concept relies on the dedication to environment and to sustainable practices, therefore these natural scenarios will also be the stage for the sustainability related activities. In practice, the experimental business will aim to establish a positive feedback loop in the territory by removing waste, both directly collecting abandoned plastic from the environment and encouraging this commitment into the local community, and manufacturing recycled plastic products which raise and diffuse the awareness of the cause, promoting better and more sustainable behaviours in the people making use of this natural spaces to reduce or avoid the phenomenon of abandoned waste in the first place.

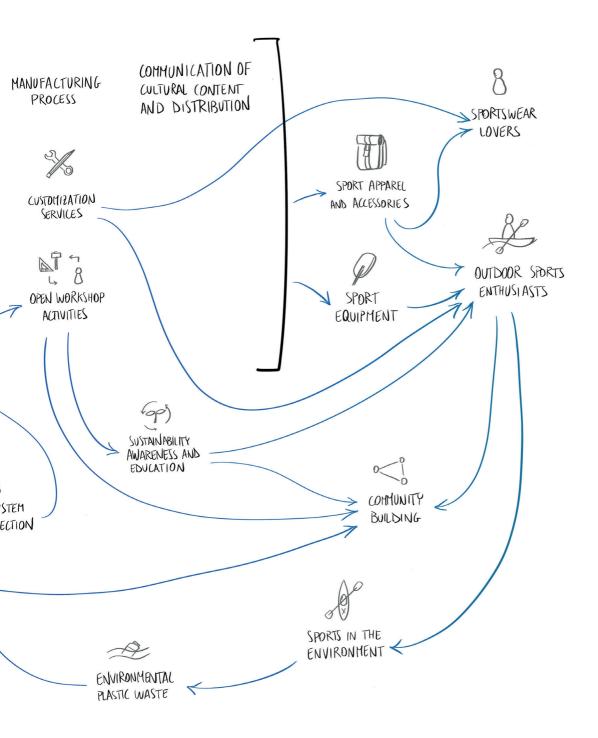
From a practical business perspective, the activities of this enterprise cannot merely consist of the manufacture and distribution of finished recycled plastic products to gain economic benefit from the sales. With such a straightforward approach, the process would lose a great deal of the cultural value associated with the distinctive added attention and unique features coming from the high cultural density manufacturing strategy adopted in the previous step of business development. Therefore, when practically introducing the activity on the market it is necessary to pay the right attention to the promotion and incentivization of a community of people involved in the cultural proposition of the business. This particularly involved user base, which relates with the previously introduced concept of persumer, establishes the base of support to the project by spreading the cultural proposition. To interact successfully with these individuals, it is important to engage them directly, narrating effectively the cultural content of the activity, and to give them the opportunity to easily collaborate to and share this common cause. In order to understand more clearly the needs and desires of this cultural circle and involve these users in the process of establishing the business concept in the real economic environment, both as a cultural and commercial activity, it is useful to approach the market cleverly with a preliminary step rather than launching immediately the whole business model.

In fact, the introduction in the real economic scenario of the business concept is the most important test for the strategy designed so far. The actual worth of the value proposition will be defined by the response of the public, whose engagement and feedback to the proposal of the concept will then serve as a strategic insight for the improvement of the whole structure. In order to balance the aim of finally involving the users directly on the market with the need for a forgiving prototyping stage which will test the commercial validity of the proposal, a preliminary stage of pre-sale for the business has been chosen as the final testing activity. The ideal setting for the practical actuation of this field-test has been identified in the crowdfunding platform. This environment holds many advantages for an actual future experimentation of the case study in the real market. Through a crowdfunding campaign, the commercial interest of the users can be assessed in a very realistic and quantitative manner as individual backers who desire to support the project are required to complete an actual purchase to proceed. On the other hand, both the backers and the enterprise can minimize the risk of their investment and use of resources, as only when the funding goal is reached the campaign moves forward with the actual production and distribution stages. This is also more forgiving from the supply and logistics point of view as the business actually has the opportunity to asses the realistic quantity of rewards to deliver to its customers, ideally only producing what is virtually already sold and paid for, while also gaining a larger time frame for the manufacturing and distribution phases as the customers are aware that they are only pre-ordering the product. Finally, it should not be overlooked that the crowdfunding method, compared to any independent pre-sale prototyping through regular pre-order purchases, holds the advantage of attracting users who especially desire to support the project aside from actually buying the product itself, which is a great opportunity to engage culturally with the users and build a community right from the start of the market proposal. Therefore, this testing stage also provides a privileged starting point for the actual market launch of an experimental business concept as it engages with a specific and selected user base for the high cultural density manufacturing model, allowing to assess practically and effectively the validity of the assumed conversion from cultural to commercial value, the economic sustainability of the business model and the response from the market.

The crowdfunding campaign must be designed to achieve the double purpose of establishing a testing ground for the concept and serving as a preliminary launch of the business in the actual market. Therefore, it is important to take into consideration these directions to define coherently the objectives of the testing stage and elaborate the actual offer of this campaign to the users. The rewards of the crowdfunding campaign are essential for the success of this phase, thus it is important to design them in a strategic way which absolves simultaneously to these two fundamental objectives. The campaign should be structured to assess directly the commercial value of the proposition and the conversion of the cultural value into an economic asset, for which it is an ideal testing tool, while additionally evaluating the recognition and support of the cultural content on its own. It is important to address how this platform also supplies a valuable opportunity for the promotion of the first activities of community building, which are a fundamental part of the strategy. Therefore it's essential to take in account this dimension as well in the design of the campaign.



Model of the hypothetic implementation of the case study in a real economic and social context



#### **COMMERCIAL VALUE ASSESSMENT**

# backers interested in buying the product

Offer a main product for sport which embodies the values coming from the strategy and design direction of the business concept

backers interested in supporting the project Offer a secondary product not sport-related which appeals to a larger audience of backers who may want to support the project even if they do not need or desire to buy the sport equipment

In this first area the objectives of the testing stage are directed at the validation of the market proposal, understanding the actual interest of the consumers in the purchase of a physical product crafted by the means established in the high cultural density manufacturing model. In this evaluation, it is significant to consider how the nature of the crowdfunding platform itself supposes that buying the product is not only a purchasing intent in a more usual commercial sense but holds the additional purpose for backers to support financially a project they are interested in. This is specifically relevant to our position, as the offered product and the wider project from which it generates are not interchangeable. Therefore, it should not be excluded that in this context users might be willing to support the project financially even if they are not specifically interested in buying the product. For this reason, it is essential to offer a wider choice to the backers, foreseeing purchase options which are given more as a support token than actual products. To reflect practically

these directions, the campaign should offer to the users a main and secondary options.

The first product is essential as it embodies directly all the previous efforts in the development of a commercial and cultural proposition. This object must derive directly from the designed business concept, interacting effectively with the cultural drivers and the implemented methodology. As such, the main product also serves as the essential prototyping tool for the market launch of the business model, validating the flow of the strategy into a real proposition in the economic scenario and assessing the response of the market. It is then fundamental that all the guidelines defined for the development, fabrication and distribution are respected in this critical stage. However, because of the specific design concept proposed, this good will possess an inherently defined audience, which is practically limited to the consumers who practice the corresponding sport and are also appreciative of the cultural qualities which make it different from the competition. Considering as well how this phase serves as an initial prototyping stage for a manufacturing structure which will offer a wider choice of products once established, it is important to offer a choice of reward also to other users which might be interested in the project but not in this individual product, as the support of this group might still prove fundamental for reaching the campaign funding goal. This option also opens the opportunity for smaller and less demanding rewards for backers who want to show a little appreciation without a serious investment of money.

## **CULTURAL VALUE ASSESSMENT**

backers whoThe valueappreciate thecommuniccultural valuepromotion

The value chain of recycled plastic must be well implemented in the production process and effectively communicated through the crowdfunding page and promotional video of the campaign

backers who are dedicated to the cause Grant the opportunity to contribute directly to the activities dedicated to environmental sustainability through the reward system

The second part assessed by this testing stage will be the cultural value. This section of the prototyping stage must be directed to a deeper understanding of the cultural involvement of the users in the value proposition and of their appreciation of the wider project behind the single product itself. Rather than offering additional goods to purchase, the efforts directed at this objective should be implemented practically in an effective explanation of how the manufacturing process has been designed, applying the narration guidelines to consistently transmit to the user which are the additional values that are incorporated through this distinctive business and fabrication approach. In the actual crowdfunding campaign, there should be two essential ways to communicate this added value. First is the informative material, comprised of the description page and the presentation video. This is an essential step to ensure the user familiarizes with the qualities which make not just the product but the whole project unique, communicating the process and the values which

are incorporated in the goods throughout their development. A second step, which takes place after the informational content has been reviewed by the user, is the opportunity in the rewards of the campaign to contribute directly to the process rather than purchasing a product, targeting directly the activities promoting sustainability and territorial development. Due to the nature of the crowdfunding platform, which requires to structure the campaign around a specific product, there is a more limited practical possibility for the offer of direct services which must be kept secondary compared to the main element. However, the participation of the users to this tier is still essential as it serves both as a test of the cultural engagement and of the willingness of users to take part in the activities first-hand, which is an important part of the strategy after the business establishes on the market. As the main product offered in the campaign already embodies the cultural value as well, the presence of backers who choose to support the project directly acts more of a confirmation of the worth of the cultural value proposition by itself. It is also the chance to understand the cultural segment better, therefore the opportunity to interact with the user and obtain direct feedback should not be missed.

## **COMMUNITY BUILDING**

backers who want to know more about the project Supply an undemanding entry-level reward which lets user be part of the inner circle of backers without investing resources, engaging them with special content to eventually bring them in higher tiers of contribution

backers who want to be involved in the development Give the opportunity for larger investments in the project, offering special and individualized content or services which involve the backer directly in the project

Finally, the campaign offers the opportunity to engage the users in a community building activity. This step, which might be easily overlooked in crowdfunding campaigns centred on selling a single product from an existing business, is in our application case remarkably important for several reasons. In the shortterm, this is fundamental to assess to ensure a positive outcome of the campaign, engaging with the initial backers to spread the initiative while also gathering important initial feedback for a correct execution of the successive stages. In the long-term, while the campaign might seem beneficial mainly to gather financial support for the manufacturing of the products and the business launch, a great advantage of this platform is its effectiveness as a channel to establish a solid and involved community of followers right from the start. For the concept of a High Cultural Density Manufacturing, this is even more significant and accurate as the interaction of an informed and engaged user base is essential for the economic sustainability of the model. Therefore, for this

phase of testing it is essential to assess the direct involvement of the users in the presented project and the overall value proposal, even without a corresponding purchase, as well as their interest in being directly part of the project in some way, even by just spreading the word. In the practical development of the campaign, this community building perspective interestingly involves the lowest and highest tiers of contribution to the crowdfunding. On the lower side, the symbolic contribution tier of e.g.  $1 \in +$  is easy to underestimate for its little impact on the funding goal of the campaign. However, this small and undemanding reward comes with the opportunity to join the closed community of the project backers for the campaign. Thus it gives the possibility to the users who are somehow interested to the project to receive direct updates from the creators and news about the development. From a campaign offer point of view, this means actively interacting with backers and crafting specific backer-only content which makes the time and money of these users worth. These backers also have the possibility to upgrade their pledge until the end of the campaign, therefore engaging with them can be an effective way of increasing the chances for successful funding. On top of this, after the end of the campaign these users still constitute a rich database of people interested in the further development of the project outside of the crowdfunding platform. On the highest tier, it should be considered the possibility that few but very interested people or even companies might want to invest more in the project. Rather than buying 10x of the main product, these special backers should be offered the opportunity to make a larger investment in change of very particular and customized opportunities, which for example might directly involve the campaign founders. For the scopes of this case study, the most effective and coherent offers would be the organization of formation events, which is relevant also to the open workshop attitude of the project, and the offer of customized goods and services, which aligns with the craftsmanship soul of the activity. It should also be possible to invest a significant amount to join the development directly, which could be the opportunity to establish important relations for the future development of the business



Once the content of the campaign has been coherently structured to satisfy both the testing requirements and the interests of the preliminary market launch, it is possible to translate this strategy into an actual offer of products and services through the reward system of the crowdfunding platform. It is essential that a priority exists in the development of the rewards and a clear understanding of which serves what purpose. The first and most fundamental one is the main product of the campaign. As the crowdfunding platform is still targeted mainly at the offer of cultural, artistic, design or technological goods, even for a proposal of a larger more culturally rich and innovative process as it happens in our case, it is still necessary to develop the campaign around a central product. To embody the distinctive qualities of the process and approach that brought the hypothetical case study to this stage, the main product must be representative of both the values of the operational framework, defined by the locally sourced recycled handmade plastic products, and the chosen design direction of "sports celebrating the environment". The identified product is a sport equipment tool which is approachable to design and fabricate according to the standards of this model while at the same time essential for many lake and river sports: the paddle. The proposed product will be made of recycled material through the workflow of Precious Plastic, in the most possible percentage from direct collection from the environment, and is going to be designed to be adapted modularly for different sports like kayak, rowing or stand up paddle. It is important to note how this product will not compete with the industrial alternatives on functionality or cost, as this would be missing the point of the methodology, but on the embedded added value from the cultural proposition. By purchasing this product, the sport practisers will have the opportunity to enjoy their passion in nature while using equipment which both directly impacts positively that environment while also spreading awareness on its preservation to other people. The product should clearly express the direct impact on environment in a quantitative way, to spread a consistent and effective message. The design of the paddle should reflect this attention not only in the choice of material but in the construction, adopting a design for components approach which favours the reusability and repair before the end of its life cycle in another round of plastic recycling. It is also important for the sake of both the campaign and the market launch to remember how this product is not the centre of attention by itself, it is a starting step in the establishment of larger project which will also eventually offer a much more diverse range of products on sale, all benefitting from this same culturally dense approach.



Example of paddle used for kayak

As it has been stated previously, the nature of the platform is to some extent restricting about the offer of the crowdfunding campaign as it requires to focus the attention on a single main product. However, the proposed manufacturing concept has a much larger potential to gain the interest of the backers. Therefore, it is essential to provide the wider base of users, who do not find direct use or interest in the specific sport equipment offered, with different options of pledge which still serve as an opportunity to back the project and show their direct appreciation for this activity. Another significant scenario is that of users interested in both the product and the project, but who are not specifically in need of a new paddle to buy or cannot afford to spend too much on the campaign. For these reasons, it is also essential that this secondary tier of rewards has an economically valid but more accessible price, lowering both the expense barrier to the participation to the project and the limitation imposed by the stricter target of the main product. A very simple but effective good which satisfies compellingly these criteria is the t-shirt. While this reward may seem uninteresting or underwhelming compared to the main product, there are some more observations to be made on top of the budget and accessibility considerations. This product does not have the responsibility of embodying the whole process of value generation, as it is not part of the offer of the business concept itself. However, it has been noted previously how fashion in general is one of the best physical media for the diffusion of cultural value. As a clothing piece, this secondary product will still be identifiably connected to the project and embodies the same cultural proposition. Even with a smaller

statement, it is in its own way a culturally-dense artefact which can actively be part of the cultural negotiation of the user with its social group and thus a vehicle of awareness for the project and the underlying cause. In order for this artefact to be an effective mean to convey the added value though, there must be some additional consideration about the characteristics of the shirt and of its fabrication process which must be coherent with the overall offer of the business concept. As it is not fabricated through the main process of plastic recycling, but realistically outsourced to another supplier, it is important to make sure that the process and materials are still coherent with the value proposition of the business. The employment of a sustainable textile is essential to stay true to the cultural proposition, therefore it is suggested the use of Tencel® lyocell, which is regarded as one of the most sustainable textiles alternatives available on the market. Even though employing a sustainable alternative for the production of the t-shirt might increase the cost, this happens in an optimal context where the added value should be appreciated by the



Tencel® lyocell fiber

users for its increased worth. Therefore, as much as it is not in the spotlight of the campaign, this reward is still interesting in the overall evaluation of the business model and of the cultural value proposition, on top of being an accessible and effective reward for the sustain of the crowdfunding campaign for smaller pledges and a smart mean to diffuse the project through branding.

With the definition of the characteristics of the crowdfunding campaign, the design of a conceptual execution of the methodology can be considered ready for the actuation of the practical experimentation. While these indications of development have covered the steps from the generation of the concept to the strategical implementation of the methodology, the consequent efforts by the adopters of the model must be directed at the industrial design of the products and at the engineering and equipment of the manufacturing workshop, as well as the administrative and financial aspects which officialise the actual launch of the business on the market. After meeting these practical conditions, the crowdfunding campaign can be designed in its communicative part and launched effectively to meet the objectives of experimental prototyping and financial establishment of the business, providing a concrete feedback from the market for the effectiveness and opportunities for further development of the designed methodology.



# **Further developments**

The development of these indications for the practical employment of the methodology has been an opportunity to assess conceptually the coherence and effectiveness of the guidelines and approach in the design of a strategy for the synergic use of the technological advancements and innovative solutions in a culturally intensive business model. The actual execution of the field testing on the market will then be the immediate consequence of this methodological design effort, assessing the economic sustainability of the proposal and defining both a crucial moment of experimental demonstration and the opportunity to gather real feedback from the economic environment on the effectiveness of the approach developed in the thesis.

As the phase of an actual market launch would require consistent material assets, the experimental stage of this methodology should start from the introduction of a partner which could provide the resources necessary for the establishment of a space for production and delivery of the products and services identified in the strategic development. Once field tested, the methodology could then be reassessed through the significant feedback obtained by the application of the guidelines, improving the initial proposal to make the high cultural density manufacturing model ready to be practically applied and implemented in real enterprises which desire to introduce an innovative approach to business through the key lever of a rich cultural content. The improved and tested model could then be diffused and more widely implemented, with the aim of building a movement around the promotion of a culturally stimulating, innovative and successful enterprise

Further developments

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## **APPENDIX: THE SURVEY DIFFUSED FOR PRELIMINARY RESEARCH**

## Survey on sustainability and local manufacturing

This short survey is part of the experimenting phase of a thesis in Systemic Design at the Polytechnic of Turin, Italy. The aim is to evaluate the perception of environmental sustainability and local manufacturing to design innovative business solutions which promote economic and cultural growth.

All people at least 18 years old are eligible and welcomed to take part in the survey. Time of completion is around 10 minutes. The very few open responses are optional but very useful as they give you the opportunity to express your opinions freely, your dedication to complete them would be appreciated greatly. I thank you in advance for the effort and time you will dedicate to sustain this research.

You are free to retire from the survey in any moment should you desire to do so. You can simply close your browser to cancel your submission at any time.

Your data will stay completely confidential and won't be used for any other purpose without your explicit consent nor it will be disclosed to third parties.

\*Required

## About You

All information is collected anonymously and aggregated for statistic purposes only.

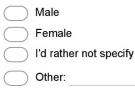
### 1. Age \*

Mark only one oval.

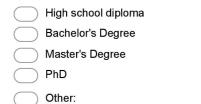
18-24 25-31 32-47 48-60 60+

### 2. Gender identity \*

Mark only one oval.



### 3. Education \*



4. Occupation * Mark only one oval.	
Not occupied	
Student	
Employee	
Self-employed	
Other:	
5. Nationality *	_

6. Country of residence\*

## **Environmental sustainability**

Please answer truthfully with your opinions, without overthinking your response. There are no right or wrong answers and all honest contributions are useful for the research.

### 7. How much relevance do you give to environmental sustainability?\*

Mark only one oval.

	1	2	3	4	5	
Low relevance	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	Great relevance

8. Do you perceive the dedication to environmental sustainability mainly as: \*

Mark only one oval.

A positive action to be proud of	٥f
----------------------------------	----

- A positive action which should be kept private
- An inconvenience which I'd prefer to avoid
- I don't have any particular interest in it
- Other:

## 9. Do you think that in your social group the dedication to environmental sustainability is perceived mainly as: \*

Mark only one oval.

$\bigcirc$	A positive action to be proud of
$\bigcirc$	A positive action which should be kept private
$\bigcirc$	An inconvenience which would be rather avoided
$\bigcirc$	No particular interest in it

Other:

## 10. How much do you agree with the following statements about environmental sustainability? \*

Mark only one oval per row.

	Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree
It's an opportunity for innovation and economic growth	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$
It's important to act today to avoid future risks	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Every citizen should contribute in its daily life	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Companies should do all the necessary to be sustainable	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$

11. Do you differentiate waste at home? If yes, which materials do you usually differentiate? \*

Tick all that apply.

I don't differentiate waste at home
Plastic
Paper
Glass
Aluminum
Organic
Other:

12. Would you like to have direct influence on the way these materials will be repurposed? \*

Mark only one oval.

- Yes, I would like to have this opportunity
- It's an interesting idea but I won't personally make use of it
- No, it only matters to me that they are recycled
- I don't differentiate waste at home
- Other:

### 13. Do you perceive differentiated waste collection mainly as: \*

- A positive action to be proud of
- A positive action which should be kept private
- An inconvenience which I'd prefer to avoid
- I don't have any particular interest in it
- Other:

14. Do you	think that in your	social group of	differentiated	waste collection	is perceived m	nainly
as: *						

Mark only one oval.

$\bigcirc$	A positive action to be proud of
$\bigcirc$	A positive action which should be kept private
$\bigcirc$	An inconvenience which would be rather avoided
$\bigcirc$	l don't have any particular interest in it
$\bigcirc$	Other:

15. What have you done or would you do personally to make people you know more aware of environmental sustainability issues? (optional)



## **Contact with nature**

Please answer truthfully with your opinions, without overthinking your response. There are no right or wrong answers and all honest contributions are useful for the research.

16. Did you ever practice outdoor sports or activities (including hiking/walking) in one or more of the following environments? \*

Tick all that apply.

I never practiced outdoor sports or activities
Sea/ocean
Mountain
Lake
River
Woods
Other:

### 17. If yes, which kind of activity?\*

Tick all that apply.

I never practiced outdoor sports or activities
Trekking/hiking/walking or similar
Cycling/downhill or similar
Climbing/canyoning or similar
Skiing/snowboarding or similar
Surfing/paddle/kiting or similar
Kayaking/rowing/rafting or similar
Swimming/snorkeling/diving or similar
Fishing or similar
Hunting or similar
Horse riding or similar
Other:

### 18. If yes, how often?\*

Mark only one oval.

$\bigcirc$	I never practiced outdoor sports or activities
$\bigcirc$	
$\bigcirc$	Few times a year / only on holidays
$\bigcirc$	1-3 times a month
$\bigcirc$	once a week
$\bigcirc$	2+ times a week
$\bigcirc$	Almost every day / I'm a professional

19. Do you think abandoned waste in nature (e.g. woods, rivers, oceans) is a relevant issue?\* *Mark only one oval.* 



## 20. Did you ever collect personally waste which had been abandoned in nature by somebody else?\*

$\bigcirc$	Yes, every time I had the chance
$\bigcirc$	Yes, but only rarely
$\bigcirc$	It didn't happen, but I would have if I had the opportunity
$\bigcirc$	No, because it's not my responsibility
$\bigcirc$	No, because collecting waste bothers me
$\bigcirc$	Other:

#### 21. Do you know brands/services which collect and/or recycle environmental waste?

Tick all that apply.

l don't know any	
Parley.tv	
4oceans	
Sand Cloud	
United by Blue	
Happy Earth	
Insecta	
Other:	

## 22. How much would the following services encourage you to be more sustainable in your daily life? $^{\star}$

Mark only one oval per row.

	1 (Not at all)	2	3	4	5 (Considerably)
A service which rewards my effort with promotional offers	$\bigcirc$	$\bigcirc$	$\bigcirc$		$\bigcirc$
To be part of an active community of people with the same purpose	$\bigcirc$	$\bigcirc$	$\square$	$\bigcirc$	$\bigcirc$
A service which informs me and guides me in my choices	$\bigcirc$	$\bigcirc$	$\square$	$\bigcirc$	$\bigcirc$
A service which rewards my effort with products	$\bigcirc$	$\bigcirc$	$\square$	$)\bigcirc$	$\bigcirc$
Another service, please answer 2 to this question as an attention verification	$\bigcirc$	$\bigcirc$	$\square$	$\bigcirc$	$\bigcirc$

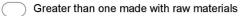
#### 23. Can you think of or would you like any other initiative? (optional)



### Sustainable products

Please answer truthfully with your opinions, without overthinking your response. There are no right or wrong answers and all honest contributions are useful for the research.

### 24. Do you think that a product manufactured with recycled materials to you holds a value: \*



- Similar to one made with raw materials
- Lower than one made with raw materials
- It makes no difference to me

## 25. Would you like to display your support to environmental sustainability through the products you use? \*

Mark only one oval.

	$\square$	Yes,	l'd	like	to	display	my	support	
--	-----------	------	-----	------	----	---------	----	---------	--

No.	l'd	prefer	my	sup	port	to	be	private	

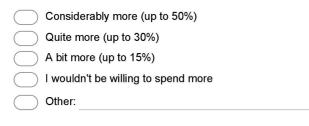
lt's not a	cause that I	support	particularly

Other:			
Uner			

26. Could you briefly provide a reason for your answer? (optional)

## 27. How much would you be willing to spend for a sustainable product compared to an alternative? $\space*$

Mark only one oval.



## Local goods

Please answer truthfully with your opinions, without overthinking your response. There are no right or wrong answers and all honest contributions are useful for the research.

## (you are almost there, just one page left)

28. While buying a product, how much do you value the indication of origin?\*

Mark only one oval.



### 29. Did you ever buy on purpose a product because of its local origin before?\*

Mark only one oval.

Yes, often Yes, occasionally Not on purpose Not at all

### 30. If yes, what kind of product?

Tick all that apply.

Food/beverage
Clothing/bags/accessories
Jewelry/watches
Furniture/home
Automotive/transport
Other:

### 31. Do you think that a local product to you holds a value:\*

Mark only one oval.

- Greater than one from international/globalized firms
  - Similar to one from international/globalized firms
  - Cesser than one from international/globalized firms
  - It makes no difference to me

## Craftsmanship goods

Please answer truthfully with your opinions, without overthinking your response. There are no right or wrong answers and all honest contributions are useful for the research.

## (this is the last page of questions, thank you for your effort)

### 32. Do you think that a unique craftsmanship product to you holds a value: \*

Mark only one oval.

- Greater than one from industrial production
- Similar to one from industrial production
- C Lesser than one from industrial production
- It makes no difference to me

## 33. How much would you be willing to spend for a unique craftsmanship product compared to an industrial alternative? \*

Mark only one oval.

- Considerably more (up to 50%)
- Quite more (up to 30%)
- A bit more (up to 15%)
- I wouldn't be willing to spend more
- Other:

### 34. Would you make use of a customization service to make your products unique?\*

- Yes, I would gladly make use of it
  - Yes, but only at an accessible price
  - Not personally, but I think it's an interesting idea
  - > No, I wouldn't make use of it and it doesn't interest me

### 35. Would you like to be involved in the design of products you frequently use?\*

Mark only one oval.

$\bigcirc$	Yes, I'd like to
$\bigcirc$	No, I wouldn't like to
$\bigcirc$	Other:

## Conclusion

Thank you for your kind help and dedication sustaining this research.

The data collected through this survey will be helpful for the creation of a sustainable model for economic and cultural growth of businesses. The project aims at the design of a business structure capable of generating commercial and social benefits on a local scale, promoting territorial innovation, distinctive human expertise and sustainable processes.

Your support will be valuable for the definition of the most important factors to target in the process and to communicate effectively the benefits of this model to the final users.



Development of a design-driven methodology for the introduction of innovation in the small-medium enterprises of the manufacturing sector, employing the meaningful integration of technological advancements and the richness of cultural content to improve market competitiveness, while investing on the preservation and growth of the distinctive cultural capital and heritage of territories and people.