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LABUTEGA

The encounter of artisan tradition and diy innovation in the new making space

The 'Labutega' project has been developed outside Politecnico di Milano with the help of Paolo Aliverti, Simone deGiuseppe and Maurizio DiLucchio, and it is used in this thesis as a case study. I want to thank them for the chance that they gave me, my relator Fabrizio Pierandrei, my family and my girlfriend for the support.

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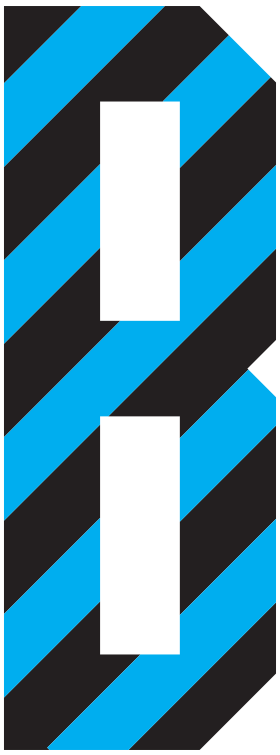


00.0

INTRODUCTION

In recent years we have been witnessing a crisis that struck the global economy, raising major complaints about an immaterial system such as that of financial economy.

We started to ask questions on labour flexibility, instability and speed, too often considered as the ingredients of success. May the mass production and standardization be the panacea? May abstract knowledge be separated from knowledge of making?

More and more people seem convinced of the opposite, and has begun to reflect on manual labour and intelligence of those who work with their hands.

Starting from the United States, where we witnessed the recovery (social and economic) of the value of manual work and craft, there are many who believe that the future necessarily has the need to rediscover the makers.

We are now experiencing the first stages of a democratization of manufacturing, a trend that promises to revolutionize the means of design, production and distribution of material goods and give rise to a new class of creators and producers.

Some disruptive technologies and several cultural and economic driving forces are leading to what has already been called the next industrial revolution: public access to digital fabrication tools, software and databases of blueprints; a tech Do-It-Yourself movement; a growing desire amongst individuals to shape and personalize the material goods they consume.

This could mean a lot for a country like Italy, the worldwide home of craftsmanship and small and medium enterprise, if the figure of the craftsman will have the ability to renew itself, associating with the potential of the web, of the new media, and of the new technological tools.

Labutega presents itself as a new making space inserted into the urban fabric of Milano, a meeting point between tradition and innovation, and a catalyst for a crucial process for the Italian cultural and social development.

01

CHAPTER ONE

THE ARTISAN TRADITION

ARTESAN:

Un artesan l'è un lavuradur espert che'l dröva arnes, machinari e materi prim per fà sü o trasfurmà rob vari.

from Wikipedia in *Lumbaart* language

01.1

THE DEFINITION

There are several definitions for the word *craftsmanship*, but making a summary of some of these we can say that the term, derived from art, in the broadest sense 'capacity to act and produce, according to a particular set of rules and cognitive experiences and techniques' [1], define an economic activity aimed at the production of not serial goods and services , made within a family group or with a limited number of workers, according to a working cycle in whole or in part devoid of machinery.
The craftsman is in fact the economic operator in the creative phase of an object and in the following exchange engages in a direct way with its own instruments, resorting mainly the manual dexterity.

The craft is therefore tied, in an unavoidable way, to the use of the body, and in particular to the dexterity. The link between craft and craftsmanship is so close that sometimes assume, for craftsmen on one hand, and for the users-buyers on the other hand, conflicting values , even opposite. For craftsmen, in fact, the dexterity is, in many cases, an ability that allows to realize products as far as possible 'perfect', ie, regular, finished, well-decorated, adhering to the rules of symmetry. In the stress towards achieving the 'perfect' work are implicit erasure and the invisibility of the hand that has done the work, according to a concept already widespread in the the ancient world and the medieval era, which saw in the most important works of art the intervention of a divine rather than human hand.

THE CRAFT OBJECT, WHICH BEARS VISIBLE SIGNS OF THE HUMAN HAND, EVEN IF IMPERFECT, IS RATHER UNIQUE, CUSTOMIZED, 'SIGNED'

For their part, buyers-users generally have shared this same attitude, especially in ancient and 'traditional' societies, consistent-

ly structured; conversely, from an angle profoundly different, in contemporary society are appreciated those handcrafted items, even botched or asymmetric, which show better dexterity, offering a guarantee of 'authenticity'. Behind this conception can be seen a reaction to the standardized mass production, serial and therefore anonymous, impersonal, on which capitalist economies are based: the craft object, which bears visible signs of the human hand, even if imperfect, is rather unique, customized, 'signed'.

According to the sociologist Richard Sennett[2], who published a book on the topic a few years ago having an unexpected success, the craftsmanship differs from work in the factory for three principal reasons.

First of all because it incorporates a higher portion of autonomy, which reflects the ability of the artisan to orient himself within complex problems and find original solutions. Unlike workman who works on the assembly line, the artisan dominates the entire production process from the substantial part and is able to skillfully use a variety of tools.

A second distinguishing feature regards dialogue with the customer. The craftsman knows the true desires and expectations of the person who is the recipient of his work and is able to verify the quality of the final result with the person concerned. This ability to listen is essential for product customization, typical of the artisan dimension.

Finally, the social aspect of the trade: the activity of the artisan is structured in socially recognizable and communicable practices (not only gestures but also attitudes and states of mind) able to define its identity.

HISTORICAL BACKGROUND

The the ancient world craftmenship, already framed in large corporations during the Hellenistic period, was particularly developed in the imperial age. Reduced to a few professions and deprived from the restricted early Middle-age market, flourished again after the 10th century, In connection with the growth of the city market and with the new corporate organization (arti). In the artisan workshop, the master worked with a small number of subordinates and apprentices, selling directly to the finished product. Since the mid-18th century, the c. began to decline in parallel with the increased demands of a mass market and the increasingly widespread use of the machines. In the course of the 20th century the c. has gradually moved away from the overall conception of the treatment of the matter, even in areas of particular creative and aesthetic value; therefore, the lines of demarcation, on one hand between c. and art, on the other in between the c. and industrial products, have eased.

01.2

THE ITALIAN SITUATION

In Italy there has always been great richness and variety of crafts: from ceramics to glass, from the woodwork to metal, from weaving to basket weaving, to jewelery, to works in stone, cork, leather, horn, and more recently to the use of new materials derived from recycling and reusing other objects. A richness that has sometimes led to indifference towards an artistic heritage that is too abundant and available. The creative crafts in Italy has a vibrancy and a vitality that are indestructible. Some regions are richer than others, but each one has some interesting aspect, which refers to ancient traditions which are maintained and renewed, with features given by the natural environment, by the historical events, by the artistic and cultural heritage, by the disposition of the inhabitants, their greater or lesser willingness to accept and process influences and external stimuli.

The craftsmanship has always been for the Italian economy a sector of strategic importance. To it we owe the spread and the recognized leadership in the world of *Made in Italy*, linked to the very high creativity and professionalism that the whole world envies us. The Made in Italy developed after the war and reached its peak in the sixties, during the economic boom. In the seventies and eighties despite the oil crisis, has reached such a power to push boundaries and aim for international recognition who appreciated the genius and high professionalism.

The industrial development of our country during the eighties and nineties coincided with the development of an army of small operators mainly concentrated in the classic fields of the traditional *Made in Italy*: Agricultural and Food, Fashion Industry (mainly textile, clothing and footwear) the Home System (mobile and furnishings), the Metal and Mechanics Industry. The competitiveness of these small businesses has never been based on managerial and strategic capacity of a single craftsman or small business owner, but rather on the overall strength of the industrial districts in which these companies have met their development. The small

enterprise has grown and has been able to conquer international markets not because autonomous entity capable of deliberate strategies, but because embedded within districts that have enjoyed the extraordinary mobilization of local communities that have supported the growth path through the offer of services in the field of education and finance.

These industrial districts are nothing more than a territorial area with a high concentration of small and medium-sized productive enterprises (where the concentration is measured by the ratio between the number of enterprises and resident population), with high productive specialization, generally characterized by an intense interdependence of their production

Case study:

THE DISTRICTS IN ITALY AND THEIR DISTRIBUTION

Although the pattern of industrial development based on districts is not an exclusive Italian, in Italy it has found the ideal conditions for his success since the seventies, simultaneously whit the first signs of the large enterprise crisis: having no longer fulfilled the conditions of expansionary growth of the market demand, monetary stability and abundance of resources on which the industrial development of the sixties was based, large companies found huge difficulties in maintaining their strategies for expansive growth. Many of them undertook a major reorganization both implementing measures to decentralize production and to exploit the potential of specialization and division of labour between firms in the same industry. At the same time, it was recorded a growth process of a network of small businesses of artisan origin, strongly rooted with the traditional production of restricted geographical areas, which gradually reached significant market share in niche productions.

Today, the Italian legislation recognizes and protects about 200 industrial clusters, distributed patchily throughout the country. [3]

cycles and is highly integrated with the local socio-economic environment that hosts them. This peculiarity is mainly concentrated in the north and in some areas of the center, is almost absent in the south of the peninsula which has not succeeded to develop, except in some areas such as Puglia and Campania. And right at the origin of the success of these districts there was an extraordinary patrimony of artisan knowledge and community relations, valuable resources when it comes to accommodate a voluble and ever more sophisticated claim as those in the fashion and interior.

Although we tend to associate the craftsmanship with small and medium enterprises, it is important to be able to capture the value that the artisan work has in larger companies. This "artisan spirit" permeates much of the *Made in Italy*, even in the medium and big business. Handicraft skills are those that enable large fashion and luxury groups to manufacture garments, bags and accessories of exceptional quality to be sold on international markets. Handicraft skills are those of the model makers that allow the protagonists of Italian style to translate their sketches into prototypes and first series on which set in motion the industrial production also in distant countries. Handicraft skills are, finally, those of the maintainers and of the propmen of machine tools that ensure the competitiveness of the Italian mechatronics in the world.

It is true that the Italian industrial capitalism has taken possession of new managerial skills (communication, logistics, design and

THE NEW MEDIUM ITALIAN ENTERPRISE HAS NOT DENIED THE FIGURE OF THE ARTISAN; HAS, HOWEVER, ARRANGED HIS QUALITIES AND PROPOSED HIS VALUE TO AN INTERNATIONAL SCALE

many more), but it is equally true that entrepreneurs who drive these new companies have not followed the precepts of the 'financial' philosophy that has guided the vision of the Anglo-Saxon management. The relationship with the product and the production still remains a distinctive feature in the guide of the companies in the fourth Italian capitalism. It remains the passion for making, rooted in a world of crafts and practices that define a social identity. Upon closer examination, the new medium Italian enterprise has not denied the figure of the artisan; has, however, arranged his qualities and proposed his value to an international scale. Has been able to mix scientific knowledge and gestures of tradition, has learned to communicate the skill of the masters through the new means of communication.

Unfortunately, only a minority has been able to adapt to the changes, and has managed to evolve into the new artisanal figures that are able to survive successfully on a global scale.

Case study:

VYRUS MOTORCYCLES, GLOCAL CRAFTS


1.


2.


3.

(1) Detail of the 986 M2, (2) Ascanio Rodorigo, founder of Vyrus, (3) the 986 M2.

"We build the most technologically advanced bike that's on the market. The Vyrus is homologated and sold in twenty-five countries around the world: the United States to the West Indies, to Europe, " says Ascanio [4], founder of the small hi-tech workshop.
At the center of the production process there is the person, even before the vehicle. "At first the customer has to explain me who he is, what he does, what are his favorite colors, his hobbies, the sports he practices. And only after that, I start to design the customized motorcycle".
Each model is a unique piece, manufactured entirely by hand by five skilled artists-artisans, including Ascanio himself and his son David, who work 365 days a year in a small workshop in Cerasolo Ausa, in the middle of Romagna.
The creative process goes through several stages. Ascanio prepare a sketch of the bike. A Japanese designer transforms it to the computer, in a volume of three dimensions.
And finally, an Englishman, naturalized French the physical-mathematical calculates the appearance of the project.
It is a creative process multiethnic very complex, but equally effective, as it allows Ascanio to design revolutionary motorcycles.
In the end, the bike is tested in a wind tunnel in collaboration with the University of Pesaro. "Here in Vyrus we are in five - says Ascanio - then we have fourteen external consultants, called the occasionally. This enables us to keep the costs down of production and to be competitive on the market. "In 90 percent of cases, those who want a Vyrus comes in Rimini. The others order it on the website *www.vyrus.it*, and the bike comes, via courier, to the customer's home in assembling kit.

01.3

THE CRISIS

The work of the craftsman, more than any other, is experiencing nowadays the difficulties of a local market, which has reduced its spending capacity, and of a globalized market, more and more prone to uniformity, flooded with standardized products, whose low prices are the result of an obvious decrease in the quality.

At the end of 2013 might have to close 140 thousand small businesses, 10% of the total, with an erosion of the productive base of 2 percentage points. This was the warning that the CNA launched in the report 'Movimprese: le imprese artigiane in ginocchio'[5]. In this way would be lost 300,000 jobs. In 2012, according to the study, the crisis has hit the craftsmanship: compared to 2011 in fact closed the 8, 4% of small businesses against 6% recorded in other sectors.
According to the study center of the CNA, crafts, which represents 25% of the Italian productive system, accused the 30.4% of total terminations recorded in 2012 (122,899 closings out of a total of 403,923).
At the end of 2012 closed the 8,4% of small businesses against an average of 6.6% of the production system. The closures of small businesses have not been balanced by the birth of new businesses: at the end of 2012 the stock of artisan enterprises has in fact reduced by 1, 5% compared to 2011.

122,899 CLOSINGS REGISTERED IN 2012 OUT OF A TOTAL OF 403,923

A completely different situation concerns the non-artisan firms for which, at the end of 2012, there has been a substantial stability compared to 2012, when the growth rate was +0.1%. The overall decline in the consistency of the whole system of production (-0.3%) therefore reflects a crisis that has hit the craft businesses.

The sectors most at risk are primarily building firms, for which the crisis has been going on continuously since 2008. In the manufacturing sectors, are particularly af-

fected textiles and clothing firms and the other means of transport, which includes, for example, the nautical field. Finally, among the services, it has greatly reduced the advertising and market research fund.
The sectors in a critical situation with the hope of hooking the recovery, according to the CNA, are mainly artisan enterprises that operate in the service sectors. Among the sectors in slow decline, then, there are many typical manufacturing sectors of *Made in Italy*, including furniture, jewelery, mechanical, production of ceramics and tiles.

The areas apparently healthy, finally, are the chemical and food industry that is notoriously anticyclical. In the tertiary, however, appear to hold the services for the person, such as beauty salons, hairdressers and dry-cleaners.

However, Despite the crisis and many difficulties, Confartigianato confirms that there is a "small army" of artisan enterprises that, in the last year, showed a positive trend, both in terms of production and employment. At the top for business development rate there are information technology, green economy, objects and equipment repairs, and food. The ranking of the anti-crisis activities has been compiled by Ufficio studi Confartigianato, that measured the areas in which, from June 2011 to June 2012, there has been a greater increase in the number of craft firms.

The data shows that, despite a thousand difficulties, in Italy there is a small army of 351,566 small businesses (24.3% of the total of 1,448,867 artisan firms) that, in the last year, showed a positive trend, an increase of 1, 96%. At the top for business development rate there are activities related to information technology, green economy, repairs, food. Resists the information and communication technology (ICT) where, in the last year, were born 760 companies (+6.4%) which drive up to 4,915 the craft businesses engaged in the production of software, consultancy, installation and maintenance of IT equipment.

Even the ecological awareness is increasingly making its way in the habits of the Italians and it is

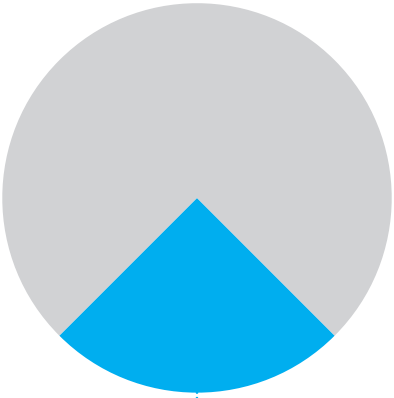
establishing as an engine of entrepreneurial initiatives: in the last 12 months, in fact, were born 5,029 businesses that lead to the number of 37,714 artisan activities of the green economy, an increase of 5,6%.
According to a survey of Confartigianato[5], has also increased the number of "green" companies that deal with the creation and maintenance of green spaces and the use forest areas. In this productive niche, which has 3,652 artisan businesses, in the last year have been created 320 new companies (+1.7%).

The crisis increases the party of those who believe that fixing is convenient, a trend that has given birth to 2,404 firms (+4.1%), bringing to 18,178 the number of companies that deal with repair, maintenance and installation of objects, machines and equipment in general.

Italians, as everybody knows, do not renounce to good food and, thus, in the catering field operate 49,238 companies (6,104 new companies, amounting to +2.2%, between June 2011 and June 2012) and in food production are 39,114 active companies (2,440 new businesses, +0.85% last year).

As we can see, the crisis is an opportunity for changing the patterns of general development of the society and in fact it interrogates all areas of craft and business.
Only those artisans who will be able to renew themselves and read the new global economic situation, taking advantage from a very tough condition, will survive.

the number of
ITALIAN ENTERPRISES
5.275.515
units



25%
of the total are
ARTISAN BUSINESSES
1.448.867
units

24,3%
showed a
POSITIVE TREND
351.566
units
+1,96%

8,5%
of these activities
CLOSED
122.899
units

**at the end of 2012*

01.4

PARADOX & PERCEPTION

While on one hand we have the really alarming datas gathered by INPS, which attests at 36% youth unemployment, on the other CGIA Mestre warns that within the next 10 years we could lose 385,000 intensive manual jobs available in handicraft and agriculture. A *paradox* that is affecting our labor market.

But what are the professions in danger of extinction? According to the elaboration[6] of the CGIA at risk are leather craftsmen, suitcase and bag makers, carpenters, straw weavers, masons, tinsmiths, body shops, auto mechanics, welders, gunsmiths, watch repairers, dental technicians, printers, offset printers, bookbinders, radio and repairers TV, electricians, electromechanics, weaving and knitting workers, tailors, mattress makers, upholsterers, painters, plasterers, scaffolders, parquet and floor layers. For agriculture, however, we may no longer have cattle ranchers, and farm laborers. Not only that, among the 'endangered' professional profiles there are also drivers, domestic helpers, cleaners, street vendors, ushers and meter readers.

In order to reach these conclusions, the CGIA calculated the number of employed people available today in manual jobs in the age bracket between 15 and 24 years and between 55 and 64 years. Once the turnover rate has been measured, it has been possible to draw up an initial ranking list for crafts. Finally, it has been estimated the number of figures that presumably will cease to exist within the next 10 years for each activity.

Giuseppe Bortolussi, Secretary of the Association of Artisans and Small Enterprises in Mestre, comments: "Many historical professions in crafts are at risk of disappearing. Not only because they lack of generational replacement, but also because they are no longer profitable or no longer have market. Burdened with taxes and an increasingly asphyxiating bureaucracy, many businesses are closing their doors, leaving cultural voids that we may not be able to fill, despite the crisis has approached many young people in these activities." [7]

Bortolussi, while admitting he could not foresee how the employ-

ment needs of the Italian labor market will change in the coming years, claims that he based this analysis on three things that are certain: in 10 years the vast majority of over-55s surveyed in this map will leave the job for reached age limit; having regard to the decline in births occurred in recent decades, in the near future will be reduced even further the number of young people who will enter into labor market, thereby accentuating the lack of turn-over; long since young people are approaching less and less manual professions.

"Hard to find a solution - continues Bortolussi - that within a reasonable time will give us the chance to fill a cultural void that has lasted for more than 30 years. First we must re-evaluate, from a social point of view, manual labor and entrepreneurial activities that offer these opportunities.
For many parents - says the secretary of CGIA - let their son undertake a trade in an artisan company is the least of their thoughts. people get to this decision only if the young man is returning from a failure at school, for which employment at a workshop becomes a 'refugium peccatorum'.

FOR MANY PARENTS LET THEIR SON UNDERTAKE A TRADE IN AN ARTISAN COMPANY IS ONLY 'REFUGIUM PECCATORUM'

Therefore it is necessary to bring school education and the world of work closer. Through the school reforms that took place in recent years, and especially with the new Consolidation Act on apprenticeship approved last July - concludes Bortolussi - some important step has been made. But this is not enough. We must make a genuine cultural revolution to restore dignity, social value and a proper economic reward to all those professions where knowing how to create with one's own hands is an additiona virtue that we risk losing."

But why are the artisan companies

THE MANUAL PROFESSIONS AT GREATEST RISK OF TURNOVER *(1)*
2012 (2)

	EMPLOYED FROM 15 TO 24 YEARS OLD	EMPLOYED FROM 55 TO 64 YEARS OLD	N ° OF POSSIBLE MISSING FIGURES IN THE NEXT 10 YEARS
BREEDERS AND SPECIALIZED WORKERS of bovine, equine, ovine, poultry herds	3.131	17.360	**14.229**
DRIVERS buses, trams, trolley buses, trucks and heavy vehicles	14.936	66.466	**51.503**
SEWAGE SYSTEM WORKERS and hygiene services and cleaning	3.733	16.295	**12.562**
FARMERS and agricultural workers in nurseries, in open fields, crops of flowers	14.912	64.822	**49.909**
DOMESTIC COLLABORATORS and assimilated / Employees of cleaning services in enterprises and government agencies and similar / street sweepers and other waste collectors	31.013	127.795	**96.783**
TANNERS of leather, leather workers, suitcases and bags makers	2.944	11.577	**8.633**
TAILORS model makers, hatters, upholsterers and mattress makers, embroiderers	5.586	21.058	**15.472**
CRANE DRIVERS earth moving machines, machines for lifting and handling of materials	5.892	16.879	**10.987**
VENDORS fruit and vegetable hawkers and street vendors of food	7.970	20.413	**12.443**
CASTERS drainers of metals, mills conductors	2.483	6.249	**3.766**
ARMOURERS repairers of precision instruments, repair watches, jewelers, repairers of dental and orthopedic prostheses	3.103	7.623	**4.521**

(*) Result obtained from the difference between the No. of employees among those over 55 and those among the under 24

(1) Among those who occupy the highest total number of employees. The order was obtained according to the index parts higher
(2) Average of the four quarters of the year
Elaboration Studies Office CGIA Mestre on Istat data - RCFL

	EMPLOYED FROM 15 TO 24 YEARS OLD	EMPLOYED FROM 55 TO 64 YEARS OLD	N ° OF POSSIBLE MISSING FIGURES IN THE NEXT 10 YEARS
CARPENTERS weavers, basket makers and brush makers	8.620	21.176	**12.556**
SPINNING MILL WORKERS weaving knitting confecciones of clothing workers	3.719	8.211	**4.492**
AGRICULTURAL LABORERS	16.051	34.163	**18.112**
MASONS carpenters and joiners in building, road floor layers, operators of tunnels and scaffolders	39.649	78.226	**38.576**
CONDUCTORS OF ROBOTS and assembly lines	2.871	5.242	**2.371**
BODY SHOPS auto mechanics, refrigerator technicians	38.758	53.059	**14.301**
WELDERS and flame cutters, tinsmiths, builders of metal joinery, underwater workers	22.223	29.728	**7.504**
USHERS clerks, meter readers	6.241	8.153	**1.912**
PRINTERS and specialized workers and composers, offset printers, bookbinders, engravers	3.893	4.828	**935**
TV & RADIO REPAIRERS electricians, electro-mechanical, installers of power lines	23.662	26.275	**2.613**
PAINTERS plasterers, parquet and floor layers, facades cleaners	10.682	11.573	**890**
		TOTAL	**385.070**

to have more difficulty finding workers, while thousands of graduates lengthen the unemployment line?
"We are prisoners of a cultural model - says Marco Colombo[8], President of the Young Entrepreneurs of Confartigianato - which opposes the theoretical knowledge and practical technical skills, with the result of blocking the growth potential of our country. Today we still think that sitting behind the desk of a Ministry is better than restoring a fresco, building a yacht, taking care of home automation, designing a high fashion dress. But to carry out such craft activities knowledge and know how are both needed. And here, unfortunately, there is a lack of perception, which is aggravated by the lack of appropriate educational institutions."
Even today is possible to become artisans especially thanks to the artisans themselves: "Entrepreneurs - continues Colombo - spend 103 million hours each year and invest 1.8 billion to train new hires."
How do these shoots of future may become the Italian way of response to the crisis, and a potential pool of skilled jobs for our young people?
"It's time - answers Micelli - for politics to finally notice the uniqueness and potential our productive system, to no longer consider it as a Cinderella, and finally start to create the conditions for its relaunch."

We said that the Italian artisan heritage is a true cultural treasure, alive and vital, of knowledge and skills that we are called to value. To understand how to translate into value the extraordinary wealth of which the country is depositary, the reflection that Sennett does is a good starting point. Sennett suggests to look at the artisan man, to its cultural and professional features, avoiding to draw up the list of jobs to be protected because they are at risk of extinction. Instead should be reconsidered training paths, incentives, all forms of social valorisation that drive people to commit to a well done job, to improve over time, to actively participate in communities of practice.

We also must beware of those risks that are "regressive" which,

in general, the craft theme brings with it, especially in our country. Italy does not need to cry over the crafts of yesteryear, to take refuge in the myth of a new *Borghigiana* society. After all, are mainly young those people who do not believe in a generic return to these trades. The craftsmanship proposed according to stale formulas does not attract. This is demonstrated by the many reports of Confartigianato: our twenty-somethings are not attracted by the artisan professions because they perceive them to fall far short of a horizon of total transformation of society. They find artisan work as a path with no prospects. No innovation, no internationalization.

THEY FIND ARTISAN WORK AS A PATH WITH NO PROSPECTS. NO INNOVATION, NO INTERNATIONALIZATION

So, paradoxically, we find ourselves in a situation where we all feel the wealth of knowledge and craft skills as a huge cultural treasure, which makes us proud in front of the whole world, but people no longer want to do these jobs. Even the Italian language proves to be paradoxical when we talk of the meaning of the word *'artigianale'*. The word *'artigianale'* generally indicates quality, but there are also contexts in which the term is used to indicate attributes significantly less positive. When the news talk about a *'bomba artigianale'* (artisanal bomb) is intended to indicate a bomb that does not explode or that can cause limited damage. At the home-made bomb is usually opposed the *scientific* precision typical of those devices which owe their effectiveness to the use of more advanced technologies. When we talk about *'gelato artigianale'* (artisanal ice-cream) we actually indicate an high quality ice cream; with this expression, however, we refer to the figure of a artisan more committed to guard the tradition rather than create innovative flavors. To find a strong link among craftsmanship and a well done job, our vocabulary uses terms as *'maestro d'arte'* (mas-

ter of a) or '*maestria artigianale*' (artisan mastery), or expressions which refer to the full mastery of the techniques and knowledge of the craftsman, and suggest an ongoing commitment to the improvement of themselves and their work.

01.5

THE OPPORTUNITIES

Although it is true that the small business suffers today from international competition, it is equally true that in recent years the figure of the artisan has been widely re-evaluated. The crisis that hit the global economy and the criticisms that finance has attracted on its work helped to restore the luster and legitimacy to the real economy and to the role of the craftsman.

The artisan embodies a method. Is the symbol of a way of working that today is extraordinarily timely after the collapse of an economy based on financial alchemy, indebted states and an unbounded confidence in the virtuality.
According to Giorgio Vittadini[9], president of the Foundation for Subsidiarity, we must reflect on five essential steps.
The first is the rejection of standardization: the demand expresses a request for customized products and only artisan work can guarantee a response in this direction.
The second is the quest for beauty. The artisan work aims for beauty before the profit margin: in this sense the beauty must be understood as a profound response to the expectations of the world in which we live.
The third aspect that distinguishes the artisan work is the relationship with reality: the "virtual-intellettualistic" attitude that has marked the last decade can not be shared anymore. The experience of reality is not merely mental experience: it must become capacity to be present in the world with the totality of the senses.
The fourth aspect of Vittadini's line of reasoning regards innovation. The craftsmanship is not folklore: it is (or should be) high technology, constant relationship with new materials and research. Nothing to do with the maintenance of a tradition that in most cases is just a caricature of local identities, often outdated.
In conclusion, the issue of training. If there is an 'introduction to reality' for young people, this step is definitely linked to the possibility of acquiring an artisanal method.

the craftsmanship is today called to renew itself, or it would otherwise risk to be perceived as a *two-dimensional* figure which is, however, in a *three-dimensional* world.

As often happens, if we want to see what will become reality within a few years in our country, we need to look at what it is happening today in the United States, and as for the case of the artisan work on the other side of the ocean we are witnessing to a genuine recovery of the cultural and economic value of manual labor and crafts.

The need to restore the center of attention on making as the centerpiece of a new system of social and economic relations crosses today - with different emphases - the world of the American makers, the new exponents of the culture of doing, according to which the next revolution industrial will be driven by small high-tech craft businesses, able to create innovative, high quality and customized objects in a limited scale.
Stating that the enterprise of the future is artisan is not a provocation. As we are seeing in many American examples the successful entrepreneurial characteristics for the future challenges belong to the artisanal enterprises: flexibility, creativity, the ability to use new technologies that the market makes available, while keeping unspoiled the quest for beauty that makes the genius of these companies known all over the world.
Entrepreneurial peculiarities but to update and renew to deal with the changes required by the markets. The enterprises of the future will be artisanal in the way of weaving formal and informal networks around them, varying and modifying them according to the requirements of the business partners. In the future companies (and many of them are already doing it successfully) shall pass through hybridization between manufacture and digital technology, and

THE ARTISAN IS THE SYMBOL OF A WAY OF WORKING THAT TODAY IS EXTRAORDINARILY TIMELY AFTER THE COLLAPSE OF AN ECONOMY BASED ON FINANCIAL ALCHEMY

through the use of internet as a tool for growth. The new factory passes also through a renewed focus on human production, to his narrative, the representation of a culture of quality and uniqueness. All this through the use of the Web as a new marketing channel.

In America, as we said, the new crafts is already a reality, exemplified by companies like Local Motors. A new paradigm for automotive design that instead of developing a car for the masses that could be marketed around the world, is serving the needs of a particular local market and depends on an online community of designers to find innovative solutions. "The American craftsmanship, therefore, does not aim only on aesthetics - says Micelli- is digital, technological while Italians are still crushed by the burden of tradition, backwardness, stereotypes. Ours is an incomplete modernity."
Excellent example of new craft in Italy is, as i said before, Vyrus. The company manufactures a very limited number of motorcycles that are tailored to each individual customer. Each owner of a Vyrus, including Tom Cruise, has a unique object, a real collector's item created on the specific instructions of the owner and according to the physical characteristics, height, weight and riding abilities.

There are therefore many possibilities for the Italian SMEs and craft enterprises, that for thirty years have marked our industrial model, and which are so similar to the new anti-crisis models indicated by the Americans.

There are about 1.5 million small businesses in Italy today, about 30% of the total Italian artisan businesses that need to evolve, to go on the market. There is need of new young people, very prepared from the technical point of view and also from the point of view of the new media. There is need of new initiatives, there is need to abolish artisanal stereotypes. There is need of renovation and renewal in order to seize new market opportunities.

02

CHAPTER TWO

THE DIY INNOVATION

MAKERS:

"Makers are hi-tech lovers, mad about making things instead of buying them already built"

Massimo Banzi

02.1

THE MAKERS

Signals pointing towards a democratization of manufacturing begin to cluster around 2007. Why was it so? The technology had already been mature enough for some time and dreams of personal factories had been around for many years. What then made several people throughout the world realize the time was ripe for online fabrication services and personal 3D printers? The answer lies mostly in a cultural trend: a renaissance of the Do-It-Yourself (DIY) movement with a hi-tech facet.

DIY is commonly used to describe the act of creating, producing, modifying or repairing something that lies outside of one's professional expertise. It's based on a notion of self-reliance and self-improvement through the acquisition of new knowledge and skills. The term is used across many fields of activity from home improvement and repair to all areas of creative endeavor. The DIY stance can be traced back to the 1900s Arts and Crafts Movement and in the U.S. it evolved from cost saving home improvement activities of 1940s and 1950s into a creative act of rebellion against mass production, consumerism, planned obsolescence and waste. Even though many different cultures, motivations and goals intersect within this practice, Amy Spencer, author of DIY: The Rise of Lo-Fi Culture, points out the core aspect common to all of them:

"The DIY movement is about using anything you can get your hands on to shape your own cultural entity: your own version of whatever you think is missing in mainstream culture. You can produce your own zine, record an album, publish your own book – the enduring appeal of this movement is that anyone can be an artist or creator. The point is to get involved." [1]

THE DIY MOVEMENT IS ABOUT USING ANYTHING YOU CAN GET YOUR HANDS ON TO SHAPE YOUR OWN CULTURAL ENTITY

The 21st century DIY movement

has now extended its practices to include both on and off line technologies. In Rise of the Expert Amateur, a large-scale study of DIY communities, Kuznetsov and Paulos point out that in the last decades, the combination of social computing, online sharing tools, and other collaboration technologies has led to a renewed interest and wider adoption of DIY cultures and practices, namely through facilitated access to and affordability of tools, as well as the emergence of new sharing mechanisms. Further on in the study the authors elaborate:

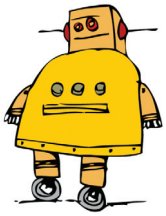
"Recent breakthroughs in technology afford sharing such that anyone can quickly document and showcase their DIY projects to a large audience. An emerging body of tools allows enthusiasts to collaboratively critique, brainstorm and troubleshoot their work, often in real-time (...). This accessibility and decentralization has enabled large communities to form around the transfer of DIY information, attracting individuals who are curious, passionate and/or heavily involved in DIY work." [2]

A subset of the DIY community, namely those involved in creat-

Case study:

INSTRUCTABLES

Instructables is a site that specializes in do-it-yourself projects created and uploaded by users, that other users can themselves comment and evaluate in their quality. Users post instructions with their projects, usually accompanied by visual supports, and then interact through comment sections below each Instructable step and thematic forums. The site is free, but paying a small fee you can become a pro member, having access to e-books, download pdf, private instructable, the display of all the steps in each instructable and less advertising.



ing/modifying hardware and/or technologically enhanced arts and crafts, has become know as the maker community. The word maker refers here the Make magazine, a combination of website and quarterly book that celebrates "your right to tweak, hack, and bend any technology to your own will" [3] by showcasing DIY projects and tutorials to build or modify technologies ranging from personal gadgets to cars. On its first issue, Dale Doherty, editor of the magazine, writes:

"More than consumers of technology, we are makers, adapting technology to our needs and integrating it into our lives. (...) Think of how many devices each of us interacts with on a regular basis today. And that's only the beginning. Neil Gershenfeld (...) writes in his book When Things Start to Think that 'personal computing has not gone far enough; it lets us shape our digital environment but not our physical environment.' In other words, technology that allows us to create complex things will soon become as affordable as the technology we used to create and manage data. We are just beginning to see the impact of technology in our personal lives." [4]

Thus, starting in 2005 and with Make magazine at its center, a community of tech DIYers began to gather around an emerging identity, that of the maker. In addition to using web platforms to share tutorials (instructions for humans) in websites such as instructables.com makers are also sharing, remixing and mashing-up ready-to-make files (instructions for machines) in web communities like Thingiverse. As Lipson and Kurman note:

"Personal manufacturing technologies are accelerated by the online communities of people who create electronic blueprints, those who build and fix machines, and consumers. Similar to the already well-known online community of open source software enthusiasts, communities are a critical part of the personal manufacturing revolution since little formal training and tech support exists. Online colleagues offer one another help, teamwork and encouragement." [5]

Among these makers are the us-

ers of online fabrication services and Fab Labs, the members of TechShops and Hackerspaces, the adopters and developers of personal 3D printers, the creators, sharers and mashupers of digital designs for physical objects, the sellers and buyers of the new fabricated-on-demand customizable goods. While these pioneers are still a minority of the population, they may be what Eric Von Hippel terms lead users: early adopters of products and practices that will eventually become widespread and customary.
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Case study:
MAKERSHED
The Maker Shed is brought to you by Maker Media, the makers of MAKE Magazine, the Maker Faire. Launched originally as a source for back issues of MAKE Magazine, the Maker Shed expanded rapidly to meet the demand for 'projects in a box,' otherwise known as kits.

You
Makershed

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Among these makers are the users of online fabrication services and Fab Labs, the members of TechShops and Hackerspaces, the adopters and developers of personal 3D printers, the creators, sharers and mashupers of digital designs for physical objects, the sellers and buyers of the new fabricated-on-demand customizable goods. While these pioneers are still a minority of the population, they may be what Eric Von Hippel terms lead users: early adopters of products and practices that will eventually become widespread and customary.

02.2

PERSONAL FABRICATION

In his 2005 book FAB, Neil Gershenfeld describes a not too distant future in which everyone will have a personal fabricator, a machine capable of producing not only material objects but also other machines:

"Like the earlier transition from mainframes to PCs, the capabilities of machine tools will become accessible to ordinary people in the form of personal fabricators (PFs). This time around, though, the implications are likely to be even greater because what's being personalized is our physical world of atoms rather than the computer's digital world of bits." [6]

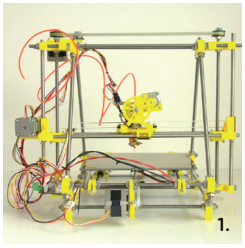
This democratization of manufacturing, which has already been termed industrial revolution 2, second digital revolution, a manufacturing revolution and the next industrial revolution, is based on the fact that, after one century of mass production and consumption, a growing number of individuals now has access to sophisticated production tools and the knowledge to manufacture objects for artistic, personal or commercial purposes.

Digital fabrication tools turn bits into atoms, they create material objects from digital designs. A computer-aided design (CAD) model is fed into a fabricator which then builds its physical instance from a stock material. Laser cutters, computer-numeric controlled (CNC) mills, and 3D printers are amongst the most practical and versatile of these tools. While laser cutters and CNC mills create parts by cutting sheets of wood, acrylic, metal, cardboard and other flat stock, 3D printers build the objects up by depositing and binding successive layers of materials such as thermoplastics, ceramics and powdered metals.

In a 2010 Wired article entitled "In the Next Industrial Revolution, Atoms Are the New Bits," [7] Anderson described how the massive changes in our relations with information have altered how we relate to things. Now that the power of information-sharing has been unleashed through technology and social networks, makers are able to collaborate on design and production in ways that facilitate the connection of producers to markets. By sharing information "bits" in a creative commons, entrepreneurs are making new

Case study:

THE *PERSONAL* 3D PRINTER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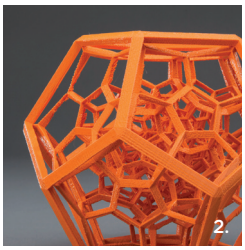
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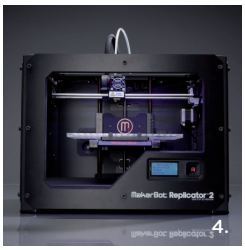


4.

(1) The RepRap, (2) a ABS 3d printed toy, (3) the Makerbot replicator 1 (4) and the replicator 2.

At the same time as professional 3D printers are becoming increasingly sophisticated, a new type of tool is emerging and taking its place in the digital fabrication techno-system: the personal 3D printer, a device small enough to fit in the home or office, low-cost enough to be within the reach of the average individual consumer, and simple enough to be operated by someone with no technical skills.

In February 2004, Adrian Bowyer, professor at the University of Bath in the UK, and his graduate student Ed Sells, announced the RepRap, a research effort dedicated to creating a self-replicating 4, highly affordable, personal 3D printer. RepRap was from the start developed as open source—a method of production in which all of the product's source materials and blueprints are made publicly available, allowing anyone to contribute to its development—and was immediately joined by several engineers and programers, both amateur and professionals, around the world.

To achieve its goals and allow distributed development, RepRap's 3D printers have since been designed as a combination of rapid manufactured parts and inexpensive and readily available hardware. Seven years after the project's launch, and even though sourcing the materials and assembling the machine is still far from being a trivial task, RepRap 3D printers have improved radically in terms of overall reliability, volume, and precision, resulting in plastic objects that now closely approximate end-use products.

Given the open source nature of the project, all that is necessary to become a RepRap operator and developer is being able to source and acquire the materials and then assemble them into a functional machine.

According to a 2010 survey conducted by Erik De Bruijn [10], "most people who become involved in the RepRap project and adopt the technology have done so fairly recently. The adoption rate increases so fast that new adopters outnumber all those who joined more than 6 months ago. (...) Regression-fitting this growth curve yields a duplication of the community every 6 months and a 10 fold growth every 20 months." [11],

In late 2008, the difficulty in sourcing the materials required to build a RepRap 3D printer led some developers to the idea of creating kits. It also became apparent that several improvements could be made to the technology by temporarily putting aside the goal of self-replication and dedicating more resources to the project. New RepRap-derived 3D printers and the kits to build them were not only an important step towards expanding the adopter and developer community but also created a business opportunity. From this emerged Bits from Bytes and MakerBot Industries, two startups dedicated to developing and commercializing RepRap-derived open source kits and machines at consumer prices—ranging between $950 (MakerBot) and $3,900 (Bits from Bytes).

In July 2010, the Chinese company PP3DP launched the proprietary, fully assembled, desktop 3D printer UP! retailing for $2,990. And in March 2011, Ultimaker entered the market with its reprap-based personal 3D printer selling for approximately $1,700.

While RepRap 3D printers use thermoplastics as stock material, two other open source projects appeared in subsequent years that allow 3D printing of objects from pastes and edibles. That's the case of the syringe-based Fab@Home which 3D prints with anything that can be squirted (eg. silicone, epoxy, cheese, chocolate, frosting, clay, playdoh, plaster, etc.) and also of CandyFab, a machine that creates edible three-dimensional objects from sugar.

Other open source projects dedicated to creating laser cutters and CNC mills have also arisen in recent years and include BuildLog, DIYLilCNC, and Bluumax CNC.

During 2009 and 2010, some of the more prominent and established additive manufacturing companies, such as Stratasys, 3D Systems and Solido, also launched smaller and lower priced tools, capable of working with plastics and resins, marketed as personal 3D printers and costing between $10,000 and $17,000.

Access to 3D printing tools is thus following along a path similar to that of document printers. On the one hand the large, professional machines are now accessible to the public mostly through online fabrication services. On the other hand, we're seeing the emergence of personal 3D printers which, just like their small 2D counterparts, are geared towards the home and office. Naturally, there are noticeable differences between the capabilities of professional and personal 3D printers.

While the professional machines can produce complex objects out of a wide range of materials, the personal versions are constrained by size and cost, i.e the need to be small and affordable enough. This translates into smaller prints, but also influences speed, resolution, overall quality, and the variety and types of materials (while multiple types of plastics are a given, printing with metals and glass is still not possible with the desktop-sized 3D printers).

Despite the progress of the last years, there are still a few technical barriers to overcome before a widespread adoption of personal digital fabrication can become possible. But many believe that just as the Web changed, redistributed, and sped up the diffusion of information—and created and destroyed businesses along the way, desktop production and design will change manufacturing from a cumbersome process based on capital to a flexible one based on creativity.

things (reshaping "atoms") more cheaply and quickly. The new manufacturing is a powerful economic force not because any one business becomes gigantic, but because technology makes it possible for tens of thousands of businesses to find their customers, to form their communities.

"Hardware is becoming much more like software," [8] as MIT professor Eric von Hippel puts it. That's not just because there's so much software in hardware these days, with products becoming little more than intellectual property wrapped in commodity materials, whether it's the code that drives the off-the-shelf chips in gadgets or the 3-D design files that drive manufacturing. It's also because of the availability of common platforms, easy-to-use tools, Web-based collaboration, and Internet distribution.

DIGITAL FABRICATION TOOLS TURN BITS INTO ATOMS, THEY CREATE MATERIAL OBJECTS FROM DIGITAL DESIGNS

We've seen this picture before: It's what happens just before monolithic industries fragment in the face of countless small entrants, from the music industry to newspapers. Lower the barriers to entry and the crowd pours in. The academic way to put this is that global supply chains have become scale-free, able to serve the small as well as the large, the garage inventor and Sony. This change is driven by two forces. First, the explosion in cheap and powerful prototyping tools, which have become easier to use by non-engineers. And second, the economic crisis has triggered an extraordinary shift in the business practices of (mostly) Chinese factories, which have become increasingly flexible, Web-centric, and open to custom work (where the volumes are lower but the margins higher).

The result has allowed online innovation to extend to the real world. As Cory Doctorow [9] puts it

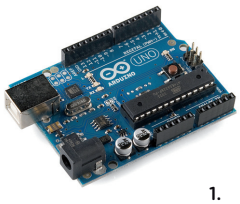
in his book, Makers, "The days of companies with names like 'General Electric' and 'General Mills' and 'General Motors' are over. The money on the table is like krill: a billion little entrepreneurial opportunities that can be discovered and exploited by smart, creative people."

A garage renaissance is spilling over into such phenomena as the booming Maker Faires and local "hackerspaces." Peer production, open source, crowdsourcing, user-generated content — all these digital trends have begun to play out in the world of atoms, too. The Web was just the proof of concept. Now the revolution is hitting the real world.

Case study:

ARDUINO: THE OPEN SOURCE INTELLIGENCE

(1) The Arduino board, (2) Massimo Banzi, creator of arduino, (3) a robot moved by arduino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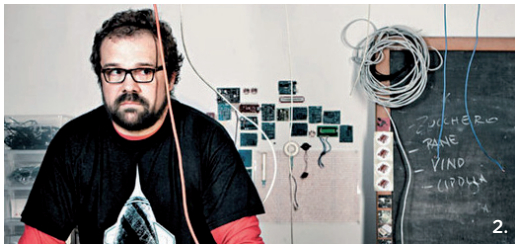
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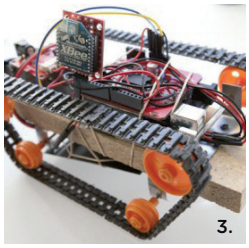
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Previously out of reach for the do-it-yourselfer, the tiny computers called microcontrollers are now so cheap and easy to use that anyone can make their stuff smart. It's called "physical computing" -- with a microcontroller, your gadget can sense the environment, talk to the internet or other gadgets, and make things happen in the real world by controlling motors, lights, or any electronic device. The Arduino is a electronics prototyping platform that allows you to quickly build interactivity into your projects. This microcontroller system allows you to connect different kinds of inputs (such as light sensors, motion sensors, sound sensors, humidity sensors, etc.) and write programs to process those signals to control devices that are hooked up to output pins (such as motors, buzzers, lights, solenoids, computers, etc.).

Massimo Banzi, the father of Arduino, during his ted talk points out:

"So one of the features that I think is important about our work is that our hardware, on top of being made with love in Italy — as you can see from the back of the circuit — is that it's open, so we publish all the design files for the circuit online, so you can download it and you can actually use it to make something, or to modify, to learn. You know, when I was learning about programming, I learned by looking at other people's code, or looking at other people's circuits in magazines. And this is a good way to learn, by looking at other people's work. So the different elements of the project are all open, so the hardware is released with a Creative Commons license." [12],

Once Banzi posted the Arduino's design specs, easy-to-use software development tools and tons of sample sketches on the Web, it was quickly adopted by the Maker movement and other DIY communities as a general-purpose controller for nearly any application. The home-made 3-D printers that hobbyists used to create toys, baubles, and board game pieces have quickly evolved into equipment that's precise and fast enough to produce engineering models, prototypes, and even limited-volume runs of parts for commercial products – but priced at 10% or less the cost of a conventional unit.

Arduino is empowering the maker movement, democratizing the invention process. The Economist has famously called 3D Printing the third industrial revolution. But Banzi says that what he sees as the real third industrial revolution is the open source hardware and maker movement.

Case study:

HOW 3D PRINTING IS INFLUENCING THE WORLD


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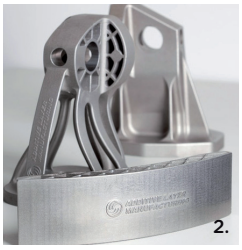
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(1) Bespoke prosthesis, (2) 3d printed boeing parts, (3) space 3d printer by made in space (4) Wasp clay printer.

The possibility of building objects based on low-cost technologies, through tools such as hardware platform Arduino and 3D printers, has triggered the birth of genuine cultural models able to give life to new processes of technological innovation and production "from the bottom". For some, 3-D printing marks the "democratization" of manufacturing, a new age of mass personalization that promises to boost innovation, foster more efficient use of resources and transform the way things are produced. Some have gone so far as to characterize it as the "Third Industrial Revolution". Many of these projects and creations are simply amateurish, but more often we hear stories of inventions and applications of great social or commercial impact, that thanks to these models are born.

Bespoke is a very good example, with their Fairings, the custom-made, stylish covers for prosthetic legs that are created using a 3D scanner. They are designed not only to fit one's anatomy but also to reflect personal taste and style of the wearer. Users can choose a design through an online tool or collaborate with the team to develop their own individualized look. Bespoke Fairings were recently nominated as a finalist for the 2013 Index: Award. Unlike the one-size-fits-all mentality that is dominant in the medical device manufacturing industry, the company uses image-based 3D scanning technology to capture the shape of the sound leg and adjust the prosthetic one with the help of the user himself. He or she can choose a form template, patterns, tattoos, materials and graphics, or they can suggest a new idea. With the help on an online tool, users can explore and apply a range of design styles, that are later 3d printed. One could chose to decorate their new artificial limb with a tattoo or an intricate artwork, and transform a disability into a bold fashion statement. [13]

Boeing, in May 2012, unveiled its experiment of applying new 3D technology on the 747 line in its Everett plant. According to wall street journal, Boeing is using 3D printing to make 300 parts for its aircraft, including ducts that carry cool air to electronic equipment. "Some of these ducts have complicated shapes and formerly had to be assembled from numerous pieces, boosting labor costs." When the dishwasher in a Boeing cafeteria in St. Louis broke down recently, the team there simply replicated the part using 3D modeling software and printed it out. It took only 30 minutes. For years, Boeing has conducted extensive research and development on additive manufacturing to produce parts. Already, more than 20,000 parts have been installed on military aircraft by Boeing. 3D printing technology could help to reduced inventory, labor and maintenance work. [14]

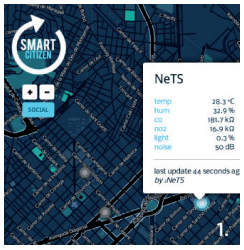
Made in space, the space manufacturing company, in order to prepare for a future where parts can be built on-demand in space, has partnered with NASA's Marshall Space Flight Center to launch the first 3D printer to space. Made in Space's customized 3D printer will be the first device to manufacture parts away from planet Earth. The 3D Printing in Zero-G Experiment will validate the capability of additive manufacturing in zero-gravity.
"Imagine an astronaut needing to make a life-or-death repair on the International Space Station," said Aaron Kemmer, CEO of Made in Space. "Rather than hoping that the necessary parts and tools are on the station already, what if the parts could be 3D printed when they needed them?"
All space missions today are completely dependent on Earth and the launch vehicles that send equipment to space. The greater the distance from Earth and the longer the duration, the more difficult it will be to resupply materials.
"As NASA ventures further into space, whether redirecting an asteroid or sending humans to Mars, we'll need transformative technology to reduce cargo weight and volume," NASA Administrator Charles Bolden said during a recent tour of the agency's Ames Research Center at Moffett Field, Calif. "In the future, perhaps astronauts will be able to print the tools or components they need while in space." The Made in Space and NASA team envisions a future where space missions can be virtually self-sufficient and manufacture most of what they need in space. [15]

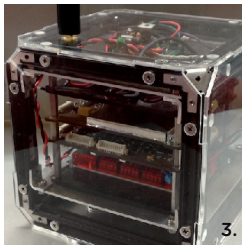
Wasp creator Massimo Moretti had a dream: building houses using a 3D printer and saving the world. 20 years ago he set up CSP, an innovative project development center focusing on research of new and innovative ideas. The RepRap project opens his mind. During his research he got the inspiration from nature: wasp builds it's nest by only depositing and consolidating the mud. Together with a group of ISIA (design university) students, the team started WASP (World's Advanced Saving Project). The first 3D printer WASP developed is POWERWASP, a unique open source 3D printer that can extrude not only plastics but also clay by switching the head, and it is also a milling machine! They call it "a personal fab". Another big step the WASP project takes is developing Delta Robot, based on the Rostock (delta robot 3D printer). The team plans to raise (or gain) funds for building and developing a huge version of Delta Robot for printing houses.[16]

Case study:

ARDUINO AND THE INTERNET OF THINGS

(1) Smart citizen interface, (2) the earthquake system by Sebastian Alegria, (3) Ardusat (4) and SmartThings device.





In these years we are witnessing the birth of the *internet of things [17]*, a global network infrastructure, linking physical and virtual objects using cloud computing, data capture, and network communications. It allows devices to communicate with each other, access information on the Internet, store and retrieve data, and interact with users, creating smart, pervasive and always-connected environments. The internet of things deals with simplifying the way we generate and consume information that is sensitive to be shared online. The issue is then how to create objects that will help designers thinking about new devices. Arduino is an open platform with a whole series of documentation that allows doing just that: creating new connected devices that will serve or collect data in ways that are more meaningful to us. It addresses the fact that you don't need to be an engineer to envision a new product.

Smart Citizen is a platform to generate participatory processes of people in the cities. Connecting data, people and knowledge, the objective of the platform is to serve as a node for building productive open indicators and distributed tools, and thereafter the collective construction of the city for its own inhabitants.
The Smart Citizen project is based on geolocation, Internet and free hardware and software for data collection and (in a second phase) the distributed production of objects; it connects people with their environment and their city to create more effective and optimized relationships between resources, technology, communities, services and events in the urban environment. Currently it is being deployed as initial phase in Barcelona city. [18]

Sebastian Alegria, a 14 years old Chilean teen, created an earthquake warning system based on Arduino, an earthquake detector (bought for less 100 $) and an ethernet shield. Alegria's rudimentary yet effective system comes from having survived Chile's own earthquakes last year and seeing the devastation that covered Japan earlier this year. Keen on finding an inexpensive solution for early earthquake detection, he rigged an Arduino and domestic earthquake detector to tweet seconds before detectable seismic activity. Tweeting from *@AlarmaSismos*, it has already successfully detected every major earthquake that could be felt from Santiago since May. As it stands, he has close to 30,000 Twitter followers who rely on him for receiving updates and warnings about impending earthquakes. So far it has been reported that it is working pretty well and that Sebastian has plans to start expanding his idea to more parts of the country, as well as a possible SMS alert system in the future. [19]

ArduSat is the world's first open Space network, offering everyday people a chance to interact with, and control a satellite for the purposes of running experiments, games, applications, or whatever other new and interesting applications can be dreamt up.
ArduSat is equipped with roughly 15 sensors on board, including a camera, spectrometer and Geiger counter. It also has a number of Arduino Microprocessors onboard, which allow users to upload their own application, game or experiment and run it on the satellite. Crowdfunded by KickStarter, its aim is to break down the barrier between everyday citizens and space and get everyone truly involved and engaged in the exploration of Space, the Final Frontier. Everyone can help to build and develop the world's first open Space network, a satellite platform where everyday explorers and creators all across the work have access to build, launch and test new and innovative applications or experiments in Space. Push the envelope in nano-satellite camera technology usage, the architecture of onboard processing computers or write an smart-phone app for millions of people that pulls together data from NASA Satellites, ArduSats and the 100million+ iPhones/Android Phone all across the planet to deliver a vivid and powerful picture of the Sun's turbulent storms' influence on Earth's transportation network, power grid and people. [20]

SmartThings makes it easy to connect the things in your physical world to the Internet. You can monitor, control, automate, and have fun with them from anywhere - at home, office, or on the go. The company aims to finally bring the future into 21st century homes. It's selling kits with moisture sensors, power outlets, and motion detectors that turn appliances such as fans and garage door openers into Internet-connected devices that can be controlled using the company's smartphone apps. SmartThings is also trying to create the dominant platform for such devices, providing free open-source software tools to thousands of developers and hackers, in the hope they'll find additional uses that will appeal to consumers. The goal is to connect appliances to each other, to the Web, and to their owners. "All of these Jetsons scenarios that people have envisioned over the years are finally possible," says Alex Hawkinson, 40, the company's chief executive officer. The community of hardware hackers, who have come up with many DIY home-automation projects in the past, was drawn to the idea of an open software platform that could be used to build a new class of connected appliances. [21]

02.3

THE NEW FACTORIES

If until 2007 it was extremely difficult for an individual to turn an idea into a material product, nowadays the panorama has radically changed with the introduction and expansion of online fabrication services, distributed manufacturing networks, local production shops, and personal 3D printers.

"A number of converging forces will promote personal manufacturing from a fringe technology used by pioneers and hobbyists, to an everyday tool for mainstream consumers and businesses. Within a few years, personal manufacturing technologies will be commonplace in small businesses and schools. Within a decade or two, every household and office will own their own machine. Within a generation, you will have a hard time explaining to your grandchildren how you were able to live without your own fabber, when you actually had to buy ready made things online, and wait a long 24 hours before they showed up in your mailbox".

This is what Lipson and Kurman [5] wrote that the future is going to look like in Factory@Home, a report commissioned by the U.S. Office of Science and Technology Policy. Today we are not at this point, but taken together these ventures are providing a wider distribution of digital fabrication technologies and giving a growing number of creators the possibility to produce and circulate goods outside of the centralized manufacturing model.

ONLINE FABRICATION SERVICES

Online fabrication services cater to the consumer looking for a custom product, the independent designer or artist seeking small scale production and distribution of her designs, and the hobbyist in need of prototypes or parts.

Services such as Shapeways, Ponoko, i.materialize and Sculpteo provide on-demand 3D printing and laser cutting services to individuals. In addition to upload-to-make (customers upload a digital design and receive the corresponding physical object in the mail a few days later), Shapeways and Ponoko also offer community marketplaces where creators can sell their designs and fabricated objects directly to the public, web-based platforms for product customization, databases of Crea-

Case study:

SHAPEWAYS

Shapeways.com is the world's leading 3D printing marketplace and community. The NY start-up harnesses 3D printing to help anyone turn ideas into a physical reality, making product design more accessible, personal, and inspiring.

Shapeways prints everything on-demand, which means that every order is customized and personalized. By providing a platform for community members to gain access to cutting edge 3D printing technology and share their designs with the world, Shapeways is democratizing creation for everyone.

The option now exist for consumers to adapt designs without prior knowledge of 3D design programming. There are models which can be adapted real-time by uploading new text or pictures: So called 'Creators'. There is also the possibility of participating in Co-Creator platforms in which consumers and designers work together to achieve optimal results.

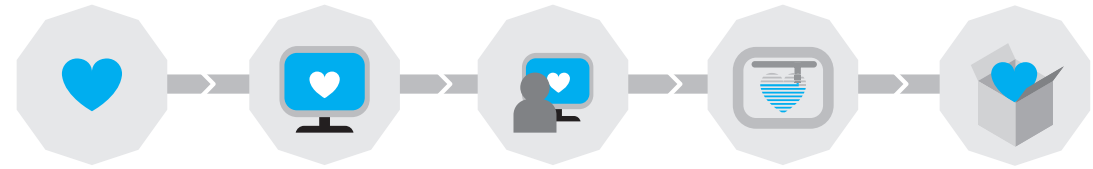
Users can

MAKE THINGS

Or

SELL THINGS

Each object has a Standard Price that includes fees associated with selling. You simply set your mark up for each product. When you sell an item, we keep the standard price and we send you the markup. An additional 3.5% transaction fee to cover administrative costs and Paypal payment cost will be charged on all markups.



tive Commons(CC) licensed designs and, in the case of Ponoko, a request-to-make area where buyers can crowd-source a custom product by asking the community of creators to design and make it (buyer posts a request with a description and creators submit bids to design/make it).

Even though they're barely four years old, online fabrication services have grown substantially not only in terms of the number of bureaus, but also in what concerns the

Case study:

PONOKO

Ponoko, the world's easiest making system, is a custom product making service. It's where creators can make their ideas real, and sell them to the world. With a free (or paid) online personal factory and showroom, creators can instantly price, make and sell their product ideas online. In the process of custom making and delivering more than 60,000 user-generated designs, Ponoko has reinvented how goods are designed, made and delivered. Creators can 'click to make' and sell their product designs online. Digital fabricators and materials suppliers can win and manage pre-paid jobs online. DIYers and buyers can submit requests to get things made for them, and click to make designs from the creative community.
Using their digital making system these product designs can be priced instantly online and made locally, as close to the point of consumption as possible.

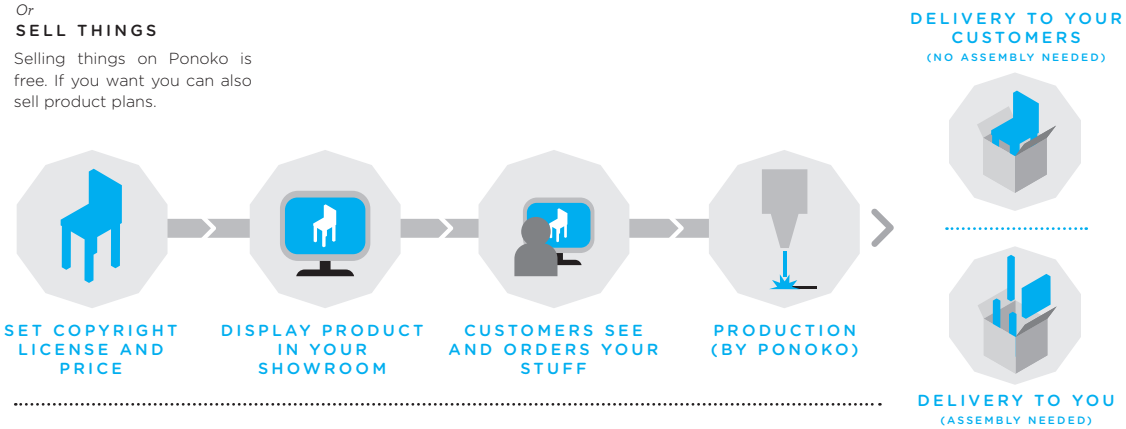
Users can

MAKE THINGS

Or

SELL THINGS

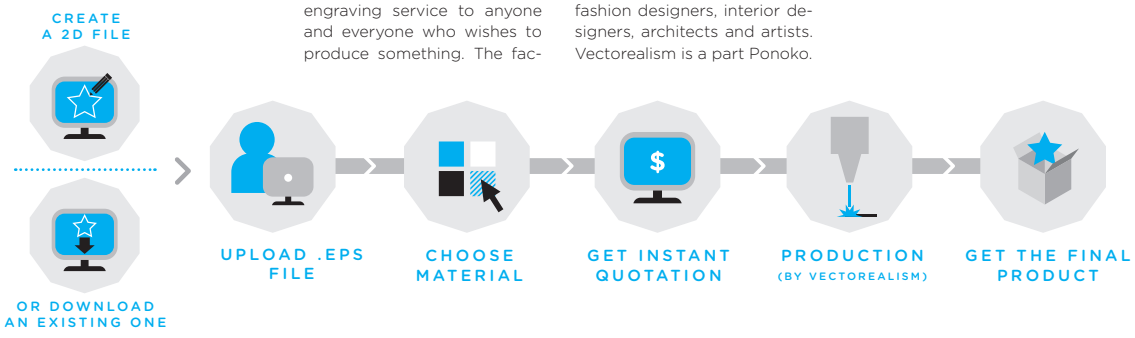
Selling things on Ponoko is free. If you want you can also sell product plans.



Case study:

VECTOREALISM

Vectorealism 's mission is to provide a fast, accessible and user friendly laser cutting and engraving service to anyone and everyone who wishes to produce something. The factory in the center of Milan serves a network of young fashion designers, interior designers, architects and artists. Vectorealism is a part Ponoko.



variety of their offering. Ponoko, for example, started by providing only laser cutting services to its customers, but in 2010 added 3D printing, new materials, and also electronics through a partnership with Sparkfun, thus getting one step closer to becoming a multi-functional public factory.

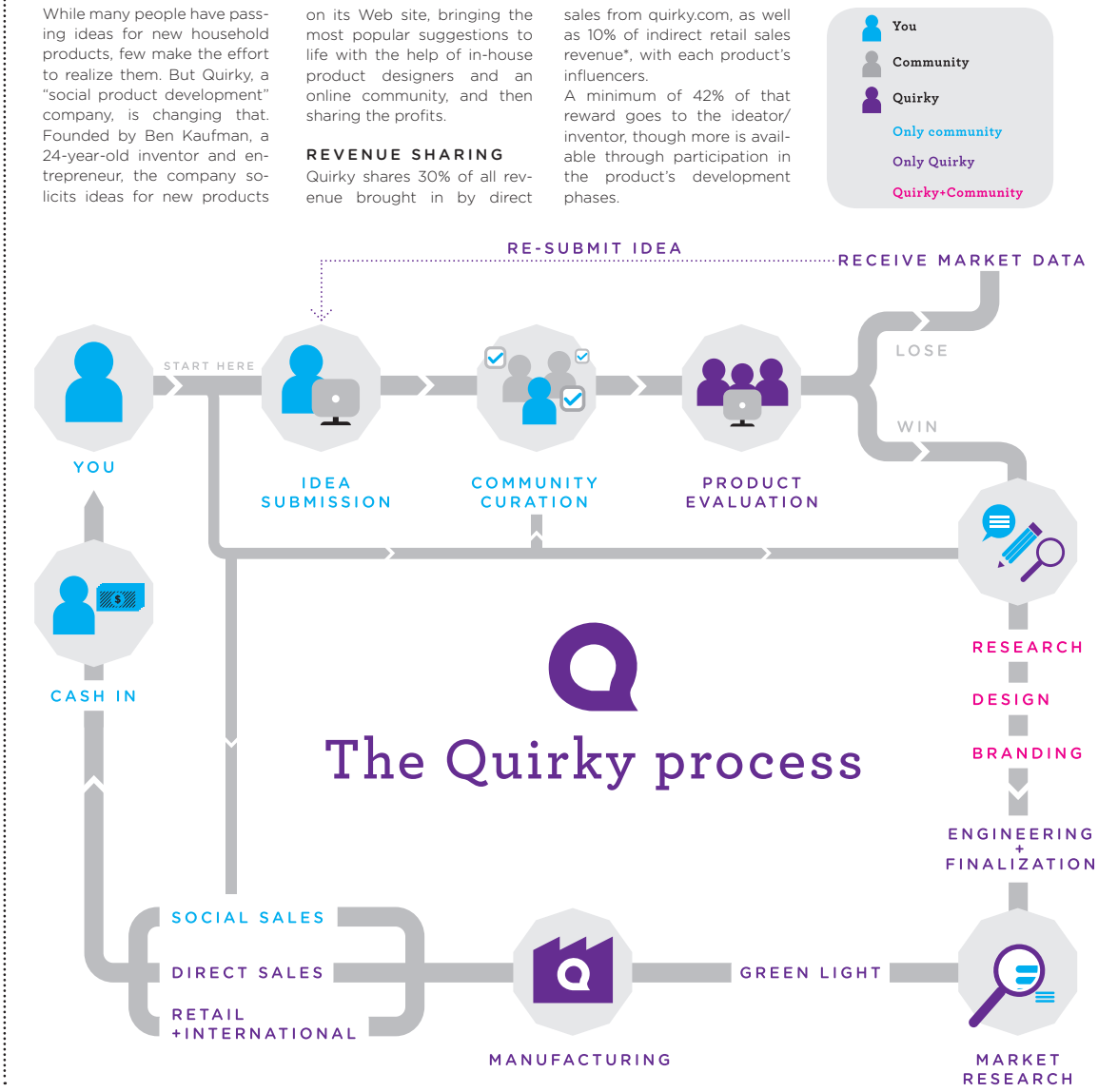
Case study:

QUIRKY

While many people have passing ideas for new household products, few make the effort to realize them. But Quirky, a "social product development" company, is changing that. Founded by Ben Kaufman, a 24-year-old inventor and entrepreneur, the company solicits ideas for new products on its Web site, bringing the most popular suggestions to life with the help of in-house product designers and an online community, and then sharing the profits.

REVENUE SHARING

Quirky shares 30% of all revenue brought in by direct sales from quirky.com, as well as 10% of indirect retail sales revenue*, with each product's influencers.
A minimum of 42% of that reward goes to the ideator/inventor, though more is available through participation in the product's development phases.



DISTRIBUTED MANUFACTURING NETWORKS

Distributed manufacturing networks such as 100kGarages, CloudFab and MakerFactory connect designers with manufacturing tools, allowing creators to get their concepts produced locally and providing tool owners with a new stream of revenue. Users of these online services can find local shops and equipment operators through maps and lists or by posting a request for a specific job and then selecting from the bids submitted by equipment owners.

Other types of infrastructures are starting to emerge in the form of grid manufacturing structures. MakerBot Industries, a manufacturer of open source personal fabricators, is currently setting up its first BotFarm, a cluster of networked 3D printers. Even though still embryonic, such a structure suggests the possibility of fully distributed grid manufacturing systems which would make use of 3D printers located in several points of the globe.

LOCAL PRODUCTION SHOPS

Local production shops are still taking their first steps, but there are already a few meaningful examples in place:

TechShops, self described as "a Kinko's for makers, or a Xerox PARC for the rest of us," are membership-based workshops that provide members with access to an enormous array of fabrication tools as well as instructions to make whatever they wish, regardless of skill level. There are currently six TechShops across the US, with several more in the planning stage.

Fab Labs, a program of the MIT's Center for Bits and Atoms, are workshops equipped with essential fabrication tools with the goal of providing communities around them with the means to create smart devices for themselves. There are currently over 50 Fab Labs in 16 countries, with many more on the planning stage.

Hackerspaces are community-operated physical spaces where people of diverse backgrounds—usually with common interests in science, technology, and digital art, but not necessarily with formal training in these areas—meet to work, collaborate, and socialize. Even though physical infrastructure and material resources are im-

portant aspects of these community laboratories, hackerspaces are above all centers for peer learning, collaborative problem solving, and community building. Unlike TechShops and Fab Labs, hackerspaces emerge directly out of local communities and are all completely independent from each other—even though there is loose network of hackerspaces. This means that the tools available vary greatly from one collective to the other but, due to the drop in cost of digital fabrication technologies, the number of spaces equipped with laser cutters and/or 3D printers is growing. The world map on hackerspaces.org currently registers around 500 hackerspaces worldwide.

Case study:

TECHSHOP

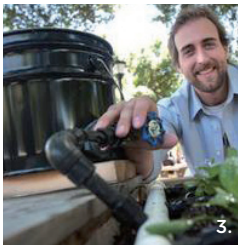
TechShop is a playground for creativity. Part fabrication and prototyping studio, part hackerspace and part learning center, TechShop provides access to over $1 million worth of professional equipment and software. It offers comprehensive instruction and expert staff to ensure people have a safe, meaningful and rewarding experience. Most importantly, at TechShop people can explore the world of making in a collaborative and creative environment. All the facilities include laser cutters, plastics and electronics labs, a machine shop, a wood shop, a metal working shop, a textiles department, welding stations and a waterjet cutter. Members have open access to design software, featuring the entire Autodesk Design Suite. Huge project areas with large work tables are available for completing projects and collaborating with others. Anyone may attend classes. For a monthly or annual fee, members can reserve and use TechShop's tools upon successful completion of equipment-specific Safety and Basic Use classes. Talented staff members are available full time to help develop ideas and improve technical skills. [22]

In 6 years TechShop opened in seven locations, and three additional openings are already planned.

Case study:

WORLD CHANGING TECHNOLOGIES BORN IN A TECHSHOP

(1) Square payment system, (2) Embrace infant warmer, (3) Peter Fryckman, Driptech founder, (4) Solum tester.



"I've been asked often whether I thought any real innovation or serious companies could come out of the Maker Movement. The question tends to be posed by those with a belief that anything driven from a bunch of amateurs playing around with glue sticks and soldering irons is probably representative of just a crafting fad. I'm glad they ask, because the truth of the matter is that a number of important technologies have already come out of the Maker Movement." This is what Mark Hatch, Techshop CEO, says in a recent interview [23]. Let's see some examples.

Square creator James McKelvey, an IBM engineer by training, also happens to own a glass blowing shop in Kansas. In fact, it was at his glass blowing shop where he found the inspiration to create a little credit card reader you may know as Square. McKelvey told this first-hand account to St. Louis Magazine:
"I was trying to sell a piece of glass. It was over the phone, to a lady in Panama. She was buying one of my glass bathroom faucets... She calls me; she's going to spend three grand on this thing, and she wants to pay for it with an American Express card." Until then, McKelvey had only accepted MasterCard or Visa for his glass, or checks or cash. "I'm sorry," he said. "I don't take American Express. Don't you have a Visa card?' And she says 'No,' and then she goes through this thing about 'Maybe my husband has one' and 'He'll be back in a week.' And I'm sitting here going, 'God!' because I'm about to lose the sale."
McKelvey went on to manufacture the original prototype for Square at TechShop, and subsequently, in 2012, Square did over $6 billion in credit card transactions and is currently valued at over $3 billion dollars. Square is an electronic payment system, consisting in a small adapter that allows individuals to accept credit cards on their mobile devices.

Embrace infant warmer is another great story from the Maker Movement that addresses the 20 million babies who are born every year under-weight and premature. In fact, worldwide, over 4 million infants die within their first month of life. One of the biggest concerns is hypothermia and the regulation of body temperature. The team at Embrace created an incubator blanket at the TechShop in Menlo Park which does not require constant electricity, is portable, safe and costs 1% of a traditional incubator. This story is especially interesting because the core technology was upgraded through interactions with other makers at the Techshop, and one of the best aspects of the hardware movement gaining traction is the ability to share technology and skills across people.

Clustered Systems creators Phillip Hughes and Robert Lipp built a data cooling center platform that went on to earn 12-16% higher efficiency than the industry giants (including Sun Microsystems and IBM) during an 18-month evaluation. These cooling systems consume $250 billion in electricity a year – or, in other words – this 2 person startup has the potential to save the world $25 billion in annual electricity.

Driptech mechanical designer Trevor Boswell, a D school project graduate from Stanford, went into the TechShop to use facilities for manufacturing. He was working for Peter Fryckman, a PHD and visionary who had just visited Ethiopia, where Fryckman saw small plot-farmers use child labor to irrigate their land. What they created was a field-ready drip irrigation tubing system complete with valve control – but it's their proprietary system which is most important – because it eliminates over 12,000 parts per acre and costed 50% less than any other irrigation system on the market. Now, Fryckman and his team at Driptech are equipped to bring water to over 600 million farms in under developed countries.

Solum's big idea is to bring Big Data to the farm. These guys set out to start working on a wholesale idea to affect how much nitrogen is in the ground – which is a serious economic and global agricultural issue due to a waste of toxic and expensive fertilizers. It started as a classic Silicon Valley startup by making use of TechShop. From there, Solum received $2 million in seed funding from Khosla Ventures, a venture capital firm founded by Vinod Khosla that invests in companies focused on IT and sustainability. Khosla also participated in Solum's latest financing round, led by venture firm Andreesen Horowitz, in which John O'Farrell, general partner of Andreesen Horowitz, joined Solum's board. That technical and financial assistance enabled Solum to put in place the testing, software and hardware systems it needs in just three years. The process begins with a faster testing system that allows the company to examine wet soil, rather than the traditional – and slow – process of chemically drying soil before testing. The tests can happen either in the field using Solum's proprietary machine, or in the lab the company opened this summer in Ames, Iowa. Using either method, farmers and agronomists can pinpoint important facts about the soil, including its chemical makeup and capacity to hold water. From there, Solum's data goes into a digital file, which farmers plug into their spraying machines fine-tuning exactly how much water and ferilizer spray, down to the square yard.

FABLABS *in the world*

Case study:

FABLABS

"Give ordinary people the right tools, and they will design and build the most extraordinary things."
That's the idea behind Fab Labs, which originated at MIT's Center for Bits and Atoms by Professor Neil Gershenfeld, who teaches How To Make (Almost) Anything.
A fab lab (fabrication laboratory) is a small-scale workshop offering (personal) digital fabrication.
A fab lab is generally equipped with an array of flexible computer controlled tools that cover several different length scales and various materials, with the aim to make "almost anything". This includes technology-enabled products generally perceived as limited to mass production.
While fab labs have yet to compete with mass production and its associated economies of scale in fabricating widely distributed products, they have already shown the potential to empower individuals to create smart devices for themselves. These devices can be tailored to local or personal needs in ways that are not practical or economical using mass production.
Fab labs have spread from inner-city Boston to rural India, from South Africa to the North of Norway. There are currently about 200 Fablabs in 43 countries. Activities in fab labs range from technological empowerment to peer-to-peer project-based technical training to local problem-solving to small-scale high-tech business incubation to grass-roots research. Projects being developed and produced in fab labs include solar and wind-powered turbines, thin-client computers and wireless data networks, analytical instrumentation for agriculture and healthcare, custom housing, and rapid-prototyping of rapid-prototyping machines.
Fab labs share core capabilities, so that people and projects can be shared across them. This currently includes:
A computer-controlled laser-cutter, for press-fit assembly of 3D structures from 2D parts.
A larger (4'x8') numerically-controlled milling machine, for making furniture- (and house-) sized parts.
A signcutter, to produce printing masks, flexible circuits, and antennas.
A precision (micron resolution) milling machine to make three-dimensional molds and surface-mount circuit boards.
Programming tools for low-cost high-speed embedded processors. These work with components and materials optimized for use in the field, and are controlled with custom software for integrated design, manufacturing, and project management. This inventory is continuously evolving, towards the goal of a fab lab being able to make a fab lab. [24]

FABLABS IN ITALY

The first experiment of a FabLab in Italy was a FabLab in the temporary exhibition "Future Station", as part of the celebrations for the 150th anniversary of the Unification of Italy.
The curator of the exhibition Riccardo Luna asked Massimo Banzi, co-founder of the Arduino project, to imagine the "station" about the world of work. The event organizer Massimo's proposal to the 'Italia 150' Committee and Luna, was the realization of a FabLab, or manufacturing laboratory, the first of its kind in Italy.
The 'Italia 150' Committee obtained from some companies the loan of their Laboratory prototyping equipment (such as laser cutting machines to - SEI, vacuum cleaners, Mills CNC - Roland and 3D printers - ZCORP), and covered the considerable number of costs of the machines missing and the of personal with the funds of the exhibition.
Goes to 'Italia 150' Committee much of the credit for having made a major step in the promotion of digital culture, within an exhibition.
The first FabLab collaborators identified through Arduino's blog, but also with the help of WIRED, were found after a difficult selection: Enrico Bassi (coordinator), Lorenzo Romagnoli and Matteo Tangi (contributors).
Massimo Banzi and Davide Gomba have conducted several projects in the FaLab Italy, creating courses, and in general by participating actively in the FabLab.
After the closure of the FabLab Italy, with the conclusion of the exhibition in November at the OGR of Turin, the team FabLab began to ask questions.
Is in this period, during a trip abroad made by Banzi and Gomba, that the idea of setting up a structure Arduino in Turin, with the opportunity to accommodate inside, at certain times, the FabLab. In this way, Arduino has built a part of R & D but also responds to the needs of the philosophy of the project: the creation of community and the desire to bring together different people in the piemontese territory to which the card is inextricably linked.
A lean, private and not public funded structure, in a historical moment in which the audience with difficulty is able to take charge of similar projects.
Other fablabs are now open in italy: there's a fablab in florence, one in Cava de' Tirreni and one in Reggio Emilia.
Other Labs are under development in Milan, Rome and Naples.

02.4

MAKERS IN ITALY

The maker movement is spreading through many countries, and there are some Maker Faires even in Africa (although they are not organized by O'Reilly Media). Moreover, there is a rising awareness of the still widespread ability and tradition of crafts and self-production of people that move from the countryside to the city. The urbanization trend that started in the UK during the Industrial Revolution, still ongoing throughout the world, brings new people to the city and with them their ability for manual work and self-sufficiency.

If we want to define the context of Italian makers, it should be not a difficult task, since Italy has a long history of arts, crafts and geographically and socially embedded industrial systems of industry clusters. We should note how Arduino is the natural evolution of Olivetti in the first place, and of the Interaction Design Institute Ivrea in a second moment. Although the Interaction Design Institute Ivrea was closed and moved to Milan, it left a strong impact on the design and business world, including Arduino itself. We have briefly focused only on Ivrea now, although similar phenomena could have happened in many other industrial clusters in Italy. With this background information in mind, it is time to think about the state of makers, open hardware, and open design in Italy.

FabLabs are one of the most popular format of spaces for making together (beside hackerspaces, sewing cafes and Techshops). As said in the previous in-depth analysis, there are many FabLabs around the world, from Boston (USA) to South Africa (Africa), from Afghanistan to India (Asia), and from New Zealand (Oceania) to Brazil (South America). In the Netherlands alone there are 13 active FabLabs, including one mobile lab on a truck and one small lab that fits into a room. The first FabLab was set up at MIT ten years ago, but we had to wait almost a decade to have the first FabLab in Italy, FabLab Italia, in Turin. It was a temporary lab and it was possible thanks to Massimo Banzi from Arduino; luckily, it has turned into a stable FabLab (FabLab Torino, within Officine

Arduino) in 2012. We have to note, for example, that there isn't yet an active FabLab in Milan, where there is currently more than one initiative, but unfortunately none of them are yet able to reach the critical mass required to start a lab.

There is, however, a very interesting scene emerging in Italy, ranging from the computational designers of Co-de-iT, to the open source fashion labels like OpenWear, and DIY e-commerce platforms like Blomming, from the high level wearable technologies of Plugandwear, to the concrete 3D printing experiments of D-Shape, and many more. In the past years, we have also seen online communities like the Arduino community, local events like WeFab, and more recently, the emergence of groups on social networks like Hopen (from Rome) and especially the Fabber in Italia group on Facebook, the most active group nationally at the moment (and that evolved from a previous Fabber in Milan group). What has actually happened in the past two years is that these and other projects started to network and discover each other, and through events and social media they have developed a real community only in the past few months. Besides the focus on the practice, the use of digital fabrication technologies and the DIY and bottom-up attitude, it is the networking attitude that defines the makers — in Italy as in the rest of the world.

At the beginning of March, the World Wide Rome event was organized in Rome showcasing the Italian Maker community, with the presence of international guests like Chris Anderson (director of Wired US) and Dale Dougherty (director of Make magazine). The event started a huge discussion on print and social media, raising also the interest of the Italian Government and the possibility of one or more Maker Faires in Italy soon.

CHALLENGE IN THE ITALIAN CONTEXT

Thanks to World Wide Rome, the existence of the maker movement is finally acknowledged, but it is too early to make a hypothesis of how much support the movement will receive or if it will gather a critical mass. The Italian context could be the perfect experiment

where to test the dynamics of makers, open design and distributed manufacturing experiences, to see if they are a real sustainable opportunity and to see how they can integrate with the existing social and industrial fabric of the country. It is a common stereotype, sometimes, that the family is at the center of the Italian life, both on a social level or as the country's actual welfare state: one could not be happier to see examples as Kent's Strapper, a whole family that works together on building self-replicating 3D printers in Florence. How can FabLabs grow in territories and cities, networking between them and collaborating with existing industries and craftsmen? It is already happening in cities like Barcelona, where local institutions are envisioning a system of networked FabLabs in every neighborhood, a FabCity, as a vision for the city that relies more on sustainable, collaborative and empowered local communities rather than on the mass scale of big events and mass low-cost tourism.

The critical economical situation that Italy is facing also raises few more questions that cannot but help to push forward the maker movement. Since only few companies reach the age of 40, shouldn't we focus on creating new ones rather than trying to change old ones, that already have a strong identity? One of these years' hot topic is proving to be business models design. Why can't we focus more in creating new businesses and new value through design? The popularity of the Business Model Canvas proves how design could be implemented successfully for developing new business models, that could be also adopted in the design field as well. Increasingly, less students register attend to Italian universities, almost 20% of graduated students and 31% of Italians younger than 25 years old are unemployed. What will designers' work and design education look like in the future in Italy in this ominous scenario?

Finally, the emergence of the Maker community in Italy also gives us further insights on the power of social networks for launching projects. Many projects started independently and then only recently networked through Web 2.0 serv-

ices and thanks to this networking the community has grown rapidly. It is also true, however, that print media and already established initiatives still play a key role in supporting such bottom-up initiatives: Wired and Make have been crucial not only in the past years but also in the World Wide Rome event. The Italian social network of makers cannot be confined only geographically to Italy and solely to bottom-up or independent projects. The social network perspective is a promising way; one should not forget that established initiatives like Make magazine are part of these emerging social networks, and it happens that they are among the most influent hubs, even in social media. Being a maker or a FabLab means being part of a specific global social network, not just using digital fabrication technologies together with manual work.

03

CHAPTER THREE

THE PLACE OF ENCOUNTER

LABUTEGA

"Craftsmanship is the future: Job doesn't have to be sought, it has to be created"

Stefano Micelli

03.1

INTRODUCTION TO LABUTEGA

In summary, we discussed in the first chapter about the Italian artisan tradition felt by everyone as an heritage, but which is going through a moment of difficulty because of the global crisis that has hit the financial economy. This crisis, however, has also affected the virtual model on which this type of economy relies, making the culture of doing, the craft knowledge and all those 'real' models that were set aside in recent decades, regain a new social and economic value. The crisis exerts two opposing forces on craftsmanship, on the one hand decimating the number of small businesses, and on the other giving back value to this type of production. Another problem we have in Italy lies in the perception that people, and especially young people and families, have about craftmenship, considered as a fallback sector with little appeal.
We've said that if we want to see what will happen in Italy within a short time we must look to American models, often ahead of the Italian times. From there comes the makers movement, the democratization of production, the personal fabrication. In Italy, ever more people are adopting these new models, sometimes giving a huge contribution, but we believe that they should somehow get intertwined with the traditionally Italian culture of doing.
The traditional vision of the artisan must be transformed into a know-how that goes through these new tools and technologies, that goes through the spread of open techniques, it has to exploit the potential of the web and new media. Thus, the traditional profession of craftsmen, which always brings to mind dexterity and workshop activities, turns into a web oriented work, that combines modernity and tradition and lives nestled in communities based on virtual participation.

Labutega, besides wanting to be a place that gives the opportunity to anyone who wants to be able to learn and create almost all kind of objects, also wants to be a place of encounter, exchange, interaction between realities which can also appear scarcely compatible, but when stimulated in the right way can lead, in our opinion, to very interesting solutions. We do not want to nostalgically save all the

artisan knowledge that is going to be lost, but we just want to provide the opportunity to those who have an interest in seizing it, to create new connections, to catalyze new processes that why not, could lead to new 'evolutionary paths' rather than towards extinction.

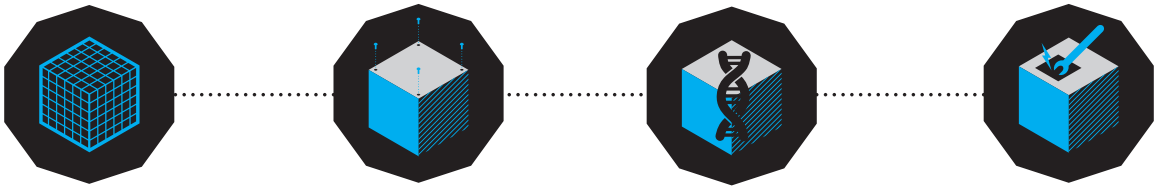
03.2

A GYM FOR

MAKERS

An equipped and open to the public space
With all that is needed to

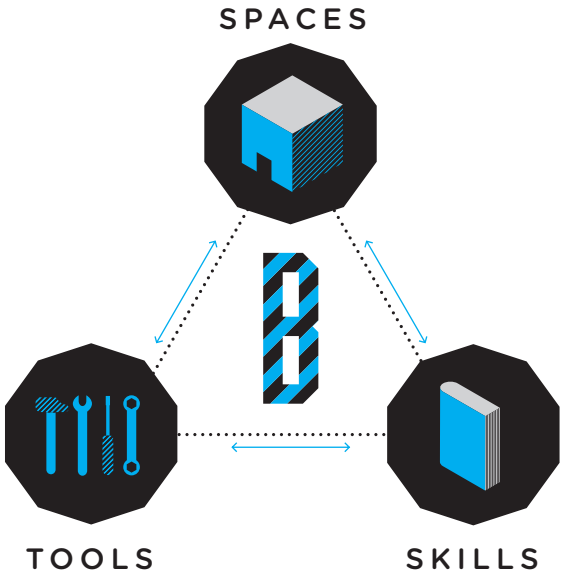
DESIGN BUILD MODIFY REPAIR



All kind of Objects

(EITHER ALONE OR WITH THE HELP OF AN INSTRUCTOR)

Labutega is an equipped and open to the public space, where people of any age, social status and preparation have the opportunity to learn to *make*. Anyone who has an idea, anyone who wants to learn how to make something new, anyone who wants to design, build, modify or repair almost any type of object, can do so in this lab/workshop. We strongly believe in the power of doing, in the power of creation, and in a moment like this people need to 'regain possession of objects', and to rediscover the creative act. In the current situation, Labutega stands as a synthesis of many models that are more and more emerging even in the Italian scene, but in a fragmented and discontinuous way. We like to define it as a gym for the makers, because like in a gym people of varying degrees of preparation have access to the spaces and can use a wide range of machinery, for purposes very different from each other, the same happens at Labutega. Here in fact the access is guaranteed both to the inexperienced who will have to learn everything from scratch, and to the professional who will have access to advanced technologies and shared spaces. The members



The lack of one or more of these three elements creates a need that Labutega can satisfy

will then have the opportunity to participate in different courses, to use different tools and machinery according to their preparation, and to get in touch with other users more or less prepared, creating in this way a network of relations, highly developed and at different levels, which facilitates the steps towards a higher level, or the approach of different sectors and interests, from which some unexpected and interesting solutions may arise.

The essential elements to *make* are three: spaces, tools and skills. There are many cases of potential users different one from each other, and it's impossible to describe them all, but the thing that unites all of these cases is the lack of one or more of the three key elements. If I have the equipment and the space but do not know how to use them i can not do anything, as well as those who have the skills, but do not have a physical place and the right tools to put them into practice, will not be able in their turn to create anything. The lack of one or more of these elements therefore creates a need that Labutega can solve, concentrating in one place large shared and non-shared spaces, equipment and ma-

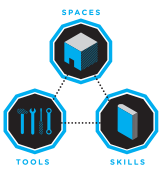
chinery both traditional and innovative, and competencies that relate to a wide range of manual and creative knowledge. In this way, an engineering student who designed a bicycle can come, learn to weld and build the prototype of a frame, a young architect who has created a chair can find suppliers and learn how to manage contracts and invoices, a blacksmith who has heard of 3d printing can come to try and experiment, a fashion student can come and use the sewing machines to create a small self-produced line. There are thousands of examples such as these, and they are all related to the triptych spaces/skills/tools, and the lack of one or more of these elements. For this reason it is also hard to make a description of the average user of this structure. We examined the categories that are more likely to have certain requirements that may be compatible with what Labutega has to offer, but we have deliberately left the catchment area very open.

Among the most significant 'groups' to which we address[1] there are SMEs, craftsmen in activity who are interested in equipment which they have no, students of technical institutes, design, engineering, architecture, academies,

LIST *of possible users*

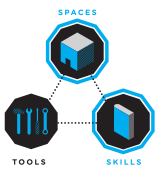
Marco, 24 y/o
engineering student

He designed a bicycle innovative and wants to build the prototype
Where does he find a welder?
Who teaches him to weld?



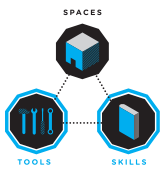
Giorgia, 36 y/o
architect

She designed the prototype of a chair and now has orders to dispatch
Where does she find a supplier?
And for contracts and invoices?



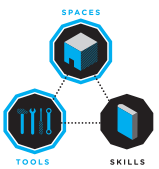
Carlo, 43 y/o
blacksmith

In the workshop has everything he needs for the job, but has heard of 3D printers and wants to try them
Where che he learn to use them?



Manuela, 25 y/o
fashion student

She created a personal collection and would like to self-produce it
Where can she find the machines and space to sew?

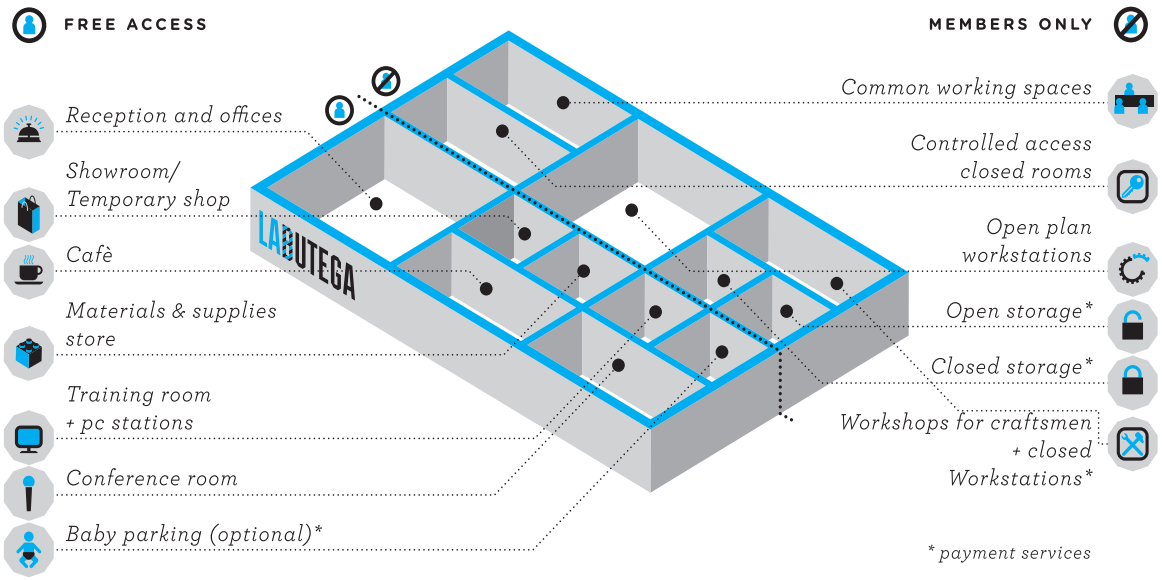


USER *groups in Milan*

IULM, IED, Marangoni and other fashion, physics and chemistry schools, we address to unemployed and worker on redundancy payment , especially from the manufacturing sector and handicrafts, we address to professionals, architects, designers, engineers, pensioners, inventors, handyman, repairmen, self-producers, makers and artists. Labutega is place open to those who *make* for work, hobby or study, is open to those who already own professional skills and to those who are approaching for the first time the world of creation. We want to shake up the traditional concept of workshop, offering a model where there is no specialization, but all the declinations of 'making' are welcome. Labutega will not only be a place of work, but also a place of encounter, a place of exchange and sharing of ideas. The spaces will be designed to encourage casual interaction among users, to facilite collaboration between projects and the exchange of know-how. There will be a café/pub (managed in partnership with a specialized company) open to the public, open-plan workstations, common workspaces, conference rooms and a shop where will be possible to buy the creations of the users. Included among these spaces there will be a store of materials, supplies and small equipment, managed in partnership with an external provider. In the next page, a list of the spaces an the tools.

SPACES

THE SUBDIVISION *of the spaces*



SPACES	UNITARY SURFACE (SQM)	#	TOTAL SURFACE (SQM)
Open workstations	6	40	240
Closed Workstations	15	6	90
Workshop special equipment (controlled access)	10	10	100
Smal lstorage	2	24	48
Medium storage	7,5	6	45
Painting room	15	1	15
Sandblasting room	15	1	15
External waste deposit	15	1	15
PC workstations	4	15	60
Closed offices	25	4	100
Meeting Rooms	12	4	48
Conference room (accorpabile with meeting rooms)	60	1	60
Showroom / Temporary shop	20	1	20
Internal shop supplies and materials	20	1	20
Café / Pub	80	1	80
Baby parking (7.5 square meters for child, 15 children)	152,5	1	152,5
Tool library	15	1	15
Reception	6	1	6
Administration offices	20	1	20
Toilet + Other rooms of Service			110
Atriums and free spaces			110
	TOTAL (SQM)		**1.369,5**

Considering a tolerance of +/- 10% the ideal dimensions are between 1,200 and 1,500 square meters

TOOLS

LIST *of tools and machines*

ABRASIVES
Disc sander, large, with pedestal
Bench grinder with brush
Vibrator for finishing

CRAFTS
Vinyl cutting machines controlled by computer
Welder for stained glass

MOTORCYCLES
Hydraulic jack and trestles
Hydraulic work stand
Stand engine support
Battery charger
Crane Engine
Tools for tires

ELECTRONIC
multimeter
oscilloscope
Welding station
Power supply, DC
Signal Generator
Variable transformer (variac)

DIGITAL IMAGES
Digital SLR Camera
Projector

PRODUCTION
Cold Circular Saw
Drill Press
Horizontal bandsaw
Vertical band saw
Tools for bending pipes
Iron bender / miter saw

TAILORING
Computerized Embroidery Machine
Industrial Sewing Machine
Common Sewing Machine
Overlocker

TOOLS FOR MANUAL WORK
Various kits of tools (wrenches, screwdrivers, ...)
Power tools (drills, sanders, ...)

CONTROL
Granite surface plate
Height digital meter

CNC MACHINING (DIFFERENT MATERIALS)
Large metal lathe with reading digital and accessory equipments
Milling machine, large, with digital readout and accessory equipment

MEASUREMENT
Digital caliper and comparator
Digital Micrometer

PLASTICS
Vacuum molding machines, 24 "x 24"
Machine tools for bending plexiglass and acrylic
Machines for injection molding (Morgan)
Router table

PROTOTYPE
3d printers for ABS
Epilog laser cutting machines (Helix 60 Watt)
3d scanner (NextEngine) 2995

METALS PROCESSING
Bender and notching machine for sheet metal
English wheel counter
Tinsmiths hammer, pneumatic
Rotating turret punch press
Shears, large 48 "
Calandra, powered, large 48 "
Mitre Saw for cutting bench

FINISH
Powder coating cabin
Ark for spray painting, hood aspirating

WELDING
Plastic cutting CNC 4 'x 8' (Torchmate)
Welder, TIG
Welder, MIG
Welder, points
Plasma cutting, hand

WOODWORKING
CNC cutting for wood
Table Saw (with stop blade)
Mitre saws, with sliding table
Cutting table
Bandsaw
Belt sander / disc, movable
Lathe, 24 ", 3HP
Tracery
Drill press, movable

FUMES AND DUST ASPIRATION SYSTEM

COMPRESSED AIR SYSTEM

03.3

HOW IT WORKS

LIKE IN A GYM
A SUBSCRIPTION

enables to do (almost) anything

THE RULES ARE THE SAME

A subscription (or entrance fee) provides access to the workshop, to use the common areas and the basic equipment, and attend some free courses

As already mentioned, we like to think labutega as a gym for makers, and indeed the operation of the laboratory is very similar to the logic of a regular gym. As in a gym in fact, people can subscribe to labutega, and become members, and using an identity badge will have access to common workspaces, to the use of some equipment, to some free basic courses and to the use of computer workstations with 2D and 3D design programs.
After the attainment of safety and basic use courses, users will have the possibility, reserving the machines on time, to use the tools provided by Labutega, paying apart the use of more complex machinery or the use of packages of extra hours. Included in the basic services there are a portal of e-procurement and an e-commerce platform, which can be used even without the Paid Membership at Labutega, but just by filling an online subscription. Customers will have the chance to take part in any course, choosing according to their own needs, and being always followed and aided by the

The self-service use of advanced equipment, specialized courses and access to certain additional services will be charged separately

Consumables and components can be purchased in the store within the workshop

The portal of e-procurement and the e-commerce platform can be used without subscription and are free of charge

expertise of the Labutega staff. The possibilities are therefore varied, since the courses span a wide range of skills and are geared towards users with different degrees of experience and training, allowing anyone to be able to learn even from scratch.
In addition to the services included in the subscription, some additional services with fee will be available. As mentioned above it will be possible to buy additional packages of hours / machine with default rate, in such a way as to allow anyone who is interested to make small productions. It will also be possible to rent closed workspaces, in order to work privately, and deposits of different sizes, both rentable also for medium/long term.

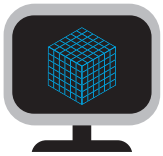
PREMIUM SERVICES *In addition to the basic services included in the subscription will be available some paid services*

Closed workspaces (small workshops) rentable even for long periods

Deposits of different sizes rentable even for long periods of time

Additional packages of hours /machine with default hourly rate

WORKSHOPS and training courses remain the most important activities at Labutega, and will allow anyone to learn how to use the most advanced equipment, and learn professionals manufacturing techniques.



PERSONAL FABRICATION CLASSES

Specific courses will be organized about Personal fabrication, or on 3d printing and computerized numerical control machines, and the use of 2D and 3D design softwares.

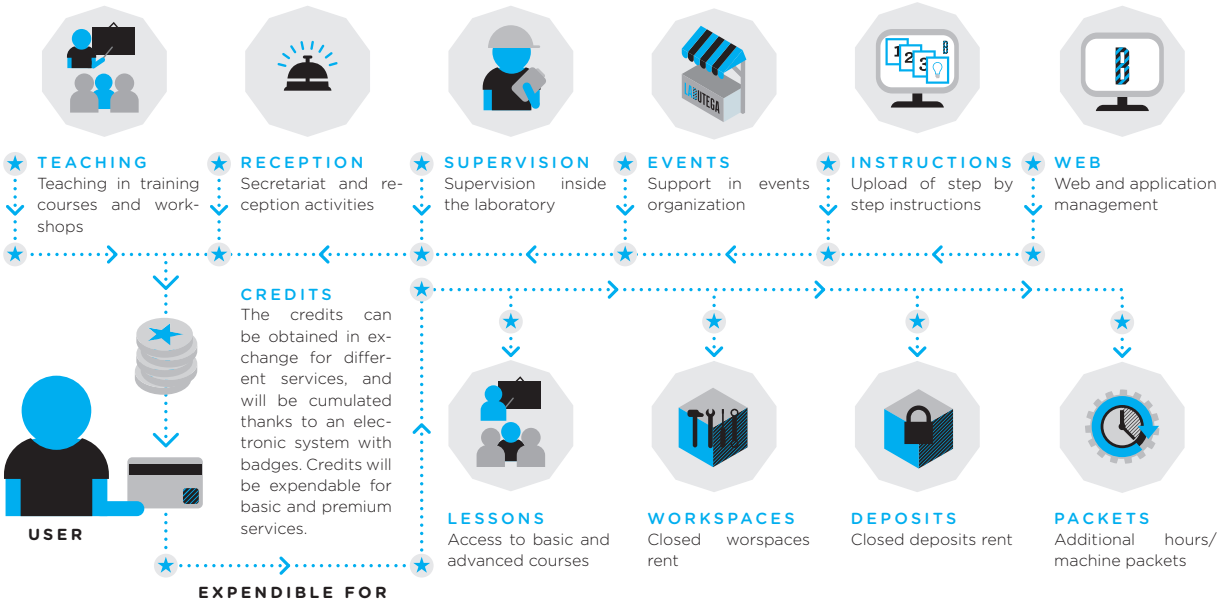
MARKETS and events will be periodically organized, allowing users and external participants to exhibit and offer for sale their own creations. All spaces can be rented by companies and users for promotional events, presentations of products and services or as temporary showroom.

THE CREDIT SYSTEM

The costs for using the most advanced machinery, to access the workshops and all the premium services will be expressed in credits. Credits will be therefore Labutega of the internal currency. These credits expendable for both basic and advanced services, in addition to being purchasable from your profile via paypal, or by cash or credit card at Labutega, can be obtained in exchange for teaching in training courses/workshops, supervision activities, reception /secretariat, maintenance of building/ furniture/equipment, support the organization of events, managing the website and applications.
Tutors and mentors could be some of the artisans built into the structure which exchange expertise with other goods/ services offered. In this way we want to integrate the structure within the different skills that come from various professions which in return will have of their experience in exchange for the chance to access to machinery, processes and skills that do not possess. With this system we can combine business needs, and

namely to reduce personnel costs as much as possible, with specific social needs, and that is to allow the use of Labutega to those who would know what to do with but does not have the economic means to do so. For example is going to be possible for pensioners or workers on redundancy payment to share their expertise and knowledge, and to get in return the access to facilities and tools that may help them to create even new income- generating activities; for students , who don't have money and knowledge, but can help the staff in some little activities and earn the credits to access all the services, and many other examples like these.

PANEL OF TASKS *that allow the gain of Credits*

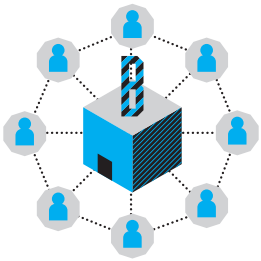


PACKETS 1
Companies will be able to buy packages of subscriptions to give to their employees or customers, (low cost R & D laboratory)

PACKETS 2
Subscriptions Packages will be offered to companies in exchange for sponsorship or supply of materials and equipment (also on loan for temporary use)

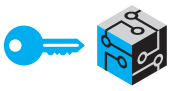
DISCOUNTS
Discounted and/or free subscriptions will be offered to students (colleges and universities), unemployed, retirees and cassintegrati

MANAGEMENT
Credit management will be applied through the website /application

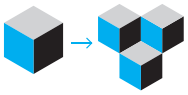


*Labutega will be the access point to a **network** of artisans and SMEs*

Users will be able to sell their items (also in assembling kit) on Labutega's e-commerce platform



Access to techniques and technologies not available in the laboratory



Transition from prototype to small series, or from small to large series

A network of artisans and SMEs will allow to find the right suppliers and to handle the request for quotations and the emission of orders

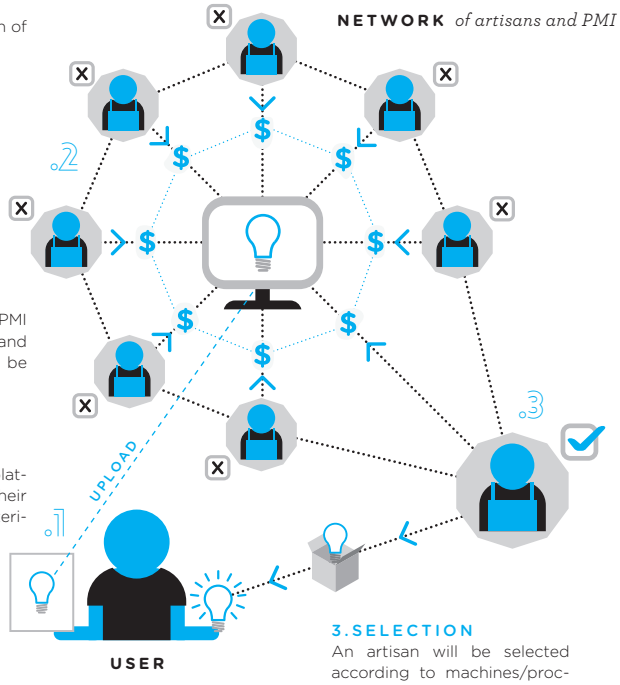
THE NETWORK

One of the main purposes of Labutega is to create a network that connects artisans, suppliers and all those users who want to switch to a more consistent production techniques and processes to access or are not available in the laboratory. Labutega will be then the promoter and the access point for this (social) network of artisans and SMEs that will enable to find the right suppliers and to easily handle the request for quotations, the emission of orders and the management of documents and invoices. It will thus be possible the transition from prototypes to small series, or from small to large series, and indeed access

to not available technologies. Thanks to the network will be possible for users to sell their creations. The transition from prototype to serial production requires the identification of suppliers able to realize/provide what is necessary. A portal of e-procurement that will allow to request quotations to a network of artisans and SMEs selected according to machines/processes available and geographical area will be created. The portal will be free for users and suppliers (who shall pay a fee only in case of award of an order), and it will be also permitted to users that are not directly subscribed to the laboratory. Users will have the chance to sell their products through a dedicated e-commerce portal that they will have access

E-PROCUREMENT

The e-procurement is a system that allows businesses and individuals to make their purchases (raw materials, semi-finished products, various materials, services) online, using online platforms, automating the retrieval of product information and comparing the market offerings.
The automation may also include the creation of the purchase order, its validation, the shipment of the order to the dealer, the reception of the invoice and the balance. Generally, the applications of e-procurement allow users to search for sellers or buyers of goods and services. Sales can be operated in different modalities, such as for example in the form of electronic auction, or more simply at fixed prices. The most attractive approach turns out to be the competitive auction.
Making automated these processes leads to several advantages such as cost reduction, simplification and transparency of the phases, the ability to access a broader market, the reduction of the production of paper documents.



2.PROCESSING
A network of artisans and PMI will receive the request and send quotations, that will be automatically compared

1.UPLOAD
On the e-procurement platform, users can upload their request of processes, materials or services

3.SELECTION
An artisan will be selected according to machines/processes available, geographical area and quotation

DATABASE
of suppliers of materials, components and processings

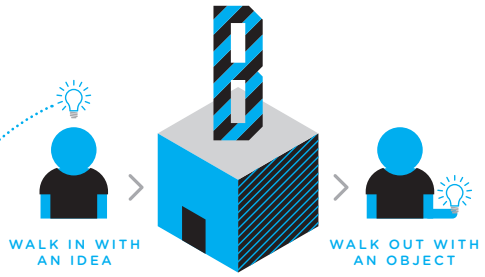
RATING
of suppliers and services

MANAGEMENT
request quotes from multiple vendors (and tabs offered) & invoices management

ISSUING
& managing purchase orders and contracts (with the support of lawyers and accountants)

to for free (they will have to pay a small fee for each sale). This service will be provided in partnership with an external provider, and utilization will also be open to non-registered users. Site users will be able to ship their products at special prices. Periodically dedicated courses will allow to learn some best practices about the management of e-commerce and the basic techniques of web marketing.
At Labutega we want to offer different options to users who make items with the intent to sell them. Obviously, every object is born according to different needs and for different purposes, and we want to give everyone the opportunity to create income-generating activities. As mentioned above, users can create small series, also thanks to the network and to the e-procurement plaform, and then sell their creations through the platform of e-commerce, paying a small percentage for each sale, and take charge of the realization and shipment of products. Obviously many creations of the users of Labutega will be an end in themselves, single items, works of art, repairs or modifications not conceived for serial production or for online sale. For these users, there is the possibility to earn credits, sharing on Labutega's site step by step instructions of what they have created in the laboratory, credits that can then be reused for all services offered. Finally we want to create a Labutega brand, for which we will select (with their consent) some objects designed or realized by users, that we will produce and sell in the physical and online shop. In this case we will take care of the creation, sale and shipment of the products, while the creators will receive a percentage for each sale occurred.

3 WAYS *to develop your idea*

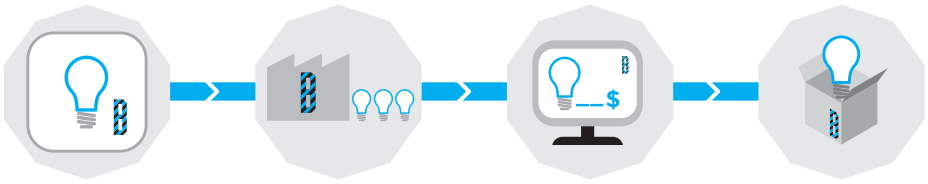


The idea behind Labutega is very simple: anyone can enter with an idea and leave with an object made with his own hands (and a little help)

USERS IDEAS
Could be developped in different ways:

1

THE BRAND
Users products may become part of the line of selected objects Labutega, which will be sold in the store



BRANDING
We brand selected users project as Labutega products

PRODUCTION
We take care of the on-demand realization of products

SALE
We take care of online and in-store sales. A percentage of each sale will go to creators

DELIVERY
We take care of the delivery to customers

2

DIY
Users can manage their production, with the help of our spaces and our services

PRODUCTION
Users can create what they want using our machines and our expertise

SALE
users can use our online marketplace to sell their items, giving us a small percentage

DELIVERY
Users will take care of the delivery to customers

3

INSTRUCTIONS
Not all creations are designed for the same purposes, but remember, sharing is caring!

IDEAS
belongs to the users, so they could decide to use them as they see fit, working with us or follow other paths

SHARING
On Labutega's website you can share the step by step 'instructions' of your project

CREDITS
By doing so users will get a free lesson to any of our courses at Labutega

03.4

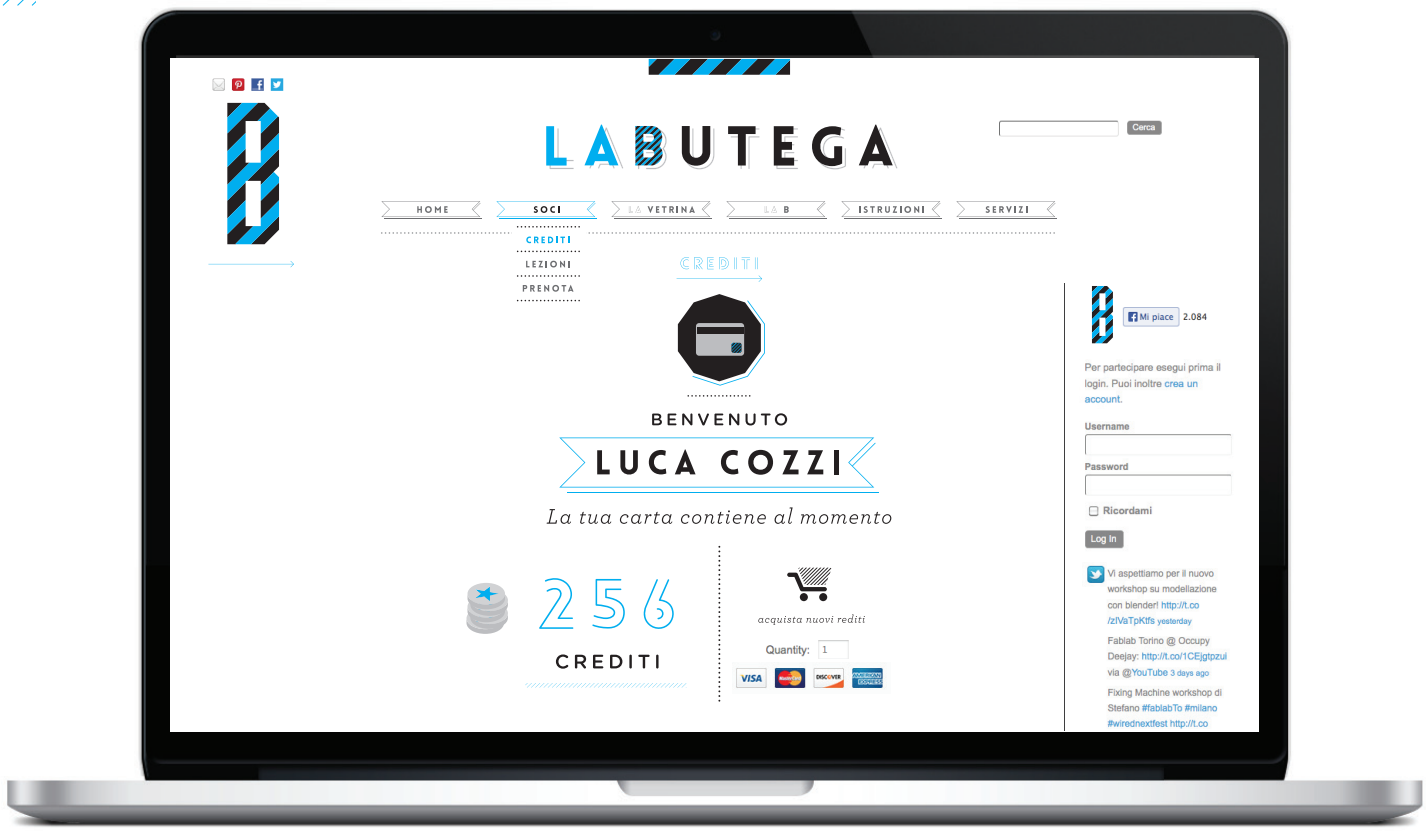
THE WEBSITE

The website will be a cornerstone of the network, and an access point to many of the offered services

The web platform will be a fundamental component of the package of services Labutega, as it will not only have the task of creating and maintaining a vibrant community, but will also be a point of access to a variety of services provided. First of all the platform will have a section on the home page dedicated to blogging and news, so as to share with the users all the news concerning the world of making, makers and creativity in general, and to inform users of events concerning these realities. Of course there will also be dedicated spaces to tell stories and creations of the users of the lab themselves. Still in the homepage, there will be a section that will have the function to explain to all those who are new to labutega and stumbled upon the website for the first time, how does the laboratory work and the logic behind of the whole system. There will also be a section dedicated to the members, in turn divided into three sections. In the section called 'crediti' every member can access and control credits at his disposal on the membership card, which will be spent on all services within Labutega, and will have the opportunity through online payment by paypal or credit card to purchase more. In the section 'lezioni' users can view all courses offered by Labutega, dates and availability, and have the possibility to register online. In the section 'prenota' users can view the blocks of availability of all the machinery on reservation. User simply have

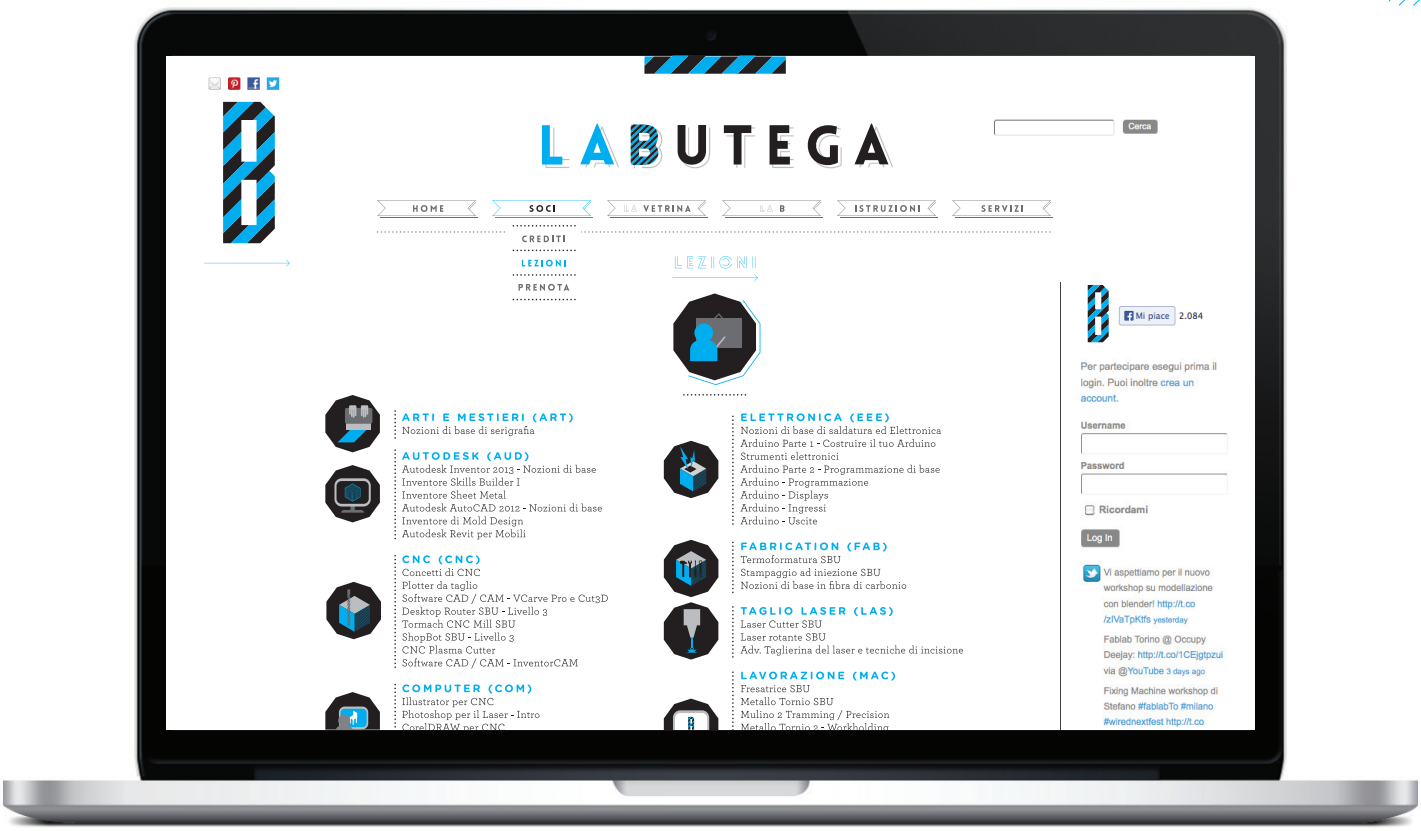
THE HOMEPAGE *of the website*

to choose the machine or equipment they want to reserve from the drop-down list, find an available block of time they want from the calendar for the specific machine or equipment, and write down the machine name, the date, and the time of the block they want. After that they can directly call Labutega and give the information to the staff, that will reserve the machine for that time slot. Another section of the web platform is 'la vetrina' a marketplace where all users (even those who are only members to the website for free) will be able to sell their creations. In this case Labutega only provides the availability to the online space, but will not intervene in the stages of creation and shipment to customers. In the marketplace will be possible to search according to three criteria: chosen by us, best sellers and most liked (facebook likes). Labutega will have instead an active role in



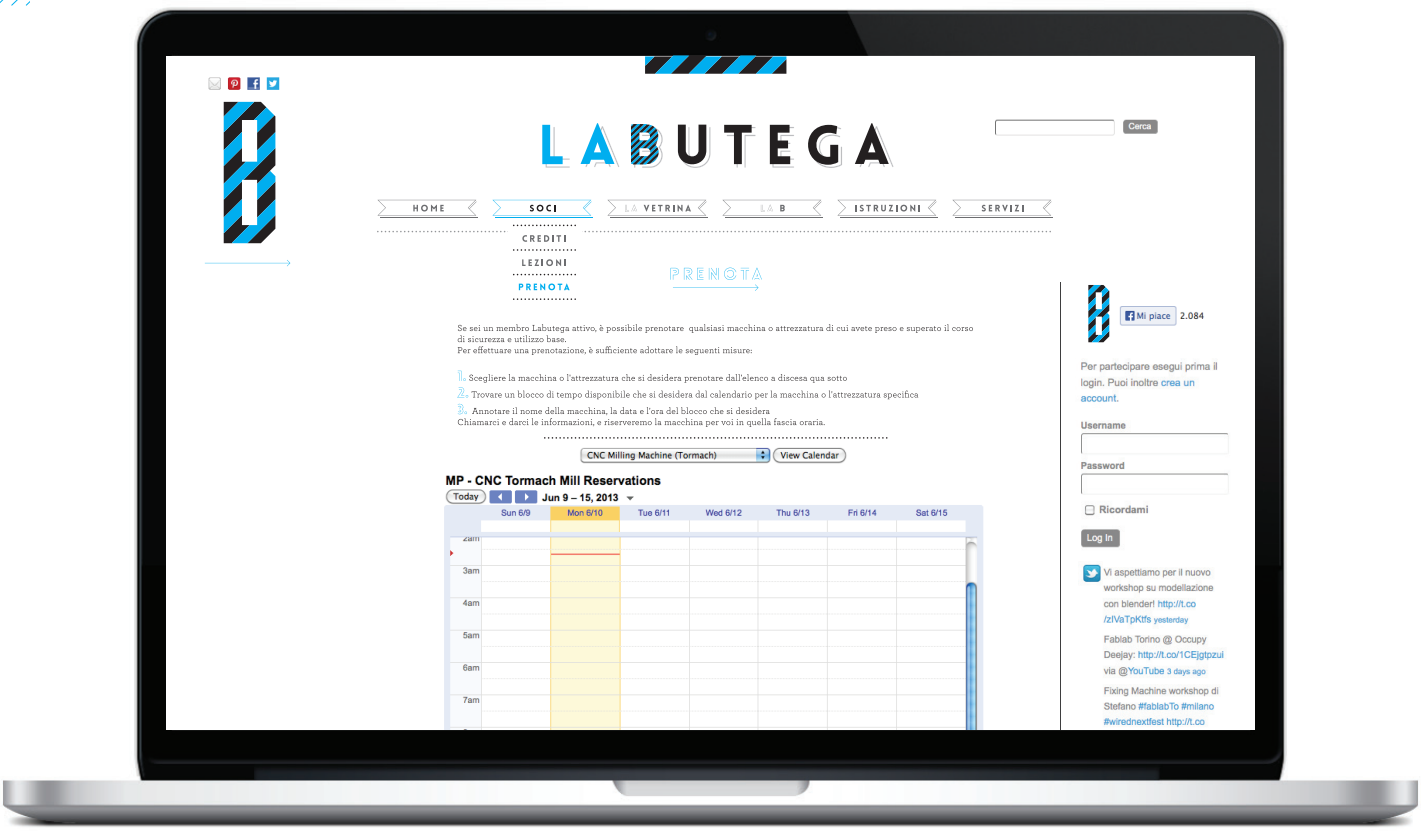
CREDITS *section for members*

regard to *la* B, Labutega's brand of selected objects, a continuously evolving line of quality objects created in collaboration with the users. As already explained, interested users will develop together with the staff of the lab their product ideas, which will be produced and sold under the brand *la* B. The Projects will be chosen on the basis of feasibility and design, and will be sold within the laboratory or may be purchased in the section 'la B' of the website. In the section 'istruzioni' once registered, members can create 'instructions' that are step-by-step descriptions of projects they want to share online. They will be written in such a way that they easily allow other members to replicate, and share with the rest of the community. Members can also upload videos and slideshows, depicting a project that they have not documented.
Uploading instructions users with



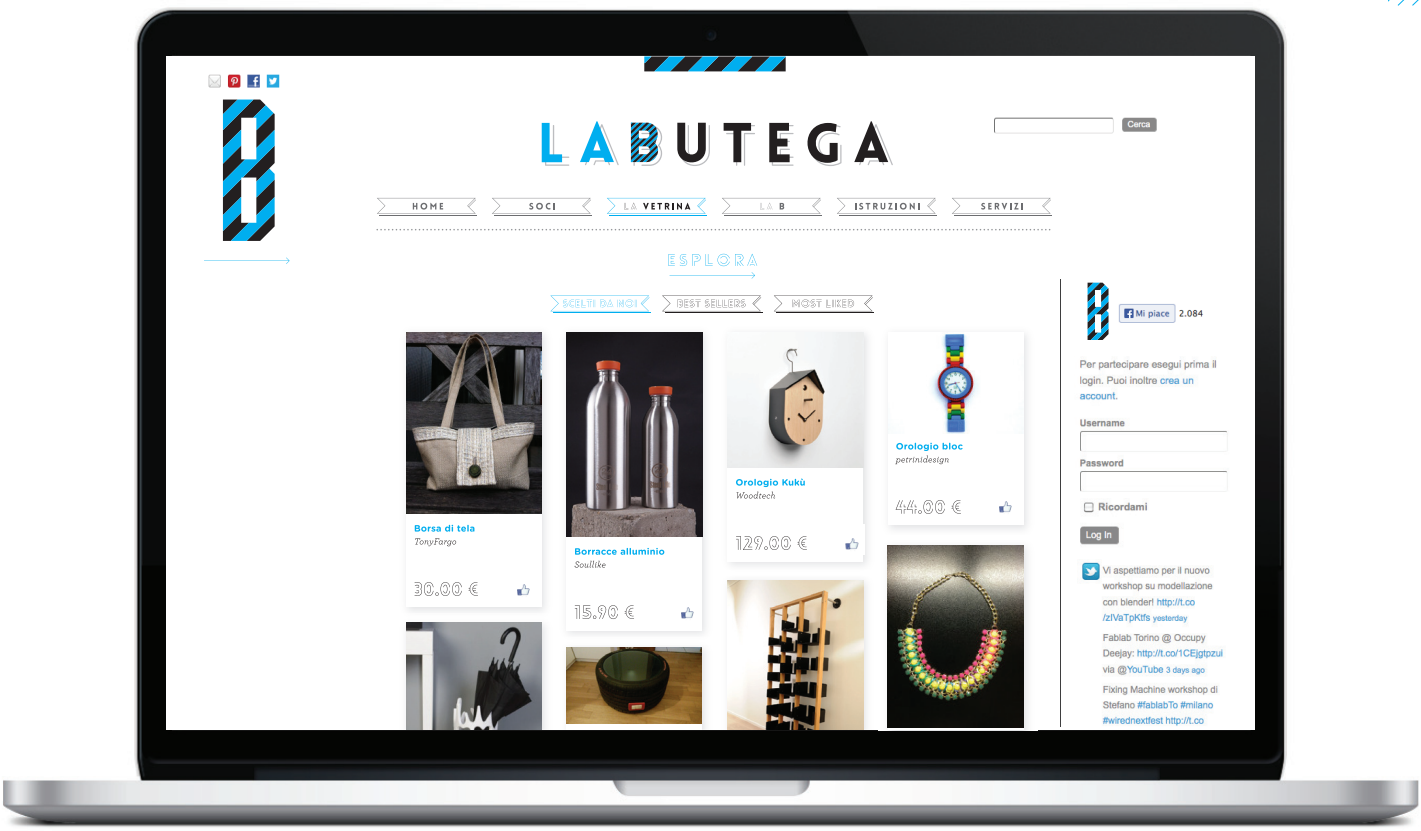
COURSES *list section*

membership card will have the possibility to earn credits valid for all Labutega services. By doing this we want in a certain way to 'force' sharing and exchange of ideas within the laboratory, rewarding those who share with a fair recompense. The last section is dedicated to additional services offered by Labutega, which can be very useful especially for those who need to realize serial productions. In fact, in the services section will be possible to directly access the network of artisans and SMEs which revolves around Labutega. Local artisans will be available through a database of processes/services offered and geographic location, with the respective ratings given by the users themselves. The service will be implemented with a software of e-procurement, which will allow the request for quotes from multiple vendors, and easily manage



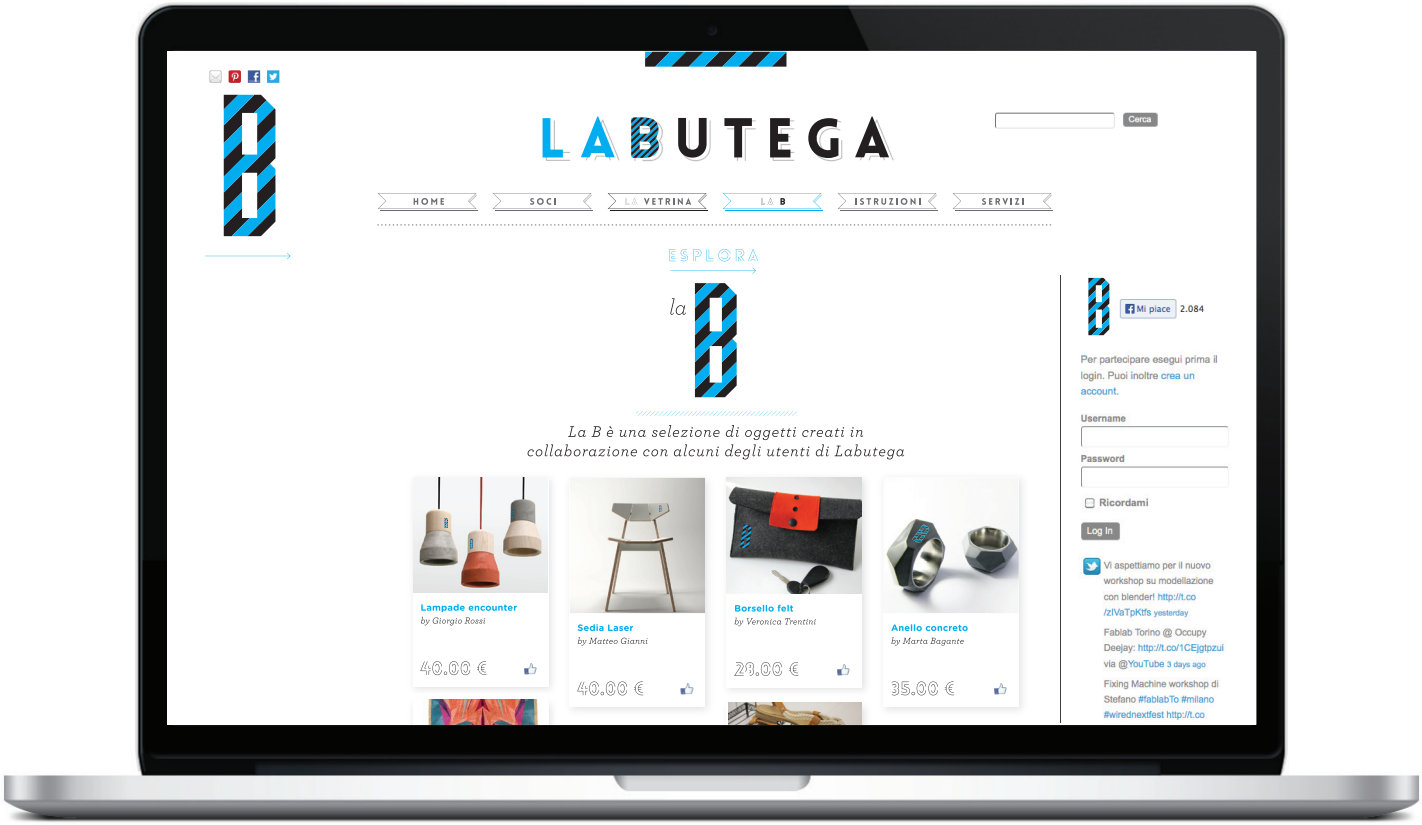
EQUIPMENT *booking page*

purchase orders, contracts and invoices. Users can search within the network the services to which they are interested, or through the e-procurement service can request competitive auctions, and receive several quotes, paying a small percentage. Through the website we want to try to create the largest possible number of interactions, both between users and between users and local artisans. From these interactions we believe that many interesting collaborations could arise, which will find in the laboratory of Labutega a fertile space where to develop further. In these difficult times we try to stimulate the creation and growth of new businesses, that can prove to be remunerative for users, providing all of these physical and virtual tools of which we have spoken above. So the website will have a key role in the development of the project Labutega, not only as an online

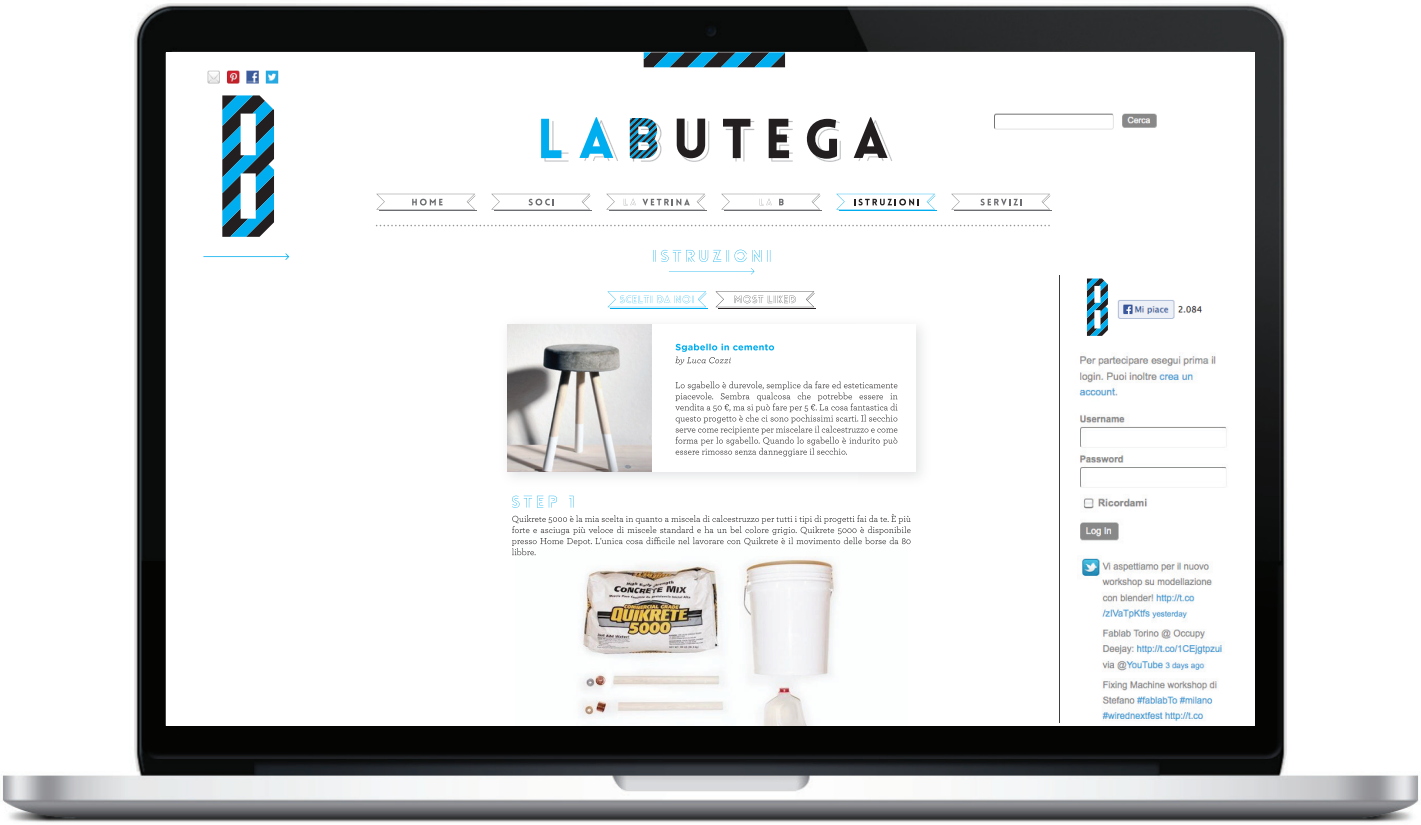


LA VETRINA *Labutega's marketplace*

space to promote the project itself, but as a place of sharing and interaction, both at the level of know-how, information, knowledge, and at a more material level, of products, creations and services.



LA B *Labutega's brand section*

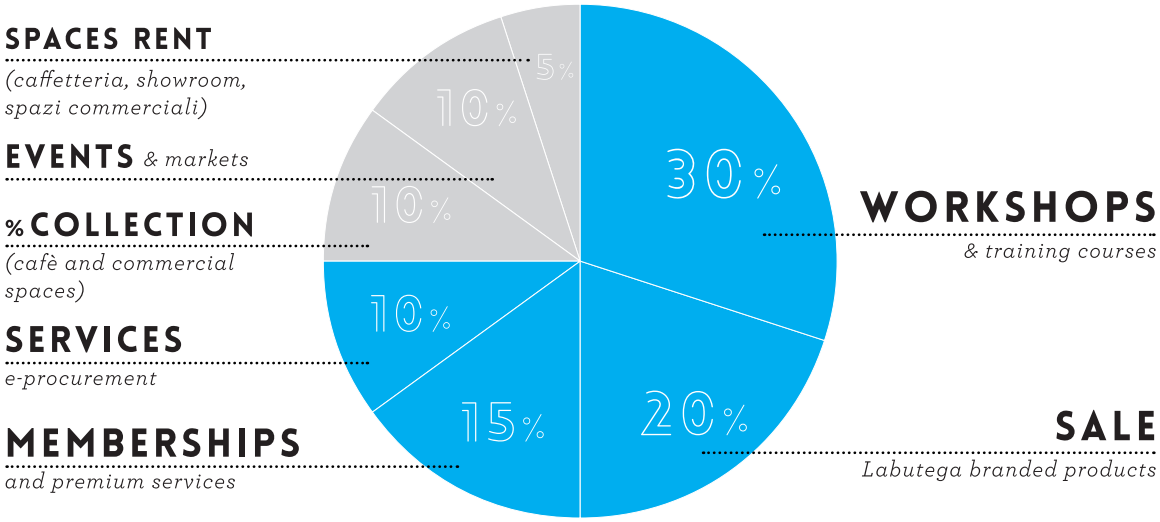


INSTRUCTIONS *uploaded by the ue*

NETWORK *of artisans and processes*

03.5

FURTHER ANALYSIS



REVENUES *expected revenues in percentages*

As we have seen, a fundamental component of our structure will be the educational effort. Workshops will be the main activity of Labutega, and therefore the major source of revenue, with an estimated 30% of the total income. Of course for members attending certain courses will be included in the cost of subscription, such as safety and basic use courses, but to take part in more advanced courses they will have to pay, either in credits or in money. The educational component then becomes the fulcrum around which the whole factory revolves, both from the economic and social point of view, because the intention is to involve artisans and professionals who can share their expertise, and to provide them new opportunities of development. Another element that we believe has a lot of potential from the remunerative perspective is the sale of Labutega branded products. Also in this case, in addition to the economic value will be very interesting to see how the network of relations and exchange between users/Labutega/artisans will evolve, and the creations that will emerge from these collaborations. The costs of membership will consistently affect the revenue stream, followed by the e-procurement service, which if fully exploited, however, could be much more profitable than expected, as

not a new tool, but brought to this new dimension could be adopted by a larger number of users, who should then pay a percentage for each auction won (both from suppliers to users).
Other revenues will come from the percentage of collections of the cafeteria, from the organization of various events and markets, and from the rental of the spaces, that is going to be possible for individuals and businesses. Labutega does not want to have the presumption to invent anything new, what we have done is to simply group under the same roof elements already encountered in several different realities on the Milanese and Italian territory. Among the features that we have taken into analysis in comparison with other laboratories there are 'openness' to the public, digital production technologies such as 3D printing and laser cutting, 'traditional' production with conventional equipment, the production of network given by the e-procurement service and the creation of a web of relationships with artisans and SMEs, online sales on our e-commerce and offline sales in the Labutega store. The other laboratories with which we confronted in this analysis are Vectorealism, where the projects are realized thanks to laser cutting and 3d printing, and where users can upload their own projects, or download the files created by other users; Officine Arduino, the Turinese FabLab born thanks to the support of the creators of Arduino, a makerspace mainly focused on creation and sharing of digital knowledge and fabbing; Talent garden Milan, a digital campus, a coworking space where startups, freelancers, incubators, accelerators and businesses coexist; Miocugino, a recently born workshop that wants to help people in the realization of their ideas; and finally Fablab Reggio Emilia, another recently born laboratory, more related to the digital model of the FabLab. One of the things that stands out from the comparison with these different realities is that they often focus only on new digital technologies, ignoring the vast repertoire of craft skills that instead we want to employ. In addition, we did not encounter an effort in creating a network of relationships and interactions such as the one we would like to create around labutega.

GOOD FAIR BAD

COMPETITORS *and features compared*

OPEN TO PUBLIC WORKSHOP | LASER CUT | 3D PRINTING | TRADITIONAL PRODUCTION | NETWORK PRODUCTION | E-COMMERCE | OFFLINE SALES

LABUTEGA
www.labutega.it
It is a space equipped open to the public to build, modify, or repair just about anything.

VECTOREALISM
www.vectorealism.com
Vectorealism is an online service for digital manufacturing using laser cutting.

OFFICINE ARDUINO
www.fablabtorino.org
It is a laboratory for digital manufacturing and a makerspace.

TAG
www.milano.talentgarden.it
It is a coworking space intended to startups, freelancers, agencies, VCs, incubators, accelerators and businesses.

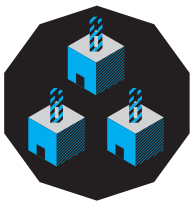
MIOCUGINO
www.labutega.com
It is a workshop where to seek help if you want to realize an idea but do not know how to do it.

FABLABREGGIOEMILIA
www.fablabreggioemilia.org
It's a Fab Lab which provides users with the equipment needed to give substance to their ideas.

WE LIKE TO

THINK BIG

because Labutega is a scalable business



FRANCHISING
Creation of a Labutega franchise network

BRAND
Sale of Labutega branded products

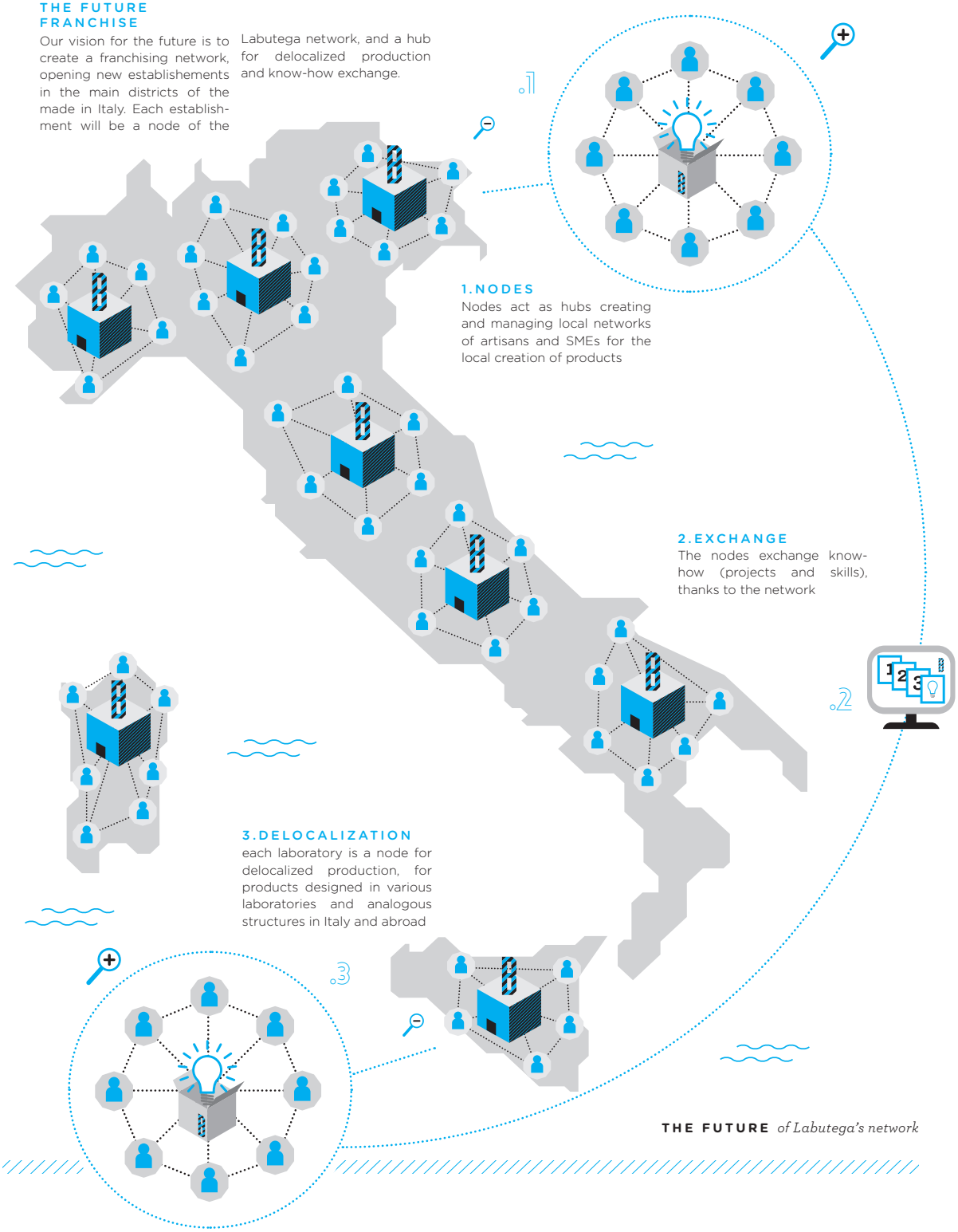
HUB
Electronic hub open to everyone

We believe that Labutega can be a scalable business, thanks to three elements upon which the whole project is based.
First of all we think that in the future it will be possible to create a franchise network, and open Labutega in other italian cities. Another scalable element is the electronic hub, open to everyone and reproducible for each different location. The third scalable element is the sale of Labutega branded products. We imagine in the future of being able to create a franchising network, and being able to open new establishments in the main districts of Made in Italy, where the culture of making and design coexist; we imagine to turn each laboratory into a delocalized productive node for products designed in various laboratories and analogous structures in Italy and abroad; nodes will act as hubs creating and managing local networks of artisans and SMEs. The nodes exchange know-how (projects and skills) and deal with the production and local marketing. Designed in Italy, produced on the spot. Of course this is just a vision for the future, but we like to think big because we believe that there are the right conditions for development.

VISION

THE FUTURE FRANCHISE

Our vision for the future is to create a franchising network, opening new establishements in the main districts of the made in Italy. Each establishment will be a node of the Labutega network, and a hub for delocalized production and know-how exchange.



1.NODES

Nodes act as hubs creating and managing local networks of artisans and SMEs for the local creation of products

2.EXCHANGE

The nodes exchange know-how (projects and skills), thanks to the network

3.DELOCALIZATION

each laboratory is a node for delocalized production, for products designed in various laboratories and analogous structures in Italy and abroad

THE FUTURE *of Labutega's network*

We have a macro plan that we want to follow to create Labutega: on the one hand we are looking for the right spaces where to create the laboratory, while on the other we continue to seek partners and sponsor in order to cover some of the fixed costs and to start to collect equipment and machinery. Among the ideas that we have there is also to run a crowd funding campaign to help fund the project, offering as a reward individual memberships or membership packages. We know that it may take some time prior to find financing and spaces, so we want to start organizing workshops inside of already existing laboratories, in partnership with the artisans of the Milan area, and by doing so begin to populate the database of companies/artisans that will form the network of Labutega. In the next page is an analysis of all the investing costs in the startup phase, and a first analysis of the sustainability of the whole project in the first three years of life. Although this is substantial investment, the sources of revenues estimated even in non-optimal scenarios turn out to

MACRO PLAN *prior to the beginning of the work*

1. Spaces research
2. Identification business name and creation legal entity
3. Partner Search (for fixed costs covering)
4. Sponsor search (furnishings, initial equipment, supplies,advertising and communication)
5. Definition and design major management processes
6. Launch crowdfunding/financing campain (companies + individuals with subscription card)
7. Experts recruiting
8. Organization of workshops in other laboratories
9. Populating of the network's companies/artisans database
10. Website realization
11. Social network pages managment
12. Organization of support events for crowdfunding/financing campaigns (even in schools with authorization)
13. Volunteers recruiting
14. Contracts drafting (barter deals)

be sufficient to cover costs and for the generations of margins. We also took into analysis various methods to reduce costs, especially for the retrieval of equipment, machinery and furnishings, for which will be proposed the formula of barter agreement, or will be purchased from trustees in bankruptcy or judicial auctions, or retrieved on the secondhand market. There are also points of attention that should be studied in greater detail in a subsequent phase of the project, but that should not be underestimated. As we can see the economic analysis has been made according to different hypothesis, considering best, worst and average scenarios, and barter deals, sponsorships and donations have not been considered. In the worst scenario machines are assumed to be purchased new, while in the best scenario are assumed to be purchased second hand.

STARTUP *costs analysis*

	STARTUP COSTS	YEAR 1		
		WORSE	BEST	AVERAGE
A	Company constitution + other bureaucratic procedures	10.000	3.000	6.500
B	Consulting/personal services	10.000	2.000	6.000
C	Renovation/upgrading consulting systems/personal services	174.250	105.500	139.875
D	Purchase machinery/equipment	300.000	100.000	200.000
E	Purchase PC + software	28.600	15.400	22.000
F	Furnishings	60.000	30.000	45.000
G	Audio/video system for eventi	12.000	6.000	9.000
H	Realizatione website/apps	10.000	2.000	6.000
I	Surveillance system/badge access control	12.000	4.500	8.250
L	Utilities enabling (water, electricity 220V, 380V, gas)	10.000	2.500	6.250
M	Wi-Fi enabling (100Mbit fiber, 100 simultaneous logins)	2.500	1.200	1.850
N	Communication/launch events	18.000	6.000	12.000
O	Total startup costs (€)	**647.350**	**278.100**	**462.725**

C. Hypothesis tidy building, without environmental remediation, with standard plants. Expected complete makeover bathrooms and bar's support services, closed offices and baby parking (worst case, 300 square meters, best case, 150 square meters, renovation cost € 500 / sq.m). For the remaining area slight renovation cost 25 € / sqm.

D. In the worst case all the machines are assumed to be purchased new in high-end price. In the best case, machinery and equipment purchased second hand at the high end of the second hand market. Conservatively barter deals, equipment deriving from sponsorship and donations from companies have been overlooked.

F. Excluded Bar/coffee shop, baby parking, and internal store furnishings (payable by the trading partner). Conservatively barter deals, sponsorships and donations are not considered.

IS IT

SUSTAINABLE?

(economically)

		YEAR 1			YEAR 2			YEAR 3		
		50%			100%			100%		
		WORST	BEST	AVERAGE	WORST	BEST	AVERAGE	WORST	BEST	AVERAGE
A	Income from subscriptions	21.775	47.906	34.840	43.551	69.681	52.261	52.883	84.612	63.459
B	Income from Workshops	66.960	200.880	133.920	139.500	418.500	279.000	223.200	669.600	446.400
C	Income from sublets	30.070	36.752	33.411	67.916	83.008	75.462	76.915	94.007	85.461
D	Income from Revenue Sharing	20.700	40.500	30.600	44.800	88.000	66.400	52.800	110.400	81.600
E	Income from event organization	32.366	39.559	35.963	64.733	79.118	71.925	92.475	113.025	102.750
F	Other income	*Not estimated as a protective measure*								
G	**total revenues**	171.871	365.596	268.734	360.499	738.307	549.403	498.273	1.071.645	784.959
H	**Total current costs**	288.410	185.367	236.888	677.859	431.064	554.461	749.230	489.889	619.560
G-H	**Margin (€/year)**	-116.539	180.229	31.845	-317.360	307.242	-5.059	-250.957	581.755	165.399

The revenue sources considered turn out to be sufficient to cover costs and to generate margins (sometimes meaningful) even in scenarios that are not optimal (average).

The estimate of the magnitude of other revenue streams is needed for the correct evaluation of the risk associated with the contemporary occurrence of worst-case scenarios in terms of both costs and revenues.

From the point of view of economic feasibility appear to be critical the ability of seeking funds in better conditions than those of the market both from the point of view of duration (minimum 10 years) and from the point of view of the rates (max 8%)

The use of discounted/free spaces would allow to release at least partially one of the two constraints inherent to obtain financing.

COST REDUCTION CUES

For the procurement of equipment and furnishings will be proposed the formula of barter deal to companies. In return for the provision companies will receive a certain number of subscriptions to give away to customers and/or employees, and will have the chance to use spaces of the structure to expose some products in dedicated corners or to organize promotional events.

Similarly, barter deals can also be used to get some particularly advanced and expensive equipment, with the formula of loan for use

for limited periods of time (during which organize workshops or carry out small productions).

In order to contain costs, equipment not retrieved by the sponsoring companies will be bought from trustees in bankruptcy, in judicial auctions or retrieved on the secondhand market.

ATTENTION POINTS

Bureaucratic/fiscal managemen of the “volunteers” collaborators in exchange for credits or membreship.

Management of various economic activities in the same place (training, equipment and spaces hire, selling products, consulting services).

Management of security issues.

What can you do when there is no supervision of the personnel? Verify it is possible that someone uses the space when not supervised.

COSTS AND REVENUES

Indicated in the next pages the analysis done on all the hypothetical proceeds from the various workstations, from workshops and training courses on payment, from sub-letting of the various spaces available, event organization, and income from revenue sharing. Finally will be analyzed current costs and personnel costs.

INCOME FROM STATIONS SUBSCRIPTIONS

			YEAR 1			YEAR 2			YEAR 3		
			WORST	BEST	AVERAGE	WORST	BEST	AVERAGE	WORST	BEST	AVERAGE
A		Number of stations		40			40			40	
B		#users for each station	2,5	5,5	4	2,5	5,5	4	2,5	5,5	4
C	A x B	MAX subscribers (potential)	100	220	160	100	160	120	100	160	120
D		Saturation rate stations		35%			70%			85%	
E	C x D	Estimated # subscribers x year	35	77	56	70	112	84	85	136	102
F	10%E	# Subscribers for free	3,5	7,7	5,6	7	11,2	8,4	8,5	13,6	10,2
G	70%E	# Subscribers reduced fare	25	54	39	49	78	59	60	95	71
H	20%E	# Subscribers full fare	7	15	11	14	22	17	17	27	20
I	Gx49x11,5	Income reduced fare	13.806	30.373	22.089	27.612	44.178	33.134	33.528	53.645	40.234
L	Hx99x11,5	Income full fare	7.970	17.533	12.751	15.939	25.502	19.127	19.355	30.967	23.225
		Total income from subscriptions (€/year)	**21.775**	**47.906**	**34.840**	**43.551**	**69.681**	**52.261**	**52.883**	**84.612**	**63.459**

- Opening hours 8-24, 7 days a week
- Positions reserved for 4h/gg to workshops and training courses
- Average time spent on position 2-5h/gg (source TechShop)
- Number of subscribers per seat from 2.5 to 5.5 per day
- Monthly subscription TechShop from $ 99/month $ 129/mese depending on the location
- 10% of subscribers for free (unemployed, cassintegrati, students)
- 70% of subscribers at reduced fare (average fee of 49 €/month)
- 20% of subscribers at the full fare (99 €/month - mostly business users)
- Saturation rate workstations, fully used (85%) achieved in the third year
- Saturation rate workstations, average first year 35%
- Saturation rate average second year 70%

INCOME FROM WORKSHOP/TRAINING

			YEAR 1			YEAR 2			YEAR 3		
			WORST	BEST	AVERAGE	WORST	BEST	AVERAGE	WORST	BEST	AVERAGE
A		# Days with workshops		180			250			300	
B		# Workshops per day	2	6	4	2	6	4	2	6	4
C	AxB	# Workshop/year	360	1.080	720	500	1.500	1.000	600	1.800	1.200
D		# Enrolled x workshop		4			6			8	
E	DxC	# enrolled/year	1.440	4.320	2.880	3.000	9.000	6.000	4.800	14.400	9.600
F		# Workshops with Kit		50%			50%			50%	
G	ExF	# Kit/year	720	2.160	1.440	1.500	4.500	3.000	2.400	7.200	4.800
H	Gx5 €/Kit	Total income from workshops Kit (€/year)	**3.600**	**10.800**	**7.200**	**7.500**	**22.500**	**15.000**	**12.000**	**36.000**	**24.000**
I		# Days with workshops		2			2			2	
L	CxDxI	# Workshops per day	2.880	8.640	5.760	6.000	18.000	12.000	9.600	28.800	19.200
M	0%L	# Workshop/year	288	864	576	600	1.800	1.200	960	2.880	1.920
N	0%L	# Enrolled x workshop	2.016	6.048	4.032	4.200	12.600	8.400	6.720	20.160	13.440
P	20%L	# enrolled/year	576	1.728	1.152	1.200	3.600	2.400	1.920	5.760	3.840
Q	Nx20€/h	# Workshops with Kit	40.320	120.960	80.640	84.000	252.000	168.000	134.400	403.200	268.800
R	Px40€/h	# Kit/year	23.040	69.120	46.080	48.000	144.000	96.000	76.800	230.400	153.600
S	Q+R	Total income workshop hours(€/year)	**63.360**	**190.080**	**126.720**	**132.000**	**396.000**	**264.000**	**211.200**	**633.600**	**422.400**
T	H+S	Total income from workshops (€/year)	**66.960**	**200.880**	**133.920**	**139.500**	**418.500**	**279.000**	**223.200**	**669.600**	**446.400**

- Opening hours 8-24, 7 days a week
- Positions reserved for 4h/gg to workshops and training courses
- On average 4 workshops/day average length 2h (TechShop average, duration 1.5 hours to 3 hours)
- Average fare 20 €/h net of consumables and kits of materials and components (TechShop average converted in rates between 15 €/h and 40 €/h)
- Average number of participants x workshop (TechShop range 4-20 members/workshop, average conservatively reduced to 8)
- 10% workshop hours provided for free
- 70% workshop hours provided at average fare (20 €/h)
- 20% hours provided at max fare (40 €/h)
- 5 €/Kit margin of kit materials and components (provided by Labutega) x workshop x participants (50% of the workshops include kit)

INCOME FROM SPACES SUBLET

		Unitary Surface	#units	Market rent x Sqm (€/month)		Market rent x Sqm (€/month)		Labutega canon (€/mese)	YEAR 1 35%	YEAR 2 70%	YEAR 3 85%
A	Closed workstations	15	6	7	10	105	150	199	5.015	10.030	12.179
B	Pc stations	6	15			150	300	129	8.127	16.254	19.737
C	storage small*	2	24	15	60	30	120	29	2,923	5.846	7.099
D	Storage medium*	7,5	6	15	60	113	450	89	2.243	4.486	5.447
E	Closed offices	25	4	13	27	325	675	299	5.023	10.046	12.199
F	Showroom/temporary shop	20	1	20	30	400	600	see events			
G	Internal shop supplies	20	1	18	30	360	600	400	1.680	4.800	4.800
H	Coffe Shop/bar	80	1	15	35	1.200	2.800	1.000	4.200	12.000	12.000
I	Baby parking	150	1	10	20	1.500	3.000	1.000	4.200	12.000	12.000
	Total rental income (€/year)								**33.411**	**75.462**	**85.461**

A. The market price only refers to rent + expenses. Labutega's canon includes utilities, Wi-fi and facilities
B. Market price of stations in coworking spaces in Milan
C. Market price referred to self storage services in the Milan area (Easybox, Safe)
D. Medium storage in 20-foot container (shared). The containers will be positioned inside or outside of the structure
E. Price inclusive of utilities and facilities
F. The temporary shop will be used to display and sell items produced by Labutega users. The space will be rented with daily/weekly fare in occasions of events (eg Salone del Mobile)
G. The management of internal shop (for sales of small equipment, supplies and materials) will be assigned to a partner company with revenue sharing (assuming 10% on turnover)
H. The management of the café/bar will be entrusted to a partner company with revenue sharing (assuming 15% on turnover)
I. The management of the baby parking will be left to a cooperative. No revenue sharing but controlled prices for members and preferential hiring for unemployed middle-aged ladies

INCOME FROM ORGANIZATION OF EVENTS

		Driver revenue calculation	Duration (day/event)	# events/ year	day/year	Average surface rented for event (sqm)	Market reference	Labutega canon	YEAR 1 35%	YEAR 1 70%	YEAR 1 100%
A	Presentations/products services	Number of events (sponsorship x event)	0,5	25	12,5	N/A	500 €/day	500 €/day	2.188	4.375	6.250
B	Markets/short exhibitions	Number of events (sponsorship x event)	1,0	16	16	N/A	1500 €/day	1500 €/day	8.400	16.800	24.000
C	Fairs/Exhibitions	Rent (€/sqm x day)	3,0	3	9	250	10-12 €/sqm x day	10 €/sqm x day	7.875	15.750	22.500
A	Salons (Mobile,EICMA,...)	Rent (€/sqm x day)	5,0	3	10	100	fino a 110 €/sqm x day	50 €/sqm x day	17.500	35.000	50.000
	Total income from organization of events (€/year)								**35.963**	**71.925**	**102.750**

INCOME FROM REVENUE SHARING

			COFFEE SHOP/BAR	YEAR 1			YEAR 2			YEAR 3		
				WORST	BEST	AVERAGE	WORST	BEST	AVERAGE	WORST	BEST	AVERAGE
A			# Opening days	180			320			320		
B			Daily takings (€/day)	500	1.100	800	600	1.300	950	700	1.500	1.100
C		AxB	Yearly taking (€/day)	90.000	198.000	144.000	192.000	416.000	304.000	224.000	480.000	352.000
D			% Labutega	15&			15%			15%		
E		CxD	Total revenue sharing Bar/coffeshop (€/year)	**13.500**	**29.700**	**21.600**	**28.800**	**62.400**	**45.600**	**33.600**	**72.000**	**52.800**
			INTERNAL SHOP SUPPLIES	WORST	BEST	AVERAGE	WORST	BEST	AVERAGE	WORST	BEST	AVERAGE
F			# Opening days	180			320			320		
G			Daily takings (€/day)	400	600	500	500	800	650	600	1.200	900
H		FxG	Yearly taking (€/day)	72.000	108.000	90.000	160.000	256.000	208.000	192.000	384.000	288.000
I			% Labutega	10%			10%			10%		
L		HxI	Total revenue sharing Internal shop supplies (€/year)	**7.200**	**10.800**	**9.000**	**16.000**	**25.600**	**20.800**	**19.200**	**38.400**	**28.800**
M		E+L	Total income from revenue sharing (€/year)	**20.700**	**40.500**	**30.600**	**44.800**	**88.000**	**66.400**	**52.800**	**110.400**	**81.600**

B. The management of the coffee shop / bar will be entrusted to a partner company. The daily takings indicated is represented by an average taken over the market for bars in any size and similar areas similar to those being sought. Conservative estimate of opening hours 12h (8-20) on 16h potential. Coffee shop / bar open to external clients.

F. The management of the shop of consumables, materials and small equipment will be entrusted to a partner company. Daily takings recorded on the market for hardware of similar size. Conservative estimate of opening hours (1oh 9-19). The receipts do not include materials and supplies sold online. Store is also open to external clients.

CURRENT COSTS

	CURRENT COSTS (€/YEAR)	YEAR 1 50%			YEAR 1 100%			YEAR 1 100%		
		WORST	BEST	AVERAGE	WORST	BEST	AVERAGE	WORST	BEST	AVERAGE
A	Rent	147.960	82.200	115.080	147.960	82.200	115.080	147.960	82.200	115.080
B	Consulting/Professional Services			0	5.000	2.000	3.500	5.000	2.000	3.500
C	Personnel costs (see details)	258.500	211.500	235.000	299.750	245.250	272.500	368.500	301.500	335.000
D	Utilities (electricity, water, gas)	14.400	7.200	10.800	19.200	9.600	14.400	24.000	12.000	18.000
E	Wi-Fi canon	6.000	3.600	4.800	7.200	4.800	6.000	7.200	4.800	6.000
F	Administration/Accounting	3.000	1.500	2.250	3.000	1.500	2.250	3.000	1.500	2.250
G	Hosting/IT management (excluding staff)	600	300	450	1.200	600	900	1.200	600	900
H	Insurance (RC + injuries)	12.000	6.000	9.000	12.000	6.000	9.000	12.000	6.000	9.000
I	Capital funding share	64.735	27.810	46.273	64.735	27.810	46.273	64.735	27.810	46.273
L	Financial charges	51.788	22.248	37.018	46.609	20.023	33.316	41.430	17.798	29.614
M	Supplies/materials	6.000	1.800	3.900	9.000	4.800	6.900	12.000	7.200	9.600
N	maintenance equipment/machinery/furniture			0	32.368	13.905	23.136	32.368	13.905	23.136
O	Facility mangement (cleaning/maintenance building)	11.837	6.576	9.206	11.837	6.576	9.206	11.837	6.576	9.206
P	Marketing/Advertasing/Merchandising			0	18.000	6.000	12.000	18.000	6.000	12.000
Q	Total Current Costs	**576.820**	**370.734**	**473.777**	**677.859**	**431.064**	**554.461**	**749.230**	**489.889**	**619.560**
R	Total Current Costs (new parameters)	**288.410**	**185.367**	**236.888**	**677.859**	**431.064**	**554.461**	**749.230**	**489.889**	**619.560**

A. Estimated cost at market prices with reference to the average area of 1370 square meters. Market cost for detected laboratories in any size and similar positions included in the range 5 €/sqm/month (worst case)

I. Conservative estimate of financing 100% of startup costs in 10 years at a rate of 8%. Returning linear principal amount (1/10 of the total annually, the first year reduced to 50%)

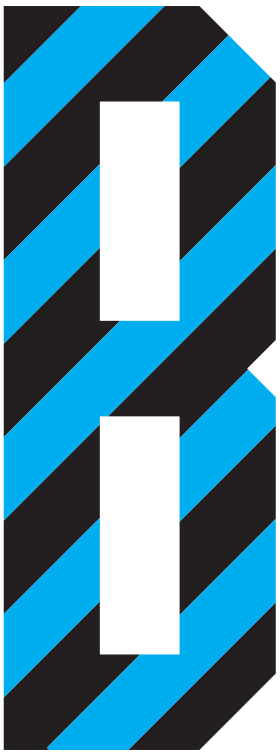
N. Hypothesis annual maintenance cost (starting from the second year) equal to 5% of the cost incurred for the purchase of equipment/machinery and furniture

O. Hypothesis facility management (cleaning and building small maintenance) 8% of the annual cost of rent

PERSONNEL COSTS

PERSONNEL COSTS			YEAR 1 reduced to 50%					YEAR 2 100%					YEAR 3 100%				
			A	B	C= A+0,5B	D	CxD	A	B	C= A+0,5B	D	CxD	A	B	C= A+0,5B	D	CxD
			Full time	Part time	Total (FTE)	€/FTE	Total (€/year)	Full time	Part time	Total (FTE)	€/FTE	Total (€/year)	Full time	Part time	Total (FTE)	€/FTE	Total (€/year)
A	Director		1		1,0	35.000	35.000	1		1,0	35.000	35.000	1		1,0	35.000	35.000
B	accounting/ administration	Accounting, administrative management (bills, invoices, insurance, other bureaucratic procedures)		1	0,5	25.000	12.500		1	0,5	25.000	12.500		1	0,5	25.000	12.500
C	communication Manager /social media marketing manager	Organization of events, blogs and social media management, media relations		1	0,5	25.000	12.500		1	0,5	25.000	12.500		2	1,0	25.000	25.000
D	Customer care	Reception, schedule management, information service, distribution of kits equipment/supplies, online customer support, organizational support for workshops and training courses, supervision at temporary shop and customers assistance		2	1,0	25.000	25.000		3	1,5	25.000	37.500		4	2,0	25.000	50.000
E	Supervisors	Supervision (for restricted areas and/or specific equipment), teaching in training courses and workshops	2	6	5,0	25.000	125.000	4	4	6,0	25.000	150.000	4	6	7,0	25.000	175.000
F	IT manager	Administration website and applications, PCs and software management and support, network management and access Wi-Fi		1	0,5	25.000	12.500		1	0,5	25.000	12.500		1	0,5	25.000	12.500
G	Handyman	small maintenece/ assistance		1	0,5	25.000	12.500		1	0,5	25.000	12.500		1	1,0	25.000	25.000
H	Total personnel costs (€/year)				**9,0**		**117.500**			**10,5**		**272.500**			**13,0**		**335.000**

Annual cost for FTE estimated as an average across personnel on permanent contracts and personnel on call/on project. Conservatively the number of FTE does not include the support of volunteers (paid with credits) active in all areas with the exception of Management and Administration/Accounting. In allocating fixed costs/variable costs, we considered the percentage of 50% -50%



04.0

CONCLUSION

The economic crisis that the world has been facing for several years now, has revived the old model of the small craft production in all fields and for a simple reason: people affected by unemployment have had to 'invent a job'. And those of them who knew how to do something with their hands have turned to this type of activity to continue to earn something. The online environment then, has not only made available some effective and inexpensive ways to advertise the small activities, but has even created some real knowledge, production and marketing platforms.

New frontiers and new challenges for the artisan world impose a reflection and an interest about some phenomena related to the new forms of craftsmanship. By going to rewrite the genetic code in the craftsmanship, the phenomena of which we have spoken bring new challenges to the representation, but at the same time, they highlight the relationship between small businesses and innovation, far from being opposed. Craftsmanship is by its very nature sensitive and receptive to the challenges that progressively faces. Declined in a technological and 'glocal' version, the sector is now a credible and fascinating way of life and development, if we will be able to invest in it properly and intelligently. In fact, although there are all the conditions to give concreteness to all these new trends, Italy is still lacking of a place that can act as a reference point to the new realities of making.

In a context of general lack of confidence on the ability of large economic aggregates to produce welfare and sustainable development, Labutega relies on an artisanal comprehensive model that can actually give impetus and open new horizons to the entire sector, thanks to new technological and social implementations.

Of course, the project that has been described in this thesis is a forward-looking vision of a very complex and not easy to achieve reality, but it has been thought of as a sum of several 'blocks' that can also function independently of each other, that we hope one after the other will constitute solid foundations.

NOTES

1. THE ARTISAN TRADITION

[1] Elisabetta Silvestrini, *Artigianato, in L'universo del corpo*, Roma, Enciclopedia Italiana Treccani,1999.

[2] Richard Sennett (born 1 January 1943) is the Centennial Professor of Sociology at the London School of Economics and University Professor of the Humanities at New York University. Sennett is probably best known for his studies of social ties in cities, and the effects of urban living on individuals in the modern world, and in this most ambitious book, he offers an original perspective on craftsmanship and its close connections to work and ethical values.
Richard Sennet, *The Craftsman*, New-Heaven London, Yale university press, 2008

[3] Distretto industriale, from Wikipedia, *http://it.wikipedia.org/wiki/Distretto_industriale*

[4] Quotation of Vyrus motorcycles founder, taken from *Intervista ad Ascanio Rodorigo* by Michele Lallai , in 'Motoblog', 25 gennaio 2011, *http://www.motoblog.it/video/385193/intervista-ad-ascanio-rodorigo*

[5] All the datas are taken from a research made by CNA, that stands for 'Confederazione Nazionale dell'artigianato e della Piccola e Media Impresa' (National confederation of the craftsmanship and small and medium enterprise). *Movimprese: le imprese artigiane in ginocchio,* Roma, CNA, 10 febbraio 2013, *http://www.cna.it/STAMPA-E-COMUNICAZIONE/Documentazione*

[6] Datas taken from *'i lavori artigianali a rischio di estinzione'* (the artisan jobs at risk of extinction), Elaborazione ufficio studi CGIA Mestre su dati Istat-Rcfl, CGIA Mestre, 2012, *http://www.cgiamestre.com/wp-content/uploads/2012/07/lavoroartigianale.pdf*

[7] Giuseppe Bortolussi is since 1980 director of CGIA (Associazione Artigiani e Piccole Imprese) in Mestre. In the early 90s he founded and still directs the Research Department of the CGIA of Mestre. Among the numerous trade union battles, has fought in the front line against the fiscal measures taken at national level in the 90s, that in fact would penalize small and micro enterprises: IRAP, the Dual Income Tax and industry studies. He is the founder and director of the quarterly magazine "Quaderni di ricerca sull'artigianato" and "Veneto, economia & società". Piece taken from taken from *'i lavori artigianali a rischio di estinzione'* (the artisan jobs at risk of extinction), Elaborazione ufficio studi CGIA Mestre su dati Istat-Rcfl, CGIA Mestre, 2012, *http://www.cgiamestre.com/wp-content/uploads/2012/07/lavoroartigianale.pdf*

[8] Marco Colombo is the national president of the Young Entrepreneurs of Confartigianato. Part of interview taken from the article by Giulia Cananzi, *Rinascimento artigiano*, from Il Messaggero di sant'Antonio, November 2012, pp.36-38.

[9] Giorgio Vittadini founded in 2002 the Foundation for Subsidiarity as a tool for cultural development through training activities, research, publications. is Professor of Methodological Statistics at the University of Milano Bicocca, and Scientific Director of the 'Consorzio Interuniversitario Scuola per l'Alta Formazione Nova Universitas'. In 2011 he has intervened at the opening of 'l'artigiano in fiera', and these quotes are taken from the article written about the event by Stefano Micelli, *Potrà il nuovo artigiano salvare l'Italia?*, su ItaliaFutura, 5 dicembre 2011, *http://www.italiafutura.it/dettaglio/112547/potra_il_nuovo_artigiano_salvare_litalia*

2. THE DIY INNOVATION

[1] Spencer, Amy, *DIY: The rise of lo-fi culture*, London, Marion Boyars Publishers, 2008.

[2] Kuznetsov, Stacey, Paulos, Erik, *Rise of the Expert Amateur: DIY projects, communities, and cultures*. In Proceedings of the 6th Nordic Conference on Human-Computer Interaction: Extending Boundaries (NordiCHI '10), ACM, 2010, pp.295-304.

[3] This is what the about section of The magazine 'Make' says, the leading magazine which brings the do-it-yourself mindset to everyday technology. *http://makezine.com/about*

[4] Dale Dougherty co-founded O'Reilly Media, a technical publisher and conference organizer known for its advocacy of Open Source and the Web. He coined the term "Web 2.0" while developing the Web 2.0 Conference. Dougherty started MAKE magazine, and is the creator of Maker Faire, which leads a growing maker movement in New York, Detroit and the Bay Area. An early Web pioneer, Dougherty was the developer of Global Network Navigator (GNN), the first commercial Web site launched in 1993. He's a former publisher of Web Review, the online magazine for Web designers. Dougherty developed the Hacks series of books to *"reclaim the term 'hacking' for the good guys,"* and he's the author of Sed & Awk. This quotation is taken from the first issue of Make magazine. Doherty, D. The Making of Make. In Make, 1, 2005, p.7.

[5] Lipson, associate professor of mechanical and aerospace engineering and computer science, and Kurman, of Triple Helix Innovation, make the case for strong government support of such digital fabrication technologies as the authors of a report commissioned by the White House Office of Science and Technology Policy. Personal fabbers have been developing over the past three decades for industrial applications, the report says. They are now reaching a "tipping point" where they will become reliable, versatile and affordable enough for the average consumer -- just like the rise of personal computers. Lipson., H., and Kurman, M., *Factory@Home: The emerging economy of of personal manufacturing,* report for Whitehouse Office of Science & Technology Policy, 2010, *http://www.mae.cornell.edu/lipson/factoryathome.pdf*

[6] from Gershenfeld, Neil, *Fab: The coming revolution on your desktop—from personal computers to personal fabrication*, New York, Basic Books, 2005, pp.59-62. Neil Gershenfeld is a professor at MIT and the head of MIT's Center for Bits and Atoms, a sister lab spun out of the popular MIT Media Lab. His research interests are mainly in interdisciplinary studies involving physics and computer science, in such fields as quantum computing, nanotechnology, personal fabrication, and other research areas. His lab is currently located in the E15 building at MIT. He is the inventor of FabLabs.

[7] from Anderson, Chris, *In the Next Industrial Revolution, Atoms are the New Bits*, In Wired, march 2010, pp.58 – 67. Chris Anderson (born July 9, 1961) is an American author and entrepreneur. He was with The Economist for seven years, then joining WIRED magazine in 2001 where he was the editor-in-chief until 2012. He is currently the cofounder and CEO of 3DRobotics, a drone manufacturing company.

[8] from Von Hippel, Eric, *Democratizing Innovation*, Cambridge, The MIT Press,2005. Eric von Hippel (born August 27, 1941) is an economist and a professor at the MIT Sloan School of Management, specializing in the nature and economics of distributed and open innovation. He is best known for his work developing the concept of user innovation – that end-users, rather than manufacturers, are responsible for a large amount of innovation. In order to describe this phenomenon, he introduced the term lead user in 1986. von Hippel's work has applications in business strategy and free/open source software (FOSS) and von Hippel is one of the most highly cited social scientists writing on FOSS.

[9] from Doctorow, Cory, *Makers*, London, HarperVoyager, 2010. Cory Efram Doctorow (born July 17, 1971) is a Canadian-British blogger, journalist, and science fiction author who serves as co-editor of the weblog Boing Boing. He is an activist in favour of liberalising copyright laws and a proponent of the Creative Commons organization, using some of their licenses for his books. Some common themes of his work include

digital rights management, file sharing, and post-scarcity economics.

[10] De Bruijn, E., *On the Viability of Open Source Development Model for the Design of Physical Objects*, 2010, *http://thesis.erikdebruijn.nl/master/MScThesis-ErikDeBruijn-2010.pdf*

[11] De Bruijn, E., *Self-replicating Devices: The statistics*, 2010, *http://blog.erikdebruijn.nl/archives/145-Self-replicating-devices-the- statistics.html*

[12] from the Ted talk by Massimo Banzi, *Come Arduino rende open-source l'immaginazione,* on TED, Junuary 2012, *http://www.ted.com/talks/massimo_banzi_how_arduino_is_open_sourcing_imagination.html.*
Massimo Banzi is the co-founder of the Arduino project. He is an Interaction Designer, Educator and Open Source Hardware advocate.

[13] from Bespoke website, *http://www.bespokeinnovations.com/content/what-fairing*

[14] from an article on scientific american. Hsu, Jeremy, *Why 3-D Printing Matters for "Made in U.S.A."*, on scientific american, 6 December 2012, *http://www.scientificamerican.com/article.cfm?id=why-3d-printing-matters*

[15] from Made in space website, *http://www.madeinspace.us/*

[16] from WASP website, *http://www.wasproject.it/*

[17] The Internet of Things refers to uniquely identifiable objects and their virtual representations in an Internet-like structure. The term Internet of Things was proposed by Kevin Ashton in 1999, in the paper *'That 'Internet of Things' Thing, in the real world things matter more than ideas'*. The concept of the Internet of Things first became popular through the Auto-ID Center at MIT and related market analysts publi-

cations.

[18] from Smart citizen website, *http://www.smartcitizen.me/*

[19] Article found on Gizmodo, *http://gizmodo.com/5822319/a-chilean-teen-tweets-about-earthquakes-better-than-his-whole-government*
20 from Ardusat website, http://spaceappschallenge.org/challenge/ardusat/

[21] from SmartThings website, *http://www.smartthings.com*

[22] information from techshop website, *http://www.techshop.ws/*

[23] Article made by Mark Hatch for CitizenTekk, *http://citizentekk.com/2013/04/08/indie-shop-6-world-changing-inventions-from-the-makers-movement/#sthash.giXviHxE.dpbs*

[24] All the information taken from the site managed by MIT's Center for Bits and Atoms that supports a digital fabrication facility and global network of field fab labs, *http://fab.cba.mit.edu/*

3.THE PLACE OF ENCOUNTER

[1] We took in consideration these user groups for the city of Milano, and we found the numbers from different sources:

Immigrants residing in Milano, 20-65 years old.
206.000
Comune di Milano statistics - 2012

Studenti Universitari
66.900

• Politecnico di Milano
37.900
MIUR - Enrolled in academic year 2012-2013

• Milano Statale
7.700
Only students enrolled in Mathematics, Physics and Natural Sciences
Ministry of Education - Members academic year 2012-2014

• Milano Bicocca
5.900
Only students enrolled in Mathematics, Physics and Natural Sciences
Ministry of Education - Members academic year 2012-2015

• Istituto Marangoni
2.200
Marangoni website

• Istituto Europeo di Design
8.000
Wikipedia - 21/06/2013

• Accademia di Brera
4.000
Wikipedia - 21/06/2013

• NABA
1.200
Wikipedia - 21/06/2013

Technical, Professional and Artistic Institutes students
15,300

• Technical Institutes (Aeronautical + Industrial)

9.400

Only Industrial and Aeronautical Technical Institutes, Education Statistics Comune di Milano - School Year 2009-2010

• Professional Institutes (Industrial)

2.400

Only Professional Industrial Institutes, Statistics of Education City of Milan - School Year 2009-2010

• Artistic education

3.500

Statistics of Education City of Milan - School Year 2009-2010

Inactive and unemployed

254,000

• Inactive (15-64 years old)

222.000

Dataset "Employment status of residents in Milan by year and gender (reference population 15-64)" - City of Milan - 2012

• In search of employment (15-64 years old)

32.000

Dataset "Employment status of residents in Milan by year and gender (reference population 15-64)" - City of Milan - 2012

SME Manufacturing Sector

18.000

Excluding the Construction sector, Chamber of Commerce of Milan - Mi-

lan productive Report 2012

artisan enterprises
13.000
Excluding the Construction sector, Chamber of Commerce of Milan - Milan productive Report 2012

freelancers (Only Engineers, Architects, Designers)
25.764

• Engineers
13.761
Website City of Milan - Survey on professions, the article 7/04/2012

• Architects
9.775
Website City of Milan - Survey on professions, the article 7/04/2012

• Designers
2.228
Website City of Milan - Survey on professions, the article 7/04/2012

Pensionati
217.037
website City of Milan - Survey on professions, the article 7/04/2012

Other
8.543

• Technicians
2.058

website City of Milan - Survey on professions, the article 7/04/2012

• Photographers
2.026
website City of Milan - Survey on professions, the article 7/04/2012

• Artists
1.572
website City of Milan - Survey on professions, the article 7/04/2012

• Taylors
1.176
website City of Milan - Survey on professions, the article 7/04/2012

• Illustrators
857
website City of Milan - Survey on professions, the article 7/04/2012

• Stylists
854
website City of Milan - Survey on professions, the article 7/04/2012

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ca, Roma, CNA, 2013.

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whole-government

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