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Open Design

New mechanisms for a new approach to design

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Abstract

The evolution of electronics, sustainable energy, digital and the web in the productive and entrepreneurial structure generated, in the second half of the twentieth century, the third industrial revolution. Defined by some scholars like Chris Anderson and economic newspapers like the "Financial Times": "A revolution in which the planner in general and the designer in particular have truly new technical, economic and above all formal language opportunities for the design of new elements". A phenomenon still in full swing, yet we are already talking about Industry 4.0, as synonymous with a fourth industrial revolution that presents a new feature, a new bidirectional relationship that re-examines two key players: producers and consumers. This complete connection has led to the creation of new products and services, which improve the level of efficiency of life by making it more productive.

Cyber-physics, in fact, the current technological science that integrates software and networking with new techniques of abstraction, modeling, design and analysis to the dynamics of physical processes, joins traditional design processes, generating a new stream of production process. Defined by Denis Santachiara, designer and Professor at NABA in Milan «[...] a virtual representation of a manufacturing process in a software environment [...]».

This new context presupposes the inclusion within the Internet network, "the network of networks", increasingly configured as a "Network Society", where to grasp the growing complexity of the digital revolution, the integration of new instruments that lead to the digital manufacturing. This determines an innovation in the language of designers, towards a new culture of the project, thanks to the resources developed by the new digital technologies. A new reality that turns into opportunities for young designers, in which transversal and multidisciplinary figures with a heterogeneous design background are needed, able to interact with the various facets of these means.

Keywords

3D print; makers; digital craftsmanship; sustainable materials; digital fabrication

1. New craftsmanship

The introduction of new technologies produces a renewal of the nature of the organizational and market context. The rediscovery of craftsmanship has drawn a common line to many advanced economies over the last ten years. The profound transformations that have marked our economy and the crises that have punctuated its evolution since the second half of the Nineties have repeatedly triggered a debate on new forms of work in an economy and in a knowledge society. This debate has different variations in the United States and in Europe, triggering converging economic and social transformations.

In the United States, several publications have helped to stimulate a new vision of work and innovation. Mark Frauenfelder, author of the volume Made by hand in 2010, was among the first to reflect on the theme of making as a tool for learning and discovering the material culture that surrounds us. Former journalist and profound connoisseur of the new economy, Frauenfelder has had the merit of re-proposing the value of doing starting from a rediscovery of the complexity of the objects that are part of our everyday life. Greater awareness of the material world around us stimulates a greater capacity for quality assessment and a more conscious consumer culture.

Figure 1. 3D printed objects

2. The social and economic field

The rediscovery of doing has never assumed regressive characters, linked to regret for lost trades and for a traditional organization of society, but rather represented an element of criticism to the limits of the current economic and social structure and a starting point for looking differently to the future. The 2009 book Makers of Cory Doctorow, foreshadowed a real battle between the proponents of a new way of working, the makers precisely, and the large corporations, interested in perpetuating an economic system based on the logic of innovation and property rights clearly unbalanced in favor of finance.

The strength of these ideas has not been confined to limited circles of readers passionate about the topic. In 2005 Frauenfelder became director of the magazine «Make», the monthly magazine promoted by Dale Daugherty, who in a few years became one of the reference points of the makers' community. The strength of the movement, especially in the United States, is mainly linked to the ability of these new figures to re-propose activities of a traditional nature in a new cultural and technological framework. It was from this editorial project that the Maker Faire circuit was born, the fairs of the makers who, first in the United States and then all over the world, have demonstrated that they can aggregate an ever-wider community of enthusiasts and professionals.

In Europe, the revisiting of manual activities linked to established trades has had a different path. In the Anglo-Saxon world, deeply marked by the cultural heritage of the works of John Ruskin and William Morris, the revisiting of the figure of the craftsman coincided with a close critique of the limits of financial capitalism and its cyclical crises. The book by Richard Sennett, The craftsman of 2009, develops in a complete manner the revival of an idea of work and of a worker capable of acting as a barrier to the logic of production and consumption that put man at the margins of economic development. The initiative of many cultural institutions has also contributed to the dissemination of a new sensibility towards artisan know-how. The Victoria and Albert museum in London, in particular, promoted the exhibition The power of making in 2011: the exhibition gathered extensive documentation on the current status of traditional crafts and the potential offered by new technologies compared to the possibility of new economic activities.

Figure 2. An example of FAB LAB

In the economic field, it is worth recalling how much the revaluation of the artisan work has helped to redefine the value of the assets referable to the luxury sector.

In Italy, the debate on the topicality of the artisan work has imposed itself not without difficulty. This debate has historically coincided with that on the small manufacturing and Service Company and this has made it difficult to highlight the contribution that the artisan work has produced in all the sectors of Made in Italy, regardless of the size of the company (Micelli, 2011). A more careful analysis today allows us to look with new eyes to the debt that many Italian manufacturers, from mechanics to furniture, from fashion to food industry, should recognize the heritage of knowledge of artisanship inherited and maintained in many Italian territories.

The possibility of considering artisan work as an essential part of evolved economic systems does not simply depend on the effectiveness and the goodness of the path of cultural and social legitimation initiated in the United States as well as in Europe. It also depends on the profound changes that are characterizing the production technologies and the evolution of the network. Just the changes initiated on these fronts, in particular the imposition of technologies of digital manufacturing, place the artisan work on the frontier of technological transformations of the last decade.

3. The digital manufacturing

The term digital manufacturing usually refers to the set of technologies for the production of manufactured products whose specific feature is to weld together the potential of consolidated tools with the computer and network calculation capacity. It should be emphasized that these technologies do not in themselves represent a novelty. The first CNC machine was built at the beginning of the Fifties at MIT (Massachusetts Institute of Technology) thanks to a combination of a lathe and a computer. The machines that exploit the potential of laser cutting have been on the market since the seventies and have become widespread in industrial companies. 3D printers (see three-dimensional printing), the most visible and emblematic technology of digital manufacturing, began to spread on the market as early as the mid-1980s and many of their functionalities - such as rapid prototyping - are widespread also in Italy since the mid-nineties.

Figure 3. Cartesian type 3D printer

Figure 4. Delta type 3D printer

What really represents an element of discontinuity compared to the past - and that prefigures what (Anderson, 2010) has called the next industrial revolution - is the reduction of the cost of these technologies and their increasing ease of use. On the one hand, these tools, especially 3D printers, have reached such low costs that they are accessible to the professional and family market. This cost reduction was possible thanks to the expiration of many international patents and the spread of new forms of open source intellectual property. The ease of use of these tools, on the other hand, is linked to the use of simplified man / machine interfaces, similar to those of PC software, and to the

possibility of referring to communities of practice capable of promoting the condition of knowledge through the web as well as through networks of dedicated laboratories (FabLab and Makerspace).

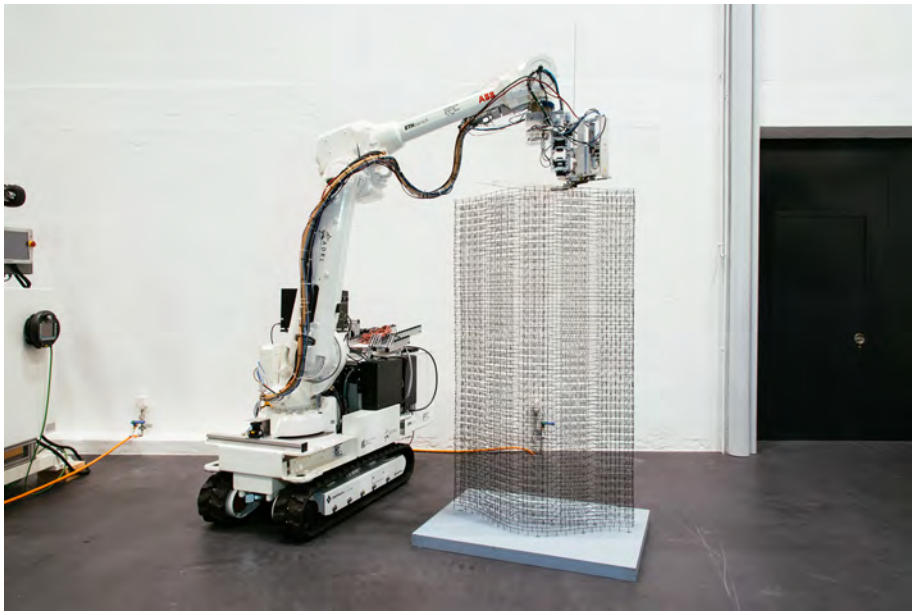

Figure 5. An example of a robot

Figure 6. 3D printed ceramic vases

The digital manifacturing label must not be limited, however, to the digital intelligence that today qualifies the manufacturing processes. Even products can become 'smart' thanks to technologies that significantly increase their ability to interact with users and the surrounding environment. The Arduino boards, small and very simple processors, invented and developed by Massimo Banzi and his working group in an open source logic, represent in this regard the emblem of a new generation of technologies able to contribute in a way significant to the connectivity of objects in the past lacking in intelligence and interactivity. These cards also allow people with limited technical knowledge, gained a little 'experience with the programming language, the design of common objects that have within them a digital intelligence.

4. Conclusion

The contribution of all these factors contributes decisively to a rapid process of democratization of the tools of production. Compared to the typical logics of mass production, the digital manufacturing technologies allow a new

generation of digitized artisans to develop a competitiveness based on the economies of variety and customization unimaginable with traditional technologies.

A first novelty for digital artisans concerns the international projection of their activity. If the traditional artisan has operated mainly within a well-defined geographical area (mainly his reference city), the digital artisan works in an international context that recognizes its specificity. This international projection does not simply translate into the possibility - however important - to access new markets thanks to increasingly effective e-commerce platforms. Coincides, also and above all, with the possibility of interacting in an innovative way with different cultures and sensitivities from those that characterize the domestic market, in order to contribute to product innovation processes that were once exclusive of large multinational organizations.

A second new aspect that characterizes the profile of digital artisans is linked to the relationship with knowledge and its dissemination. Traditional craftsmen have jealously guarded their secrets, allowing only those who participated directly in the production process to gradually take possession of that set of knowledge that defines a profession. Digital artisans develop a different perspective: they tend to tell a story about the product to make explicit its cultural value and the necessary commitment to its realization.

In this case too, technology plays a fundamental role in making available, at low cost, infrastructures for multimedia communication that today play an essential role in promoting the history of the product and its specific elements in an effective and innovative way. The urgency of a new story of craftsmanship is particularly important when the products are complex, as in the case of so much of the made in Italy. Only adequate communication can make objects that are characterized by a history and a sophistication otherwise inaccessible to those coming from cultures different from ours.

The commercial projection on an international scale, as well as the communication and marketing activities of the new artisans, have a growing need for technologies and services to be economical even in the presence of a limited dimensional scale. In the near future, it is plausible to imagine that the range of these online activities grows consistently. The possibility of accessing funding for the promotion of innovative projects, for example, is now effectively supported in services such as Kickstarter.com or Indiegogo. Personnel selection and continuing education find a growing space in dedicated social networks such as, for example, LinkedIn.

The growing importance of the digital dimension in the management of business activities should not suggest a decrease in the relevance of the territory with respect to the competitiveness of digital artisans. In the field of research and prototyping, digital artisans find an important part of the network of FabLabs and Makerspaces today widespread on an international scale. These spaces host a wide range of technologies for digital manufacturing and aggregate a variety of professional profiles (from simple enthusiasts to specialists in the field): unlike many facilities dedicated to innovation and technology transfer, these laboratories allow diffusion dynamics knowledge that are based on active participation and on informality. The possibility of a continuous updating of digital artisans will pass through the quality of these new infrastructures often located in urban centers and metropolitan areas.

Even the distribution and commercial structures in the cities are today the subject of profound transformations. Compared to the past, the commercial space of the new digital artisans presents itself first of all as a space for interaction and exploration: thanks to new technologies, the customer can define the finished product in a new way and, in some cases, actively participate in its construction. These new-generation commercial spaces, already visible in many international cities, are aimed at stimulating the purchase of a product that is not yet there, triggering the curiosity of a more attentive and aware question.

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