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Makers: Hobbyists or a new economic driving force?

In this paper, we raise the question of the characterisation of the difference between craftsmen and makers. Are makers just a new form of craft, a hobby for the post-industrial middle-class urban dwellers or, as some say, a new organization of production? If we want to comparatively study the patterns of craftsmen and the makers' movement, it is necessary to explore the epistemological foundations of this movement. We believe that a definition of the makers' movement should be based on an analysis from an anthropological and historical point of view.

I. From the definition of a makers' movement to a shifting society

The first thing to be pointed out about makers is that they re-appropriate many industrial production skills 'from crafting to high-tech electronics' (Anderson 2012: 20), to analyse, modify and adapt them to their needs.

The second observation is that this appropriation is a kind of protest movement against some economic and sociological aspects of capitalist societies. Cory Doctorow, maker, science fiction novelist and journalist, compares makers to 'people who hack hardware, business-models, and living arrangements to discover ways of staying alive and happy even when the economy is falling down the toilet' (Doctorow 2009).

Historically, the development of the makers' movement follows the development of web technologies during the 1990s. Chris Anderson, entrepreneur and journalist, goes further by stating that 'they're the web generation' (Anderson 2012: 21). It is clear that a part of this web generation, anchored in a world where ways of communication are extremely efficient and becoming ever faster, is characterised by a spirit of community and free exchange, of which makers are a part. Indeed, blueprints, design, process and knowledge are massively shared by makers. In return for their membership of a 'community', makers must enrich the global knowledge of the makers' community by sharing models, experiments, experiences, etc.

The community of makers is not very formally structured. For the most part, it's made up of little groups, centred around sites such as Fab Labs, hackerspaces or makerspaces which are often far away from each other. For example, in the case of Fab Labs alone, the MIT website states that there are less than 200, localized in seventy-seven states or countries. In spite of this kind of 'diaspora', thanks to the world wide web, a sharing community does exist. This community uses several web platforms to exchange knowledge, including: GitHub,[1] which is more oriented for code and programming; Thingiverse,[2] where most printable 3D models are exchanged; and Instructables,[3] which creates tutorials that explain all kinds of crafting.

These kinds of support, in the form of websites and forums used by makers, reflect diversity and a much knowledge pooling. From the critical viewpoint of western society, this operation can be considered from two aspects: economic and industrial, and academic.

(i) *Economic and industrial*

The open source represents a total freedom of use and worldwide circulation of plans, processes or technologies all over the world. It facilitates local production and short circuits of exchange. For example, if Chinese, Peruvian and English makers all produce the same object, it will inevitably be very difficult for them to export their products to the other side of the world. On the other hand, they can produce locally and develop globally.

Makers question the globalization of production, at least partly, by pointing out how it has sometimes resulted in the re-localisation of manufacturing. Paul Soriano (2006), editor of the journal *Medium*, argues that this re-localisation raises social (poverty) or territorial issues.

To demonstrate this point, we can take the example of the FabFi project[4] realized for the first time in an Afghan Fab Lab. This project facilitated local manufacturing over a high-speed network. FabFi is an open-source, Fab Lab-grown system using common building materials and off-the-shelf electronics to

transmit wireless ethernet signals across distances of up to several kilometres. With FabFi, people can build their own wireless networks to gain high-speed internet connectivity, thus enabling them to access online educational, medical and other resources. The installation of this kind of network is generally only available to large communities, whose financial or economic interests can vary a lot, depending on their place in the world. By sharing the experiences of these Afghan makers, Kenyans were able to adapt the FabFi project to their own territory and build a network of 3.5 kilometres long. Today, several new networks are under construction in Afghanistan and the United States. This brings us to the second level, academic.

(ii) *Academic*

Generally speaking, and especially on the web, constant exchange between different cultures and a diversity of disciplines deeply modify the normalized and classical learning model and remove the more traditional pyramid of knowledge in favour of community sharing. The vertical teacher–student relationship is replaced by a horizontal one as makers learn from others and share their knowledge. The apprenticeship contract becomes: if you learn something, teach it to somebody else. This critical posture of makers gives them the status of observer in the three fields that constitute any liberal or industrial activity: conception (or design), manufacturing and marketing. Unlike the traditional role of craftsmen, this critical posture of external observer is precisely what allows them to innovate. Basically, the makers are no longer just designers, craftsmen and not even providers, but, working from home, connected to the world wide web, they can study other people's practices and modify them by experimentation.

II. Assumption for the future of the makers' movement

At this point, we should raise the following question about the maker's economic model: if we try to plan a probable future for the makers' movement, based on previous economic and social models of evolution, two hypotheses can be advanced:

1. *The makers' revolution will probably be absorbed into our society*

This hypothesis corresponds to an integration of makers into current economic activity and three types of activity are relevant:

(a) Makers could be suppliers for industry; even if this relationship is not new, the community phenomenon and the internet would accelerate their reactivity. According to Anderson (2010), makers are the new inventors of today. They can more easily conceive products and share their development with early adopters. If the product is a good idea they can just send a simple file to the largest industries and start full production. This vision may seem to be a little simplistic as a system of internet 'inventors' connecting to 'off-shore industries' does not really revolutionize production.

The success of an idea can lead to the launch of industrial activity. However, this process often leads to the end of the experience of sharing in order to protect the knowledge gain which has been converted into a marketable product to generate a return on investment. For instance, in the case of MakerBot industries, its 3D printer project was originally completely conceived by and for its makers. However, this company now chooses to restrict the licences of its machines even though its reputation originated from an open source community. Today it is more complicated to repair a MakerBot printer and soon it will be impossible for most people to understand how it works.

Not wishing to engage any further with the 'MakerBot debate', which generated so many bytes on the network, we can also quote the case of Arduino, a company that managed to generate, on an industrial scale, an open-source community product without denying the maker's input. The main value of makers, in every sense of the term, which implies something accepted and promoted by the community, can be assumed by the keyword 'sharing'. Beyond the 'do it yourself' element, which is also important for us, makers consider that sharing, the open source, signifies precisely the possibility to download and modify freely. It is a fundamental quality, which can generate a safe and stable network for activities.

The Arduino economic model, as explained by Tom Igoe (see Thompson 2008) is based on selling expertise rather than a product. Indeed, Arduino does not reap huge benefits from the sale of its products themselves but from all kinds of specific developments. Since they are the inventors of an open source product and share their knowledge on a broad scale, the 'Arduino community' builds up numerous potential developments. This business model authorizes Arduino's customers to build devices based on Arduino hardware.

(b) The second field susceptible to integrating makers is undoubtedly design crafts. For example, we can discuss the company 'Unto This Last', which is based in London. This 'craft' company integrates tools and the process of Fab Labs within an activity of local manufacturing of furniture. Its current catalogue offers more than 2,000 objects made on request. The name of the company is highly significant because it evokes the famous book by John Ruskin and the more recent theories of social economy arising from it. We take this opportunity to quote a passage from Ruskin which can be very effectively applied to makers' philosophy:

> When we ask a service of any man, he may either give it us freely, or demand payment for it. Respecting free gift of service, there is no question at present, that being a matter of affection, not a traffic. But if he demand payment for it, and we wish to treat him with absolute equity, it's evident that this equity can only consist in giving time for time, strength for strength, and skill for skill ... The justice consists in absolute exchange. (Ruskin, 2006)

This fusion of makers with the crafts sector creates a real economic activity, but we think that it also produces a confidential know-how. Indeed skills, practices and know-how cannot be shared equally. The only way to share knowledge is crystallized in the master–student relationship, the basis of education in craft activities.

(c) Finally – however, we don't want to insist on this point here – makers are also able to combine activities of conception and design. Indeed, design that uses rapid-prototyping technologies and iterative development process can reduce development and test deadlines.

(2) *I have a dream*

The second hypothesis we'd like to consider concerns the construction of a 'makers' utopia'. The consolidation of makers' critical posture could result in the constitution of a social and economic utopia only if it possesses a similar political foundation to that of the creation of workers' cooperatives and syndicates in the nineteenth century.

In France, these cooperatives were started in Lyon in the Croix-Rousse district. In 1831, the silk workers, who were craftsmen, joined together into cooperatives to assure a fixed price for their work and obtain financial guarantees in the event of any work accident. One of the strange facts of this story is that the silk workers, who knew how to inspire new social and political forms, worked on the first numerical control machines – the 'Jacquard's looms' – which facilitated the creation of patterns by using punch cards.

Conclusion and an opening

To conclude this subject, we think that it's very important, in this context that we have just developed, to redefine the concept of 'know-how' and 'how-to' design as well as 'market' and 'public' which finally determine all these practices.

To redefine these concepts, we work on the I.D.E.A. program, transdisciplinary teaching which is led by Design Thinking, which involves alternative methods of knowledge transmission, especially the practice of learning by doing.

Management education is under growing criticism, and calls for a profound renewal of management theories and practices abound within and outside academia. Creative industries in general and Design Thinking, in particular, are being proposed as a possible source of such renewal. Beyond this renewal, the global question of (better) training innovators is being raised.

We propose Design Thinking as a core concept that can address this thorny issue in a program funded in 2011 by two prestigious French schools: the Ecole Centrale Lyon, an engineering school, and the EMLyon Business School. The main idea lies in the integration of Design Thinking and arts into management to develop innovation while providing basic technology education. This model has its roots in the triad developed by Brown (2009), according to which, innovation is the conjunction of three elements: feasibility, viability, and desirability (see Figure 1). I.D.E.A., which stands for Innovation, Design, Entrepreneurship and Arts, is a two-year post-bachelor graduate degree. Our teaching is centred on the practice of project management and Design Thinking, as well as multidisciplinary and cross-disciplinary teaching. This practice aims to develop students' flexibility in the complex context of becoming future project managers and creators of innovative companies.

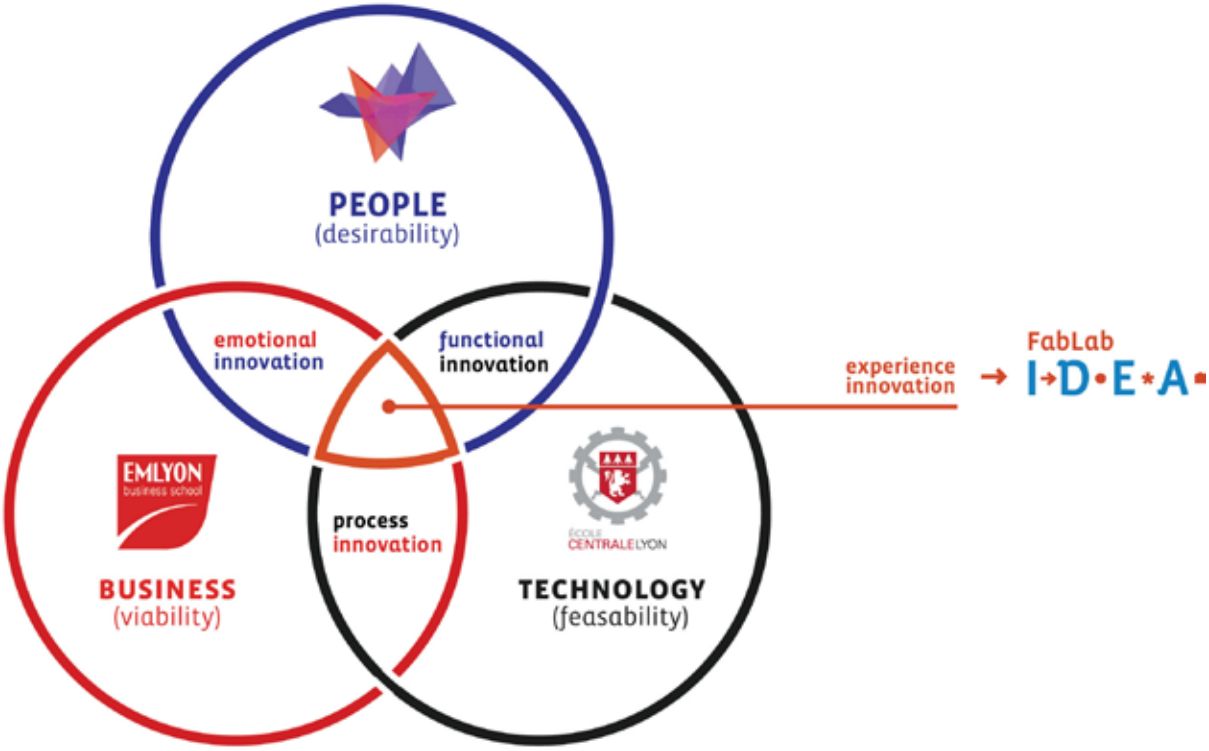

Figure 1 The I.D.E.A. programme based on viability, feasibility and desirability.

Feasibility is covered by courses delivered by the engineering school and viability is covered by courses given by the business school. Desirability, which includes design, as well as creative and cultural aspects, is covered by a diverse, ad-hoc faculty from both schools and external lecturers. I.D.E.A.'s teaching model emphasizes action in the curriculum with the integration of a real fabrication laboratory or Fab Lab (see Gershenfeld 2005) at the heart of the teaching structure. Indeed, innovative management practices are not only about new ideas, but also about action. This is in conformity with recent entrepreneurship research that has shown that action is often the main creator of novelty in the world (Sarasvathy 2001).

Students are evaluated on projects that lead to public exhibitions where they must deliver a mediation between what they have produced and its audience. This two-year programme only began in September 2012. Thus, rather than a clearly-defined and stable education program, it is work in progress whose promoters and educators are very much acting as reflective practitioners (Schön 1983), learning with an abductive approach, just like designers do (Dunne and Martin 2006). Since the I.D.E.A. program can be seen as a pedagogical living lab, this experience is continuously documented and students, teachers and coordinators are closely monitored. This approach leads us to interrogate any common evaluation tools that may be revealed to be insufficient as well as helping to establish a deeper understanding of how to improve our program of training innovators.

Notes

1. https://github.com/ Build software better, together
2. http://www.thingiverse.com/ Digital Design for Physical Objects
3. http://www.instructables.com/ DIY How To Make Instructions
4. http://fabfi.fabfolk.com/

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