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Fablabs in Africa: Digital Innovation for Sustainable Cities?

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Translated from the French by Oliver Waine

In a context where "smart cities" are being promoted in urban projects in Africa, Armelle Choplin and Martin Lozivit examine the role "fablabs" can play in cities' futures. They show that their emergence can be an opportunity to design a frugal African city, by making use of inhabitants' ingenuity.

The next Africa-France summit—initially to be held in June 2020, now to take place in July 2021—will focus on the "sustainable city" with digital technology and innovation at the heart of debates. With this in mind, we wonder about the role that fabrication laboratories, or fablabs, can play in the future of African cities. Over the past 10 years, digital innovation laboratories have opened in Africa based on the model of fablabs[1] and Western "third places" (Besson 2018; Bosqué 2015). These initiatives attempt to offer solutions to development challenges and tools adapted to the needs of the poorest and least connected continent. Their values are linked to the frugal-city model, favoring do-it-yourself and low-tech solutions, and allowing access to new technologies with low investment costs (Radjou *et al.* 2013; Bihouix 2014; Haudeville and Le Bas 2016; Grimaud *et al.* 2017; Jaglin 2019). Should we then see in these places a simple trend-related effect linked to the all-digital world? Or, on the contrary, should we see them as vectors of an urban counter-model, in opposition to that of the smart city, which is nowadays decried for the dependence it creates on private companies, its strong ecological impact, and its capitalist logics (Rochet 2018)? The analysis of these fablabs and bottom-up experiences[2] reveals interesting opportunities to think about and contribute to the African city of tomorrow, questioning the model to follow, which should perhaps be more frugal than smart, and more ingenious than intelligent.

Fablabs in African cities

The first fablabs opened their doors in the 2010s in French-speaking West Africa. They were openly inspired by the first French digital innovation labs (such as Artilect in Toulouse and ElectroLab in Nanterre, in the Paris region). As a result of encounters at intensive digital "bootcamps" organized in various African capitals, a number of individuals became interested in the

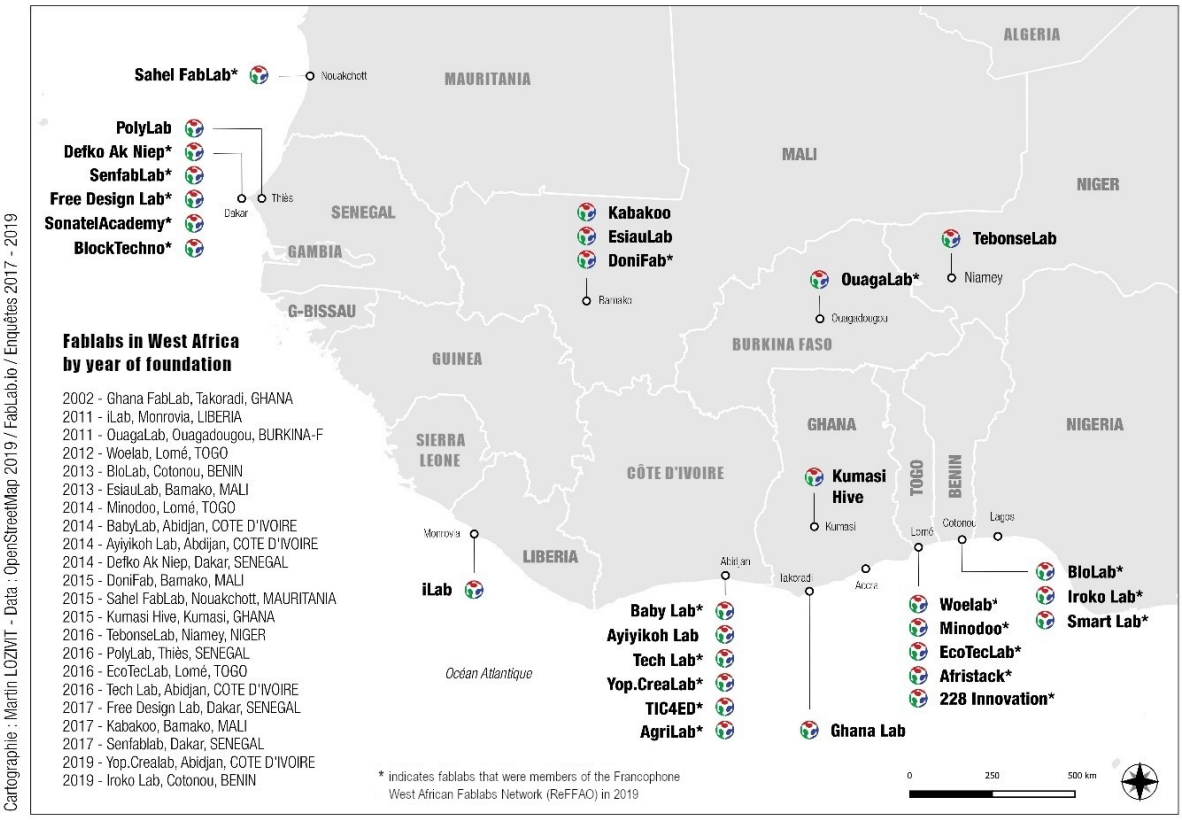
[1] The concept of the fabrication laboratory, or fablab, first appeared at MIT in Boston in the late 1990s. A fablab is a space for digital innovation and technological democratization open to all, generally equipped with open-source software and hardware, made available to make objects and conduct projects. It is related to the makers' movement, which draws its inspiration from various currents that appeared following the industrial revolution of the 19th century to advocate a return to craftsmanship (for example, the Arts & Crafts movement, the DIY Movement during the hippie period, self-build movements—such as Les Castors in France—in the 1950s, or the works of John Ruskin and William Morris).

[2] This article draws on interviews and experiences developed with some African fablabs between 2016 and 2019. See the Urbacot research program (Observatory of Coastal Urban Dynamics in West Africa; website: https://urbacot.hypotheses.org) and the Map & Jerry project (www.youtube.com/watch?v=8f6sknx7sTQ) funded by the Institut de Recherche pour le Développement (IRD – French National Research Institute for Sustainable Development; website: https://en.ird.fr).

fablab model and imported it to Africa. For example, following the InnovAfrica Forum in Ouagadougou, Burkina Faso, in 2011, Gildas Guiella, a young digital entrepreneur, created OuagaLab. Momentum is also growing in Togo: after having created L'Africaine d'Architecture, a platform for reflection on smart cities, in 2010, architect and anthropologist Sénamé Koffi Agbodjinou founded the Woelab in Lomé in 2012. His path crossed that of Médard Agbayazon, a young Beninese computer scientist who had just discovered the first fablabs in France. In 2013, he created BloLab (which literally means "doing together") in Cotonou to promote the democratization of digital technology. In 2014, a collective led by Edwige Gbogou inaugurated BabyLab, a space for expression and creativity in a working-class neighborhood of Abidjan, Côte d'Ivoire. The same year, the Senegalese fablab Defko Ak Niep ("Do it with others"), in conjunction with the cultural space Kër Thiossane, added to the network of innovative spaces in Dakar.

These fablabs quickly met with strong interest among local youth, offering open spaces for sharing knowledge and experiences among the general public and "*bidouilleurs*" ("tinkerers"), a term that groups together individuals with a wide variety of profiles: computer scientists, artisans, hackers, designers, artists, geeks, DIYers, etc. They formed communities of makers who gather around a few shared machines (3D printers, cutting plotters, computers, carpentry tools, etc.) from which they try to make objects that can improve the daily lives of Africans. These objects are often prototypes that advocate the do-it-yourself approach using recycled materials (scrap metal, computer equipment, wood). The resulting creations range from furniture to mobile applications and connected objects. These places also attract other open-source and open-access actors, such as the cartographers of OpenStreetMap, who use geolocalized tools. Gradually, these spaces are becoming places of exchange, knowledge transmission, training in new technologies, and innovation in the heart of African cities.

Figure 1. Map of the principal fablabs in West Africa



Source: Martin Lozivit.

For a connected and innovative Africa

A number of public authorities, international donors and companies support digital initiatives in Africa and praise fablabs. They see them as a showcase for emergence and a factor for growth and employment, especially for young people. This is a viewpoint shared in France, which is particularly committed to these digital issues (Leyronas *et al.* 2018). The International Organization of La Francophonie, the cooperation and cultural-action departments of embassies, and the French Development Agency, via its private-sector subsidiary Proparco Digital Africa and in conjunction with the Choose Africa program, provide financial and sometimes logistical support for African start-ups. African governments also support these initiatives, with financial assistance from telecommunications companies or banks with a presence in Africa, such as Orange or Société Générale. In parallel, business incubators (such as the Dakar Innovation Center) and groupings of digital stakeholders are growing in number all the time.

It is in this context that the "Make Africa" conference was held in November 2018 in Cotonou. This meeting led to the creation of the Réseau Francophone des Fablabs Ouest-Africains (ReFFAO; Francophone West African Fablabs Network), modeled on the Réseau Français des Fablabs (RFFLabs; French Fablabs Network). ReFFAO brings together 21 fablabs from seven West African countries, with the aim of "sharing best practices and solutions to our common problems, and building developmental projects across several countries," summarizes Mr. Agbayazon, director of BloLab and president of ReFFAO. This initiative reflects the need for African structures to be represented on a larger scale in order to defend their interests and promote their development.

And yet the commitment of politicians, public services such as universities, donors, and private operators is far from overwhelming. Although they are regularly invited to events to showcase innovation in their countries, African makers—leaders of the future, as they are sometimes called—have real difficulty finding sustainable business models to develop their activities.

Figure 2. Visit to BloLab in Cotonou by the French secretary of state for foreign affairs and the counselor for cooperation and cultural affairs at the French embassy in Benin

© Martin Lozivit, 2018.

Everyday tinkering—or innovation, African-style

Finding money to pay rent for premises, water and electricity bills, and an internet connection: such is the daily lot of a West African hacker. Despite a reduction in costs in recent years, monthly internet subscriptions remain particularly high in this part of the world: at least 15,000 CFA francs (€23; $27; £20), a significant sum when the average monthly salary is around 35,000 CFA francs (€53; $64; £46). Most fablabs operate using their founders' or active members' own funds, and rely on more lucrative activities, such as developing applications and websites or running training sessions for private companies, for additional funding. Others, lacking these means, improvise. The Togolese fablab Minodoo is a nomadic third place. Without premises or machines, but with a mobile internet router, laptops and social networks, its members meet on the university campus or organize pop-up events, across the country and in Lomé.

To obtain resources, some tinkerers launch crowdfunding campaigns, while others seek to diversify their activities. Iroko Lab in Cotonou has a natural juice bar and snack bar, for intance. This collective regularly rents out the space and the few machines it has to individuals or professionals. In addition, like OuagaLab and BabyLab, it runs weekly DIY workshops for a fee (e.g. making wooden tables and toys). Finally, as an incubator and coworking space, it charges for its services to help young people, students, and entrepreneurs launch business activities. The fine balance between profitable activities and projects with a social vocation remains to be found.

Figure 3. Demonstration of a 3D printer to Cotonou high-schoolers at Iroko Lab

© Martin Lozivit, 2019.

Thinking salvage, or how to reinvent the African fablab model

The availability and acquisition of equipment is also a day-to-day problem. According to the original MIT definition, a fablab is a place where manufacturing equipment and machines equipped with open-source software are made available. African fablabs have adapted this definition to their

particular reality, creating digital innovation labs sometimes without any equipment or even a space to meet. “What makes a “makerspace” is not the machines, but the communal, shared aspect,” Mr. Agbayazon explains.

Finding new, good-quality and affordable products locally is a challenge. Secondhand computer equipment is imported from Europe or America. These are often end-of-life machines that end up in large open-air dumps, such as the infamous Agbogbloshie e-dump in Accra, Ghana. To build their prototypes, the only solution is to salvage materials and spare parts. “Here, when you have a project, you have to think salvage first,” explains Ousia Assiongbon, cofounder of EcoTecLab in Lomé. In Benin, BloLab has launched the RecycleBJ project to recover used computer equipment from businesses, universities and international organizations, to supply their workshops in order to construct “Jerrys”: computers built from recycled components assembled in a plastic jerrycan. For many schoolchildren and adults, these introductory workshops provide the opportunity to touch a computer keyboard or mouse for the first time and demystify a distant technology. These workshops are also a way of providing computer equipment to schools or neighborhood associations that do not otherwise have the means to do so (Choplin and Lozivit 2019).

However, salvage has its limits. It is rare to find high-quality components. Most break down regularly, which generates extra costs and means makers have to import new parts from China or from Europe. In the absence of financial means and good-quality equipment, it is often impossible to go beyond the prototype stage of inventions.

Figure 4. Building “Jerrys” as part of the Map & Jerry project[3]

© Martin Lozivit, 2018.

[3] The Map & Jerry project has provided training in digital skills to residents of an informal neighborhood of Cotonou and enabled them to map their neighborhood.

Smart or low-tech? Two visions for an urban future

On the one hand, there are fablabs that advocate the commons, low-tech initiatives, and the open city, where any citizen can theoretically participate in improving the urban condition; on the other, there is the "smart city", a showcase for public authorities, who see it as a guarantee of competitiveness and a symbol of emergence. There seems to be nothing in common between these two models, which offer two visions of the future of African cities with very different conceptions of the use of technology.

For the time being, satellite-city and smart-city projects are flourishing in Africa (Van Nooross and Kloosterboer 2018): Hope City in Accra, Diamniado in Dakar, Eko Atlantic City in Lagos, or Sèmè City in Cotonou. The last of these, presented by the Beninese government as the future city of science, innovation and knowledge, is supposed to attract institutions and courses of excellence and become an incubator for start-ups. Here, on the outskirts of Cotonou, three miles (5 km) from the border with Nigeria, glass towers and large-scale real-estate projects are expected. At least that is what appears on the 3D plans, drawn up by the Singaporean firm Surbana Jurong. The Beninese government called upon the services of this design practice, which developed the masterplan for Kigali, the Rwandan capital now being presented as the model city of success in Africa (Michelon 2015).

Figure 5. Sèmè City; image from Singapore-based design firm Surbana Jurong, 2017

Source: Surbana Jurong, 2017.

Local makers have not hidden their reservations about these cities of innovation, in which they are rarely invited to get involved and which they consider "disconnected from reality." The Togolese architect Sénamé Koffi Agbodjinou takes the opposite view of this model, and has since 2010 been developing L'Africaine d'Architecture, a platform for reflection on smart cities, and for giving residents themselves the possibility to shape their neighborhoods via new technologies. He is also developing "Lomé Hub-Cité," a city built with local materials, inspired by the way villages function and which reflects on energy and environmental costs. What Sénamé Koffi Agbodjinou proposes is not to design smart cities (or, worse still, have them designed by individuals with little experience of cities in Africa), but rather to train smart citizens and find simple solutions to meet people's needs.

Low-technology approaches could be one of these solutions, as they could meet people's basic needs by using recycled or natural materials that are repairable, inexpensive, and energy-efficient (Bihouix 2014), and all without any loss in quality compared to the high-tech objects commonly used. In Benin, the GanviÉolienne project has enabled young Beninese people in the lakeside city of Ganvié, which is not served by the conventional electricity grid, to build low-tech wind turbines that can recharge a cellphone or run a lamp (Figure 6). Faced with the climate emergency and the environmental costs of many energy-intensive practices, low-tech solutions are now the subject of growing interest, particularly with regard to mobility and waste management (Durand, Cavé and Pierrat 2019). Their development is also the result of often fruitful collaborations with the OpenStreetMap community, which produces geolocalized data, and to ingenious makers who are developing applications and objects that meet the immediate needs of these populations.

Figure 6. First manufacturing workshop open to the public, to produce a low-tech wind turbine from recycled materials, at Ganvié, Benin, in April 2019.

The power generated by the wind turbine remains low, and it would take five hours to recharge a cellphone battery (© Martin Lozivit, 2019).

Towards a frugal, innovative and sharing African city?

Fablabs are in the process of drawing a new map of innovation in Africa, this time frugal and markedly different from smart cities. In the backyards of fablabs, young people are training themselves and inventing new ways of thinking about the city and the world, in which they are fully-fledged actors. Faced with the difficulties of acquiring knowledge and equipment, these initiatives offer potential tools to respond to the challenges of poverty and sustainable development.

However, these localized and often not very reproducible experiments should not be seen as a panacea for all the dysfunctions of African cities. A wind turbine connected to a dynamo will never be as efficient as the conventional network—just as a map produced by the OpenStreetMap community does not excuse municipal authorities for not updating their land registers. These tools

can improve certain living conditions, but in no case can they be solutions that replace the intervention of the authorities. There is a great risk that simple digital applications will be transformed into tools for depoliticizing public action. Similarly, enthusiasm for the frugal-city model and for low-tech solutions must not be reduced to the production of low-cost cities, which would offer only reduced-quality services, made available for a fee, to poor and excluded city dwellers (Jaglin 2019). The initiatives, tools and networks developed in fablabs should be bearers of hope, offering a different urban future that promotes a truly frugal, innovative, and sharing city.

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