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LOW-TECH SOLUTIONS: INNOVATIONS FOR LOCAL RESILIENCE

FOR SEVERAL YEARS, LOW-TECH DESIGNS HAVE BEEN GAINING TRACTION. MANY INITIATIVES EMBODY CREDIBLE ALTERNATIVES TO PURELY TECHNOLOGICAL SOLUTIONS AND FORM PART OF ECOLOGICAL TRANSFORMATION GOALS. THESE USEFUL, FRUGAL SOLUTIONS SUITED TO LOCAL CONTEXTS REPRESENT A FORMIDABLE LEVER FOR DEVELOPMENT. IMPROVE THE RESILIENCE OF CITIES IN A CONTEXT OF RESTRICTED RESOURCES. AND FORM PART OF A NEW POSITIVE NARRATIVE OF PROGRESS.

he response to major environmental, economic and social challenges often turns towards high-tech solutions: green tech, smart tech, deep tech, and so on. But we tend to forget that these innovations are complex, energy-guzzling, and rely on increased consumption of already scarce resources. As a result of these tensions, they may find themselves in competition with more appropriate technologies strongly anchored in modes of use: namely low-tech solutions. Several intellectuals underlined their value as far back as the 1960s, in particular the economist Ernst Schumacher, an exponent of the "small is beautiful" ethos. Useful, frugal, accessible, well adapted to their local context, and complementary with respect to other technologies, they provide an alternative response to citizens' needs and aspirations to progress. To achieve this, we urgently need to change the way we frame the concept of innovation.

WHY TECH CANNOT RESPOND ALONE TO MAJOR CHALLENGES?

According to Marc Giget, an economist and innovation specialist, the evolution of today's world is influenced by five major trends: strong growth and a redistribution of the world's population; the globalisation of the economy; the rapid urbanisation of society; global warming and pollution growth; and the evolution and renewal of technology. These changes bring challenges and growing preoccupations to which innovation must respond. "Green" and smart technologies are invariably presented as key to resolving these challenges: renewable energy sources, self-driving cars, hydrogen storage, CO, capture and sequestration, smart grids, nanotechnologies, and so on. Often relying on the development of digital tech, they seem to signal a kind of dematerialisation of the economy, or at the very least substantive progress in terms of material productivity. But the direct and indirect



environmental impacts (rebound effects: see glossary) relating to their increased use are being underestimated. The miniaturisation of equipment, the "invisibility" of the infrastructures used, and the delocalisation of the vast majority of production facilities create the illusion of a disconnect between value production and consumption of materials. And yet manufacturing a computer requires 240 kg of fossil fuels, 22 kg of chemicals and 1.5 tons of water. Each resident of the Region consumes 6.5 tons of material per year—20 tons if we include consumption of finished products manufactured outside the region.

Most high-tech solutions accelerate the extraction of materials, increase related pollution levels (water, soil, biodiversity, natural spaces, etc.) and make it increasingly complex to recycle products that have reached the end of their lifespan¹. Consumer goods whose design is based on built-in obsolescence or criteria of competitiveness and price are quickly thrown away because they are impossible to fix or out of date. Christophe de Maistre, former CEO of Siemens France [Utopies, 2014], explains that by aiming to do "more with more" in order to differentiate themselves, products become too complex and their functionalities increase faster than actual needs, so that ultimately only very few of those functionalities are used: on average only 10% of the functionalities of productivity software such as Microsoft Office are actually used. Basing ecological transition on high-tech solutions would be risky. Innovating to cope with current

challenges means challenging modes of use and looking at the economic and environmental costs that arise from our habitual lifestyles. Do we always need more? How can we best respond to genuine needs, and how can we make our responses accessible to as many people as possible?

THE NEED FOR NEW MEANING

In order to be acceptable and sustainable, the ecological transition dynamic also entails providing concrete, rapid benefits to a growing number of citizens. The "more is more" mentality is currently experiencing three major limitations²: the deterioration of the conditions under which resources can be accessed; reduced purchasing power for a large part of the population; and a disconnect between products on offer and improved living conditions for their potential customers. The exponential growth of tech products and services has helped to disconnect innovation from what people actually need and want. Only one French person in ten perceives technical innovation as an opportunity to improve daily life. Consumers expect brands to provide practical service benefits and to work for society.

Moreover, this disconnection has harmful effects on what technologies can provide and fuels a feeling of exclusion for a growing number of people. A large section of the population—20 to 30%—is either unable or unwilling to adapt to advanced technologies. The challenges of innovation are also framed in terms of accessibility. Over the last three decades, the GDP has grown without any effect on the problem of inequality, the poverty rate, the quality of teaching, and so on, whereas one of the fundamental principles of innovation is that it should improve living conditions. For André Torre³, innovation should not be the preserve of technologists alone; it is also organisational, social and institutional.

HOW DO YOU RECOGNISE A LOW-TECH SOLUTION?

By "low-tech" we mean an upgradeable approach that encourages frugal consumption and production via easy-to-use technologies. Instead of a refusal of technology, it means the appropriate and sufficient use of technology in order to reduce its environmental impact. For Philippe Bihouix, an engineer who specialises in resource exhaustion [Bihouix, 2014], the low-tech approach revolves around three key questions:

- need: Is the usefulness of the object or service "worth" the environmental damage it causes? Do we really need an umbrella drone, a fan connected to our smartphone, a robot to park cars at the airport, or a connected fridge?
- product lifespans: Is a product disposable? What proportion of renewable and non-renewable resources are used to manufacture it? What is the proportion of local resources? Is it reparable, reusable, modular, easy to dismantle, recyclable?
- the socio-economic value of modes of production: should we continue to frantically pursue economies of scale, or would it be better to develop human-sized workshops and companies? Should we not redefine the role of humans, the degree of mechanisation and robotisation, and the way we currently arbitrate between labour, resources and energy? In this regard there are similarities between low-tech and open-source solutions, fab labs and the fab city. They converge at the point where the challenge is how to re-appropriate techniques and the tools of production.

A low-tech product is simple, no-frills, and locally manageable—if not in terms of manufacturing, at least in terms of repair and recycling. Affordable and easy to use, it responds sustainably to ordinary essential needs in terms of energy, food, health, housing or transport (see boxes on pages 3-4). The low-tech approach entails rethinking products based on modes of use, specific expectations and local resources, and offering solutions that limit their impact on the environment.

TOWARDS A MIX OF HIGH-TECH AND LOW-TECH

In a complex, globalised and interconnected world, thinking in terms of simplicity and local expertise is counterintuitive, and practising technological frugality in technophile environments where people dream of smart cities, connected objects and

GLOSSARY

Rebound effect: the way in which some environmental benefits gained from improved energy efficiency or material productivity are offset by increased use. The environmental benefits of collaborative consumption, for example, are less clear-cut than they might seem: for instance people might have to drive for miles to exchange goods, and the possibility of reselling or buying second-hand items can accelerate hyper-consumption.

Low-tech: a challenge to high-tech solutions. Low-tech involves the use of simple, affordable technology that is easy to repair, accessible to all, and makes use of readily and locally available resources. By their very nature, low-tech solutions use the intelligence of both machines and humans. They actively involve individuals and communities, who are encouraged to get to grips with local problems and deal with them using the means at their disposal. It is a kind of innovation that adheres to the principles of resilience, ecology, and/or the circular economy.



Consumer goods: from built-in obsolescence to sustainability

New low-tech products will revolutionise everyday consumer goods. Presented in 2015 at the Cité des Sciences et de l'Industrie, the L'Increvable ["the indestructible"] washing machine by industrial designer Christopher Santerre has a life expectancy of fifty years. The machine has also been designed so that anyone can repair it easily, and comes with an array of on-line services to facilitate maintenance. The company intends to put an end to the built-in obsolescence of electrical and electronic goods and is looking for a manufacturer to launch its products. Another young designer, Paul Morin, has designed a simplified wall-mounted printer called IMPRO, which is dismountable, reparable and rechargeable, with exposed ink tanks instead of cartridges.

www.lincrevable.com/fr

www.positivr.fr/imprimante-inusable-paul-morin

Community-oriented collaborative digital

In 2006 some IT professors in Cambridge designed a minimalistic computer, the Raspberry Pi. The size of a credit card, it runs open-source software and costs only 35 euros. It can be turned into a games console, a weather station, a web server and a camera. With 25 million sold, it is the third most popular computer of all time. As far as operating systems are concerned, "lite" versions of the free collaborative system Linux have been developed to extend the use of computers whose performance is obsolete. As for Internet access, the French Data Network (FDN), an association whose members are volunteers, was a pioneer in 1992 when it provides access to decentralised Web networks. All these are examples of potential applications of low-tech solutions in the digital world.

www.raspberrypi-france.fr www.fdn.fr

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Innovative and sustainable mobility

In the field of mobility many innovations are emerging with the aim of reducing the environmental impact of transport while diversifying means of travel. The K-Ryole company offers useful, ecological and economical electric bike trailers that can carry loads of up to 250 kilos. After two years of R&D, the Danish art collective N55 has presented its XYZ cargo bikes, which can be self-assembled. Where cars are concerned, Jérémy Cantin, a garage owner from Vendée, showed his ElectroCox, a VW Beetle converted to electric propulsion, at the 2019 Paris Motor Show, and the Swiss scooter maker MicroMobility has designed Microlino, a small, lightweight electric car.

www.k-ryole.com

www.xyzcargo.com; www.micro-mobility.fr





New farming practices

In 2009, a few organic growers and technicians from the Association des Producteurs Biologiques du Nord-Est Rhônalpin (Adabio) decided to make new tools to improve their farming methods. They identified examples of local tool-making expertise and created L'Atelier Paysan [the farmers' workshop], a cooperative that helps farmers to design and make machines and buildings that are adapted to agroecology. All the plans are open-source and accessible on line, and training is provided all over France. The farmer only pays for the materials that make it possible to develop a tool at the end of the training course; training support bodies take care of tuition fees. L'Atelier Paysan is also eager to develop its R&D using an experimental farm where it can test prototypes. www.latelierpaysan.org



Tomorrow's housing: tradition and innovation

The Manifeste pour une frugalité heureuse et créative [Manifesto for happy creative frugality] has already garnered 6,800 signatures. The collective promotes low-tech housing solutions based on the rediscovery of traditional materials and the development of innovative construction systems. Bio-sourced materials (timber, straw, hemp, silvergrass, linen, etc.) and geo-sourced materials (raw earth, dry stone) form the core of these approaches as producing them required little energy. The techniques involved are learnable. The "Collect'IF Paille" offers training in selfbuilding techniques. Several projects are under way in the Paris region experimenting with raw earth. Most of the buildings make use of timber. The AgilCare company innovates in this field with a new generation of prefabricated timber buildings that are eco-designed, upgradeable, moveable, and generate no waste.

www.frugalite.org/fr/le-manifeste.html

Collaborative and open-source technology

The Low-tech Lab is a project led by the Gold of Bengal association, which promotes research, development aid and solutions to public-interest issues. Its mission is to seek out and document collaborative technical and technological solutions responding to a wide range of needs, allowing people to operate autonomously and sustainably. Over fifty technologies have been identified, tested, documented and distributed in open-source mode via a collaborative platform. The project includes research on low-tech housing, a vehicle demonstrating alternative materials and fuels, and the brand new Low-tech Skol, a training organisation designed to help firms to transition to low-tech approaches.

www.lowtechlab.org





artificial intelligence is something of a challenge. But the idea is not to call creative processes, the spirit of innovation and discovery, or R&D resources into question; instead it is to look at innovation in a new way, to change our perspective, and to restrict high-tech to indispensable applications. In a nutshell, it means using technological discernment. This concerns all stakeholders, on every scale. The individual is concerned with regard to his or her ability to re-appropriate consumption and its effects (frugality). Akin to 'do-it-yourself' movements, lowtech solutions are inexpensive. They are empowering because their simplicity makes it easy for users to appropriate them. They are reparable, locally sourced, and meet the aims of both the circular economy and the social and solidarity economy. Many initiatives embody these community-minded aspirations: recycling depots, fab labs, repair cafés, urban farms, shared workshops and certain socalled 'third places' already embrace low-tech principles. Interconnecting these local public facilities and making them accessible to all remains a challenge. For Marie Goyon [Goyon, 2019], a socioanthropologist of science and technology, some represent a resource for community education, access to technology, and low-cost manufacturing or remanufacturing, as well as acting as vectors for community participation. For example, the Fabrique d'Objets Libres (FOL), a fab lab on the working-class outskirts of Lyon, offers repair café workshops where people can acquire new skills to help them to redirect their careers or to find jobs.

In companies, a low-tech approach makes it possible to rethink the technological mix, putting high-tech where it is indispensable and socially desirable. Focus is also on eco-design and the development of new after-sales service initiatives. More broadly. corporate business models should move from a sales-driven approach to a consideration of modes of use and from purely financial values to an investigation of the socio-economic meaning of the products or services on offer. These changes involve redefining the "useful" value of commercial offerings and helping consumers and public actors to recognise it. The low-tech approach, given the social and environmental challenges it involves, could thus quickly be built into corporate innovation strategies. Environmental regulations, the accessibility of resources, and new consumer and employee expectations should gradually lead firms in this direction. Over the last two decades, companies have become aware of the limitations of their "sustainable development" approaches, which are restricted to communication initiatives, and of corporate social responsibility (CSR) policies, which fall short of challenging business models.

More and more firms⁴ are eager to revamp their product offerings and business models, aware that they can no longer grow without taking the natural and social environment into account. These approaches have been gaining traction for several years, and are applied to industrial products and services in equal measure. They are embodied to varying degrees not only in engineering diploma projects, but also in large and small companies.

The Californian firm Patagonia, for example, which makes climbing equipment and outdoor clothing, is strongly involved in eco-design R&D. It helps customers to keep clothes for as long as possible by offering repair workshops and on-line tutorials. Danone has adopted a low-tech approach as part of its international strategy in emerging countries. It has entered a partnership with Grameen Bank to create Grameen Danone Foods, which makes affordable dairy products locally in Bangladesh. The factory is 90% smaller than other Danone facilities. and using manual processes helps to protect jobs. In the services sector we find Compte Nickel, a prepaid credit card that can be activated in five minutes in a café or tobacco shop for an annual subscription of 20 euros, providing an innovative solution for the 2.5 million French people who do not have access to traditional banking. As well as offering widespread accessibility, from a 'circular economy' perspective the low-tech approach challenges the material footprint of products and services, their degree of complexity, and their reparability.

LEVERAGING PUBLIC POLICY AND LOCAL ECOSYSTEMS

Public funding initiatives for innovation and calls for tender often focus on digital and high-tech and still leave little room for "less technological" projects, and yet the low-tech approach can offer many benefits to local and regional authorities because it relies on collective intelligence, makes human activity meaningful, and creates social bonds. By examining fundamental needs that are poorly met and finding the simplest and most local ways of responding to them, the approach reinforces local innovation ecosystems, engaging regional public authorities in more frugal and resilient development models.

A more general way of integrating the low-tech approach (which is all too often the exclusive preserve of the most politically engaged actors), is not easy to establish. It struggles to take root without a favourable regulatory and fiscal framework. For this still emerging and yet strategic dynamic to succeed, the engagement of public authorities is vital, especially to facilitate the emergence and development of local ecosystems combining companies, customers, employees and local authorities.

Low-tech initiatives, of which there are many, concern all the fields of intervention of local authorities and are able to adapt themselves to different local and regional scales, to the realities of local resources, and to factors of vulnerability. Emerging sporadically in community associations, within the social and solidarity economy, or in third places that are often located just where needs arise, they are currently also being undertaken by a growing number of firms. The sensitivity of young graduates to the issues at stake where frugality is concerned also has a knock-on effect on business actors.

WHAT IS CSR?

The international standard ISO 26000 defines the scope of corporate social responsibility (CSR) relating to seven core issues:

- Organisational governance
- Human rights
- Labour practices
- Environmental responsibility
- Fair operating practices
- Consumer and consumer
- protection issues
- Community involvement and development

Source: Ministry of the Economy and Finance.

Public policies must also anticipate this movement by supporting companies as they change their business models and rebalance their technology mix, improving awareness of the regional interconnectedness of the actors involved, or funding third places that foster low-tech approaches. Policies supporting innovation, craft industries, industry in general, the circular economy, and so on, are thus eagerly awaited to help new sectors to emerge focusing on the repair, reuse, and remanufacturing of everyday consumer products. At the same time, this socio-economic readjustment supports re-localisation by establishing short production cycles.

Professional training must also get on board in order to keep in step with this vision of innovation and to be able to introduce eco-design and technological discernment into corporate training programmes. Low-tech campus programmes are emerging, especially in Brittany and the Paris region.

Last but not least, by using and developing local public facilities such as repair cafés, shared workshops, urban farms and third place networks, local authorities could also promote a freeaccess low-tech approach in connection with technology and expertise resource banks⁵. "Low-tech challenges" for families and firms could be launched on the theme of "Doing things better with fewer resources, less energy, and so on." This interconnected region-wide approach will allow people to re-appropriate technical expertise by connecting production systems with ordinary citizens.

Low-tech approaches are now an attractive alternative to products and services that are the result of an overconsumption of resources. Focusing on actual modes of use and avoiding built-in obsolescence, they point to a major development perspective for regions by offering high-quality environmentally and socially responsible products and services.

In this perspective, the innovation strategies that now need to be put in place will have to form part of a technology mix that defines the tech solution that best suits needs, modes of use and necessary resources. Far from holding back innovation, this approach can be not only a factor of economic and social vitality, but also a source of resilience for our regions.

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1. The very small quantities of material used in nanotechnologies and electronics, the fact that they are so often made of alloys and composite materials, and the rising number of connected and complex objects, all have a negative impact on the use of recycled materials.

3. See the minutes of the breakfast meeting between decision-makers and researchers "Et si la transition s'inventait aussi dans les villages?" [What if transition were also being invented in villages?], L'Institut Paris Region, 2018.

4. See for example the extensive experimental feedback collated in "L'innovation qui change le monde" [Innovation Changes the World], Utopies, 2013.

5. Examples of open-access resource banks: Lowtech Magazine, Low Tech lab, Atelier paysan, Precious Plastic.

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RESOURCES

- Bihouix Philippe, L'Âge des low-tech. Vers une civilisation techniquement soutenable, Paris, Seuil, 2014.
- Philippe Bihouix, Le bonheur était pour demain, Éditions du Seuil, 2019.
- Giget Marc, Les nouvelles stratégies d'innovation 2018-2020, vision prospective 2030, Les éditions du net, 2018.
- The Shift Project, Pour une sobriété numérique, 2019.
- Socialter, «L'avenir sera low-tech», numéro Hors-Série, mai 2019.
- La Fabrique Écologique, «Vers des technologies sobres et résilientes

 Pourquoi et comment développer l'innovation «low-tech»?», 2019.
- Urbanités, «Ville Low tech et quête d'une modernité écologique », 2019.
- Jancovici Jean-Marc, « Nous sommes en décroissance énergétique », *Socialter*, 2019.



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^{2.} See the TED talk by Navi Radjou, "frugal" economy theorist.