

Chapter 1

Development of eHealth: could reverse innovation help overcome the issue of medical deserts?

According to the World Health Organization, access to healthcare is a basic human right. In France, the government's *Ma Santé 2022* healthcare plan is designed to “create a united healthcare offer bringing together health professionals from all fields: hospitals, primary care physicians and the medical and welfare sector. Everyone involved [...] must pool their skills, resources and energy, and channel them into providing health care for patients in their local area” and was voted in on 24 July 2019. This general truth applies even more specifically to the Covid-19 pandemic, which has been triggering some rethinking about human consumption and production methods, as well as how we live our lives generally.

The health systems of some older industrialised countries are on their last legs, while health care in moderately developed countries is just being established, drawing on new information and communication technologies.

Could the systems being used in Africa or India help us fight against the consequences of declining public satisfaction in French medical services?

To answer this question, we need to think about how reverse innovation could be used to make progress in all regions and create fair access to medical services in a country such as France. Reverse innovation (Govindarajan and Trimble, 2009 and 2012) is a tool or technology applied locally in emerging countries (as frugal innovation), then arrives in developed countries, where it is applied in a different way, proving that the innovation is effective.

In this chapter, we start by taking a systemic approach so we can correctly understand how innovations might be connected and related. Then we reflect on how African experiences might be considered best practices and used to reduce the number of medical deserts in France.

To answer the question of widespread access to health care for all, we draw on a multidisciplinary approach generated by merging two worlds: medical and managerial.

The issue of medical resources

The World Health Organization (WHO) Foundation states that each person has a fundamental right to good health. It also states that the quality of health care and services should guarantee that each patient can access a set of “diagnoses and treatments that will ensure the best health result, in accordance with the current state of science, at the best cost for the same result, at the lowest iatrogenic risk, for their greatest satisfaction in terms of procedures, results and human contacts inside the healthcare system”.

The United Nations Millennium Development Goals (adopted in 2000, then updated in 2015), aim to:¹

- “Reduce the infant mortality rate to 70 in 100,000 live births; eliminate avoidable deaths in new-born babies and children under 5.
- Put an end to certain diseases (AIDS, tuberculosis, malaria, etc.).
- Reduce infant mortality due to non-transmissible diseases by a third [...].

Finally, provide universal access to medicines, [...], improve the resources that all countries have at their disposal, especially developing countries, to reduce and manage national and worldwide health risks”.

In France, the government’s *Ma Santé 2022* (2018) plan presented its ambition to “create a united healthcare offer bringing together

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 1 United Nations, “Goal 3: Ensure healthy lives and promote well-being for all at all ages”, www.un.org.

health professionals from all fields: hospitals, primary care physicians and the medical and welfare sector. All these stakeholders (doctors, midwives, physiotherapists, nurses, etc.) must pool their skills, resources and energy, and channel them into serving the patients in their region.” The health law was voted in on 24 July 2019, specifying in Title II that it is necessary to “create a healthcare collective to serve patients and improve how local healthcare services are offered around the country”.

Medicine is the backbone of all industrial societies. Public health involves social and economic, individual and collective issues (Herzlich and Pierret, 2010).

A local area is understood to be a “perimeter of life [...] representing a certain geographic, social, economic and cultural cohesion. It is a space occupied by individuals and groups, associations, and public and private bodies, and has many different statuses and many different issues and rationalities” (Zardet and Noguera, 2013).

The government plan and the resulting health law have ten objectives, one of which refers to the problem of access to health care. There is a plan “to improve local care by coordinating practice among all healthcare professionals [...], freeing up time for medical personnel by creating a new function: medical assistants [...], supporting hospitals as they reorganise themselves [...], bringing together primary care physicians and hospitals into one local health plan”.

On 1 January 2018, France had 226,000 practising doctors, but the French medical authority, *Conseil de l'Ordre des médecins*, estimates that by 2025, there will be fewer than 77,000 primary care physicians in regular practice. Even disregarding specific figures, the shortage of doctors in rural areas is a real issue. In 2014, there were 334 doctors per 100,000 inhabitants in France with considerable regional disparity. There were 798 in Paris but only 180 in the Eure department! Also, “areas struggling to provide health care cannot be identified using a single cross-referenced figure of medical personnel and the public. In these areas there is a combination of social and local issues, including health care and other vulnerabilities: access to health care, poverty, isolation, insufficient digital services, etc.”.

To fully understand the figures and compare medical resources with healthcare needs, the *Conseil de l'Ordre des médecins*² used one indicator: the Local Potential Accessibility indicator (*Accessibilité Potentielle Localisée*, or APL) The APL highlights the disparities in healthcare services not taken into account by conventional density indicators, because it is calculated by local city councils and not by departmental authorities. It also considers the age structure of the population, which has an obvious impact on healthcare needs. Using this indicator, the figures range from 0 to 2.2 consultations per year and per inhabitant to 4.1 to 28.7 consultations per year and per inhabitant.

The healthcare systems of some industrialised countries such as France are genuinely struggling, while health care in moderately advanced countries is only just being established. Their success depends on new information and communication technologies.

Would it be possible, once the necessary adjustments are made, for the systems put in place in Africa to help us to combat the consequences of the decline in public satisfaction in French medical services throughout France and improve access to healthcare for everyone everywhere?

To answer this question, we need to think about how reverse innovation could be a way to make progress in all regions and create a fair and inclusive medical service in a country like France. The concept of reverse innovation popularised by Govindarajan and Trimble (2009 and 2012) is about innovation that not only adapts to local situations in emerging countries (frugal innovation), but also returns to developed countries where its uses are reappropriated, but have yet to be demonstrated in the field.

We have worked on a systemic approach to correctly understand how innovations can be connected and related. Then we reflected on how African experiences and approaches, particularly in terms of best practices, might be used to help improve access to health care in France, from the point of view of reverse innovations.

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 2 Dr Patrick Bouet, "Atlas de la démographie médicale en France",
www.conseil-national.medecin.fr, 2018.

These reflections are based on a multidisciplinary approach drawing on two worlds – medical and managerial – involving the three-pronged structure of doctor-practitioner/teacher-researcher/consultant. When people with these varying experiences work together, the concepts and realities take on greater meaning.

Changing health systems require a systemic approach

The WHO defines a health system as “all the organisations, people and actions whose primary intent is to promote, restore or maintain health”.

In France, the system is based on many different structures: health organisations to care for patients in hospitals, social and welfare centres to provide care for fragile or disabled people, and outpatient structures to organise and manage what is known as *ville* health care (local independent medical professionals).

These are interrelated systems or subsystems, and are equivalent to units for Bertalanffy (1948) or interacting elements organised according to a goal (Rosnay, 1975), or even a “global unit organised by interrelating elements, actions or individuals” (Morin, 1977), or “an object which, in an environment rich with meaning, serves a purpose and sees its internal structure evolve over time, without losing its unique identity” (Le Moigne, 1977).

According to Le Moigne (1977), a so-called general system has one or more interrelated actions (care) in an environment based on processes for projects with set purposes (the teleological dimension) that work (the functional dimension) and transform over time.

The system was created from nothing, because it does not exist naturally. The systemic approach explains the system and its internal components, recontextualising it in various environments. Beyond this context, the approach considers that the whole is more than the basic algebraic sum of its sub-systems (Le Moigne, 1977).

The systemic approach takes interrelationships and interconnections into account, so it becomes possible to look at real experiences, highlight best practices and consider societal issues, therefore leaving room for reverse innovations. Ultimately, a bottom-up procedure, or at the very least a participatory approach to a co-build, will make it possible to get all stakeholders (health professionals and patients) on board and consequently, to put their trust in the new system, which is essential in all patient-doctor relationships.

According to Emery and Trist (1965), an organisation is an open system, composed of an interacting technical and social system. Aloui (2007), recalling Meinadier (1998), defines the hospital system as a complex sociotechnical system designed to draw focus back to people: “A composite collection of personnel, equipment and software organised so that as they work together in a given environment, they can fulfil the missions for which the collection was designed.” This definition can also be applied to a health system.

By using the SAGACE matrix by Penalva (1997), which is also suggested by Aloui, we will seek to model and then understand the system and how it works (or doesn't work), then look at how to optimise performance (technical, human and societal in our opinion) and organise piloting, in order to keep the system alive or evolving (see Table 1.1).

The method is based on three analysis perspectives (mission, function and evolution) and three visions (functional, organic and operational). It makes it possible to answer the questions of what, how and when, by relying on individuals, who are stakeholders in any system or organisation.

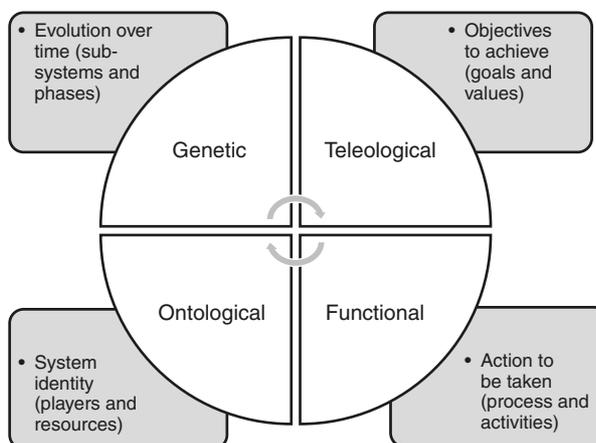
Below, we propose to apply this matrix to the health system.

TABLE 1.1 SAGACE matrix applied to a healthcare system

Visions	Perspectives for Analysis			
	Mission (practical view)	Function (structural view)	Evolution (behavioural view)	
Functional vision	Ensure that quality care is available to all	Acts of prevention Diagnosis Treatment	Patient care pathway/ continuity of care	⇔ What the system does
Organic vision	Healthcare professionals and patients	Areas of health care	eHealth, including telemedicine	⇔ What the system is
Operational vision	Supervised or private initiatives	Stakeholder buy-in /consensus	Reverse innovation?	⇔ What the system decides
	⇔ performance	⇔ stability	⇔ sustainability	

Source: adapted from Penalva and Aloui.

Jean et al. (2011), approaching telemedicine services via the systems theory, corroborate these definitions, remarks and methods. They use the same definition for a system as Schindler et al. (2007) to outline and develop the teleological, functional, ontological and genetic axes, as presented in Figure 1.1.

FIGURE 1.1 Systemic approach to telemedicine

Source: Jean et al., 2011.

This diagram allows us to grasp the many varied dimensions of a healthcare system by answering the following questions:

- **Teleological:** the objective to be achieved is for all patients to have access to health care in all places, both in countries that have been industrialised the longest and in emerging or moderately developed countries.
- **Practical:** the aim is to treat patients.
- **Ontological:** the constitutive elements are healthcare professionals who are assisted by new information and communication technologies.
- **Genetics:** the system and its structure evolve over time with the help of technology.

Aware of the benefit of the systemic approach in terms of its ability to take into account complex healthcare systems, the WHO (2008) applied it to the field of health care: healthcare systems are self-organising (they are run according to their internal structure), constantly evolving (they are adjusted and re-adjusted based on many interactive time scales), closely connected (with a significant degree of connectivity), regulated by non-linear retroactions (internal relations cannot be organised according to a basic entry-exit model), dependent on history and resistant to change. The last two dimensions are fundamental. The 2008 report by the WHO concludes by specifying that while the systems theory does not solve all the problems of developing countries, it at least allows them to restructure the relationships within these systems, because “the more often and more comprehensively the actors and parts of the system can talk to each other – communicating, sharing, problem-solving – the better chance any initiative to strengthen health systems has. Real progress will undoubtedly require time, significant change, and support for the present momentum to build capacity across the system and to promote multi-stakeholder approaches in the design and evaluation of system-level interventions. However, the change is necessary – and needed now.”

Arguably, this conclusion can also apply to developed countries. In that case, is it reverse innovation?

Towards societal innovation: from disruptive innovation to systemic innovation?

According to the French Ministry for Health (2018), 84% of the population in France lives in a municipality with a primary care physician/general practitioner, while 8.1% of the population struggles with poor accessibility (9,000 municipalities and 5.3 million inhabitants). Further, if we consider the municipalities with doctors over 65, 12.4% of the population struggles with or will be facing poor accessibility. These figures corroborate the statistics mentioned above, especially the APL.

eHealth is an innovation. How then should it be qualified?

The WHO defines eHealth (or cyber-health) as “the cost-effective and secure use of information and communications technologies in support of health and health-related fields, including healthcare services, health surveillance, health literature, and health education, knowledge and research. [It] is also characterised by the use of tools for the production, transmission, management and sharing of digital information for the benefit of both medical and welfare practices.” In no way, says the WHO, is eHealth limited to telemedicine and cannot be assimilated to ICT³ healthcare tools, which are digital applications serving the healthcare offer, particularly concerning the information systems of hospitals and medical practices. Finally, the WHO defines mHealth as “medical and public health practices supported by mobile devices”, such as mobile phones or patient monitors; mHealth and telemedicine are subsets of eHealth.

In France, the HPST (Hospital, Patients, Health, Territories) law of 21 July 2009 defines telemedicine as “a form of remote medical practice using information and communication technologies”.⁴ The decree of 19 October 2010⁵ splits it into five articles:

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3 Information and communication technologies.

4 Art. L6316-1 in the HPST law of 21 July 2009.

5 Decree No. 2010-1229 of 19 October 2010.

- **Teleconsultation:** a medical professional gives a remote consultation using digital tools. It is a medical act and a synchronous action; the patient and the doctor talk to each other.
- **Tele-expertise:** a medical professional remotely solicits the opinion of one or more other medical professionals using digital tools. It is a medical act and an asynchronous action.
- **Telemonitoring:** a medical professional works remotely to interpret data collected from a patient's home.
- **Tele-assistance:** a medical professional remotely assists another health professional during the performance of a medical act.
- **Medical regulation:** following a telephone call to accidents & emergencies, the patient is referred to a particular healthcare centre.

The first acts of telemedicine in France date back to the 1990s when Professor Lareng (who co-founded the Samu medical emergency services in 1968) created the European Institute of Telemedicine in 1989, to promote quality medicine with easy access to health care from anywhere in the country.

So could eHealth be appreciated for its disruptive dimension?

Christensen (1997) defines a disruptive innovation as one that “manifests itself by providing massive and straightforward access to products and services that were previously barely accessible or expensive. Disruption changes a market not with a better product – that’s the role of pure innovation – but by opening it up to as many people as possible” (Christensen, 2014). Innovation, in the context of telemedicine, can be described as empowering, because if a product is perceived as being able to transform expensive, complicated or inaccessible services into simpler ones that the greatest number of people can use, it gives more power to those users. And that’s the purpose of teleconsultations. Within the global universe of eHealth, patients are more and more heavily involved in their own care.

In terms of making eHealth and telemedicine available to more and more people, the regions which have experienced the most massive advances in this field – given the societal and health challenges, and their urgency – are Africa and India.

If we look at telemedicine as an innovation, it is relatively recent, but the invention itself dates to the late 19th century. Indeed, the medical journal *The Lancet* records that the Bell telephone, first used on 9 February 1878, was recognised as being able to allow doctors to perform remote medical diagnosis based on the different sounds that were perceptible depending on whether the heart muscle was contracting (Aronson, 1977).

A century later, the word telemedicine was listed in the French *Larousse* as being the “part of medicine in which medical information (images, recordings, etc.) is transmitted using telecommunication with a view to obtaining a remote diagnosis, a specialist opinion, continuous surveillance of a disease, or a therapeutic decision”.

The invention turned into an innovation in the sense of Schumpeter (1934): invention is the discovery of new products, processes or knowledge; innovation is the next phase, namely its implementation (or commercialisation in some cases).

When a form of innovation is eventually used by the greatest number of people, it can be described as disruptive.

Desbois (2018) argues that in rural areas, telemedicine can provide access to specialised consultations for patients and diagnostic tools for primary care physicians. Therefore, access to care can be improved for those who had previously struggled to obtain those services. He cites the state of Tamil Nadu in India, where a rural health centre in a natural park has a satellite link to the Coimbatore general hospital.⁶

All other factors being equal, many regions are facing medical demographic issues; emerging or moderately developed countries do not have sufficient human and financial resources for all their citizens to access health care. Countries that have been industrialised the longest are having to deal with an ageing population alongside a dip in the age pyramid of health professionals. There are also socioeconomic disparities between urban and rural areas, which are increasingly exacerbated by the lack of interest among young graduates in some places, which leads to the now critical issue of medical deserts.

6 This information is given in *The Hindu* (2008), “Telemedicine to bridge rural-urban divide”.

Faced with a lack of financial and human resources, the health systems of certain developed countries are struggling, and to an extent are having to deal with problems similar to those in emerging countries. Both the South and the North must innovate: does that mean the rise of reverse innovation?

Reverse innovation (Govindarajan and Trimble, 2009 and 2012) is a type of innovation used locally in emerging countries (frugal innovation), which then arrives in developed countries, where it is used in a different way, proving that the innovation is effective in the field.

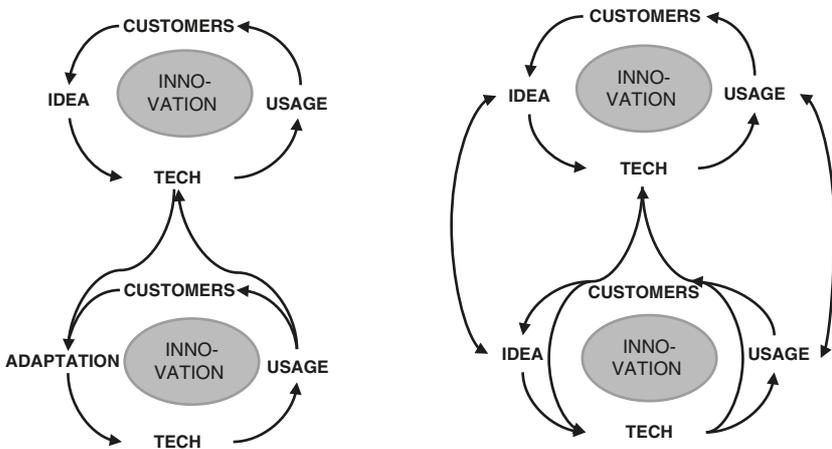
Micaëlli (2016) takes elements from Radjou et al. who defined *jugaad* according to six principles (do more with less, think and act in a flexible way, aim for simplicity, integrate the marginal and the excluded, follow one's heart), and he defines frugal innovation, still referring to Radjou, as how to do better with fewer resources.

Huet et al. (2013) note that the health sector offers the most fertile ground for reverse innovation. And the authors give the emblematic example of the Mac 800, a battery-powered electrocardiograph developed by the health division of General Electric in 2008. After operating in China for several years and with sales revenue well below expectations, GE Healthcare (GEH) decided to change its sales strategy. Rather than choosing a conventional approach, in which a product designed in the West is then sold in developing countries, GEH chose to rethink its research and development strategy. The company used a local team to design a scanner for the Chinese market (a portable device that is easy to use and less expensive than those manufactured in developed countries). By launching it on the domestic market, the manufacturer demonstrated that decentralised innovation meets local needs more effectively. Similarly, the company developed a special electrocardiogram device in India. With the same criteria (price, transportability, and ease of use), GEH provided emerging markets with products that take into account local needs and the real situation on the ground. The observation was "straightforward": the doctors, to whom their products are targeted often travel long distances to see patients, sometimes going several

days with no electricity connection. Further, they may not have sufficient resources to buy existing machines. GEH needed to design products that would fit these constraints, which are very different from those in the company's original countries. After penetrating the markets in developing countries, these two innovations were brought to developed countries for use in rescue and emergency services.

By looking at innovation on a global scale, there are clearly varying needs to adapt innovations in developed and developing countries alike. Both contexts must be examined, and an innovation cannot simply be re-routed to another place (reverse innovation),⁷ as shown in Figure 1.2.

FIGURE 1.2 Innovation – Inverted model/systemic model (Huet, 2019)



Reverse model

Feedback on how an innovation has been used in emerging countries can improve services in developed countries.

Systemic model

There might be technology-related input or usage findings, so the local loop works in both directions.

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7 Huet Jean-Michel, “Systemic’ innovation: to go beyond reverse innovation”, www.hbrfrance.fr, 3 November 2019.

Looking at eHealth, the basic elements are similar (issues linked to specific regions and a lower density of healthcare personnel), but local adaptation is necessary, both in emerging and developed countries. Specific technological features, priorities and uses must be considered and tailored to the economic and financial situation.

In terms of technology, mHealth (healthcare actions carried out using a mobile phone) is more advanced in emerging countries than it is in developed countries. Africa, for example, is creating its model from scratch; no – or almost no – health system existed there before. mHealth, which can be described as frugal innovation, becomes reverse innovation for developed countries, which can then learn from these experiences.

In terms of ideation or development, Africa is obligated to fight urgently against infectious diseases (malaria, HIV, tuberculosis, etc.), maternal and infant mortality and even counterfeit drugs and/or health professionals, while Europe is more affected by chronic diseases linked to the ageing of its population.

Finally, in terms of economics, the financial structure of the systems is totally different: Africa is facing a patient solvency issue, which generates difficulties in accessing drugs that Africans must pay for in full, while Europe, or at least France, has a social security and complementary system for everybody, with patients often not needing to advance any money at all.

Despite these differences, experiences in Africa can be used to help countries that have been industrialised longer to reduce the medical desert problem.

Useful feedback on experience

Here are some examples of what could constitute reverse innovation. Further on, we explain what happened during a project carried out in Africa in collaboration with France. The project is treated as a case (Gerring, 2004); the information was collected from C. Jacquinet, who was a partner and creator of the Doc&You platform.

Projects, potential sources of so-called reverse innovations

We use the examples (see Table 1.2) presented by the president of Unicef France and the *Fondation de l'Académie de médecine* (Dru, 2017), which we supplemented with some financial information (where available on the organisations' websites) to demonstrate their sustainability.

TABLE 1.2 Examples of innovations

Name of innovation	Year and place of launch	Project description	Additional elements*
<i>Himalayan Cataract Project</i>	1994 Nepal	<i>Vision restoration for cataract patients in 24 countries</i>	<i>Total assets 2018: \$12.4m (2017: \$11.43m) 2018 revenue: \$10.9m (2017: \$9.2m)</i>
<i>CardioPad</i>	2011 Cameroon	<i>Remote electrocardiograms (ECG) offered to any patient located far from medical structures, using a touch pad (free service for hospitals, but payable for the patient at a cost of \$29)</i>	<i>Product sold in Gabon, India and Nepal</i>
<i>Practo</i>	2009 India	<i>Medical practice management Online appointment booking Referral of patients to hospitals</i>	<i>Annual growth of 25% Presence in 15 countries 200,000 healthcare professionals 5,000 diagnosis centres 9 August 2019, launch of a co-branded Practo-RBL Bank credit card offering online consultations, health checks and loyalty points in the form of "Healthcash"</i>
<i>Zipline</i>	2014 Rwanda	<i>Delivery of blood and drugs using drones for emergency supply to clinics</i>	<i>2017: 7,000 blood bags delivered by 4,000 flights 2019: 2 centres opened in Ghana</i>

Name of innovation	Year and place of launch	Project description	Additional elements*
<i>3nethra</i>	2010 India	<i>Portable ophthalmic imaging devices to detect vision problems</i>	<i>26 countries (including France) 250,000 people diagnosed in India and 800,000 throughout the rest of the world</i>
<i>Sense Ebola Followup</i>	2014 Nigeria	<i>Mobile application that provides GPS tracking of suspected Ebola cases (lead time reduced from 72 to 2 hours)</i>	

* Additional elements have been taken from the websites of the organisations in question.

Practo was launched in 2009 in India and offers 50 million appointments with 100,000 doctors and 10 hospitals. Only Zocdoc had been launched previously, in 2007 in the United States. It offers its 6 million subscribers the services of 45,000 doctors. Doctolib, founded in 2013, offered 42 million French patients appointments with 140,000 healthcare professionals in 2020, for a total of 8 million teleconsultations over the year.

In addition to these examples, Dru (2017) cites *Accompagnateurs* (meaning “supporters”), a system (created 25 years ago) of community health workers set up in Haiti, Rwanda and Mexico, and finally in Boston. Agents are recruited (from among the general population) and trained to accompany patients as they recover, making it possible to reduce the expenses of hospitalisation and the costs of treatment.⁸

In view of these experiences, medical acts clearly cannot be replaced, but rather supported, to allow patients access to care wherever they may be.

8 “This study shows that in the context of a comprehensive strategy to improve primary health care and to address challenges of remuneration, materials and workload, CHW hired for disease-specific initiatives represent a potentially powerful component of the solution to this human resources crisis. They offer an important means by which to strengthen health systems for the delivery of care, prevention and education, particularly in rural isolated settings and particularly by providing services that would not otherwise be delivered even if other healthcare professionals were available” (Jerome and Ivers, 2010).

An eHealth platform: an example to promote locally

Doc&You is an eHealth platform created in 2016 for Tunisia, Morocco and Côte d'Ivoire based on an initiative by French doctors and employees. The principle is a matrix that reconciles an eHealth offer and the current state of the market in the areas mentioned. As such, it is a comprehensive eHealth platform for North and West Africa offering the following services:

- An IT ResoDoc platform – like Doctolib in France – geolocates doctors, including the Order registration number (a fundamental element in West Africa) and allows patients to make appointments online.
- A network of health professionals based on the sharing of information between doctors enables assimilation as a “B to D” system, D meaning doctors. The information is shared among doctors using a tele-expertise system (such as Covalia in France) with data hosted in accordance with current regulations applicable in France (GDPR), and an interprofessional forum between subscribers, allowing *de facto* exchanges of information such as clinical cases or innovations and other information arising during symposia.
- A service for e-payments and financial contributions for care. It should be noted that these contributions may come from the diaspora due to the very low rate of healthcare insurance among Ivorians (under 5%).

Finally, two other services were to be offered by 2019-2020 in terms of chaining doctors' appointments and medicine supply on the one hand, and a “travel for treatment” service on the other.

Doc&You works with two types of customers: healthcare professionals (doctors and dentists) and key accounts. The platform should develop rapidly on teleconsultations and telephone advice.

Experience suggests that there is significant appetite among the population for mobile telephony equipment (in the areas covered by Doc&You, 40% of inhabitants have a smartphone, with an expected figure of 70%, which means that mHealth probably has a bright future), but also that the medical profession is hungry for the development of a fully online doctor's office service. However, there

remains the question of doctors paying a subscription fee, though they seem open to electronic payment, with tripartite security.

Finally, the start-up was to enter discussions with telephone operators to integrate these eHealth services, which suggests strong uptake of mHealth, like mMoney, which is certain to become widespread.

Given the various experiences that demonstrate know-how, many examples must be given to share best practices.

During the same year that Doc&You was created in Africa, Medicitus⁹ arrived in France. Medicitus is a medical platform that draws on a network of health professionals offering teleconsultation services by video to promote universal access to healthcare. The platform has now been taken over by Doctegestio, which became AVEC just when the group was claiming to “help the greatest number of people to live in good health for as long as possible”.

Gradually, to encourage this type of initiative while remaining vigilant, medical authorities are there to govern the various aspects of telemedicine. Amendment 6 to the *Convention médicale des médecins libéraux* (medical convention of independent doctors) dated 25 August 2016, was signed on 14 June 2018 and published in the *Journal officiel* on 10 August 2018. It brings acts of teleconsultation¹⁰ and tele-expertise¹¹ into French common law. We should also mention amendment 15 to the *Convention nationale pharmaceutique* (national pharmaceutical convention), which was signed on 6 December 2018, which specifies how teleconsultations can be implemented in pharmacies and what role pharmacists might have.

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9 See: www.medicitus.com.

10 “[...] is understood as teleconsultation, a remote consultation carried out between a doctor known as a ‘teleconsultant’, exercising an independent activity under agreement, whatever their sector of practice and medical speciality, and a patient, who may be assisted by another healthcare professional. The advisability of using teleconsultation is assessed on a case-by-case basis by the attending physician and the corresponding physician.” *Journal officiel*, 10 August 2018.

11 “[...] is understood as tele-expertise, the expertise requested by a doctor known as the ‘requesting doctor’ and given by a doctor called the ‘requested doctor’, because of their training or particular competence, on the basis of information or medical elements related to the care of a patient, without their presence. This covers all contracted independent doctors, regardless of their sector of practice or medical speciality. The use of tele-expertise is assessed on a case-by-case basis by the requesting doctor. Its advisability is the responsibility of the requested doctor.” *Journal officiel*, 10 August 2018.

Like the examples mentioned above, countries that have been industrialised the longest can refer to experiences of frugal innovation in moderately advanced countries to turn these advances into innovations that qualify as reverse.

What about innovations in the light of the global health crisis?

The first cases of SARS-CoV-2 (Covid-19) were reported in December 2019. A year later, new variants were being found in South Africa and the UK. Alongside this development, an agreement called COVAX, supported by 190 countries, began ensuring that vaccines were specifically available for the most vulnerable populations. At the end of September 2020, while the WHO estimated loss of life at more than a million people – Johns Hopkins University had recorded more than 3.3 million deaths by mid-May 2021 – several countries were committing to a method of speeding up access to tools to fight Covid-19, known as ACT-Accelerator. These outbursts of solidarity, emanating from various nations as well as from the private sector or even civil society and other international organisations, led the WHO Secretary-General Antonio Guterres to say that “it is in the national and economic interest of each country to work together to massively expand access to testing and treatment, and to support the idea of seeing a vaccine as a global public good – a ‘people’s vaccine’ which is available and affordable for everyone, everywhere”.¹² Samuelson (1954) defines a public good as being a product whose consumption cannot be prevented by anyone (principle of non-exclusion) and whose consumption does not prevent consumption by another economic agent. Kaul et al. (1999) define a global public good as meeting the same principles, but adding those of temporality (affecting several generations) and territoriality (extended to the whole world). In view of these definitions, the vaccine against Covid-19 should be

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12 “United Nations welcomes pledges of nearly one billion US dollars to support access to essential tests, treatments and vaccines to end COVID-19,” www.who.int, 30 September 2020.

understood as a global public good. Therefore, all countries face the same problem and cooperation is essential.

However, Africa was already developing its own innovations, like those mentioned above.

We will look at some of them below, first recalling that on 15 October 2020 during the annual conference of the Observatory of the eHealth in southern countries, A. Geissbuhler, chief physician of the eHealth and telemedicine service at Geneva hospitals, declared: “Tools and solutions, often simple, frugal and robust, which have already proved their worth in countries like Burkina Faso, can now serve as examples for us here in Europe. We must capitalise on more than 20 years of collaborations with certain countries in the South to take better care of patients in their homes and improve the overall organisation of our health services in the region”.¹³

E-SAME is an all-in-one platform and has been used in Cameroon since 8 September. It offers a full range of telemedicine services, including medical record monitoring. Its position is to offer services by Africans for Africans.

In Ghana, drones deliver tests; in Kenya, Msafari was created to identify and trace public transport users. In Senegal, a chatbot known as Dr. Covid was created to provide information to inhabitants on the pandemic, in a similar way to tools used in other countries (Burkina Faso, Togo or Nigeria), with African celebrities saying:¹⁴ “We are certain that African civil society holds the keys to the situation. The current crisis could give Africans the opportunity to make a quantum leap in the health field...” and concluding that “in this ordeal, Africa must once again demonstrate its ingenuity and draw on the unified resilience of its civil society and the creativity of its youth. The continent could then show the world that a third way is possible.” Isn’t that the principle of reverse innovation?

As a parallel to reverse innovations is the 4 A theory developed by Prahalad (2005) and Anderson and Markides (2006) in their

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13 “E-santé : l’Observatoire de la e-santé dans les pays du Sud récompense ses lauréats 2020”, www.usinenouvelle.com, 16 October 2020.

14 “Le Covid-19 donne à l’Afrique l’occasion d’opérer un saut quantique dans le domaine sanitaire”, www.lemonde.fr, 7 April 2020.

demonstrations of the so-called BoP strategy (Bottom of the Pyramid) in health care access. The authors give recommendations to organisations (we prefer to refer to them as organisations rather than companies to avoid treating medicine and care as a commodity). These recommendations are in put into place to get closer to the bottom of the pyramid (or populations located in under-supplied areas in France, not necessarily the most disadvantaged populations) and to be proactive, to avoid geographic, organisational and functional inequalities, which have become glaring in certain areas.

This 4 A framework makes it possible to synthesise the challenges facing current networking policies:

- **“A” as in Accessibility:** the challenge is the key issue of access to quality care in all regions.
- **“A” as in Acceptability:** the challenge is about understanding cultures so that modes of access to care are widely accepted, just as much as the care itself.
- **“A” as in Affordability:** the challenge is to sell the product or service at a price people can afford, as well as one at which medical professionals will be willing to use it.
- **“A” as in Awareness:** the challenge is to make the method of accessing care better known, and to convince target populations that the care will benefit them.

Systemic analysis allowed an understanding of what we had to learn from countries in the South, by recontextualising to adapt to our cultures. But in both cases, adaptations might be necessary to achieve sustainability. The systemic approach resonates with that of Moine (2006), who defines a territory as a set of players in multiple interrelations. The same territory is a whole made up of multiple elements or subsystems and relationships, including retroaction loops that link two essential systems: geographic space and social system. The two systems – geographic and social – are then maintained by the players who ensure they are kept sustainable and balanced.

Within the framework of health systems, the players are healthcare professionals and patients who operate in a specific territory with a varying density of doctors and caregivers. Countries in the South are

chronically under strain due to a lack of caregivers, whereas countries in the North have seen the emergence of under-supplied areas. In these two territories there are major inequalities in terms of care, but they converge in terms of societal issues.

Therefore, the example of *Accompagnateurs* (supporters) cited above could encourage more widespread reverse innovations.

These innovations are based on human initiatives. They are part of a sociological approach to population inclusion challenges in both developing and developed countries. New technologies have made them possible. As such, they qualify as sociotechnical and must be encouraged to respond to societal challenges in a sustainable manner. This sustainability, alongside an inclusive dimension, is only possible with accountability. To this end, innovation will become responsible if the following elements are considered throughout the life cycle (Silva et al., 2018): values for the health of the population and for health systems, economic, organisational and environmental values (see Figure 1.3).